



Nantucket Planning Board

SPECIAL MEETING

STAFF REPORT

Date: September 23, 2016

To: Planning Board

From: Holly E. Backus
Land Use Specialist

Re: Staff Report for **September 28, 2016** Special Planning Board Meeting

Call to Order:

Approval of the Agenda:

Previous Plans:

- #7684 Pippen's Way, Form J Release (Lot 15)
Staff recommends endorsement.

Richmond Great Point Development – Public Hearing Items:

- #7918 – Richmond Great Point Development, LLC, owner, 42, 46, 48, 54 Skyline Drive & 20 Davkim Lane

FROM 02-26-16 STAFF REPORT:

The Applicant is seeking approval of a Definitive Subdivision Plan for properties along Skyline Drive and Davkim Lane. The Applicant proposes to create a new roadway known as Clay Street to access one (1) new buildable lot containing portions of 42, 46, 48 and 54 Skyline Drive and to connect Skyline Drive to Davkim Lane. A reconfiguration of the 20 Davkim Lane lot to accommodate the proposed roadway will result in the creation of an additional lot with frontage on proposed Clay Street. A copy of Ed Pesce's report is included in your packet. A letter of opposition to this proposal is also included in your packet. Staff does not have a recommendation at this time. This proposal will significantly impact future development in that area, particularly relevant to the workforce housing project that the applicant has publicly committed to building. The Board should thoroughly discuss this proposal and the future potential that will be created.

FROM 07-01-16 STAFF REPORT:

The Applicant submitted a modified plan and materials for the Board to consider. The Applicant also submitted a revised list of waivers from the Subdivision Regulations and a revised Storm Water

Management Plan. One of the proposed changes to the proposed subdivision plans is that the proposed Clay Street does not continue into or through any portion of the 20 Davkim Lane property. Staff does not have a recommendation at this time.

FROM 08-01-16 STAFF REPORT:

No further update.

FROM 08-30-16 STAFF REPORT:

At the last regular meeting, the Applicant did not provide any additional info. There was discussion from the Board about not allowing Clay Street to go through the rest of the development from Skyline. There was discussion on why there can't be a decision made on this application. However, there was also a point made that this plan is important to the overall proposed development. The Board was reminded that staff has not received the required traffic report yet for the Richmond Development and to wait to make a decision at the scheduled special meetings for all of Richmond's projects. The Board was also reminded of the pending litigation with Land Court regarding the ownership of Clay Street as a reason to hold this particular application. Staff does not have any further recommendations at this time.

UPDATE:

Staff has not received any further information from the Applicant, however at the last regular meeting in September, the Applicant asked for guidance on the Clay Street and Retail Liner "projects." It is anticipated that the Applicant will provide further information at the next regularly scheduled Planning Board meeting on October 13th.

- **#7988 Richmond Great Point Development, LLC, Nancy Ann Lane, Greglen Avenue, Davkim Lane, and Old South Road**

FROM 07-01-16 STAFF REPORT:

The Applicant is seeking approval of a Definitive Subdivision Plan to reconfigure certain roadway segments and reconfigure existing lots in the area comprising thirteen (13) contiguous lots and 1,270 linear feet +/- of roadway segments. The Applicant is seeking approval to improve the engineering design of Nancy Ann Lane and Greglen Avenue roadways to accommodate the future mixed-use development. No buildings are proposed to be developed as part of the proposed subdivision; however most of the vacant properties will not be reconfigured until the roadway reconfiguration improvements are completed. Staff does not have any recommendations at this time.

FROM 08-01-16 STAFF REPORT:

No further update.

FROM 08-30-16 STAFF REPORT:

No further update.

UPDATE:

Staff has not received any further information from the Applicant; however the Applicant anticipates time to discuss the Traffic Study that was received prior to the last meeting.

- **#39-16 Old South Road Crossing Retail "Liner" Buildings, 63, 67m 73, and 75(A) Old South Road**

FROM 07-01-16 STAFF REPORT:

The Applicant is requesting a Major Commercial Development Special Permit to develop a series of retail "liner" buildings that will include retail, personal services, and restaurant uses. These uses are proposed within a series of five (5) single story buildings, to be located on a combination of five (5) contiguous properties. The Applicant is further requesting waivers from Off-Street Parking; Driveway

Access; and Site Plan Review. The Applicant intends to construct three (3) of the five (5) buildings first. These commercial buildings will have multiple commercial tenants in each structure, however no residential uses are proposed. One (1) structure will have outdoor display and outdoor patio area. Mr. Ed Pesce, PE provided an engineering review comments that are included in the Board's packet for consideration. One component of the proposed project is widening of Old South Road to add a center left or right turning lane between the east-west Old South Road travel lanes. Should the Board consider approving this design concept, Mr. Pesce and staff recommend that additional design details be provided to the Board for their review. This would include the relocation of the drainage and electrical infrastructure on Old South Road. Recently, town staff had a coordinated review with the Applicants to discuss the proposed project. Staff understands that the Applicant would like to hear feedback from the Board on the proposed projects as the projects represent a preliminary design concept; however Mr. Pesce left the Applicant and their engineers a list of items to include in a future revision, as outlined in his July 4, 2016 review letter. Staff does not have any other recommendations at this time.

FROM 08-01-16 STAFF REPORT:

No further update.

FROM 08-30-16 STAFF REPORT:

At the last regular meeting, the Applicant requested for this application to be discussed as they have tenant commitments. The Applicant answered some past questions regarding proposed entrance lining up with the Valero's property across the street. The Board was notified that the Applicant has had discussions with the Naushop HOA about traffic and therefore the traffic study is still pending as it was redone. There was a discussion about creating a commercial village like the development across the street. There was a reminder that a sidewalk easement will be important to provide. The Board also asked the Applicant for a copy of the Landscape Plan; however the Board was notified that the HDC has only reviewed and approved a Landscape Plan for the first and second lots of the retail "liner" building project. During the discussion, the Board heard comments from the public where the Chair of the Naushop HOA pleaded for the Board to not allow Old South Road to "look like Route 132 in Hyannis!" Also, there was a question on the hours of operation for the proposed restaurant and what could be mitigated in relationship to the impact of the restaurant. Since the last meeting, staff has received the updated HDC approved elevations of two (2) of the proposed retail buildings.

UPDATE:

At the last regular meeting, the Applicant informed the Board of changes that they have incorporated into their plans. They are willing to grant a 30' easement along Old South Road; propose to move the dumpster pads and roads behind the building; to incorporate rain gardens into the stormwater drainage system; and forgo patio seating area for the future.

▪ **#40-16 "Meadows II" Rental Apartment Development Project, 20 and 20R Davkim Lane**

FROM 07-01-16 STAFF REPORT:

The Applicant is requesting a Special Permit to allow the development of the "Meadows II," a workforce rental community project, located on a combination of two (2) contiguous properties, comprising of two hundred and twenty-five (225) rental apartment units. The proposed project will offer a mix/range of studio, one-bedroom, two-bedroom, and three-bedroom units, with a total of three hundred and sixty-three (363) individual bedrooms. The Applicant is further requesting waivers from Major Site Plan Review; Intensity Regulations; and Site Plan Review. The Applicants will be providing a Traffic Study for a future meeting. The proposed project will need to be served by new infrastructure, which will be provided by the applicant. This includes water and sewer services, drainage, street lighting, landscaping, etc. Recently, town staff had a coordinated review with the Applicants to discuss the proposed project. Staff understands that the Applicant would like to hear feedback from the Board on the proposed projects as the projects represent a preliminary design concept. Staff does not have any recommendations at this time.

FROM 08-01-16 STAFF REPORT:

No further update.

FROM 08-30-16 STAFF REPORT:

See updated comments below for #43-16.

UPDATE:

At the last meeting, the Applicant informed the Board that they have had meetings with the Cedar Crest Subdivision. They plan to come back to the Board with larger lots for Sandpiper Way and Mayflower Circle area. They are looking to make a better connection with larger lots along Evergreen Way. There was discussion from Attorney Hill for Cedar Crest II regarding the ownership of the private ways.

▪ **#8013 “Meadows II” Rental Apartment Development Project, 20 and 20(R) Davkim Lane**

FROM 08-30-16 STAFF REPORT:

The Applicant is seeking approval of a definitive subdivision that correlates with a Special Permit (File #40-16) currently being reviewed by the Board. The plan will reconfigure the existing property which will allow the development of the Meadows II for a workforce rental community which will comprise of two hundred and twenty-five (225) rental apartment units. The proposed plans show the connection with the 50' wide Nancy Ann Lane and Davkim Lane intersection and then down to 40' wide roads proposed within the development. The plan also shows the proposed intersection with Old South Road.

UPDATE:

At the last meeting, the Applicant respectfully without prejudice withdrew Special Permit #43-16 and Definitive Subdivision #8014 for the “Sandpiper” development. This was an effort to create phases of “north” and “south” of the proposed Sandpiper Subdivision. These items have been resubmitted to staff and appropriately advertized for the October 13, 2016 regularly scheduled meeting. The Applicant also submitted a “Fiscal Impact Analysis” that provides an estimate that is expected to occur to the Town of Nantucket upon the development of the proposed Meadows II and Sandpiper Place development projects. The analysis has been submitted to the Board of Selectman, Planning Board, and Finance Committee. A copy of this is included in the Board’s packet for their consideration.

Public Comments:

Other Business:

Adjourn:



Nantucket Planning Board

SPECIAL MEETING

Nantucket Planning Board Agenda

WEDNESDAY, SEPTEMBER 28, 2016

5:00PM

4 Fairgrounds Road

Public Safety Facility Training Room

Second Floor

www.nantucket-ma.gov

Video of meeting available on Town website

(AGENDA SUBJECT TO CHANGE)

The complete text, plans, application, or other material relative to each agenda items are available for inspection at the Planning Office at 2 Fairgrounds Road between the hours of 8:30 AM and 4:30 PM

I. Call to order:

II. Approval of the agenda:

III. Previous Plans:

- #7684 Pippen's Way, *Form J Release (Lot 15)*

IV. Public Hearings:

- #7918 Richmond Great Point Development, LLC – 42, 48, & 54 Skyline Drive & 20 Davkim Lane, *action deadline 11-30-16, CONTINUED TO 10-13-2016*
- #7988 Richmond Great Point Development, LLC, Nancy Ann Lane, Greglen Avenue, Davkim Lane, and Old South Road, *11-30-16*
- #39-16 Old South Road Crossing Retail “Liner” Buildings, 63, 67m 73, and 75(A) Old South Road, *action deadline 11-30-16*
- #40-16 “Meadows II” Rental Apartment Development Project, 20 and 20R Davkim Lane, *action deadline 11-30-16*
- #8013 “Meadows II” Rental Apartment Development Project, 20 and 20(R) Davkim Lane

V. Public Comments:

VI. Other Business:

VII. Adjourn:



Nantucket Planning Board

Form J
Certificate of Completion and
Release of Municipal Interest in
Subdivision Performance Security

Date: _____ Planning Board File # 6992, 7662, and 7684

Subdivision Name: Pippen's Way

Owner: Pippen's Way LLC

Owner's Address: 488 Boston Post Road, Post Office 5967, Marlborough, Massachusetts 01752

Phone number: (508) 460-9508 Fax number: _____ E-mail: cgadbois@wellenconstruction.com

Applicant, (if other than owner): Same as above.

Applicant's Address: _____

Phone number: _____ Fax number: _____ E-mail: _____

Date of Subdivision Plan: March 10, 2014, revised July 24, 2014

Land Location: 14 Pippen's Way

Plan Recorded: Nantucket Registry of Deeds Plan Book _____ Page _____

Plan Registered: Nantucket Land Registry, Land Court Plan Number 12268-D

Type of Performance Security:

Covenant dated: _____
Covenant recorded: Nantucket Registry of Deeds, Book _____ Page _____.

or
Covenant registered: Nantucket Land Registry District as Document # 144152 and noted on
Certificate of Title # 25225 in Registration Book _____ Page _____.

Deposit of money, agreement dated: _____
Bank (if bank passbook): _____
Address of Bank: _____

Other Security , agreement dated: _____

Letter of credit, agreement dated: _____

Nantucket Planning and Land Use Services ▪ 2 Fairgrounds Road ▪ Nantucket ▪ MA ▪ 02554 ▪ (508) 325-7587

Bank: _____

Address of Bank: _____

The undersigned, being a majority of the Planning Board of Nantucket, have determined that the construction of ways and installation of municipal services in the subdivision referred to above have been completed partially completed by the applicant in accordance with the Board's rules and regulations to adequately serve the following enumerated lots:

Lot 15

Pursuant to Section 81.U of Chapter 41, M.G.L. and in consideration of said construction and installation, the Town of Nantucket, a Massachusetts corporation, acting through its Planning Board, hereby releases its interest in the Performance Security referred to above, as to the lots enumerated in the preceding paragraph only.

Duly executed as a sealed instrument this _____ day of September, 2016.
(Date) (Month) (Year)

Barry G. Rector

Nat Lowell

Linda Williams

John McLaughlin

Joseph Marcklinger

Signed by a Majority of the Town of Nantucket Planning Board

COMMONWEALTH OF MASSACHUSETTS

Nantucket, SS _____, 2016

On the _____ day of _____, 2016, before me, the undersigned notary public,

Personally appeared _____, one of the above-named members of the Planning Board of Nantucket, Massachusetts, personally known to me to be the person whose name is signed on the preceding document, and acknowledge that he/she signed the foregoing instrument voluntarily for the purposes therein expressed.

Notary Public

My commission expires:



Nantucket Planning Board

APPROVAL OF A DEFINITIVE SUBDIVISION PLAN (AR)

See Terrier Farms Trust, Pippen's Way Subdivision
Planning Board File #6992

Applicants: See Terrier Farms Trust, Diane Halm, Trustee, c/o Daniel J. Bailey, III, Rackemann, Sawyer, & Brewster, One Financial Center, Boston, MA 02111-2659

Owners: See Terrier Farms Trust, Diane Halm, Trustee, 11809 Piney Meeting House Road, Potomac, MD 20854

Property recorded at Nantucket Registry District of the Land Court, Certificate of Title # 21215

Parcels 94.2 as shown on Nantucket Tax Assessors Map 43

August 27, 2007

NOT
SE-7
P338

The applicant is proposing a standard Approval Required (AR) subdivision on twenty (20) acres of land with average lot size of 43,000 square feet and two lots greatly exceeding that of 176,000 and 432,000 square feet respectively, all with frontage on the proposed roadway.

Based on the Preliminary Plan Approval of February 13, 2006 the site utilizes Limited Use General 1 (LUG 1) zoning which is 40,000 square foot lot area with 100 feet of frontage and is also within the Nantucket Harbor Watershed Protection Overlay District. There are five (5) existing structures on site. The applicant is proposing eight (8) building lots with the roadway shown as lot 8.

The roadway for the proposed development is a dead-end roadway terminating with a cul-de-sac, approximately 830 feet long. In addition the applicant will improve approximately 1000 feet of Gardner Road. The traveled surface of the roadways will be twenty (20) feet in width with Cape Cod berms for Gardner Road with appropriate side slopes provided to allow for pervious paver road construction of the interior roadway. Stormwater runoff from the proposed interior roadway will be collected by deep sump catch basins which will discharge to subsurface infiltration systems. Individual dry wells will be installed for the collection of roof runoff for each lot. All lots within the proposed subdivision will be serviced by on-site wells and wastewater will be treated through individual on-site septic systems.

The applicant agreed to make infrastructure improvements to Gardner Road, which is a private way. The infrastructure improvements proposed for Gardner Road include reconstructing and paving the road to a width of twenty (20) feet, designing and installing drainage structures or swales for the collection and treatment of stormwater runoff, and re-landscaping/re-vegetating areas to maintain slopes in accordance with the Subdivision Rules and Regulations. Final plans for the road will be reviewed by the consulting engineer for the Planning Board with the Planning Board prior to construction.

1 East Chestnut Street Nantucket Massachusetts 02554
508.228.7233 telephone 508.228.7298 facsimile

The Nantucket Planning Board, at its meeting of *August 27, 2007* voted 5-0 to close the public hearing and voted 5-0 to approve the Definitive Subdivision Plan (AR) for property located at 12 Gardner Road. The application for approval of this definitive subdivision plan was received by the Planning Board on November 13, 2006 and approval of this subdivision was based on the following documents:

- Plans entitled "Definitive Subdivision Plan, Pippen's Way Subdivision, 12 Gardner Road, Nantucket, MA" being a subdivision of lot 2 shown on Land Court Plan 12268-B, tax map 43, parcel 94.2, prepared for See Terrier Farms Trust, sheets 1 through 11, scale as noted, prepared by Site Design Engineering, LLC., 11 Cushman Street, Middleboro, MA 02346, dated November 3, 2006 as revised through July 5, 2007 along with two separate sheets by same engineer for same lot 2 on LCP 12268-B, one dated August 8, 2007, scale 1" = 60' entitled "Proposed Conservation Restriction Plan" and the other dated August 16, 2007, scale 1" = 20' entitled "Gardner Road Detail Plan";
- Hydraulic/Hydrologic Analysis, Pippen's Way Subdivision, 12 Gardner Road, Nantucket, Massachusetts, November 10, 2006, prepared for See Terrier Farms Trust by Site Design Engineering, LLC., 11 Cushman Street, Middleboro, MA 02346;
- Site Analysis Report, Pippen's Way Subdivision, 12 Gardner Road, Nantucket, Massachusetts, November 3, 2006, prepared for: See Terrier Farms Trust by Site Design Engineering, LLC., 11 Cushman Street, Middleboro, MA 02346;
- A list of waivers to the Subdivision Rules and Regulations from Site Design Engineering, LLC dated November 13, 2006;
- Engineering Review Reports from Pesce Engineering & Associates, Inc., engineering consultant to the Planning Board dated March 23 and August 8, 2007;
- Engineering Review Response Letters to Abutters Comments and to Pesce Engineering Review from Site Design Engineering, LLC., all dated May 9, 2007;
- A letter concerning "Community Benefits" from Attorney Daniel J. Bailey, III of Rackemann, Sawyer & Brewster, PC, One Financial Center, Boston, MA;
- A Preliminary Plan approval letter dated February 13, 2006;
- Assorted documents (including correspondence from abutting property owners) on file with the Planning Board;
- Representation and testimony received in connection with the public hearings/continuances held on 12/11/06, 1/8/07, 1/22/07, 2/12/07; 2/26/07, 3/12/07, 3/26/07, 4/23/07, 5/14/07, 5/31/07, 6/11/07, 6/25/07, 7/9/07, 7/23/07, 8/13/07 and 8/27/07. Minutes of these meetings are on file with the Planning Board; and
- Other assorted documents (including correspondence from abutting property owners) that are on file with the Planning Board.

Approval of this Subdivision is granted conditionally upon the aforementioned documents, compliance with the Planning Board's *Rules and Regulations Governing the Subdivision of Land* (as amended through December 20, 1999), and on the following additional requirements and agreements:

1. That the applicant shall be granted the following waivers from the *Rules and Regulations Governing the Subdivision of Land*:

2.06e -- STAKING OF SUBDIVISION: there is sufficient information on the plans and on site to enable the Board and public to determine location of the proposed way;

4.03a(1) --STREETS: in order to fit the required improvements within the available right-of-way of Gardner Road an 8-inch cape cod berm rather than a 12-inch berm and allow a 1:1 side slope rather than a 2:1 side slope;

4.09-SHOULDERS: allow use of 2-foot shoulders rather than 4-foot shoulders on Pippen's Way and variable width shoulders of 1-foot to 2-foot shoulders in Gardner Road to allow for reduced site disturbance;

4.18-SIDEWALKS: waive requirement for sidewalk as there are no sidewalks in Gardner Road to connect an interior road sidewalk;

4.19-BICYCLE PATHS: waive requirement for a bicycle path. Note that applicant has agreed to contribute to the Town Bicycle Path fund;

4.20- STREET LIGHTS: waive requirement for street lights to assist in maintaining the rural nature of the neighborhood;

5.04- ON SITE DISPOSAL OF BRUSH AND TREES: waive requirement of on-site disposal area as all debris will be chipped; and

5.06-DRAINAGE: allow for use of HDPE pipe in drainage structures as allowed in recent development projects on the Island.

2. That the applicant agree to alter and improve the traveled surface of Gardner Road to twenty (20) feet in width and perform infrastructure improvements to include relocating portions of the road that encroach on private property to a location within the roadway layout; reconstructing, paving, designing and installing drainage structures or swales for the collection and treatment of stormwater runoff, and re-landscaping/re-vegetating disturbed areas;

3. That the applicant shall provide for final plans for improvements presented to the Planning Board within six (6) months from the date of the final decision with the proposed improvements in accordance with the *Rules and Regulations Governing the Subdivision of Land*. The final plans should be reviewed by the consulting engineer for the Planning Board and the Planning Board prior to construction. Review and approval of these plans should not require additional public hearings, as they will have been adequately discussed during the subdivision review. The interior roadway and associated infrastructure improvements should not commence until the definitive plans have been endorsed by the Planning Board. The definitive plans should be presented to the Planning Board within six (6) months of the date of the final decision. Recorded copies of all legal documents (Homeowners Association, if any, documents, Statement of Conditions, Grant of Right of Enforcement, Grant of Easements for Utilities and Drainage, and Covenant) should be presented to the Planning Board prior to the release of any lot from the Covenant or within six (6) months from the date of the final decision;

4. In the event the improvements cannot be completed as represented by the applicant and agreed to by the Planning Board, a modification to the subdivision may be required and additional conditions may be imposed;

5. That the applicant shall be responsible for the establishment of a Road Maintenance Endowment Fund for the maintenance in perpetuity of all required improvements to the interior roadway including the drainage structures, grading, utilities, etc., initially endowed at \$2000 per buildable lot. This fund shall be administered by the applicant and/or Homeowners Association if any, and with the Planning Board named as a third party enforcing agent;

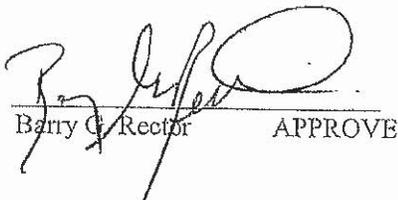
6. That the roadway layout for the interior roadway be transferred to a Homeowners Association with evidence of that conveyance presented to the Planning Board prior to the release of any lot;

7. That no further division of land will occur without modification to the approved plan but minor lot line adjustments may be approved through the Approval Not Required (ANR) plan process;

8. That in the event Gardner Road is paved prior to the construction of the interior roadway, a gravel tracking pad with a minimum depth of 100 feet of dense gravel or stone shall be installed at the entrance to the site during the construction period to remove construction debris from the tires of construction vehicles prior to entering Gardner Road;
9. That all required infrastructure improvements be completed within two (2) years from the date of definitive plan endorsement;
10. That individual dry wells be installed for the collection of roof runoff for each lot as shown on the definitive plans;
11. That the Planning Board may grant extensions of deadlines stated herein without holding a public hearing;
12. That the applicant resolve the requirements of the Massachusetts Natural Heritage Endangered Species Program prior to the start of construction. The Board notes that the applicant has filed the required applications as of August 13, 2007 and expects a report in the Fall of 2007;
13. That the applicant has agreed to grant to the Town/County of Nantucket sewer easements within the layout of the interior roadway through the site to South Valley Road. The applicant has also agreed to the extent they have the authority to grant sewer easements to the Town/County of Nantucket within the layout of Gardner Road, to provide such easements necessary to accommodate sewer service in the future;
14. In the even the site is included in the Sewer District in the future, the applicant shall extend the sewer to the site and each of the lots shall be 'hooked up' to the sewer system, in the alternative that Town installation of sewer hookups is requested, such work will be completed within two (2) years of the date such sewer hookups are available and that easements relating to such installation shall dissolve if such hookups are not completed by the year 2020;
15. That the Estimated Seasonal High Groundwater elevations (ESHGW) be submitted by the applicant and confirmed by the Planning Board's consulting engineer during construction;
16. That the applicant provide for additional soils and groundwater inspections along the proposed roadway to ensure compliance with Section 4.06a of the *Rules and Regulation for the Subdivision of Land*;
17. That prior to the issuance of roadway construction, a pre-construction meeting shall take place at the site which shall include, at a minimum, the following: Planning Board staff, consulting engineers for the Planning Board, the contractor, the applicant or their representative, engineers for the applicant, utility company representatives, and staff from other Town departments;
18. That each driveway shall have an apron ten (10) feet in depth and maximum fifteen (15) feet in width off the proposed interior roadway; and
19. That the applicant shall establish a permanent Conservation Restriction prohibiting destruction of wildlife habitat on at least 5.4 acres of the subdivision property. The exact location of the Conservation Restriction shall be determined by the applicant in consultation with the Massachusetts Natural Heritage and Endangered Species Program. A copy of the Conservation Restriction shall be provided to the Planning Board.

The Nantucket Planning Board at its August 27, 2007 meeting voted 5-0 to close the public hearing and voted 5-0 to APPROVE the Definitive Subdivision Plan (AR) for property located at 12 Gardner Lane and to endorse this decision.


Francis T. Spriggs APPROVE


Barry C. Rector APPROVE


Sylvia Howard APPROVE

John McLaughlin DIS-APPROVE

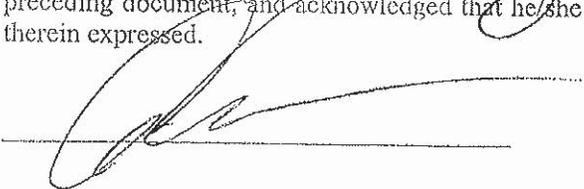
COMMONWEALTH OF MASSACHUSETTS

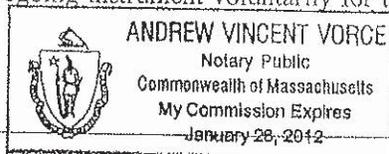
Nantucket, SS

September 6, 2007

On the 6th day of September, 2007, before me, the undersigned notary public,

personally appeared Francis T. Spriggs, one of the above-named members of the Planning Board of Nantucket, Massachusetts, personally known to me to be the person whose name is signed on the preceding document, and acknowledged that he/she signed the foregoing instrument voluntarily for the purposes therein expressed.

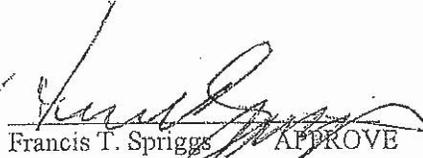


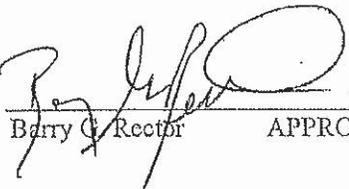


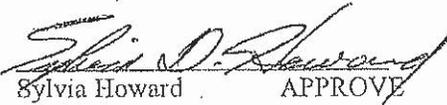
Notary Public

My Commission Expires

The Nantucket Planning Board at its August 27, 2007 meeting voted 5-0 to close the public hearing and voted 5-0 to APPROVE the Definitive Subdivision Plan (AR) for property located at 12 Gardner Lane and to endorse this decision.


Francis T. Spriggs APPROVE

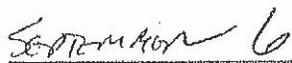

Barry C. Rector APPROVE


Sylvia Howard APPROVE

John McLaughlin DIS-APPROVE

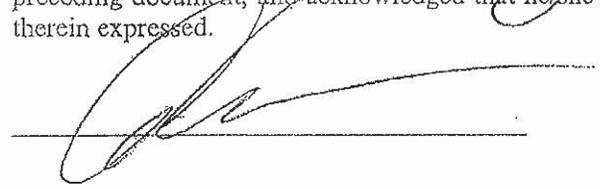
COMMONWEALTH OF MASSACHUSETTS

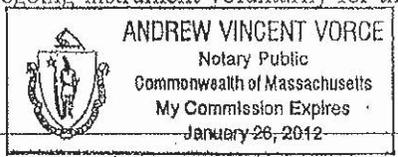
Nantucket, SS

 6, 2007

On the 6th day of September, 2007, before me, the undersigned notary public,

personally appeared Francis T. Spriggs, one of the above-named members of the Planning Board of Nantucket, Massachusetts, personally known to me to be the person whose name is signed on the preceding document, and acknowledged that he/she signed the foregoing instrument voluntarily for the purposes therein expressed.





Notary Public

My Commission Expires



RECEIVED
2014 APR 29 AM 10 45
NANTUCKET TOWN CLERK

Nantucket Planning Board

MODIFICATION TO A DEFINITIVE SUBDIVISION PLAN (AR)

Modification #1

Pippen's Way Subdivision
Planning Board File #7662

Applicant: Pippen's Way, LLC, a Massachusetts limited liability company
Owner: John Bruno, as Trustee of See Terrier Farms Trust under Declaration of Trust dated April 12, 2004, registered with Nantucket Registry District as Document No. 106936, as amended of record

Decision: Approval of a Definitive Subdivision Plan (AR), See Terrier Farms Trust, Pippen's Way Subdivision, dated August 27, 2007, Planning Board File #6992

Nantucket Registry District of the Land Court
Certificate of Title #21215

Lots 12 through 20, inclusive, Land Court Plan No. 12268-D

Nantucket Tax Assessors Map 43, Parcel 94.2

April 14, 2014

The applicant is requesting modifications to the Approval Required (AR) subdivision decision in File No. 6992, "Pippen's Way Subdivision," dated August 27, 2007, as follows:

1. Change the construction of the subdivision roadway, Pippen's Way, from the currently approved pervious paver surface or asphalt to a twenty-foot wide pervious shell surface and, in consideration for this change, restrict the number of bedrooms allowed in the second dwellings on Lots 12 through 16, inclusive, on Land Court Plan No. 12268-D to a maximum of two (2) bedrooms each to limit the amount of potential vehicular traffic on the shell roadway. The overall number of bedrooms allowed per lot under Title 5 would remain unchanged. The pervious shell surface was previously approved by the Nantucket Conservation Commission.

2. Eliminate Condition 14 in its entirety from the Approval. Condition 14 reads as follows:

"In the event the site is included in the Sewer District in the future, the applicant shall extend the sewer to the site and each of the lots shall be 'hooked up' to the sewer system, in the alternative that Town installation of sewer hookups is requested, such work will be completed within two (2) years of the date such sewer hookups are available and that easements relating to such installation shall dissolve if such hookups are not completed by the year 2020."

Condition 14 is not clear and appears to require the applicant to extend sewer to the site if the property is added to the sewer district at any time prior to 2020, but the condition does not specify the origin of the sewer, there is no sewer line in reasonable proximity to the site, the property has not been added to the sewer district, the condition imposes an undue burden on the applicant who may not own the property in 2020, and Town priorities have changed since the Approval was granted such that the extension of sewer to the property is no longer under immediate consideration.

The Nantucket Planning Board at its April 14, 2014 meeting voted 5-0 to close the public hearing and voted 5-0 to **APPROVE** the Definitive Subdivision Plan Modification. The application for approval of this modification was received by the Planning Board on March 17, 2014 and approval of the subdivision modification was based on the following documents:

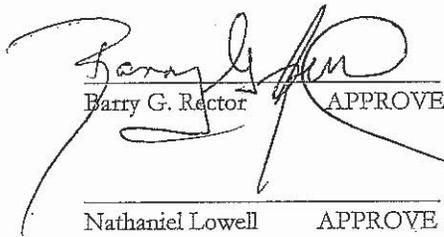
- The Planning Board's Approval Required subdivision decision in File 6992 dated August 27, 2007;
- The Application (Form B1) and accompanying materials;
- Plan of Pippen's Way Roadway Apron, drawn by Site Design Engineering, LLC, dated April 21, 2014;
- Plan of Pippen's Way Roadway Cross-Section, drawn by Site Design Engineering, LLC, dated April 21, 2014;
- Representation and testimony received in connection with the public hearing held April 14, 2014. Minutes of this meeting is on file with the Planning Board; and
- Other assorted documents that are on file with the Planning Board.

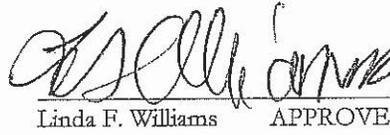
Approval of this modification is granted upon the following conditions:

1. That the number of bedrooms allowed in any second dwellings on Lots 12 through 16, inclusive, on Land Court Plan No. 12268-D, is limited to a maximum of two (2) bedrooms each, with the total overall number of bedrooms allowed per lot under Title 5 remaining unchanged;
2. That the construction of Pippen's Way be done in accordance with the plan of Pippen's Way Roadway Apron and the plan of Pippen's Way Roadway Cross-Section, both drawn by Site Design Engineering, LLC, dated April 21, 2014, as approved by the Board's consulting engineer, Edward Pesce, and;
3. That all other conditions of the Approval Required subdivision decision in File 6992 dated August 27, 2007, shall remain in full force and effect.

SIGNATURE PAGE TO FOLLOW

On April 14, 2014, the Planning Board voted 5-0 to **APPROVE** this modification (#1) to the Pippen's Way Subdivision and to **ENDORSE** this decision.


Barry G. Rector APPROVE


Linda F. Williams APPROVE

Nathaniel Lowell APPROVE

Sylvia Howard APPROVE

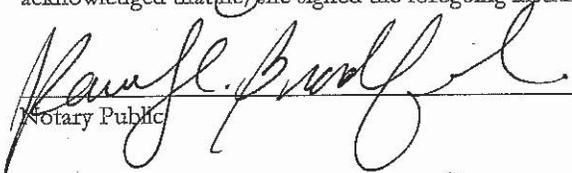

John McLaughlin APPROVE

COMMONWEALTH OF MASSACHUSETTS

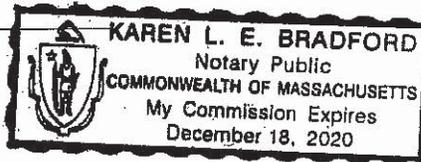
Nantucket, SS

April 28th, 2014

On the 28th day of April, 2014, before me, the undersigned notary public, personally appeared John McLaughlin, one of the above-named members of the Planning Board of Nantucket, Massachusetts, personally known to me to be the person whose name is signed on the preceding document, and acknowledged that he/she signed the foregoing instrument voluntarily for the purposes therein expressed.


Notary Public

My Commission Expires





RECEIVED
2014 MAY 22 AM 11 25
NANTUCKET TOWN CLERK

Nantucket Planning Board

MODIFICATION TO A DEFINITIVE SUBDIVISION PLAN (AR)

Modification # 2

Pippen's Way Subdivision
Planning Board File #7684

Applicant: Pippen's Way, LLC, a Massachusetts limited liability company
Owner: John Bruno, as Trustee of See Terrier Farms Trust under Declaration of Trust dated April 12, 2004, registered with Nantucket Registry District as Document No. 106936, as amended of record

Decision: Approval of a Definitive Subdivision Plan (AR), See Terrier Farms Trust, Pippen's Way Subdivision, dated August 27, 2007, Planning Board File #6992
Modification #1, dated April 14, 2014, Planning Board File #7662

Nantucket Registry District of the Land Court
Certificate of Title #21215

Lots 12 through 20, inclusive, Land Court Plan No. 12268-D

Nantucket Tax Assessors Map 43, Parcel 94.2

May 12, 2014

Applicant requests that the Board modify the Approval of a Definitive Subdivision Plan in File No. 6992, dated August 27, 2007, "Pippen's Way Subdivision" (the "Approval") by modifying the limit and extent of required improvements as follows:

1. Center the proposed roadway improvements to Gardner Road within the thirty-three foot (33') wide easement.
2. Reduce the required pavement width of Gardner Road from twenty feet (20') to sixteen feet (16').
3. Reduce the traveled surface of the subdivision roadway, Pippens Way, to sixteen feet (16').

The Nantucket Planning Board at its May 12, 2014 meeting voted 4-0 to close the public hearing and voted 4-0 to **APPROVE** the Definitive Subdivision Plan Modification. The application for approval of this modification was received by the Planning Board on April 15, 2014 and approval of the subdivision modification was based on the following documents:

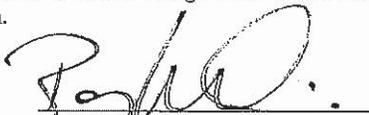
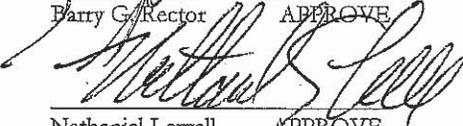
- The Planning Board's Approval Required subdivision decision in File 6992 dated August 27, 2007 and Modification #1, dated April 14, 2014, Planning Board File #7662;
- The Application (Form B1) and accompanying materials;
- Gardner Road Detail Plan, drawn by Site Design Engineering, LLC, dated May 6, 2014;

- Gardner Road Roadway Cross-Section, drawn by Site Design Engineering, LLC, dated May 6, 2014;
- Gardner Road Vehicle Passing Section View, drawn by Site Design Engineering, LLC, dated May 6, 2014;
- Representation and testimony received in connection with the public hearing held May 12, 2014. Minutes of this meeting is on file with the Planning Board; and
- Other assorted documents that are on file with the Planning Board.

Approval of this modification is granted upon the following conditions:

1. That the number of bedrooms allowed in any second dwellings on Lots 12 through 16, inclusive, on Land Court Plan No. 12268-D, is limited to a maximum of one (1) bedrooms each, with the total overall number of bedrooms allowed per lot under Title 5 remaining unchanged;
2. That the construction of Gardner Road be done in accordance with the Gardner Road Detail Plan and the Gardner Road Roadway Cross-Section, both drawn by Site Design Engineering, LLC, dated May 6, 2014, as approved by the Board's consulting engineer, Edward Pesce, and;
3. That all other conditions of the Approval Required subdivision decision in File 6992 dated August 27, 2007, and Modification #1, dated April 14, 2014, Planning Board File #7662 shall remain in full force and effect.

On May 12, 2014, the Planning Board voted unanimously (4-0) to **APPROVE** this modification and to **ENDORSE** this decision.

 <hr/> Barry G. Rector APPROVE	 <hr/> Linda F. Williams APPROVE
 <hr/> Nathaniel Lowell APPROVE	 <hr/> Sylvia Howard APPROVE

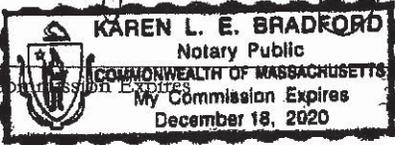
COMMONWEALTH OF MASSACHUSETTS

Nantucket, SS

May 20, 2014

On the 20th day of May, 2014, before me, the undersigned notary public, personally appeared Barry Pictor, one of the above-named members of the Planning Board of Nantucket, Massachusetts, personally known to me to be the person whose name is signed on the preceding document, and acknowledged that he/she signed the foregoing instrument voluntarily for the purposes therein expressed.

Karen L. E. Bradford
Notary Public

My Commission Expires

KAREN L. E. BRADFORD
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
December 18, 2020



The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

September 21, 2016

TOWN OF NANTUCKET
BOARD OF SELECTMEN
16 Broad Street
Nantucket, Massachusetts 02554

TOWN OF NANTUCKET
PLANNING BOARD
2 Fairgrounds Road
Nantucket, Massachusetts 02554

TOWN OF NANTUCKET
FINANCE COMMITTEE
37 Washington Street
Nantucket, Massachusetts 02554

Attention: Jim Kelly, Chairman, Board of Selectmen
Barry Rector, Chairman, Planning Board
David Worth, Chairman, Finance Committee

Subject: Submittal of Fiscal Impact Analysis Prepared by Connery Associates
"Meadows II" and "Sandpiper Place" Development Project

Dear Chairman Kelly, Chairman Rector, and Chairman Worth:

The purpose of this correspondence, issued in our capacity as development manager on behalf of Richmond Great Point Development LLC (the Owner / Developer) is to submit the enclosed "Fiscal Impact Analysis" dated September 20, 2016, prepared by Connery Associates, which provides an estimate of the fiscal impact that is expected to occur to the Town of Nantucket upon the development of the "Meadows II" 225 unit rental apartment development project and the "Sandpiper Place" 100 lot / home single family homeownership development project, to be located on a contiguous +/- 32 acre portion of the total +/- 65-acre site owned by Richmond Great Point Development LLC and located off Old South Road and Davkim Lane.

The analysis has been prepared and is being simultaneously submitted to each of your (respective) boards as specified and in compliance with Section # 7 of the "Memorandum of Agreement" dated November 9, 2015, entered into by and between the Town of Nantucket, by and through its Board of Selectmen, and Richmond Great Point Development LLC, as relates to these two major housing initiatives.

As specified in this Agreement, the analysis includes a "student projection report" regarding the total number of school-aged children that are projected to reside at the Project. As also specified in this Agreement, we are providing a copy of the analysis "for informational and planning purposes during the permit granting process" to the Nantucket Public School District.

1
Submittal of Fiscal Impact Analysis
Richmond Nantucket
September 21, 2016
Page Two

As the analysis indicates, based on an analysis of the many variables that are described in detail in the analysis, the development and occupancy of the proposed project, at full buildout, is projected to result in the generation of +/- 22 net new school-aged children who will be expected to enroll across the Kindergarten through Grade 12 spectrum in the Nantucket Public Schools in any given year (based on the 25% housing "infill / echo" effect that was established as the most likely, but still conservative estimate of this ratio, as a result of the methodology that was utilized in the analysis).

As the analysis also indicates, based on estimates of the different applicable recurring municipal revenues that are expected to be generated and the different applicable recurring municipal service costs that are expected to be generated, the development and occupancy of the proposed project, at full buildout, is projected to result in a substantial positive fiscal profile to the Town of Nantucket, generating a recurring annual surplus of municipal revenues in excess of municipal service costs equal to +/- \$220,900 per year.

As further indicated, in addition to the generation of recurring (annual) surplus revenues to the Town of Nantucket, development of the proposed project will also result in the generation of a significant magnitude of one-time fees to the Town of Nantucket (primarily comprised of building permit, electrical permit, and plumbing permit fees, as well as sewer connection and sewer privilege fees) equal to +/- \$1,825,600.

We appreciate the opportunity to submit this analysis to each of your respective boards, and we and Mr. Connery look forward to the opportunity to review the analysis and findings with your boards, at your request, at one of your future (respective) meetings, at your convenience. We and Mr. Connery are also available to answer any immediate questions that you may have with respect to the analysis.

We would also like to take a moment to express our gratitude to the Town officials and to the other community representatives who formed the "working group" that met with us and with Mr. Connery, prior to the commencement of the analysis by Mr. Connery, who provided important perspective which assisted in identifying the unique "local" issues that needed to be addressed and framing the scope of the analysis.

Very truly yours,



David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc. and
Richmond Great Point Development LLC

Very truly yours,



Patty Roggeveen
Director of Community Relations
The Richmond Company, Inc. and
Richmond Great Point Development LLC

Cc: C. Elizabeth Gibson, Town Manager
Andrew Vorce, Director of Planning
Brian Turbitt, Director of Municipal Finance
Dr. W. Michael Cozort, Superintendent of Schools
Philip Pastan, RGPDLLC
Kathryn Fossa, RGPDLLC
John Connery, Connery Associates

Fiscal Impact Analysis
Meadows II and Sandpiper Place
Development Project
Nantucket Massachusetts

September 21, 2016

Prepared by
Connery Associates
Melrose Massachusetts

Table of Contents

Section	Page
Executive Summary and Conclusions	1
1.0 Preface	6
2.0 Summary of Methodology	9
3.0 Summary of Findings	12
4.0 Police, Fire, and General Service Costs	14
5.0 Education Costs (Including Student Enrollment Estimates)	18
6.0 Total Service Costs	25
7.0 Revenue Projections	27
8.0 Estimated Long Term Fiscal Profile	31
9.0 Comparison of Existing and Projected Tax Revenues	33
10.0 One Time Local Fees	35
Appendix	39

Fiscal Impact Analysis

Meadows II and Sandpiper Place Development Project

Nantucket Massachusetts

September 21, 2016

Executive Summary and Conclusions

Scope and Methodology of Report

- Connery Associates, through a combination of research, data compilation, interviews with Town officials, and empirical analysis, has prepared the attached report which provides an estimate of the fiscal impact that is expected to occur to the Town of Nantucket upon the development and occupancy of the “Meadows II” 225 unit rental apartment development project and the “Sandpiper Place” 100 lot / home single family homeownership development project, as proposed by Richmond Great Point Development LLC on a contiguous +/- 32 acre portion of a total +/- 65-acre site owned by them and located off Old South Road and Davkim Lane in the mid-Island area of the Island of Nantucket.
- The report provides a series of projections of the different recurring municipal revenues (including real estate taxes and local receipt revenues) that are expected to be generated and the different recurring municipal services costs (including public education (including an estimate of the number of additional school-aged children that are expected to enroll in the Nantucket Public Schools), police, and fire / emergency medical services) that are expected to be generated by the proposed project, as well as an estimate of certain one-time fees (including building, plumbing, and electrical permit fees and sewer and water utility fees) that are expected to be generated by the proposed project.
- The report uses a combination of industry standard empirical and financial analytical tools and formulas and applies a series of conservative (and in most cases, highly conservative) methodological and statistical assumptions to reach the estimates and conclusions that are provided in the report.
- Through this analysis, the report provides a conclusion as to whether the proposed project is expected to result in a recurring (annual) fiscal profile whereupon it will be expected to generate a recurring annual net fiscal benefit (profit) to the Town of Nantucket, or whether it will be expected to generate a recurring annual net fiscal deficit (loss) to the Town of Nantucket. The report also estimates the recurring (annual) “break-even point” the point at which recurring (annual) revenues would be at equilibrium with recurring (annual) municipal service costs.

- In terms of time frames, the report estimates all of the revenues and costs at “project stabilization” which is expected to be the year 2022 (6 years from now) assuming that the proposed project will be fully developed and occupied at that time. All dollar figures in the report are represented in current (2016) dollars (i.e., they are not increased for the anticipated impact of future inflation until the project stabilization date).

Summary of Estimates of Recurring Municipal Revenues

- The proposed project is expected to generate a total of +/- \$461,500 in annual property taxes to the Town of Nantucket (+/- \$227,000 of this annual total is expected to be generated by the “Meadows II” rental apartment component of the project, +/- \$231,000 of this annual total is expected to be generated by the “Sandpiper Place” single family home ownership component of the project, and +/- \$3,500 of this annual total is expected to be generated by the “Commercial / Meeting House” component of the project).
- The +/- \$461,500 estimate of annual real property taxes that are expected to be generated from the property will represent an increase by a factor of 796% (a factor of almost 8 times) compared to the +/- \$58,000 in annual real property taxes that are currently being generated from the property to the Town of Nantucket.
- Based on the existing local receipts generation rate that equates to +/- \$775 per dwelling unit, averaged across all of the +/- 11,650 existing dwelling units (which includes both year round and seasonal dwelling units), the proposed project is expected to support a total of +/- \$252,000 in annual local receipts, either directly, or indirectly (including vehicle and boat excise taxes, meals taxes, and room [hotel] taxes).
- Combining all of these sources of recurring (annual) revenue sources, the proposed project is expected to generate a cumulative total of +/- \$713,500 in recurring (annual) revenues to the Town of Nantucket.

Summary of Estimates of School Age Children (Student) Generation (Nantucket Public Schools)

- The single largest municipal service expense in Nantucket, as in almost all communities, is the cost of educating school-aged children in the local public school system. As a result, the single largest contributor to any residential development project’s municipal service (cost) generation is the number of additional net new school aged children (students) that will live in the development. Once this “generation rate” is established, this prospective municipal service cost can be estimated, and once combined with police and fire / emergency medical service costs, can provide an estimate of the direct municipal service costs that are expected to be generated by a proposed development project.
- Determining the number of net new school aged children that will move into a new residential development (either rental apartment units or single family home ownership units) is difficult to precisely predict, especially in a unique (isolated / Island) location such as Nantucket that has a housing market with such complex / unique characteristics.

- Based on data and other input obtained from the administration of the Nantucket Public Schools and an analysis of traditional student generation ratios overlain against the re-housing dynamics which are particular to the Nantucket housing market, the report concludes that the proposed project could generate a range of between 22 and 66 additional net new school-aged children into the public school system at any given time.
- As the analysis indicates, the single most important factor which will eventually determine the number of school-aged children (students) that will be generated as a result of the development and occupancy of the proposed project will be the rate of the housing “infill / echo” effect that will occur: (1) depending upon of the number of individuals or families with school-aged children who will move into the existing local housing units that will be vacated by people moving to the new units to be provided in the proposed project, and (2) depending upon the number of individuals or families with school-aged children who will migrate to and will relocate to Nantucket specifically to move into the new housing units to be provided in the proposed project. The ranges described in the analysis are based on calculations utilizing a spectrum of assumptions that the potential housing “infill / echo” effect could range from 75%, to 50%, to 25% of all occupants of the new and existing housing units. The report asserts that even the 25% housing “infill / echo” effect is unlikely to occur and that this projected number of net new school-aged children could likely prove to be overstated and likely still represents a conservative estimate.

Summary of Estimates of Municipal Service Costs

- Based on current municipal budget data that was obtained directly from Town officials, which was then extrapolated and applied against estimated service demands, the proposed project is estimated to generate a total cumulative increase in municipal service costs of +/- \$492,600 per year, comprised and broken out by the following additional recurring (annual) service demands and municipal service costs:
 - Police Services: The proposed project is anticipated to generate a total of +/- 211 additional service calls per year (+/- 4 additional service calls per week) and +/- \$66,000 in additional annual service costs to the local police department (including a 20% additional contingency, to account for the concentration of density and higher resident turnover that is general encountered in a larger multi-family rental apartment project).
 - Fire and Emergency Medical Services: The proposed project is anticipated to generate a total of +/- 106 additional service calls per year (+/- 2 additional service calls per week) and +/- \$95,500 in additional annual service costs to the local police department (including a 20% additional contingency, to account for the concentration of density and higher resident turnover that is general encountered in a larger multi-family rental apartment project).

- Public Education Services: As described above, at the 25% housing “infill / echo” effect ratio that is expected to be the most likely and still conservative estimate of generating local public school enrollment, the proposed project is estimated to generate a total of 22 net new additional school-aged children (students) who will enroll in the Nantucket Public Schools at any given time (including the Kindergarten through Grade 12 class spectrum).

Based on this ratio, the proposed project is estimated to generate a total of +/- \$331,100 in additional annual public education service costs (at the current annual service cost of \$15,050 per net new student, which is net of the current amount of annual local aid funding received by the Town per child / student).

Estimated Long Term Fiscal Profile

- Based on the estimated generation of +/- \$713,500 in recurring (annual) municipal revenues and the most likely and (still expected to be conservative) estimated +/- \$492,600 in recurring (annual) municipal service costs, the proposed project is expected to result in a substantial positive (profitable) net fiscal profile to the Town of Nantucket, of 0.69, resulting in an annual fiscal benefit (profit) to the Town of +/- \$220,900 per year.
- This means that for every \$1.00 in additional recurring (annual) municipal revenue generated by the proposed project to the Town, the Town will be expected to incur \$0.69 in additional recurring (annual) municipal service costs as a result of the project.
- As described in the report, the fiscal “break-even” point of the proposed project would occur if the student generation ratio of the project were to increase to the point where the housing “infill / echo” effect reached 43%, a ratio that would be approaching almost double the 25% housing “infill / echo” effect ratio that is estimated in the report as the most likely and still conservative estimate (at this [43%] housing “infill / echo” effect ratio, the proposed project would result in 37 net new additional school aged children enrolling in the Nantucket Public School system in any given year, as opposed to the 22 net new students that are estimated in the report as the most likely and still conservative estimate).

Even if this substantially higher student generation ratio were to occur (37 net new students, as opposed to 22 net new students, representing a 68% increase from the most likely generation ratio, as estimated by the analysis), the proposed project would still be economically neutral to the Town of Nantucket on a recurring (annual) basis, in terms of its ratio of anticipated recurring (annual) revenues (totaling +/- \$713,500), compared its anticipated recurring (annual) municipal service costs (totaling +/- \$713,500).

Estimate of Major One-Time Local Fees (Non-Recurring Revenues)

- In addition to the recurring (annual) local revenues which are estimated for the proposed project and described above, the proposed project will generate a substantial variety of one-time local fees (non-recurring revenues), cumulatively expected to total +/- \$1,825,600, comprised of the following different fees:

- Sewer Fees: The proposed project is anticipated to generate +/- \$1,339,600 in one-time sewer-related fees (comprised of +/- \$689,100 in sewer privilege fees and +/- \$650,500 in sewer connection fees). If the Town Board of Sewer Commissioners applies its stated policy of waiving these fees for qualified affordable housing units, these fees would be reduced by an increment of +/- \$332,700, to a total of +/- \$1,006,900.

- Building Permit, Plumbing Permit, and Electrical Permit Fees: The proposed project is anticipated to generate +/- \$486,000 in one-time permit-related fees (comprised of +/- \$367,000 in building permit fees, +/- \$68,100 in plumbing permit fees, and +/- \$50,900 in electrical permit fees).

1.0 Preface

Richmond Great Point Development LLC of Nantucket Massachusetts (the Owner / Developer) is proposing to construct, consistent with the “local control / workforce housing” zoning that was approved at a Special Town Meeting of the Town of Nantucket on November 9, 2015, a 225 rental apartment community (known as “Meadows II”) and a 100 lot / unit single family home ownership community (known as “Sandpiper Place”) on a contiguous +/- 32 acre portion of the total +/- 65-acre site that is owned by Richmond and is located off Old South Road and Davkim Lane in the mid-Island area of the Island of Nantucket.

Both of these “workforce housing” residential components will set aside increments of 25% of the total number of units for affordable housing, in perpetuity, by regulating: (1) the maximum income that tenants and buyers can earn to qualify to rent the affordable apartments or buy the affordable homes, (2) the maximum monthly rents that can be charged for the affordable apartments or the maximum initial purchase prices that can be charged for the affordable homes, and (3) the maximum prices that the affordable homes can be sold for in the future (the Proposal).

In addition to the housing elements, the Proposal includes a concept for a community meeting house / public use component of approximately 3,000 square feet located near the primary project entrance on Old South Road. It is noted that this prospective component of the Proposal is conceptual in nature at this time and, if implemented, could be pursued through a public / private partnership structure, with outside funding sources, and may also not be built until a later time frame. The fiscal impact projections for this component of the project have been included in the report, but they only represent +/- 0.50% of the total recurring revenue from the project, +/- 0.60% of the one-time fees from the project and do not generate any prospective school enrollment or public education costs. These projections have been shown and described separately in the report, so they can readily be deducted from the analysis if reviewers of the report want to identify and understand the prospective impacts and fiscal profile of only the housing component of the project.

The goal of this report is to objectively identify the key fiscal characteristics of the Proposal and to estimate its long term fiscal profile at project stabilization, which is estimated to occur in 2022 (approximately six years from now). Importantly, the report generates a “cost-to-revenue ratio” or fiscal “profile” based on the assumption that the Proposal was occupied today, as the Town of Nantucket is reviewing the permits and the approvals that are required for the Proposal. Accordingly, the costs and revenues used in this report represent current (2016) dollar values. This approach is intended to provide the reader with an insight into the fiscal implications of the Proposal, given known municipal service costs and revenues.

In plain terms, the analysis and conclusions provided in this report are intended to estimate to Town officials and the public if the Proposal is expected to generate either a “profit” (or a “loss”) to the Town, in terms of whether it is expected to generate more (or less) annual revenues to the Town of Nantucket, in terms of various taxes and fees, compared to the annual costs that will be incurred by the Town to provide local services to its occupants and to serve and maintain the elements of the property that fall within the Town’s jurisdiction.

While the conclusions of any predictive fiscal profile are subject to future fluctuations in background economic conditions, the findings presented in this report are intended to provide the Town of Nantucket with a factually-based understanding of how the Proposal will relate to service costs and revenue generation over the long term. The municipal service cost estimates generated in this are not intended as budget recommendations for individual municipal departments. This report recognizes that the assignment of municipal revenues and the levels of public services is the purview of the local government.

Projected public school student enrollments and associated costs are a major component of any residential development (whether rental apartments or homes for sale). This report generates an estimated annual education cost estimate, based on a projection of additional school age children and the current annual net spending per student (ANSS) provided by the MA Department of Education. Similar to non-education municipal service cost estimates, education costs are not designed as budgetary or policy recommendations. Rather, the enrollment and cost projections should be considered as information to be used in conjunction with other mid to long term school department studies designed to meet future educational needs of the Town of Nantucket.

Table 1 below provides an overview of the proposed unit mix for both the Sandpiper Place and Meadows II housing components of the Proposal, as provided by the owner / developer and illustrates the affordable and market rate unit ratios.

Table 1. Proposed Development Program

Meadows II (Rental)	Units	Percent of Total (Rounded)
Studio (Market Rate)	17	7.6
Studio (Affordable Rate @ 80% AMI)	5	2.2
1 Bedroom (Market Rate)	65	28.9
1 Bedroom (Affordable Rate @ 80% AMI)	22	9.8
2 Bedroom (Market Rate)	70	31.1
2 Bedroom (Affordable Rate @ 80% AMI)	24	10.7
3 Bedroom (Market Rate)	17	7.6
3 Bedroom (Affordable Rate @ 80% AMI)	5	2.2
Total	225	100.0%
Sandpiper Place (Ownership)	Units	Percent of Total (Rounded)
2 Bedroom (Market Rate)	5	5.0
2 Bedroom (Affordable Rate @ 80% AMI)	2	2.0
2 Bedroom (Affordable Rate @175% AMI)	1	1.0
3 Bedroom (Market Rate)	62	62.0
3 Bedroom (Affordable Rate @ 80% AMI)	17	17.0
3 Bedroom (Affordable Rate @175% AMI)	5	5.0
4 Bedroom (Market Rate *)	8	8.0
4 Bedroom (Affordable Rate @ 80% AMI *)	0	0.0
Total	100	100.0%
Community / Public	Sq. Ft.	
Meeting House	3,000	100.0%

As shown above, the overall unit mix of the Meadows II (rental component) is designed as 10% studios, 38% one bedroom units, 42% two bedroom units, and 10% three bedroom units. Therefore, of the 225 total units, 109 units, or 48% of the total units, are either studio or one bedroom units that will not generate any measurable or sustainable level of school aged children. Accordingly, of the 225 total units, an increment of 116, or 52% of the total units, the two bedroom and three bedroom units, will generate some level of school aged children and school costs.

Sandpiper Place (the single family component) is expected to be comprised of 8% two bedroom homes, 84% three bedroom homes, and 8% four bedroom homes. Due to the fairly efficient lot sizes proposed for the Sandpiper Place development, which range from slightly larger than 4,000 square feet in land area to slightly larger than 5,000 square feet in land area, and given the thirty-foot height limit that is applicable under local zoning, very few larger homes (4 bedrooms or greater) are expected to be built. Further, as means of limiting future expansion / occupancy capacity, the majority of the homes in the Sandpiper Place development are expected to be constructed as “slab on grade” construction or with crawl spaces, without basements.

To this end, as shown in the table provided above with the Development Program (unit mix), to be particularly conservative from a methodology standpoint for the purposes of this analysis / report, even though Owner / Developer is not expected to build any homes larger than three bedrooms, including the number of homes that are subject to the affordability requirement, it is assumed that a few buyers of the single family housing lots who will ultimately build their own homes may build four bedroom homes, notwithstanding the lot sizes and local zoning height limitations (for this reason, 8% of the total single family homes [equal to 8 of the total 100 single family homes] are assumed to be four bedroom homes for the purposes of the analysis / report).

The Proposal is intended to provide quality ownership and rental housing and to address the strong need to re-house many Nantucket residents who may currently be occupying substandard housing units or cannot otherwise afford housing on the Island as a means of remaining in the community, as identified in the April 2015 *Nantucket Workforce Housing Needs Assessment* prepared for the Nantucket Planning Department by Ms. Judi Barrett of RKG Associates (RKG Report).

2.0 Summary of Methodology

In considering the fiscal impacts of the Proposal, this report divides municipal service costs into two broad categories: general service costs (i.e. all non-education costs) and education costs. As noted in the body of this report, the measurable general service costs will be generated primarily from public safety-services (police and fire departments, including emergency medical services). The departmental cost estimates discussed in this report were based on fiscal year 2016 operating budgets and operational data provided directly to the author of the report by the Nantucket police and fire departments.

In any community, public education costs represent the large majority of the service cost associated with residential development. For both the Meadows II and Sandpiper Place housing developments there are no comparable developments on Nantucket that can provide a precise local perspective relative to the generation of school aged children. Based on town wide enrollment data and current housing application data, Section 5.0 of this report will provide details of the methodology employed to estimate the number of school aged children associated with the Proposal.

However, it is important to note that an important corollary to the issue of student generation rates regards the issue of re-housing of the Nantucket workforce; a significant housing problem that was clearly identified by the RKG Report of 2015. In many ways the re-housing issue in Nantucket is a unique situation. While there is little debate about the need for re-housing many households on Nantucket, various discussions with Town department heads and Town officials indicated a belief and / or concern by some that as existing workforce households move from substandard or cramped housing into the proposed housing, all of the former substandard and cramped housing will be replaced by households with the same demographic and family size profile (i.e. the possibility of experiencing a 100% infill or “echo” effect scenario). This scenario assumes that the vast majority or all of the re-occupied housing will be occupied primarily by people moving to Nantucket from the mainland, with the same or similar number school aged children, seeking workforce employment opportunities.

This report asserts that the 100% housing “infill / echo” scenario (i.e. an extensive number of new families moving from off island communities to Nantucket as a result of the Proposal and the availability of new housing) with its with minimal housing opportunities, modest paying job opportunities, and well documented high cost of living, while theoretically possible, is extraordinarily unlikely to occur, given the reality of significant economic and housing cost stress that is likely to result from such a move. Similarly, it is theoretically possible, but also extraordinarily unlikely that no families will move from off island communities to Nantucket as a result of the Proposal and the availability of new housing (the 0% housing “infill / echo” scenario)

It is important to point out that no one, including the author of this report can definitively state exactly what migration patterns will or will not occur; given that the Proposal creates a range of housing opportunities that have no true local precedent or comparable.

Based on these factors, the prospective impacts of the Proposal at the extreme end of either side of the spectrum have not been specifically calculated and described in the report (meaning either the 0% housing “infill echo” scenario or the 100% housing “infill / echo” scenario).

However, this report will also consider that moving to Nantucket with a family cannot be considered a typical or likely scenario, given that the preponderance of employment opportunities available on the Island are low to mid-level salary positions and / or seasonal positions, relative to the day to day cost of living and the other high and recurring costs associated with traveling to and from an isolated island location. Therefore, an argument can be made that given the cost of living and housing costs realities, if considerable in-migration does occur it will be represented by primarily households *without* school aged children (without the extra cost and responsibility of having a family to provide for). The fact is that without the existence of a specifically comparable existing development in the community to gauge a potential outcome, it can be argued that both a 100% housing “infill / echo” scenario and a 0 % housing “infill / echo” scenario are possible.

Therefore, this report has projected and described the prospective school age children generation rates (and associated costs) for ranges of three (3) different outcomes, outside the two extremes of the spectrum that were described above. At one end of the range the analysis assumes a 75% housing “infill / echo” scenario, the analysis also assumes a 50% mid-point housing “infill / echo” scenario, and at the other end of the range, the analysis assumes a 25% housing “infill / echo” scenario, which the author believes may still be overly conservative (meaning that even the 25% housing “infill / echo” scenario may still overestimate the number of school aged children that will be generated by the Project) but is possible.

In terms of public education cost, estimates are driven by the estimated additional school-aged children to be enrolled in the Nantucket Public School System. The basic formula for determining the portion of the additional school costs to be borne by the local tax base is Actual Net School Spending per Student (ANSS) as reported by the Massachusetts Department of Education minus MGL Chapter 70 aid; a local revenue / reimbursement source.

2.2 General Service Cost Estimates

For all other municipal service costs i.e. general service costs, the report employs the Town’s FY2016 operating budget and includes those service categories that will most likely exhibit a measurable additional cost due to the Proposal. In this case, the Police Department and Fire Departments will be impacted. The report combines the individual estimated departmental costs to generate a total general service cost estimate.

It should be noted that there are municipal operational budget categories that are properly not included in general service costs for the purposes of determining the fiscal impact, such as existing debt payments, municipal services paid by various enterprise accounts, such as those related to water and sewer services.

Further, building department reviews and inspections which are paid for directly by fees charged to a developer, builder, or homeowner are not included. In addition, Public Works responsibilities such as road maintenance and plowing of existing public roadways abutting the project area will not change as a result of the Proposal, so no additional marginal costs for these services are included. In short, the measurable additional general service costs generated by the Proposal will almost entirely be associated with school, police and fire services.

2.3 Revenue Projections

Service costs represent only one part of the fiscal equation. In order to appropriately estimate the annual fiscal impact of the Proposal, the estimated annual revenue stream (total tax revenues accruing to the Town) must also be determined. This report has employed two approaches i.e. a review of current multi-family assessed values for the rental multi-family component and a full and fair market assessment method for the single family component. For the small commercial / public component an assessed value per square foot was assigned after reviewing comparable uses. The results of the various analyses have been combined to generate an estimated total assessed value at stabilization and the associated annual tax revenue (current value).

The sources of municipal revenue on Nantucket are the same as generally every community in Massachusetts, however, the *percentage* of revenue received from these sources is very different. In most communities, local receipt revenue, (i.e. meals, hotel and room taxes, excise taxes and various other non-property tax sources), represent a small percentage of local revenue (generally less than five percent of total municipal revenues)

This is not the case for Nantucket, where local receipts play a major role in financing community services. Said revenues are a direct result of Nantucket's successful tourist based economy (in the case of Nantucket, in 2016 these revenues are expected to comprise more than eleven percent (11%) of total municipal revenues, a total that is exponentially greater than virtually any other municipality in Massachusetts). Accordingly, this report, as part of its revenue analysis, will take into account the significant revenues generated by local receipts in funding various community services.

2.4 Fiscal Profile

The report compares the estimated total municipal service costs (both general service costs and education costs) to estimated total annual revenue to arrive at an estimated annual cost-to-revenue ratio, or annual fiscal profile. The fiscal finding is also expressed in terms of current dollars gained or lost annually, commencing at project stabilization.

Since the goal of the report is to provide Nantucket Town officials and members of the general public with an objective understanding of the long-term fiscal implications of the Proposal, the most important finding presented is the estimated "cost-to-revenue ratio", since this finding reflects the Proposal's most likely long term fiscal profile.

While the cost-to-revenue ratio will likely vary slightly from year to year, due to variations background regional or national economic trends, the cost to revenue is the best measure of the long-term projected fiscal performance.

3.0 Summary of Findings

The following table summarizes the findings described below.

Summary of Fiscal Profiles

Proposal (325 Housing Units)	Recurring Annual Revenue	Recurring Annual Cost	Annual Cost / Revenue Ratio	Annual Benefit or (Loss)
75% Off Nantucket “Infill / Echo” Effect	\$713,500	\$1,154,800	1.62	(\$441,300)
50% Off Nantucket “Infill / Echo” Effect	\$713,500	\$ 823,700	1.15	(\$110,200)
43% Off-Nantucket “Infill / Echo” Effect (Break-Even Point)	\$713,500	\$ 713,500	1.00	0
25% Off Nantucket “Infill / Echo” Effect	\$713,500	\$ 492,600	0.69	\$220,900

As referenced earlier in this report, the author believes that the 25% housing “infill / echo” scenario while still a conservative or high estimate, is the most likely housing “infill / echo” scenario given the relationship of economic opportunities on Nantucket and housing costs.

- The key variable in determining the fiscal profile of the Proposal is to attempt to estimate the number of families with children that will move to Nantucket, to either occupy the proposed housing or to occupy the housing that will be vacated by existing Nantucket residents seeking better and / or more affordable housing who will relocate to and occupy the housing in the proposed development.
- The highly unlikely and worst case fiscal scenario would occur if 75% of the vacated housing units attracted new residents to Nantucket with the same or higher number of existing Nantucket school aged children that will be housed in the Proposal (i.e. in this case, an estimate of generating 66 additional school aged children who would enroll in the local public school system). This worst case scenario has a cost to revenue ratio of 1.62 and would generate an annual fiscal loss to the Town of Nantucket of \$441,300.

- A similarly unlikely but moderately less adverse fiscal scenario would occur if 50% of the vacated housing units attracted new residents to Nantucket with the same or higher number of existing Nantucket school aged children that will be housed in the Proposal (i.e. in this case, an estimate of generating 44 additional school aged children who would enroll in the local public school system). This scenario has a cost to revenue ratio of 1.15 and would generate an annual fiscal loss to the Town of Nantucket of \$110,200.
- A moderate and likely much more realistic outcome would occur if up to 25% of the vacated housing units attracted new residents to Nantucket with the same or higher number of existing Nantucket school aged children that will be housed in the Proposal (i.e. in this case, an estimate of 22 additional school aged children who would enroll in the local public school system). This scenario has a cost to revenue ratio of 0.69 and would generate annual fiscal benefit to the Town of Nantucket of \$220,900.
- A 43% infill scenario represents the “break-even” scenario in relation to the Proposal. This report finds that it is highly likely that the infill percentage will be considerably lower than this scenario, thus generating lower school costs and an annual net fiscal annual benefit.
- This report contends that the proposed housing will provide workforce housing primarily for existing residents and that it is extremely unlikely that a substantial “infill” or “echo” effect will occur, given that to generate this scenario, in excess of several hundred new households would need to move from the mainland to Nantucket, with school aged children, for workforce wages, given the unique nature of Nantucket’s economy and extremely high cost of living. We contend that the housing vacated in favor of the Proposal will overwhelmingly be occupied by other existing residents who cannot otherwise find and / or afford more suitable housing, due to the extreme lack of such inventory on the Island today, and not by new families migrating to Nantucket from locations off Island who already have school aged children. Therefore, it is anticipated that the total number of new public school enrollments will be moderate in number (22) and the Proposal will generate a moderate annual fiscal benefit to the Town of Nantucket.
- The Proposal will also generate a total of \$1,825,498 in one-time (non-recurring) fees to be paid prior or during construction.
- The Proposal will increase the annual property taxes generated at the subject property exponentially, by a factor of almost eight (by 796%)

4.0 Police, Fire, and General Service Costs

This report uses the Town of Nantucket's FY2016 operating budget to estimate annual departmental costs associated with the Proposal based on information provided directly to the author by the Town Police Department and Town Fire Department in January of 2016.

4.1 Residential Service Costs – Police Department

Understanding the nature of calls for police services is the starting point of estimating annual police related costs that may be generated by any new development. Like all communities, police service costs on Nantucket emanate from a variety of land uses and circumstances. Particular to Nantucket is that of the 11,650 total existing dwelling units on the Island, only 4,200 units are occupied year round (approximately 36% of the total number of units) and 7,450 are only occupied on a seasonal basis (approximately 64% of the total number of units).

While the proposed housing will primarily be year round housing, the Police Department must respond to service requests for all dwelling units all year round and in particular during the 4 to 5-month "peak" season (running from May through September) when the Town's population and police service demand increases significantly. Accordingly, for the purposes of this analysis we will employ the total number of residences on Nantucket (11,650) as a representation of residential service demand, not just the housing units that are occupied on a year round basis.

The key question becomes what percentage of police service demand and / or cost is specifically related to servicing the total number of new dwelling units? On Nantucket, the police department, like all local police departments, also provides services for commercial uses, public facilities, institutional uses, schools, recreation areas, town wide traffic management, general tourism demand and directed patrols. Based on a review of police data, current to June of 2015, we estimate that in 2016 the Nantucket police will record 25,300 police service incidents / contacts of various types (note that police department characterizes approximately 80% of all recorded services as "general police services", (see Appendix 1 for more detail) and do not represent arrests or criminal activity).

In our experience in Massachusetts, police service demand related to residential land use varies from 20% to 40% of total service calls, with the higher percentage being consistently experienced in more urban areas. Without a precisely comparable development to estimate potential police demand to similar development types (particularly the 225-unit rental component) this report, to be cautious, will employ a mid-range ratio of assuming that 30% of all service calls are related to residential land use, even though Nantucket is not a heavily urbanized or a high crime community. At said rate, this report assumes that the current residential land use generates approximately 7,600 police service calls or 0.65 service calls per dwelling unit per year; the vast majority of which are not related to arrests or criminal activity. Accordingly, if we deduct the 80% of general police service listings that are not related to any specific location, we estimate that 1,520 police service calls per year are directly related to specific residential land use locations (arrests, reported crimes, disturbances and vehicular accidents) or a rate of 0.13 police service calls per dwelling unit per year, a rate that is consistent with the historical or average rates for communities in Eastern Massachusetts.

Applying the 0.65 service call per unit per year rate (which includes general police services) the Nantucket Police department can anticipate 211 additional calls for service as a result of the proposed development. Applying the 0.13 service call per unit per year rate, which removes general police service listings, the Nantucket Police department can anticipate that 43 of the 211 total estimated calls to the development location per year (approximately twenty percent [+/- 20%] of the annual total) will be for more substantive police services (arrests, reported crimes, disturbances and vehicular accidents).

In terms of related costs of service, applying the estimate that 30% of police services are generated by residential land use, we can assign approximately \$1,965,570 of the current police budget of \$6,551,901 to residential land use. Further, given 11,650 dwelling units the proposed 325 dwelling units represents an increase of approximately 2.8% to the Islands total housing supply.

Accordingly, we can estimate that the Proposal will increase police service cost related to residential land use by 2.8%, or by \$55,000 (\$1,965,570 x 2.8%). Given the normal fluctuation in police service calls on an annual basis and given the lack of more detailed comparable data, this report will add a further “contingency” to this cost increase of twenty percent (20%) to the numerically derived estimate and will carry a police service cost of \$66,000 per year (in current dollars). This further contingency has been added, for among other reasons, to account for the fact that the overall density of the proposed housing will be different from any existing rental apartment development in the community and that the occupants of rental housing are historically more transient than the occupants of for sale housing and “turn over” more often, which may cumulatively generate some additional increment of police service demands.

Table 2 below provides a summary of the police service cost estimate.

Table 2. Police Service Cost Estimate

Year	Incidents (1)	Residential Related (2)	Residential Costs. (3)	Dwelling Unit Increase (4)	Est. Cost at 120%
2016	25,300	7,600	\$1,965,570	2.8%	\$66,000

- (1) Value is based on an 8% increase over the last full year of data i.e. 2014.
- (2) Based on an estimate of 30% of all police service demand.
- (3) Represents 30% of current police budget of \$6,551,901
- (4) Represents an increase of 325 dwelling units by 2022 over current supply i.e. 11,650

4.2 Residential Service Costs –Fire Department

Nantucket Fire Department data indicates that from 2013 to 2015 the total number of annual fire service runs ranged from 3,773 in 2013 to 5,192 for 2015 an increase of 37.6% or an average annual increase of 12.5% per year. Based on this trend we project that from 2015 to 2016 there will be an increase of 649 calls for service (for all categories).

Consistent with statewide norms, and due to significant improvements in fire safety and building codes in recent decades, residential fires and building fires in general do not represent major percentage of fire department service calls for any community in Massachusetts, including Nantucket (i.e. approximately 1.5% of all runs). However, other fire service calls such as hazard calls, alarm calls (including false alarms), service calls, inspections, and emergency medical services (EMS) can be associated with residential land use, to some degree. In the case of Nantucket, there are commercial, public, recreational, and institutional uses, along with approximately 7,450 seasonal and 4,200 year-round dwelling units that generate varying levels of service demand from the Fire Department.

Without a precisely comparable development to estimate fire service demand, but based on town-wide Fire Department data, this report estimates that on average 65% of all fire service calls emanate from residential land use, with the balance coming from commercial, industrial, institutional / public uses, boating, traffic accident and tourist related sources.

As noted above, for 2015 total call volume for the year was 5,192. Examining the rate of growth for past three years this report assumes that for 2016 the call volume will expand by 649 calls to approximately 5,840. Accordingly, applying the 65% ratio of said service calls equates to a potential of 3,800 residentially oriented service calls per year, including inspections. Therefore, the 11,650 total dwelling units in Town generate have an estimated annual average call rate of approximately 0.326 calls per dwelling unit.

Based on this ratio, the addition of 325 new dwelling units by 2022 is expected to generate 106 additional annual fire service calls (0.326 calls per unit per year times the 325 total dwelling units) or an increase of 2.8% over the total estimated 2016 call volume related to residential land use (representing an average of approximately two service calls per week during the year). It should be noted that based on current fire department service data, approximately 60% of the total projected 106 additional service calls will be emergency medical service (EMS), calls or an estimated 64 additional emergency medical service calls per year by 2022, and 42 fire service runs; of all types.

Similar to the methodology utilized in the police cost analysis, described above, by assigning 65% of the current fire department budget of \$4,369,886 to residential land use generates an annual cost attributable to residential uses of \$2,840,425. Increasing this cost by 2.8% (the increase in total dwelling units) generates an annual cost estimate of \$79,500 attributable to service calls to the new development or an average of \$750 per call for 106 additional calls for service. Further, adding a 20% contingency factor to account for annual fluctuations fire service demands, we can estimate that the Proposal will increase annual fire service costs by approximately \$95,500 (in current dollars).

Table 3. Fire Department Service Costs Estimate

Year	Incidents (1)	Residential Related (2)	Residential Costs. (3)	Dwelling Unit Increase (4)	Additional Cost at 120% (5)
2016	5,840	3,800	\$2,840,425	2.8%	\$95,500

- (1) Value is based on a 12.5% increase over the last full year of data i.e. 2015.
- (2) Based on an estimate of 65% of all calls fire service from residential land uses
- (3) Represents 65% of current fire dept. budget of \$4,369,886
- (4) Represents an increase of 325 dwelling units over current supply i.e.11,650.
- (5) Represents the cost of 106 additional calls i.e. \$79,500 plus a 20% contingency factor

4.3 Other General Service Costs

Water and sewer costs for the Proposal will be addressed via sewer / water connection fees, water meter fees, sewer privilege fees, and “pay as you go” usage charges established by the Town of Nantucket (the Wannacomet Water Company). Similarly, building department costs will be covered by the required permit fees.

Further, the additional population resulting from the Proposal should not generate specific additional staffing requirements for general government services such as Town Clerk, Treasurer, and for services such as libraries or recreation. Further, budget items like current municipal debt are not applicable since they pre-date the Proposal. Accordingly, the municipal departments that will experience measurable and identifiable additional costs are the Town Police and Town Fire Departments.

Table 4 below summarizes the total estimated annual general service costs (current dollars) associated with the Proposal.

Table 4. Total General Service Costs

Department	Annual Cost
Police	\$ 66,000
Fire	\$ 95,500
Total	\$161,500

5.0 Education Costs (Including Student Enrollment Estimates)

5.1 Student Projections

The initial intent of this report from a study methodology standpoint was to attempt to find local comparable developments for both the rental and home ownership components of the Proposal, in order to estimate the school aged child (student) per unit generation rate of the Proposal, based on verifiable local experience. The Nantucket School Department was of great assistance in this effort, but in the final analysis, no truly comparable existing development (either single family with a 25% mixed affordable component or a large multi-family with a 25% traditional affordable component) could be found in the community. Given the lack of specifically comparable local development, the school-aged children (student) projections used in this report are based on Town wide enrollment characteristics, along with additional data assembled relative to the demographics of recently available rental developments.

As noted earlier the large majority of the 11,650 total existing dwelling units on Nantucket are seasonal occupancies, with approximately 36% being year round residences. Accordingly, there are approximately 4,200 year-round residences and it is from this portion of housing supply that the student per dwelling unit estimate is derived (i.e. 1,557 total students currently generated from 4,200 year-round dwelling units, or an average of 0.37 students per year round dwelling unit. See table 5 below.

Table 5. Nantucket Students Per Dwelling Unit

Enrollment	Total Dwelling Units	Year Round Dwellings	Students Per Year Round DU's
1,557 (1)	11,650	4,200 (2)	0.37

(1) Source: Nantucket School Department, January 2016

(2) Work Force Housing Needs Assessment, April 2015 RKG Associates

The Proposal, as designed, has an overall average of 2.06 bedrooms per unit, i.e. 1.61 for the 225 unit apartment component and 3.09 for the 100-unit single family component. Our review relative to existing housing located in the immediate area of the Proposal indicates that there are only a small number of single family homes with two bedrooms, but that a large majority have three bedrooms, and some have four or more bedrooms. Based on this review and a sampling of dwelling units in other areas of Nantucket, we find this bedroom per dwelling unit characteristic holds quite consistently for the Town as a whole (i.e. an average of slightly more three bedrooms per unit for year round dwellings) and is similar (3.09 bedrooms per unit) for Sandpiper Place; the proposed single family component.

However, we believe it would be inappropriate to simply directly relate the smaller number of bedrooms per dwelling unit of the proposed Sandpiper Place development to the Town wide average of students per unit, thereby reducing the fraction of the Town wide student ratio to be applied for the purposes of the analysis, since there are other factors affecting the town wide ratio.

Specifically, the proposed Sandpiper Place development has a 25% affordable component (with units anticipated to be sold to buyers who earn from 80% to 175% of the area median income) while the Town's housing supply has considerably less than 10% of total housing that meets state affordability requirements, but the Town's housing supply also includes very low income and public housing at 30% to 50% of the area median income. Due to the similarity of the Sandpiper Place component of the development in the number of bedrooms per unit to the existing year round housing inventory across the community and after taking into consideration the variations in affordable housing percentages, this report will employ the Town wide average of 0.37 students per unit to the 100 units within the Sandpiper Place component of the proposed development.

In addition, it is also important to note that for the purposes of the analysis, it has been assumed that all 100 of the single family homes will be occupied year round, and that none of the homes will be occupied on only a seasonal basis (with such homes generating zero students into the Nantucket public school system). While the owner / developer is intending to focus its marketing to and is expecting to seek as high a percentage of year round occupancy buyers as possible, in order to try to be responsive to the highest need buyers in the current housing crises (meaning existing year round Island residents) given the nature of fair housing laws that prohibit discrimination against any particular buyers, and given the attraction of Nantucket as a location for seasonal homes, it is almost a certainty that some number of the single family homes will be purchased by buyers who will occupy the homes on only a seasonal basis, with these homes generating zero students into the Nantucket public school system. This factor provides an additional contingency or "cushion" in the methodology which has been utilized for the analysis.

In terms of the affordable units proposed within the single family housing component, it is also relevant to note that the provisions of the zoning that was proposed by the Owner / Developer and was adopted for the property mandates that the state maximum of 70% of all of the affordable units must be sold under the "local preference" provision, meaning sold to an existing Nantucket resident or a person that currently works in Nantucket. This requirement will serve to further minimize the likelihood that the occupants of the new housing will in-migrate from outside the community and further increase the net new enrollment to the public school system.

Accordingly, this report estimates that the Sandpiper Place component of the proposed development may generate as many as 28 net new students who will enroll in the Nantucket public school system by the 2021 / 2022 school year (project stabilization) assuming that the large majority (75%) of the new homeowners or those purchasing the homes vacated by existing local residents who choose to purchase a new home in the Sandpiper Place component of the proposed development will be moving into the community from off-island.

Likewise, the ability to precisely estimate the ratio of students per unit that may be generated by the 225 rental apartments of the Meadows II component of the proposed development is also constrained by a lack of a precisely comparable existing local development. However, in this instance the low bedroom per unit ratio differential is a significant factor i.e. 1.61 bedrooms per unit vs. approximately 3.0 bedrooms per unit for the existing year round housing inventory in the community. This low bedroom per unit ratio of the proposed rental component is a direct result of having 48% of all of the Meadows II units (almost half of all the units) designed as studios or one bedroom apartments.

Essentially, this 48% increment of the rental apartment units will not generate school aged children in any measurable or sustainable manner. Therefore, only 116 units will generate school aged children I. e. 94 two bedroom units and 22 three bedroom units. While twenty-five percent (25%) of the rental housing will be made affordable (to tenants earning 80% or less of the area median income (AMI); this ratio is incrementally higher than the affordable AMI range found with other existing affordable rental units comprising the existing year round affordable rental housing supply in the community (i.e. primarily 30% AMI levels, up to 80% AMI levels).

This report will assume a slightly lower student generation ratio, given the variations in the affordable housing AMI levels in existing affordable rental units in the community, however, this report does assume that the Town-wide 0.37 student per unit generation ratio will be impacted by the fact that the proposed rental component has only 54% of the number bedrooms per unit (slightly more than half of the number of bedrooms per unit) as does the current year round housing supply (a ratio of 1.61 bedrooms per unit, versus the Town-wide average of slightly more than 3.00 bedrooms per unit). Accordingly, the 0.37 student per unit will be reduced by approximately 40% to 0.22 students per unit.

In addition, it is also important to note that for the purposes of the analysis, it has been assumed that all 225 of the apartment will be rented by tenants who have the possibility of having school-aged children living with them in the unit, and will not be rented to local corporate or institutional tenants, a high percentage of which units would be occupied by only non-related adults who do not have any school aged children living with them. Many of these individuals either commute to and live on the Island only during the work week and live by themselves, without their families, or are in transition, awaiting housing that will better suit their needs, at which time they will move their families to the Island (generally moving in to a single family home).

Even at this very early stage of marketing and discussion, the owner / developer has been approached by multiple local businesses and institutions (including numerous public and non-profit sources) who are seeking rental housing opportunities for their employees and have indicated a specific interest in renting units within the proposed development for this purpose. As a result, although it is not expected to represent a high percentage of the total tenants, it is a certainty that some increment of the 225 total units will be rented and occupied by these “non-school aged children generating” tenants, which will serve to further reduce the overall potential student generation rate of this component of the proposed development. This factor provides an additional contingency or “cushion” of conservatism in the methodology which has been utilized for the analysis.

In terms of the affordable units proposed within the multi-family rental housing component, it is also relevant to note that the provisions of the zoning that was proposed by the Owner / Developer and was adopted for the property mandates that the state maximum of 70% of all of the affordable units must be rented under the “local preference” provision, meaning rented to an existing Nantucket resident or a person that currently works in Nantucket. This requirement will serve to further minimize the likelihood that the future occupants of the new housing will in-migrate from outside the community and further increase the net new enrollment to the public school system.

As a result, at the student generation ratio established and described above (0.22 students per unit, multiplied across the total 225 units), the Meadows II component of the proposed development may generate as many as 38 net new school-aged children (students) assuming the source of 75% of the new occupants of the units who are moving into the community or those renting the units vacated by existing local residents who choose to rent a new apartment in the Meadows II component of the proposed development will be from off-island

Accordingly, combining both housing components (the Sandpiper Place single family units and the Meadows II rental apartments) under the most conservative 75% “infill / echo” scenario, the Proposal may generate as many as 66 new school aged children (students) by the 2021 / 2022 school year. For any other community in the Commonwealth this report would assume that the potential of 66 new students would be the basis for estimating additional school costs. However, Nantucket’s housing supply is distorted to the point where traditional characteristics and student generation rates may not apply. We note that the previously cited Workforce Housing Needs Assessment Study of 2015 made the following key findings:

- Half of all year –round households are housing cost burdened.
- Most of un-affordably housed renters are working age people, below the age of 34.
- Owner occupied homes have decreased by 640 units since 2000.
- The greatest year round demand is for two bedroom units.
- Nantucket needs to focus on creating reasonably priced rental housing if it expects to attract and keep workers over the long run.

Each of the items listed above speak to the need for additional workforce housing. However, the key item for student projection purposes is likely the last item which speaks to the Town’s ability to keep existing workers. Essentially, all the points illustrated above speak to a strong need to *re-house* many Nantucket residents.

This report finds the relationship between the clearly identified need to re-house many existing residents and the nature of the households that may infill the existing housing units is the critical factor relative to estimating the number of net new school aged children and school costs.

In order for the 66 net additional school aged children (students) projection to be an accurate estimate we need to accept the premise that the households moving into the new housing units will be households having approximately 66 school aged children or a rate of 0.20 students per unit (66 students divided by 325 total units). Further, and importantly, the assumption that the 75% of the households moving into the housing that will be vacated by households moving to the new development will be off island households who are willing to move to Nantucket to accept workforce wages (as opposed to existing Island residents, who may already have children enrolled in the local school system). While the Nantucket tourist economy is healthy and projected to remain so, it does not seem reasonable to assume that it can generate employment for additional 325 households, many with school aged children ratios similar to on island rates that will allow said households to avoid significant housing cost stress.

This report contends that the “75% housing infill or echo effect scenario” of similar household types is decidedly not a realistic outcome. However, given the highly distorted housing market on Nantucket no one can say with absolute certainty that it could not occur. Accordingly, to be overly cautious for the purposes of estimating student generation ratios and school costs, we will assume that 66 students is the least probable outcome and that 66 students will represent the extreme high end of the range to be estimated for education cost purposes.

Conversely, it can also be argued that new households moving into the vacated dwelling units will likely have few school aged children. In this scenario the Proposal would generate only a small net increase in enrollment. As noted, we have not been able to identify a precisely comparable development on Nantucket in order to more traditionally estimate student per unit ratios for the proposed new development.

However, Meadows I, a new 28-unit rental development abutting the project area, with similar studio, one, and two bedroom units, will become available in 2017 and require year round leases. Richmond Great Point Development LLC has received over 200 applications for the 28 units; a verification of the depth of year round housing demand that currently exists on Nantucket. More importantly of the over 200 applications *none* are from households of off island residents, clearly indicating that the 75% infill scenario is likely not a reasonable assumption for the Proposal. Meadows I provides a strong real time indicator that occupants of the Proposal will overwhelmingly be current residents who will be relocating and intra-migrating from within the community, not new residents moving to / migrating to the community.

It could be argued that the number of net students could be between 0 and 66 depending on the nature of the Proposal’s residents and the nature of the households moving into the (to be vacated) existing housing. However, rarely is anything that precise. Accordingly, this report contends that the “infill / echo” effect household characteristics resulting from the Proposal will be *closer* to those exhibited by the prospective tenants who have filed applications seeking to rent units in the Meadows I” development than those exhibited under the 75% housing “infill / echo” scenario.

To this end, and to be conservative, this report will assume the low end of the net new student increase generated by the Meadows II component of the proposed development will be 25% of the high end (with the high end representing the 75% housing “infill / echo” scenario estimate of 66 net new students), or equal to an estimate of 22 net new students who would enroll in the Nantucket public School system.

Combining both the Sandpiper Place component and the Meadows II component of the Proposal and the 25% assumed housing “infill / echo” effect rate, it is estimated that there will be approximately 22 net new school aged children (students) moving to Nantucket to rent / buy the housing offered by the Proposal or “backfilling” the housing being vacated by buyers or tenants moving to the new housing to be provided by the new development. Given the nature of the Islands economy and the high cost of living, this is still likely a conservative (high) estimate, but is the one that will be used for the purposes of this report.

It should be noted that while providing a fiscal analysis using a school enrollment range will generate a fiscal profile, it is essentially dependent on the key question; what number of school aged children (students) will be part of the households that re-occupy (infill) the dwelling units being vacated as current residents seek better quality and in many cases more affordable housing and move to the new housing units that are being made available as a result of the Proposal?

5.2 Estimated Annual School Cost and Enrollment Patterns

Based on information received from the Massachusetts Department of Education, Actual Net Spending per Student (ANSS) in Nantucket for FY2015 is approximately \$19,140 (per pupil). However, of said total cost, approximately \$1,437 per pupil is addressed by Chapter 70 state school aid (a revenue / reimbursement source received directly from the State). Said amount is deducted from ANSS to generate a more accurate picture of the impact of school costs on local tax resources. Therefore, this report employs an adjusted cost per pupil of \$17,703 to reflect the local cost burden per pupil, per year. This report does not assume that the amount of state aid per pupil will increase given the additional new students.

However, in many instances we find that using the adjusted cost per pupil (in this instance \$17,703 per pupil, per year) would generate an overly conservative (high) estimate, since it assumes that each projected new student will also marginally add the same direct incremental cost to the existing school building operations and maintenance costs. Further, we note that the Town is proceeding to expand both elementary and middle school facilities by 2017. Our review indicates that approximately 15% of the education budget is allocated to operations and maintenance. Given the planned expansion, we believe a more accurate estimate of the marginal cost increases deducts per pupil operation and maintenance cost increases. Therefore, for each additional student, the assigned marginal cost increase is expected to be \$15,050 per pupil, per year, primarily reflecting instructional and employee benefit cost increases.

Based on the estimated student range of 22 to 66 net new students generated by the Proposal by school year 2021 / 2022, we estimate that school costs attributable to the Proposal could range from a low end of the range of \$331,100 to a high end of the range of \$993,300 (in current dollars). As noted, for the various reasons described in the methodology and analysis portions of the report, above, we believe that the estimated school costs will likely be consistent with the low end of the cost range.

Table 6 summarizes the school enrollment and cost estimate projections. It should be noted that by project stabilization approximately 60% of all students housed by the Proposal are likely to be elementary grade students and the balance will middle and high school grade students.

Table 6. Projected School Enrollments and Cost Range

Scenario	Students (1)	Cost Per Student	Total Cost (2)
75% Housing "Infill / Echo" Effect	66	\$15,050 (2)	\$ 993,300
50% Housing "Infill / Echo" Effect	44	\$15,050 (2)	\$ 662,200
25% Housing "Infill / Echo" Effect	22	\$15,050 (2)	\$ 331,100

(1) Students at stabilization 2021/22 school year.

(2) Adjusted to remove operation and maintenance cost per student and Chapter 70 aid (revenue source). Values shown are in current dollars.

6.0 Total Service Costs

Table 7 below summarizes the estimated total annual public service cost range associated with the Proposal

Table 7. Summary of Estimated Annual Public Service Costs

Service Cost (Category)	Estimated Annual Cost at 25% Off-Island "Infill / Echo" Effect	Estimated Annual Cost at 50% Off-Island "Infill / Echo" Effect	Estimated Annual Cost 75% Off-Island "Infill / Echo" Effect
Police	\$ 66,000	\$ 66,000	\$ 66,000
Fire	\$ 95,500	\$ 95,500	\$ 95,500
School	\$331,100	\$662,200	\$ 993,300
Total	\$492,600	\$823,700	\$1,154,800

As shown above, the annual public service cost "range" anticipated upon full stabilization of the Proposal is from \$489,100 to \$1,154,800 per year (in current dollars).

The 25% housing "infill / echo" effect scenario assumes that up to 25% of the households moving into the housing that will be vacated by households moving into the new housing in the proposed development will have school aged children at rates consistent with current town wide averages; and that an increment of 81 "net new" households will be moving (relocating) to Nantucket from the mainland.

The 50% housing "infill / echo" effect scenario assumes that up to 50% of the households moving into the housing that will be vacated by households moving into the new housing in the proposed development will have school aged children at rates consistent with current town wide averages; and that an increment of 163 "net new" households will be moving (relocating) to Nantucket from the mainland.

The 75% housing "infill / echo" effect scenario assumes that 75% of the households moving into the housing that will be vacated by households moving into the new housing in the proposed development will have school aged children at rates consistent with current town wide averages; and that all 244 "net new" households will be moving (relocating) to Nantucket from the mainland.

The range of municipal costs presented in this report is due to the fact that given Nantucket's highly distorted housing market and without the benefit of precisely comparable existing developments to indicate the most likely outcomes, it is not possible to rule out any outcome, no matter how seemingly extreme. However, we assume that individuals and families usually make rational decisions in terms of where they would like to and can afford to live (especially in the case of families with school aged children). In this instance that decision is compounded by the fact that moving includes a decision to relocate to a fairly remote island location whose economy is primarily tourist based, and to a community that has clear work force housing deficiencies and an extremely high cost of living.

It is for the existing economic and housing market conditions noted above that this report contends that the fiscal profile of the proposal is much more likely to resemble the estimated costs anticipated as a result of the 25% housing “infill / echo” scenario rather than either the 50% or the 75% housing “infill / echo” scenarios.

7.0 Revenue Projections

7.1 Estimated Revenues

Methodology for Valuation of Single Family Residential (Homeownership) Property

The normal practice of determining property tax revenue for single family housing that is for sale to buyers (meaning not owned by a landlord and rented) is to estimate the total sales value of the home and to assign 100% of said sales value as the estimated assessed valuation. This method will be applied to the 100 single family homes that will be for sale in the Sandpiper Place component of the proposed development.

Methodology for Valuation of Multi-Family Residential (Rental) Property

For multi-family residential (rental) properties, in this case the Meadows II component of the proposed development, the traditional method to establish the value for properties to determine the property tax revenue that will be generated by the property is to apply what is usually referred to as the “stabilized income method”. Essentially a set of metrics is applied to the gross stabilized rent in order to determine a market based assessed valuation for rental properties. However, given that the Meadows II rental apartments has no precisely comparable development, there has not been a need for the Town of Nantucket Assessor to generate an income method approach on Nantucket and our attempts to construct a hypothetical income method approach leads to highly speculative values that are usually double the assessed value per sq. ft. of existing rental properties located on the Island. Accordingly, The Town of Nantucket Assessor has utilized other appropriate assessing methods to assess the existing rental developments on Nantucket. In this instance, after meeting with the Town’s Assessor and after also reviewing a number of existing (albeit smaller) apartment developments, via the Town Assessing Department web site, we will employ an average assessed value per existing (similar) rental apartment units adjusted, slightly, to reflect the (higher) value of new construction.

Summary of Local Receipts (other Revenue Sources)

Local receipts are non-property tax but recurring annual revenue sources. They include automobile excise taxes, boat excise taxes, meals taxes, room (hotel) taxes, etc. In most instances local receipts play a relatively minor role in financing community services and except for automobile excise taxes, they are not usually factored into a fiscal analysis. However, due to the highly successful tourist based economy of Nantucket, local receipts are a considerable source of local annual revenue and they support municipal service costs for all existing housing. By way of illustration, in the year 2016, cumulative local receipts are estimated to total more than \$9,013,000 which represents more than eleven percent (11%) of total annual municipal revenues. The new housing provided by the Proposal will generate substantial auto excise taxes and to a certain extent, either directly, or indirectly, meals taxes, hotel taxes, and boat excise taxes, in the same manner as all residential uses on the Island.

This report does not attempt to estimate specific local receipts that are expected to be generated by the Proposal on a category by category basis and add it to the property tax total. Rather, the assumption made is that local receipts historically and currently underwrite, to a considerable extent, residential service costs throughout the community. Further, given the Town's expectations of continued increases in overall local receipts over time, absent any major adverse regional or national macroeconomic trends or events, this source of income will continue to be a significant source of revenue as a percentage of the overall municipal budget. Therefore, the average annual value that local receipts now generate per dwelling unit (for all 11,650 dwelling units on the Island) will be applied as an overall revenue source on a per unit basis for the Proposal.

On a per dwelling unit basis the current 11,650 dwelling units are supported by approximately \$775 dollars in local receipts. Assuming continued expansion of local receipts due to the tourist economy this report assumes that the 325 units of new housing will be supported by approximately \$252,000 in local receipts. This value would be higher if the seasonal housing (no costs associated school aged children) were deducted from the housing count.

Seasonal Housing Economic Factors

As noted in this report, seasonal housing represents approximately 64% of all existing housing units on the Nantucket (approximately 7,450 of the 11,650 total housing units are only occupied on a seasonal basis). While these (seasonal) housing units are subject to property tax, charged at the same rate as year round housing units, it provides Nantucket with a significant indirect fiscal benefit, since season housing units do not generate school aged children (i.e. do not generate school-related costs, which represent approximately 60% of the total local operating budget). However, this fiscal benefit cannot be translated to a *source* of annual revenue that can be applied to the Proposal and therefore does not appear in this analysis.

Projection of Single Family Residential Property Tax Revenue

The following is a breakdown of projected sales prices, by home type, for the Sandpiper Place (single family / homeownership) component of the proposed new development.

Table 8. Projected Single Family Home Sale Prices and Assessed Value

Single Family Type	Number of Units	Home Sale Price	Cumulative Assessed Value
Two Bedroom (Market Rate)	5	\$740,000	\$ 3,700,000
Three Bedroom (Market Rate)	62	\$790,000	\$48,980,000
Four Bedroom (Market Rate)	8	\$850,000	\$ 6,800,000
Sub Total (Market Rate)	75	n/a	\$59,480,000
Two Bedroom (80% AMI)	2	\$259,700	\$ 519,400
Two Bedroom (175% AMI)	1	\$537,100	\$ 537,100
Three Bedroom (80% AMI)	16	\$285,500	\$ 4,568,000
Three Bedroom (175% AMI)	6	\$597,800	\$ 3,586,800
Four Bedroom (80% AMI)	0	n/a	\$ 0
Four bedroom (175% AMI)	0	n/a	\$ 0
Sub Total (Affordable Rate)	25	n/a	\$ 9,211,300
Total	100	n/a	\$68,691,300

Based on the local Fiscal Year 2016 property tax rate (or “mill rate”) of \$3.36 per \$1,000 in assessed values for residential property, the single family (ownership) component of the new development is expected to generate approximately \$231,000 in annual property taxes to the Town of Nantucket.

Projection of Multi-Family Residential (Rental) Property Tax Revenue

As noted earlier, it is not viable to apply an income method to estimate the property tax revenue that is expected to be generated by the multi-family (rental) component of the new development. However, discussions with the Town’s Assessor indicated that the most likely assessed value per arrogate unit in the proposed Meadows II multi-family (rental) component of the new development would be approximately \$250,000 per unit, based on current rental assessments of existing rental apartment properties. To account for the fact that the proposed development would all be comprised of brand new construction, a 20% new construction premium was added to the existing inventory value estimate (on a per unit basis) and resulting in an aggregate estimated assessed value for property tax purposes of \$300,000 per unit, or a total assessed value of \$67,500,000 for the entire 225-unit development.

Based on the local Fiscal Year 2016 property tax rate (or “mill rate”) of \$3.36 per \$1,000 in assessed values for residential property, the multi-family (rental) component of the new development is expected to generate approximately \$227,000 in annual property taxes to the Town of Nantucket (equal to approximately \$1,010 per year per unit).

Projection of Commercial Component-Property Tax Revenue

The Proposal also includes a small commercial / public component of 3,000 square feet of building area (currently expected to be a “community meeting house”). While the exact uses have not been determined at this point our review of various commercial buildings outside of Downtown Nantucket, where value are unusually high, indicates an average assessed value of approximately \$200 per square foot is appropriate. Accordingly, the 3,000 square foot community / public component of the proposed development is expected to have an estimated assessed value of \$600,000.

Applying the local Fiscal Year 2016 property tax rate (or “mill rate”) of \$5.93 per \$1,000 in assessed values for commercial property, the commercial component of the new development is expected to generate approximately \$3,500 in annual property taxes to the Town of Nantucket.

Local Receipts (other Revenue Sources)

As discussed above, local receipts play a major role in the Town’s annual revenue stream. A specific review of local revenue sources indicate that local receipts currently contribute approximately \$9,013,000 in revenue per year to the Town of Nantucket.

Excluding any estimate fiscal benefit due to having 64% of total dwelling units as seasonal dwellings, each of the 11,650 dwelling units benefits by approximately \$775 per year in local receipts. While all current fiscal reports indicate anticipated increases in local receipt revenues due to a continued strong tourist economy this report does not estimate future local receipts.

Accordingly, for the total 325 units of the Proposal there is an estimated local receipt fiscal support value of approximately \$252,000 per year that can be used for services provided by the Town

Table 9 below summarizes the estimated Revenue supporting the stabilized development.

Table 9. Projected Revenues

Use	Tax Value
Residential Apartments	\$227,000
Residential for Sale	\$231,000
Local Receipts	\$252,000
Commercial	\$ 3,500
Total	\$713,500

8.0 Estimated Long Term Fiscal Profile

Table 10 provides an overview of the Proposal’s long term fiscal profile, assuming the most conservative, worst case scenario 75% off Nantucket housing “infill / echo” scenario, the second and still extremely conservative 50% off Nantucket housing “infill / echo” scenario, and the more moderate and likely, but still conservative 25% off Nantucket housing “infill / echo” scenario. For illustrative purposes, the table also estimates the point at which the project would represent a “break-even” scenario to the Town in terms of recurring revenues and expenses, which would occur if 43% of the new housing units or housing units vacated by people moving into the new housing were to migrate from off Nantucket (i.e., the 43% “infill / echo” scenario).

Table 10. Summary of Fiscal Profiles

Proposal (325 Housing Units)	Recurring Annual Revenue	Recurring Annual Cost	Annual Cost / Revenue Ratio	Annual Benefit or (Loss)
75% Off Nantucket “Infill / Echo” Effect	\$713,500	\$1,154,800	1.62	(\$441,300)
50% Off Nantucket “Infill / Echo” Effect	\$713,500	\$ 823,700	1.15	(\$110,200)
43% Off Nantucket “Infill / Echo” Effect (“Break-Even” Point)	\$713,500	\$ 713,500	1.00	0
25% Off Nantucket “Infill / Echo” Effect	\$713,500	\$ 492,600	0.69	\$220,900

As noted above and assuming the 75% housing “infill / echo effect” scenario was to occur, it would generate a cost to revenue ratio of 1.62 and an estimated annual fiscal loss of \$441,300.

The 50% housing “infill / echo effect” scenario, which still requires a significant number of workforce oriented families (approximately 163) to move to Nantucket from off-Island, generates a cost to revenue ratio of 1.15 and an annual fiscal loss of \$110,200.

At approximately a 43% housing “infill / echo effect” scenario (assuming 143 households move to Nantucket from off-Island) the Proposal will achieve a revenue neutral status.

The 25% housing “infill / echo effect” scenario, which still requires a considerable number of workforce oriented families (approximately 82) to move to Nantucket from off-Island, generates a cost to revenue ratio of 0.69 and an annual fiscal benefit of \$220,900.

As referenced earlier in this report, the author believes that the 25% housing infill / echo scenario while still a conservative or high estimate, is the most likely housing infill / echo scenario, given the relationship of economic opportunities on Nantucket and housing costs.

Based on the analysis of the many variables and statistical indications cited above and based on the experience of the author, it would be extraordinary unlikely that any of the (higher) “infill / echo” scenarios would occur. These are primarily provided as theoretical examples, to compare to the more realistic (and still conservative) 25% housing “infill / echo” scenario.

Accordingly, the annual average number of additional students expected to be generated by the development and occupancy of the Proposal is estimated at 22, with an operational range of 17 to 29 students in any given year. Further, if enrollment patterns across the age and grade spectrum remain consistent with current patterns, approximately 60% of all of the students generated will enroll in grades Kindergarten through 6 (i.e. an average increase of 13 students will spread among all elementary grades) and an average increase of 9 students will be expected to be enrolled in grades 7 through 12.

9.0 Comparison of Existing and Projected Real Estate Tax Revenues

In addition to estimating and understanding the cumulative total annual property tax revenues that are projected to be generated by the Proposal, it is relevant to compare and contrast the exponential increase in property taxes that will be generated on the properties upon which the Proposal will be developed, when compared to their existing condition (which is almost entirely vacant residential properties, with the exception of the 20 Davkim Lane property upon which the majority of the Meadows II multi-family (rental) component of the new development will be constructed (which is partially vacant and currently used for the storage of vehicles and materials and is partly developed for a series of small garages and storage buildings).

The +/- 14.5-acre sized property upon which the Meadows II multi-family (rental) component of the Proposal will be developed, comprised of the 20 Davkim Lane and 20(R) Davkim Lane properties, has a cumulative existing assessed value of \$6,125,800 and generates a total of approximately \$35,000 per year in real estate taxes. As estimated below, once developed, this component of the Proposal is expected to generate a total of approximately \$227,000 per year in property taxes, an (exponential) increase of approximately six and one-half (6.5) times the amount of annual property taxes that are currently generated from this portion of the property.

The +/- 17.6 acre sized property upon which the Sandpiper Place single-family (homeownership) component of the Proposal will be developed, comprised of a series of almost twenty individual properties off Old South Road, Daffodil Lane, Mayflower Circle, and Evergreen Way, has a cumulative existing assessed value of approximately \$6,553,000 and generates a total of approximately \$22,000 per year in property taxes. As estimated above, once developed, this component of the Proposal is expected to generate a total of approximately \$231,000 per year in property taxes, an (exponential) increase of approximately ten and one half (10.5) times the amount of annual property taxes that are currently generated from this portion of the property.

The +/- 0.5 acre sized property upon which the commercial / public (meeting house) component of the Proposal will be developed, comprised of the eastern portion of the 73 Old South Road property, has an existing assessed value of approximately \$309,000 and generates a total of approximately \$1,000 per year in property taxes. As estimated above, once developed, this component of the Proposal is expected to generate a total of approximately \$3,500 per year in property taxes, an (exponential) increase of approximately three and one-half (3.5) times the amount of annual property taxes that are currently generated from this portion of the property.

See Table 11 below for a summary of the comparison of real estate tax revenues.

Table 11
Comparison of Existing and Projected Property Taxes
to be Generated by the Proposal

Project Component	Existing Annual Property Taxes	Projected Annual Property Taxes	Net Change [Annual Increase]
Meadows II Rental Apartments Projected Assessed Value: \$67,500,000	\$ 35,000	\$ 227,000	\$ 192,000
Sandpiper Place Single Family Homes Projected Assessed Value: \$68,691,000	\$ 22,000	\$ 231,000	\$ 209,000
Commercial / Meeting House Projected Assessed Value: \$600,000	\$ 1,000	\$ 3,500	\$ 2,500
Project Total	\$ 58,000	\$ 461,500	\$ 403,500

Based on the estimates described above, for all of the properties which comprise the Proposal, the existing assessed value equals a cumulative total of approximately \$12,988,000 and the existing property taxes generated equals a cumulative total of approximately \$58,000 per year.

Upon development of the Proposal, the projected property taxes generated are expected to equal a cumulative total of approximately \$461,500 per year, an (exponential) increase of approximately eight (8) times the amount of annual property taxes that are currently generated from all of the properties which comprise the Proposal.

10.0 One Time Local Fees

Major One-Time Local Fees (Non-Recurring Revenues)

In addition to generating the recurring (annual) property tax and local receipt revenues that are described above, the proposed new development will also generate a wide range and significant amount of one-time (non-recurring) revenues to the Town of Nantucket. The most substantial of these fees are summarized below.

Sewer Privilege Fees and Sewer Connection Fees

These fees are charged on a one-time basis, generally concurrently with the issuance of building permits for new development, in order to allow any unit or building to connect into the local (public) sewer system, which is owned and maintained by the Town of Nantucket.

For all residential uses and for most customary commercial uses, these fees fall into the two categories shown below, at the rates described.

- Sewer Privilege Fee – This fee is equal to a total payment of \$6,322 per lot / parcel (this fee can be paid in a lump sum at the time of connection to the system, or can be amortized over a time period of up to twenty years at a low interest rate, payable in installments with the real estate tax bill for the property).
- Sewer Connection Fee – For residential uses, this fee is equal to a one-time payment of \$2,000 for each new dwelling unit (either a single family home or an apartment) to be connected into the municipal sewer system. For customary (non-water intensive) commercial uses, this fee is equal to a one-time payment of \$0.10 per square foot of building area, with a minimum fee of \$500.00, for any new commercial building to be connected into the municipal sewer system.

Based on this combination of fees and the calculation methodology described above, the proposed development, at full buildout, will generate a total of approximately \$689,100 in sewer privilege fees and approximately \$650,500 in sewer connection fees, cumulatively equal to approximately \$1,339,600 in one-time sewer related fees (as shown in the table below).

Table 12
Estimate of Sewer Fees to be Generated by the Proposal

Project Component	Sewer Privilege Fees	Sewer Connection Fees	Total Sewer Fees
Meadows II Rental Apartments 8 Lots and 225 Units (Apartments)	\$ 50,576	\$ 450,000	\$ 500,576
Sandpiper Place Single Family Homes 100 Lots and 100 Units (Homes)	\$ 632,200	\$ 200,000	\$ 832,200
Commercial / Meeting House 1 Lot 3,000 Sq. Feet	\$ 6,322	\$ 500	\$ 6,822
Project Total	\$ 689,098	\$ 650,500	\$ 1,339,598

It is the author's understanding that the Town of Nantucket, in an effort to further incentivize the development of local affordable housing, has established a policy whereby it may waive the local sewer connection and sewer privilege fees for the specific units within a development that statutorily qualify as "affordable" under applicable guidelines.

In the case of the Proposal, if the fees for the 25% affordable units within the two housing components were to be waived, the total sewer fees expected to be generated by the Proposal would be reduced by an increment of +/- \$332,700, to a total of +/- \$1,006,900.

Sewer System Capacity

One of the various issues related to sewer services and sewer-related fees that jurisdictions take into consideration in the review of proposed development projects, such as the Proposal, is the prospective impact of the Proposal on the capacity of the local sewer system.

With respect to this issue as relates to the Proposal, the engineering firm that designed the existing (Town owned and operated) sewer pumping station (the “South Valley” Pumping Station) that will process the sewer flows generated by the development and occupancy of the Proposal (Hazen and Sawyer) conducted an analysis and issued a “*Technical Memorandum*” dated April 2, 2015 that calculated the existing capacity of the station and estimated the future capacity of the station, once all of the development under the Proposal was completed and occupied.

This analysis concludes that the pumping station is currently operating at +/- 21% of its design capacity (in terms of peak flow, in gallons per minute of flow). Upon the full development and occupancy of the Proposal, as well as several other surrounding areas on Lovers Lane and Woodland Drive, the pumping station will be expected to operate at +/- 61% of its design capacity (in terms of peak flow, in gallons per minute of flow). Based on this information, it is clear that the municipal sewer system, including the South Valley pumping station, will have more than sufficient capacity to handle the anticipated sewer flow of the Proposal.

Building Permit Fees, Plumbing Permit Fees, and Electrical Permit Fees

- All buildings constructed in the Town of Nantucket are required to pay a one-time building permit fee at the time of issuance of the building permit for the structure. The building permit fee is based on a charge which is equal to \$1.00 per gross square foot of building area for the structure which the fee is being charged.
- Plumbing permit fees are based on a fixed rate of \$60 per building or home, plus \$10.00 for every plumbing fixture that is located in the building, home, or apartment unit (fixtures include sinks, toilets, dishwashers, showers / bathtubs, washing machines, drains, etc.).
- Electrical permit fees are based on a rate of \$1.50 per Ampere (amp) of electricity that the building or home is designed for (its electrical capacity).

Under its current design, the Meadows II rental apartment component of the new development is expected to have a total of approximately 194,000 gross square feet of building area (equal to an average of approximately 862 gross square feet per unit). Each apartment unit is expected to have an average of approximately 12 individual plumbing fixtures and each of the 42 proposed apartment buildings is expected to have an electrical capacity of approximately 600 Amperes (amps).

Based on the current design, the average single family home within the Sandpiper Place single family component of the new development is expected to be approximately 1,700 gross square feet in building area. Each home is expected to have approximately 15 individual plumbing fixtures and each home is expected to have an electrical capacity of approximately 200 Amperes.

Under its current design, the commercial (community meeting house) component of the new development is expected to have a total of approximately 3,000 gross square feet of building area, is expected to have approximately 20 individual plumbing fixtures and each unit is expected to have an electrical capacity of approximately 200 Amperes (amps).

Based on the preceding information, applied to the total number of units and homes that are expected to comprise the Proposal, the new development is expected to generate a total of approximately \$367,000 in building permit fees, approximately \$68,100 in plumbing permit fees, and approximately \$50,900 in electrical permit fees, cumulatively equal to approximately \$486,000 in one-time building, plumbing, and electrical permit fees (as shown in the table below).

Table 13
Estimate of Building Permit, Plumbing Permit, and Electrical Permit Fees
to be Generated by the Proposal

Project Component	Building Permit Fees	Plumbing Permit Fees	Electrical Permit Fees
Meadows II Rental Apartments 194,000 Sq. Feet 225 Units (Apartments)	\$ 194,000	\$ 29,520	\$ 37,800
Sandpiper Place Single Family Homes 100 Units (Homes) 1,700 Sq. Feet Per Home	\$ 170,000	\$ 21,000	\$ 30,000
Commercial / Meeting House 1 Building 3,000 Sq. Feet	\$ 3,000	\$ 360	\$ 300
Project Total	\$ 367,000	\$ 50,880	\$ 68,100

The total building, plumbing and electrical fees are estimated to be \$485,900. Combined with the sewer privilege and connection fees the total one time nonrecurring fees are estimated at \$1,825,498. These fees are paid prior to any occupancy.

Appendix 1. Estimated Police Incidents for 2016

Type	Total
Arrests, Criminal Complaints	1,200
Reported Crimes	600
Other Crimes	20,000 (1)
Motor Vehicle Stops / Crashes	3,500
Total	25,300

(1) Includes other police services, about 80% of this category.



Town Clerk
Town & County Building
16 Broad St
Nantucket, MA 02554

JUN 15 2016

Nantucket Planning Board

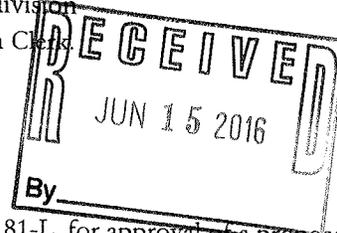
Form B

Application for Approval of a Definitive Subdivision Plan (AR)

"Old South Road Crossing" Definitive Subdivision

File one completed form with the Planning Board and one copy with the Town Clerk.

Date: _____ June 13, 2016 _____



To the Planning Board of Nantucket:

The undersigned, being the applicant as defined under Chapter 41, Section 81-L, for approval of a proposed subdivision shown on a plan entitled Subdivision of Land in Nantucket, Mass designed by Hayes Engineering, Inc. dated June 9, 2016, and described as follows: located on Multiple Lots on Nancy Ann Lane, Greglen Avenue, Davkim Lane, and Old South Road (See "Attachment A" for List of Individual Parcels), number of lots proposed Thirteen (13), total acreage of tract +/- 22.8 Acres, hereby submits said plan as a **definitive** plan in accordance with the *Rules and Regulations Governing the Subdivision of Land* of the Nantucket Planning Board and makes application to the Board for approval of said plan.

(See "Attachment B" for List of Individual Parcels)

The undersigned's title to said land is derived from _____ by deed dated _____ and recorded in the Nantucket Registry of Deeds Book _____, Page _____, registered in the Nantucket Registry District of the Land Court, Certificate of Title # _____ and shown on Nantucket Assessor's Map # _____, Parcel _____, and said land is free of encumbrances except for the following: (See "Attachment C" for List of Encumbrances) _____

Said plan has has not evolved from a preliminary plan submitted to the Board on _____(date) and approved disapproved on _____(date).

The undersigned hereby applies for the approval of said **definitive** plan by the Board, in belief that the plan conforms to the Board's *Rules and Regulations*.

Name(s) and address(es) of the Applicant(s):

(to include all the names and addresses of the principals of the owner entity such as principal officers of the corporation, trustees of a trust or partners of a partnership)

Philip Pastan, (Sole) Manager of Richmond Great Point Development LLC

Contact Phone #: (978) 988-3900 Fax #: (978) 988-3950 E-mail: ppastan@richmondco.com

Name of owner(s): Richmond Great Point Development LLC

Address of owner(s): 23 Concord Street, Wilmington MA 01887

I hereby certify that the applicant(s) listed above have been authorized by me to file a subdivision plan with the Planning Board on property that I own.

Owner's signature Philip Pastan, as Manager of Richmond Great Point Development LLC

OK
6/13/16

Received by Town Clerk:

Date: _____

Time: _____

Received by Board of Health:

Date: _____

Time: _____

RECEIVED
JUN 15 2016

BY: AS for BOH

Planning Board File # _____

"ATTACHMENT A"
LIST OF INDIVIDUAL PROPERTIES INCLUDED IN "FORM B" APPLICATION
"OLD SOUTH ROAD CROSSING" DEFINITIVE SUBDIVISION
RICHMOND GREAT POINT DEVELOPMENT LLC (OWNER / APPLICANT)

Index	Parcel Address	Assessor's Tax Map / Parcel ID		Land Court Plan Information	
		Map	Parcel	Plan Number	Lot
1	63 Old South Road	68	157	16514-103	872
2	67 Old South Road	68	158	16514-L	59
3	73 Old South Road	68	129	16514-97	853
4	75 (A) Old South Road	68	999.2	16514-100	858
5	3 Nancy Ann Lane	68	132	16514-Z	160
6	4 Nancy Ann Lane	68	204	16514-103	869
7	5 Nancy Ann Lane	68	133	16514-Z	161
8	6 Nancy Ann Lane	68	205	16514-Z	179
9	8 Nancy Ann Lane	68	206	16514-Z	180
10	10 Nancy Ann Lane	68	207	16514-Z	181
11	12 Nancy Ann Lane	68	176	16514-Z	182
12	14 Nancy Ann Lane	68	130	16514-Z	183
13	2 Greglen Avenue	68	131	16514-Z	159
14	4 Greglen Avenue	68	177	16514-Z	177
15	20 Davkim Lane	68	57	16514-Z	184

**REQUESTED WAIVERS
OLD SOUTH ROAD CROSSING
NANTUCKET, MASSACHUSETTS**

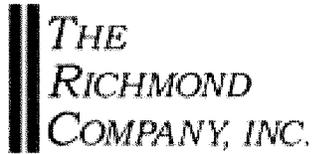
June 2016

Town of Nantucket Rules and Regulations

Section 2.06b(10)	The elevations shown on the plan are NAVD88 rather than half-tide datum.
Section 2.06b(14)(a)	Landscape Plan to be provided prior to Planning Board approval.
Section 2.06b(14)(b)	Existing trees to be saved will be decided during construction.
Section 4.03e	No Right-of-way rounding is proposed on the south side of the intersection of Road B and Greglen Avenue. However, a 28 foot curb radius is being proposed.
Section 4.06(b)(3)	Stormtech® MC-4500 stormwater chambers to be substituted for the leaching basin (Appendix A, Plate No. 12)
Section 4.13	Dry sewer lines are not proposed to be installed.
Section 4.16	Same as Section 2.06b(14)(a) & (b) above.
Section 4.18	No sidewalks are proposed along the sides of the proposed roadway Road B and one sidewalk is proposed along a portion of Road A.
Section 4.23	Soil tests will be provided prior to Planning Board approval.

"ATTACHMENT B"
LIST OF INDIVIDUAL PROPERTIES FOR DERIVATION OF TITLE FOR DEFINITIVE SUBDIVISION
RICHMOND GREAT POINT DEVELOPMENT LLC
"OLD SOUTH ROAD CROSSING" DEFINITIVE SUBDIVISION

Index	Parcel Address	Deed Recording Reference (Date, Book, Page)			Internal Reference in Deed	
		Date	Book	Page	Parcel Number	Page
1	63 Old South Road	August 8, 2013	01397	312	Thirty-Three	7
2	67 Old South Road	August 8, 2013	01397	312	One	1
3	73 Old South Road	August 8, 2013	01397	312	Forty-Three	9
4	75 (A) Old South Road	February 6, 2015	Document # 00147075		n/a	n/a
5	3 Nancy Ann Lane	August 8, 2013	01397	312	Fourteen	4
6	4 Nancy Ann Lane	August 8, 2013	01397	312	Twenty-Seven	6
7	5 Nancy Ann Lane	August 8, 2013	01397	312	Fifteen	4
8	6 Nancy Ann Lane	August 8, 2013	01397	312	Twenty-Eight	6
9	8 Nancy Ann Lane	August 8, 2013	01397	312	Twenty-Nine	6
10	10 Nancy Ann Lane	August 8, 2013	01397	312	Thirty	6
11	12 Nancy Ann Lane	August 8, 2013	01397	312	Thirty-One	7
12	14 Nancy Ann Lane	August 8, 2013	01397	312	Fifty	10
	20% Partial Interest	July 14, 2014	Document # 145051		n/a	n/a
	20% Partial Interest	October 10, 2014	Document # 145942		n/a	n/a
	20% Partial Interest	October 10, 2014	Document # 145959		n/a	n/a
	20% Partial Interest	November 7, 2014	Document # 146249		n/a	n/a
13	2 Greglen Avenue	February 17, 2015	Document # 147131		n/a	n/a
14	4 Greglen Avenue	February 17, 2015	Document # 147135		n/a	n/a
15	20 Davkim Lane	August 8, 2013	01397	312	Thirty-Two	7



The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

June 13, 2016

TOWN OF NANTUCKET
PLANNING BOARD
2 Fairgrounds Road
Nantucket, Massachusetts 02554

Attention: Leslie Woodson Snell, AICP, LEED AP, Deputy Director of Planning

Subject: Submittal of Application for Definitive Subdivision
Richmond Great Point Development LLC (Owner / Developer)
"Old South Road Crossing" Definitive Subdivision

Dear Ms. Snell:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to submit the enclosed completed application (Form B) and associated materials (plans, storm water management report, deeds, etc.) comprising a Definitive Subdivision Plan for the series of adjoining properties located at 42 (Rear), 48 (Rear), and 54 (Rear) Skyline Drive, and 20 Davkim Lane.

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to submit the completed application (Form B) and associated materials (plans, storm water management report, deeds, etc.) to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the approval of a definitive subdivision of land to allow for the reconfiguration of certain roadway segments and the reconfiguration of existing lots in this area comprising a series of thirteen (13) contiguous lots and +/- 1,270 linear feet (0.24 miles) of roadway segments, totaling +/- 24.3 acres of land, located along Old South Road, Nancy Ann Lane, Greglen Avenue, and Davkim Lane.

The submittal is being made in accordance with and conforms to the provisions of Section 2.06 of "The Rules and Regulations Governing the Subdivision of Land, Nantucket, Massachusetts" as well as "The Subdivision Control Law of Massachusetts" (M.G.L. Chapter 41, Sections 81K-81GG, inclusive).

The primary objective of the subdivision is to reconfigure, re-route, and improve the engineering design, safety, and condition of portions of the existing Nancy Ann Lane and Greglen Avenue roadways in the northern center of the Richmond Great Point Development LLC portfolio, which connect into Old South Road (to the north) and Lovers Lane (to the west), to "set the table" to accommodate the mixed-use development that is being proposed on adjacent properties owned by Richmond Great Point Development LLC, primarily comprised of the +/- 15,500 gross square feet series of retail "liner" buildings that are proposed to be developed along the frontage of Old South Road, the 225 unit 'Meadows II' workforce housing rental community that is proposed to be developed on the +/- 14.5 acre 20 and 20(R) Davkim Lane properties, and the 100 lot "Sandpiper Place" workforce homeownership housing community that is proposed to be developed on the +/- 17.2 acre combination of properties located off Old South Road, Daffodil Lane, Mayflower Circle, and Evergreen Way.

The first action proposed, which is the straightening, widening, and improvement to a "boulevard" type design of the segment of Nancy Ann Lane which is located in the northern half of the portfolio, is necessary in order to allow for the development of the retail "liner" buildings and, ultimately, to allow for the enhanced access and capacity that is necessary to allow for the development of the two housing initiatives described above.

In order to develop the two easternmost retail "liner" buildings, the existing stub of Greglen Avenue that currently runs from the northern edge of the existing "Parcel Plus" property located at 2 Greglen Avenue and connects at a stop-sign controlled "T" intersection with Old South Road, offset slightly from the intersection of Goldfinch Drive, located on the northern side of Old South Road, will be abandoned. It is noted that this existing "stub" or "roadway segment" is actually not a right of way that was laid out or approved on any plan, and does not even have status as a legal road; it was simply constructed by a predecessor owner and has been continued to be utilized for this purpose for many years.

The current condition of this "stub" or "roadway segment" creates a quirky and unsafe "S" curve that has very steep radius curves, connecting from the northern end of Nancy Ann Lane, past the "Parcel Plus" property and connecting into Old South Road.

Upon its termination, this "stub" or "roadway segment" will be replaced by a straighter, wider, significantly improved reconfigured Nancy Ann Lane, which will run straight / directly into a (proposed) ninety degree, stop sign controlled "T" intersection with Old South Road, located approximately at the mid-point (roughly equidistant) between the existing Goldfinch Drive entrance and exit intersections to the existing Naushop residential community located on the north side of Old South Road, thereby eliminating the existing unsafe "S" curve with the restricted turning radius.

This new intersection will have a substantially more generous design width, including a center median and multiple dedicated turning lanes, to provide the additional capacity and design enhancements that will be necessary to accommodate the adjacent proposed development and all existing uses and businesses in the area, including the multiple existing trucking-intensive businesses located along the southern portion of Nancy Ann Lane and along Davkim Lane (including Cape Cod Express, Coca-Cola, Pepsi-Cola, Structures Unlimited, and Sayles Seafood).

As shown on the attached plan, a new roadway segment will then also be constructed along the southern boundary of the 4 Greglen Avenue property and the 5 Nancy Ann Lane property, running east to west and connecting Nancy Ann Lane and Greglen Avenue, in order to allow continued cross-access out to Lovers Lane and Old South Road, as a second means of vehicular access and circulation to the area.

The reconfiguration of the roadways, as described herein, will require the slight reconfiguration of the series of +/- fifteen (15) existing properties in the vicinity of the proposed roadway areas, primarily located along Nancy Ann Lane and the northern portion of Greglen Avenue. Most of these properties are vacant and will not be reconfigured until the roadway reconfiguration improvements are completed.

No buildings are proposed to be developed as part of the proposed subdivision; the subdivision is only comprised of the roadway reconfiguration, re-routing, and improvement and the (slight) reconfiguration of the lots surrounding the new roadway configuration.

The current zoning of the land / lots in the area is classified in three different zoning districts; portions are classified within the Commercial Neighborhood (CN) zoning district, portions are classified within the Commercial Trade, Entrepreneurship and Craft (CTEC) zoning district, and portions are classified within the Residential-5 (R-5) zoning district.

The specific dimensional characteristics of the thirteen (13) lots that are proposed to be reconfigured as a result of the proposed subdivision, and the length and area of the proposed roadway segments, will be as follows (following the proposed reconfigurations):

Lot Number on Plan And Street Address	Lot Area (Square Footage)	Lot Area (Square Footage)	Lot Frontage (Linear Feet)	Lot Regularity Factor (rf)
Lot # 1 – 4 Road “C”	38,388	0.88	96.55	0.701
Lot # 2 – 6 Road “C”	37,107	0.85	55.00	0.628
Lot # 3 – 8 Road “C”	52,581	1.21	84.86	0.794
Lot # 4 – 4 Road “A”	47,309	1.09	274.83	0.650
Lot # 5 – 6 Road “A”	28,161	0.65	105.00	0.776
Lot # 6 – 8 Road “A”	28,159	0.65	105.53	0.770
Lot # 7 – 4 Road “A”	36,606	0.84	178.89	0.995
Lot # 8 – 2 Greglen Avenue”	29,520	0.68	178.84	0.998
Lot # 9 – 4 Greglen Avenue	16,366	0.38	75.01	0.929
Lot # 10 – 6 Road “A”	20,145	0.46	80.16	0.913
Lot # 11 – 5 Nancy Ann Lane	22,250	0.51	201.78	0.929
Lot # 12 – 73 Old South Road	102,656	2.35	566.26	0.563
Lot # 13 – 20 Davkim Lane	534,267	12.26	1,331.13	0.552
Roadways (“A” and “B”)	64,900	1.49	1,270 Linear Feet	n/a
Subtotal (Average)	1,058,415	24.30	n/a	0.784

As documented in the above-table and on the attached plans, the thirteen (13) lots resulting from the proposed subdivision will meet or exceed the relevant dimensional criteria and related requirements, as such are established in Section 139-16 (A) and (D) of the Town of Nantucket Zoning Bylaw for each of the applicable zoning districts.

In addition to the completed (Form B) application, attached hereto, we have submitted the following plans and technical materials that are required to be submitted to provide for the processing and approval of the proposed subdivision, including: (1) the *Definitive Plan, Old South Road Crossing, Nantucket, Mass* as prepared by Hayes Engineering, Inc., dated June 9, 2016, depicting the subdivision of the lots along with the applicable / customary notes and details (totaling 11 sheets), (2) the *Site Analysis Report*, as prepared by Hayes Engineering, Inc., dated June 10, 2016, (3) the *Street Network Plan*, as prepared by Hayes Engineering, Inc., dated June 9, 2016, and (4) the *Requested Waivers*, as prepared by Hayes Engineering, Inc., dated June 2016. Additional detail on the drainage improvements for the proposed roadways and a full *Stormwater Management Plan* will be submitted under separate cover, at a later date, once the additional design of this system has been refined.

We have also attached “Attachment A” and “Attachment B” to the Form B application form, detailing the specifics of the fifteen (15) existing parcels that comprise the proposed subdivision and the derivation of the title to the land comprising the proposed subdivision, given that the land includes multiple parcels, and that title to several of the parcels has been derived from different sellers / grantors.

"Old South Road Crossing"
Definitive Subdivision Plan Submittal
June 13, 2016
Page Four

We trust that this submittal conforms to the applicable requirements for such a Definitive Subdivision Plan (AR) and we look forward to the completion of your review and the subsequent review and approval of the plan by the Town of Nantucket Planning Board.

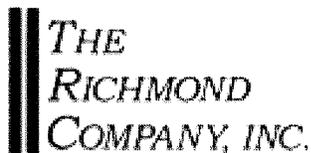
If you any immediate questions with respect to either the application or the enclosed materials, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,



David J. Armanetti, Director of Real Estate Development
The Richmond Company, Inc. (Applicant / Development Manager)
On Behalf of Richmond Great Point Development LLC (Owner)

Cc: Philip Pastan, TRC
Kathryn Fossa, TRC
Patricia Roggeveen, RGPDLLC
Shane Valero, RGPDLLC
John Ogren, Hayes Engineering
Andrew Burek, Esq., TRC
Arthur Reade, Esq.



The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

June 13, 2016

TOWN OF NANTUCKET
TOWN CLERK
16 Broad Street
Nantucket, Massachusetts 02554

Attention: Catherine Flanagan Stover, MMC, CMMC

Subject: Submittal of Application for Definitive Subdivision
Richmond Great Point Development LLC (Owner / Developer)
"Old South Road Crossing" Definitive Subdivision

Dear Mrs. Stover:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to document submittal of the completed application to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the approval of a definitive subdivision of land to allow for the reconfiguration of certain roadway segments and the reconfiguration of lots in this area comprising a series of thirteen (13) contiguous lots and several proposed roadway segments, totaling +/- 24.3 acres of land, located along Old South Road, Nancy Ann Lane, Greglen Avenue, and Davkim Lane.

The Notice (and copy of the completed (Form B) application and accompanying plan) is being submitted to your office in accordance with and conforms to the provisions of Section 2.06 of "The Rules and Regulations Governing the Subdivision of Land, Nantucket, Massachusetts" as well as "The Subdivision Control Law of Massachusetts" (M.G.L. Chapter 41, Sections 81K-81GG, inclusive).

Upon your acknowledgment of receipt of this Notice (by way of time / date stamping the application), we intend to submit the original completed (Form B) application and accompanying plan to the Town of Nantucket Planning Board to obtain its review and subsequent approval.

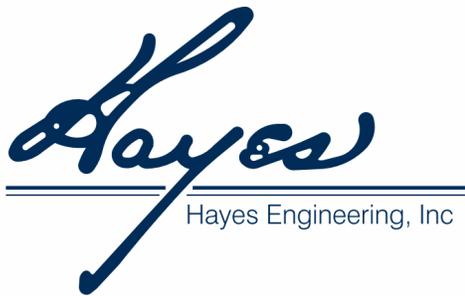
Should you have any questions with respect to the application and submittal, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,

A handwritten signature in black ink, appearing to read 'David J. Armanetti', written in a cursive style.

David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc.
On Behalf of Richmond Great Point Development LLC

Cc: Andrew Burek, Esq., TRC
Arthur Reade, Jr., Esq., RGH



603 Salem Street
 Wakefield, MA 01880
 Tel: (781) 246-2800
 Fax: (781) 246-7596

Nantucket, MA 02554
 Tel: (508) 228-7909

Refer to File No. NAN-0107J

**SITE ANALYSIS REPORT
 OLD SOUTH ROAD CROSSING
 NANTUCKET, MASSACHUSETTS**

June 10, 2016

This site analysis report was prepared as part of the submission requirements of a definitive subdivision plan in accordance with Section II, 2.06(a) (11) of the Rules and Regulations of the Planning Board for the Town of Nantucket, as amended. This subdivision plan proposes the creation of thirteen (13) lots, in conjunction with 1,268 linear feet of roadway, together with approximately 2,300 linear feet of improvements to Old South Road, Greglen Avenue and Nancy Ann Lane (Road C) as shown on the subdivision plans. The new roadways, known as Road A and Road B are proposed to be constructed as shown on the typical cross-sections illustrated on the profile plans, in order to provide frontage and adequate access to the lots within the parcel in a safe and convenient manner.

The site, being approximately 24.3 acres in extent, is located approximately 2.1 miles southeast of the town center, and is currently consists of undeveloped meadow, areas of interspersed scrub oak and pines (brush) and areas of developed residential and commercial lands, buildings and driveways. The topography of the site ranges from approximately 22 feet above the North American Vertical Datum of 1988 (NAVD88) to approximately elevation 43.

The area in which the project is proposed to be constructed is within the CN, R-5 and CTEC zoning districts. Zoning requirements for each district are summarized in the table below:

Criteria	CN Zoning District	R-5 Zoning District	CTEC Zoning District
Lot Area	7,500 sf.	5,000 sf.	10,000 sf.
Lot Frontage	50 feet	50 feet	50 feet
Front Yard	10 feet	10 feet	10 feet
Side Yard	5 feet	10 feet on one-side, 5 feet thereafter	5 feet
Rear Yard	10 feet	5 feet	10 feet
Ground Cover	40%	40%	40%

Lot areas of proposed lots vary from 16,000 sf. to 534,000 sf.

The property is comprised of Evesboro soils and were determined by using the Web Soil Survey from the National Cooperative Soil Survey for Nantucket County. The Evesboro sands consist of excessively-drained soil, generally found in smooth, irregular-shaped areas, as reported by the Soil Conservation Service. It is expected that the permeability of the soil is rapid in the surface layer and subsoil, and very rapid in the substratum.

Due to the granular nature and the grain size of the Evesboro soils coupled with the site topography and proposed drainage design leads us to believe that erosion is not expected to be a problem. Likewise, these soils are largely void of the small grain sizes, and do not produce excessively dusty conditions. Should dust control be required, it would be handled by wetting the surface of exposed areas during periods of activity of construction vehicles or in highly windy conditions. No other form of dust control is anticipated.

No surface water resources are present on the parcel being developed, nor are any portion of the site subject to the Wetlands Protection Act for Coastal Wetland Areas (M.G.L. Chapter 131, Section 40).

No areas of the site are represented as having severe limitations due to seasonal high water table. Similarly, no portion of the site is designated as being in a Zone A, B or V, as shown on the Flood Insurance Rate Map (FIRM), Community Panel #25019C0089G, effective date June 9, 2014.

The Evesboro sands typically provide poor potential for growth of vegetation.. The site is generally comprised of a sand and gravel pit with paved areas, numerous storage structures and gravel drives. There exists scattered clusters of vegetation on the southern end of the property of vegetation with the remained either pavement or devoid of vegetation. Any tree removal for the proposed roadways will be minimal as the majority of the area within the proposed roadway is currently gravel driveways or the sand and gravel pit.

An examination of the profile sheets submitted with the plan reveals that no major changes in watershed areas or directions are contemplated by construction of the subdivision proposed in this application. The general design approach for management of storm water is to collect the roadway drainage as well as runoff from portions of the site. This runoff is to be collected in deep sump catch basins, and then directed via a closed pipe system VortSentry treatment devices and discharge to proposed subsurface infiltration areas. The closed piping system shall be designed with sufficient capacity to accommodate the 25-year design storm and mitigation for the 100-year design storm. Stormwater entering the proposed subsurface infiltration area will provide for groundwater recharge in the proposed development. Also, the proposed deep sump catch basins and VortSentry devices will improve the water quality of the runoff from the proposed roadway.

The improvements which are contemplated for construction of the subdivision roadways include rights-of-ways with varying width as depicted on the plans. Existing roadways to be abandoned shall have pavement and infrastructure removed. Minimum pavement width for newly proposed roadways having two-way (bidirectional) traffic is 24-feet.

Sanitary sewer from the lots are proposed to be connected to municipal sanitary facilities available in Old South Road proximate to the intersection with Goldfinch Drive.

Potable water will be provided for domestic purposes by connecting to the Town water supply. The proposed eight (8) inch water main through the project will be connected to an existing twelve (12) inch water main in Old South Road and existing eight (8) inch water main in Nancy Ann Lane.

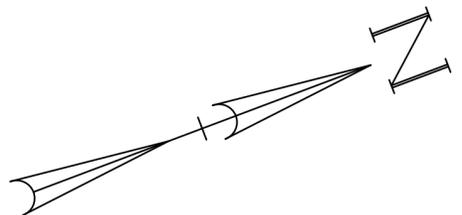
The project roadways are provided to service future commercial and residential\multifamily developments within the project limits. The proposed roadway system will connect two existing roadways, Greglen Avenue and Nancy Ann Lane to Old South Road. These connection will provide for adequate site distances so as to enable vehicles to safely enter and exit the property, as well as providing adequate access for emergency vehicles.

The traffic generated by uses adjacent to the proposed roadway will add to the existing traffic volumes of the surrounding streets. Roadway improvements are proposed in Old South Road to mitigate new traffic generation. The geometry and construction of the proposed roadway system will provide for a safe and convenient alignment for vehicular traffic and access to the lots by emergency vehicles.

A sidewalk is being proposed along one side of the proposed Road A right-of-way.

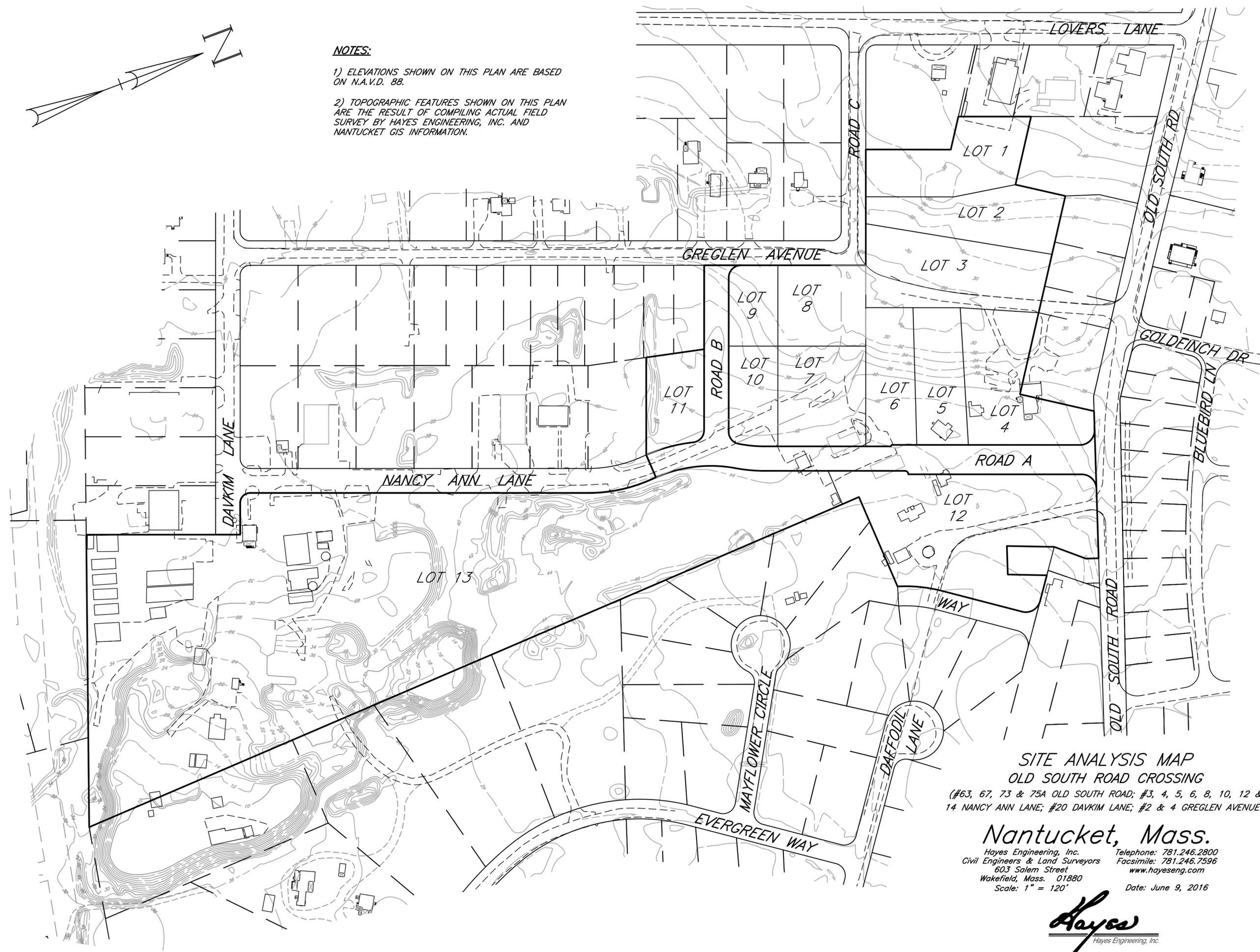
It is presently anticipated that all construction related to the physical roadway and infrastructure improvements would be completed within two (2) years following the receipt of all necessary approvals.

There are no proposed common open spaces associated with this development.



NOTES:

- 1) ELEVATIONS SHOWN ON THIS PLAN ARE BASED ON N.A.V.D. 88.
- 2) TOPOGRAPHIC FEATURES SHOWN ON THIS PLAN ARE THE RESULT OF COMPILING ACTUAL FIELD SURVEY BY HAYES ENGINEERING, INC. AND NANTUCKET GIS INFORMATION.

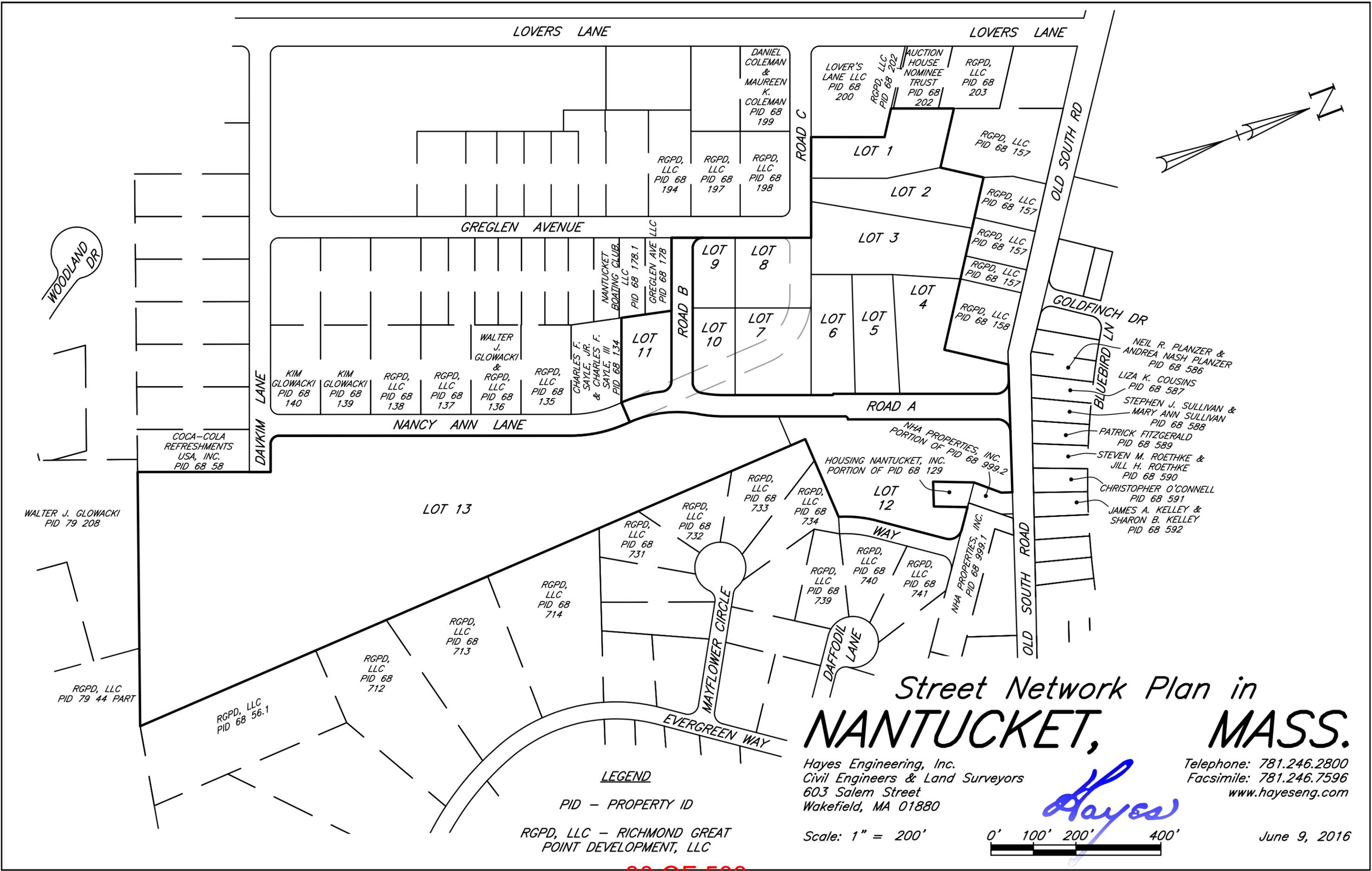


SITE ANALYSIS MAP
OLD SOUTH ROAD CROSSING
(#63, 67, 73 & 75A OLD SOUTH ROAD; #3, 4, 5, 6, 8, 10, 12 & 14 NANCY ANN LANE; #20 DAVKIM LANE; #2 & 4 GREGLEN AVENUE)

Nantucket, Mass.

Hayes Engineering, Inc. Telephone: 781.246.2800
Civil Engineers & Land Surveyors Facsimile: 781.246.7596
603 Salem Street
Wakefield, Mass. 01880 www.hayeseng.com
Scale: 1" = 120' Date: June 9, 2016





Street Network Plan in NANTUCKET, MASS.

Hayes Engineering, Inc.
Civil Engineers & Land Surveyors
603 Salem Street
Wakefield, MA 01880

Telephone: 781.246.2800
Facsimile: 781.246.7596
www.hayeseng.com



Scale: 1" = 200'

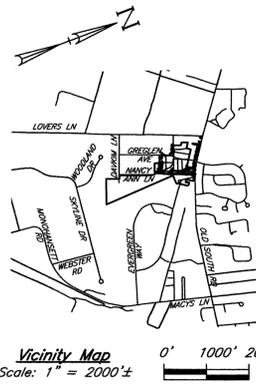


June 9, 2016

LEGEND

PID - PROPERTY ID

RGPD, LLC - RICHMOND GREAT
POINT DEVELOPMENT, LLC



Subdivision Plan of Land in NANTUCKET, MASS.

Being a Subdivision of Lot 59 on LC Plan 16514-L, Lots 159, 160, 161, 177, 179, 180, 181, 182, 183 & 184 on LC Plan 16514-Z, Lot 853 on LC Plan 16514-97, Lot 858 on LC Plan 16514-100, & Lots 869 & 872 on LC Plan 16514-103

Hayes Engineering, Inc.
Civil Engineers & Land Surveyors
603 Salem Street
Wakefield, MA 01880
Telephone: 781.246.2800
Facsimile: 781.246.7596
www.hayeseng.com

Scale: 1" = 100' June 9, 2016

I CERTIFY THAT AS OF THE DATE OF THIS SURVEY, THE MONUMENTS CONTROLLING PRIOR PLANS ARE IN THE GROUND AS SHOWN AND DESCRIBED HEREON. I FURTHER CERTIFY THAT ANY ADDITIONAL MONUMENTS SHOWN HEREON HAVE BEEN SET IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 AS OF THE DATE OF THIS SURVEY.

I CERTIFY THAT THIS PLAN WAS DRAWN FROM AN ACTUAL SURVEY MADE ON THE GROUND IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 BETWEEN NOVEMBER 20, 2012 AND JUNE 3, 2016.

EDM ACCURACY ±(2 MM + 2 PPM)
TRAVERSE PRECISION (RAW) = 1:52,714
LINEAR ERROR OF CLOSURE (RAW) = 0.16 FEET
DIRECTIONAL ERROR OF CLOSURE = S53°E

DATE: JUNE 9, 2016 PROFESSIONAL LAND SURVEYOR

CURRENT OWNERSHIP

RICHMOND GREAT POINT DEVELOPMENT, LLC

LAND COURT CERTIFICATE NO. 24872

[LOT 59 ON LC PLAN 16514-L]
#67 OLD SOUTH ROAD
PROPERTY ID 68 158

[LOT 160 ON LC PLAN 16514-Z]
#3 NANCY ANN LANE
PROPERTY ID 68 132

[LOT 161 ON LC PLAN 16514-Z]
#5 NANCY ANN LANE
PROPERTY ID 68 133

[LOT 179 ON LC PLAN 16514-Z]
#6 NANCY ANN LANE
PROPERTY ID 68 205

[LOT 180 ON LC PLAN 16514-Z]
#8 NANCY ANN LANE
PROPERTY ID 68 206

[LOT 181 ON LC PLAN 16514-Z]
#10 NANCY ANN LANE
PROPERTY ID 68 207

[LOT 182 ON LC PLAN 16514-Z]
#12 NANCY ANN LANE
PROPERTY ID 68 176

[LOT 184 ON LC PLAN 16514-Z]
#20 DAVKIM LANE
PROPERTY ID 68 57

[LOT 853 ON LC PLAN 16514-97]
#73 OLD SOUTH ROAD
PORTION OF PROPERTY ID 68 129

[LOT 869 ON LC PLAN 16514-103]
#4 NANCY ANN LANE
PROPERTY ID 68 204

[LOT 872 ON LC PLAN 16514-103]
#63 OLD SOUTH ROAD
PROPERTY ID 68 157

LC CERTIFICATE NOS. 12709 & 25430

[LOT 183 ON LC PLAN 16514-Z]
#14 NANCY ANN LANE
PROPERTY ID 68 130

LAND COURT CERTIFICATE NO. 25525

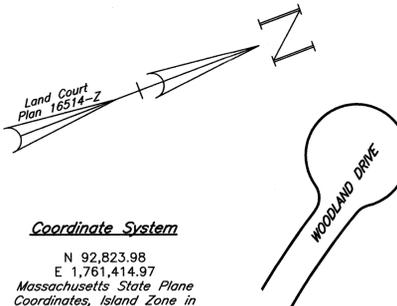
[LOT 858 ON LC PLAN 16514-100]
#75A OLD SOUTH ROAD
PROPERTY ID 68 999.2

LAND COURT CERTIFICATE NO. 25529

[LOT 159 ON LC PLAN 16514-Z]
#2 GREGLAN AVENUE
PROPERTY ID 68 131

LAND COURT CERTIFICATE NO. 25530

[LOT 177 ON LC PLAN 16514-Z]
#4 GREGLAN AVENUE
PROPERTY ID 68 177



Coordinate System

N 92,823.98
E 1,761,414.97
Massachusetts State Plane
Coordinates, Island Zone in
US Survey feet based upon
Nantucket Primary Airport
Control Station designation
ACK ARP (PID - AB3245)
NAD 83(2011) position.

LEGEND

CBDF - CONCRETE BOUND
WITH DRILL HOLE
(FD) - FOUND
LC - LAND COURT
- REGULARITY FACTOR
□ - PROPOSED
CONCRETE BOUND
WITH DRILL HOLE TO BE
SET BY OWNER UNLESS
OTHERWISE NOTED

ZONE: CN

MINIMUM LOT AREA = 7,500 S.F.
MINIMUM LOT FRONTAGE = 50 FEET
MINIMUM YARD SETBACKS
FRONT = 10 FEET
SIDE = 5 FEET
REAR = 10 FEET
ALLOWABLE GROUND COVER % = 40%

ZONE: R-5

MINIMUM LOT AREA = 5,000 S.F.
MINIMUM LOT FRONTAGE = 50 FEET
MINIMUM YARD SETBACKS
FRONT = 10 FEET
SIDE = 10 FEET ON ONE SIDE,
5 FEET THEREAFTER
REAR = 5 FEET
ALLOWABLE GROUND COVER % = 40%

ZONE: CTEC

MINIMUM LOT AREA = 10,000 S.F.
MINIMUM LOT FRONTAGE = 50 FEET
MINIMUM YARD SETBACKS
FRONT = 10 FEET
SIDE = 5 FEET
REAR = 10 FEET
ALLOWABLE GROUND COVER % = 40%

REGULARITY FACTOR (#) SHALL NOT
BE LESS THAN 0.55

SHEET INDEX:

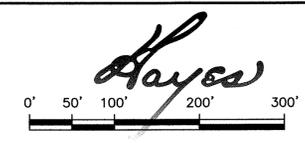
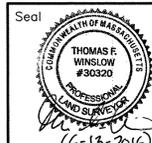
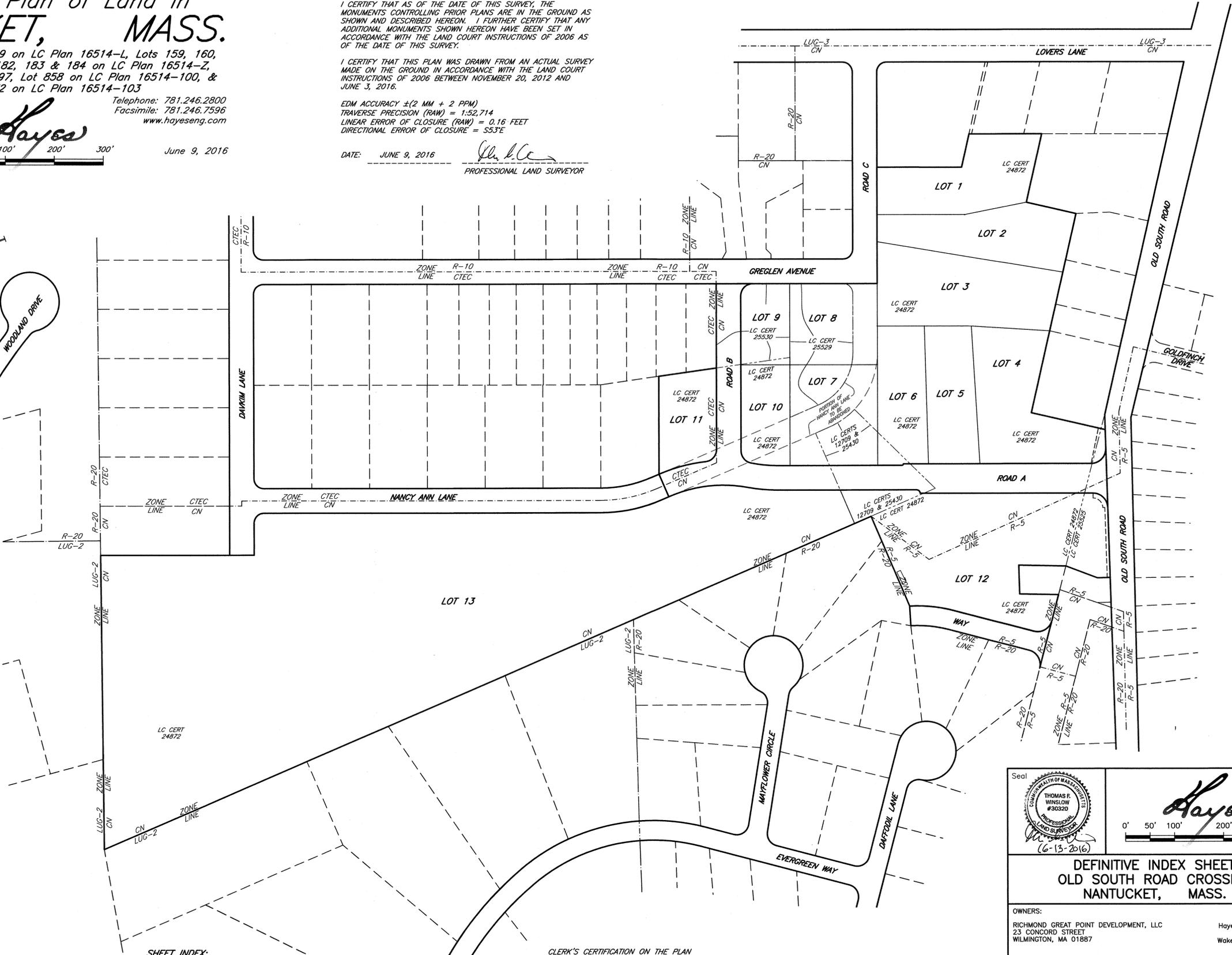
SHEET 1 of 11: DEFINITIVE INDEX SHEET
SHEET 2 of 11: DEFINITIVE PLAN SHEET 1 (LOTS 1-3)
SHEET 3 of 11: DEFINITIVE PLAN SHEET 2 (LOTS 4-12)
SHEET 4 of 11: DEFINITIVE PLAN SHEET 3 (LOT 13)
SHEET 5 of 11: DEFINITIVE PLAN SHEET 4 (ABANDONMENT PLAN)
SHEET 6 of 11: DEFINITIVE TOPOGRAPHIC PLAN SHEET 1
SHEET 7 of 11: DEFINITIVE PLAN & PROFILE SHEET 1
SHEET 8 of 11: DEFINITIVE PLAN & PROFILE SHEET 2
SHEET 9 of 11: ROADWAY IMPROVEMENTS & SEWER SHEET 1
SHEET 10 of 11: ROADWAY IMPROVEMENTS SHEET 2
SHEET 11 of 11: DETAIL SHEET

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET,
DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY
THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS
OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS
NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

NOTES:
1. LOTS SHOWN HEREON COMPLY WITH THE LOT AREA REQUIREMENTS AS PROVIDED IN THE NANTUCKET ZONING BYLAW, CHAPTER 139 ss 2A AND 16A.
2. THE PLANNING BOARD DETERMINES THAT LOTS 1 THROUGH 13 DO NOT CONTAIN AREAS SUBJECT TO PROTECTION UNDER THE MASSACHUSETTS PROTECTION ACT WHICH ARE REQUIRED TO BE EXCLUDED FROM LOT AREA UNDER THE NANTUCKET ZONING BY-LAW, BUT STILL MAY BE SUBJECT TO PROTECTION UNDER STATE AND LOCAL WETLAND BYLAWS. DETERMINATION MAY BE OBTAINED THROUGH APPLICATION TO THE CONSERVATION COMMISSION.



DEFINITIVE INDEX SHEET OLD SOUTH ROAD CROSSING NANTUCKET, MASS.

OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887
Engineer: Hayes Engineering, Inc.
603 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

Scale: 1" = 100' June 9, 2016

10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
No.	Revision	Date

NANTUCKET PLANNING BOARD	Application Filed: _____
	Final Plan Filed: _____
	Hearing Date: _____
	Plan Approved: _____
	Plan Signed: _____
INDEX SHEET	
SHEET 1 OF 11	

Subdivision Plan of Land in NANTUCKET, MASS.

Being a Subdivision of Lot 59 on LC Plan 16514-L, Lots 159, 160, 161, 177, 179, 180, 181, 182, 183 & 184 on LC Plan 16514-Z, Lot 853 on LC Plan 16514-97, Lot 858 on LC Plan 16514-100, & Lots 869 & 872 on LC Plan 16514-103

Hayes Engineering, Inc.
Civil Engineers & Land Surveyors
603 Salem Street
Wakefield, MA 01880

Telephone: 781.246.2800
Facsimile: 781.246.7596
www.hayeseng.com

Scale: 1" = 40'



June 9, 2016

Coordinate System

N 92,823.98
E 1,761,414.97
Massachusetts State Plane
Coordinates, Island Zone in
US Survey feet based upon
Nantucket Primary Airport
Control Station designation
ACK ARP (PID - A83245)
NAD 83(2011) position.

LEGEND

- CBDH - CONCRETE BOUND WITH DRILL HOLE
- (FD) - FOUND
- LC - LAND COURT
- rf - REGULARITY FACTOR
- - PROPOSED CONCRETE BOUND WITH DRILL HOLE TO BE SET BY OWNER UNLESS OTHERWISE NOTED

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

NOTES:

- LOTS SHOWN HEREON COMPLY WITH THE LOT AREA REQUIREMENTS AS PROVIDED IN THE NANTUCKET ZONING BYLAW, CHAPTER 139 ss 2A AND 16A.
- THE PLANNING BOARD DETERMINES THAT LOTS 1 THROUGH 13 DO NOT CONTAIN AREAS SUBJECT TO PROTECTION UNDER THE MASSACHUSETTS PROTECTION ACT WHICH ARE REQUIRED TO BE EXCLUDED FROM LOT AREA UNDER THE NANTUCKET ZONING BY-LAW, BUT STILL MAY BE SUBJECT TO PROTECTION UNDER STATE AND LOCAL WETLAND BYLAWS. DETERMINATION MAY BE OBTAINED THROUGH APPLICATION TO THE CONSERVATION COMMISSION.

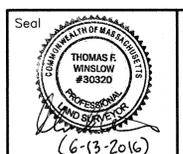
I CERTIFY THAT AS OF THE DATE OF THIS SURVEY, THE MONUMENTS CONTROLLING PRIOR PLANS ARE IN THE GROUND AS SHOWN AND DESCRIBED HEREON. I FURTHER CERTIFY THAT ANY ADDITIONAL MONUMENTS SHOWN HEREON HAVE BEEN SET IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 AS OF THE DATE OF THIS SURVEY.

I CERTIFY THAT THIS PLAN WAS DRAWN FROM AN ACTUAL SURVEY MADE ON THE GROUND IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 BETWEEN NOVEMBER 20, 2012 AND JUNE 3, 2016.

EDM ACCURACY ±(2 MM + 2 PPM)
TRAVERSE PRECISION (RAW) = 1:52,714
LINEAR ERROR OF CLOSURE (RAW) = 0.16 FEET
DIRECTIONAL ERROR OF CLOSURE = 55.3"

DATE: JUNE 9, 2016

PROFESSIONAL LAND SURVEYOR



Hayes Engineering, Inc.
603 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

DEFINITIVE PLAN OLD SOUTH ROAD CROSSING NANTUCKET, MASS.

OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET WILMINGTON, MA 01887

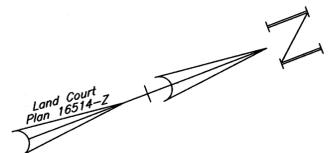
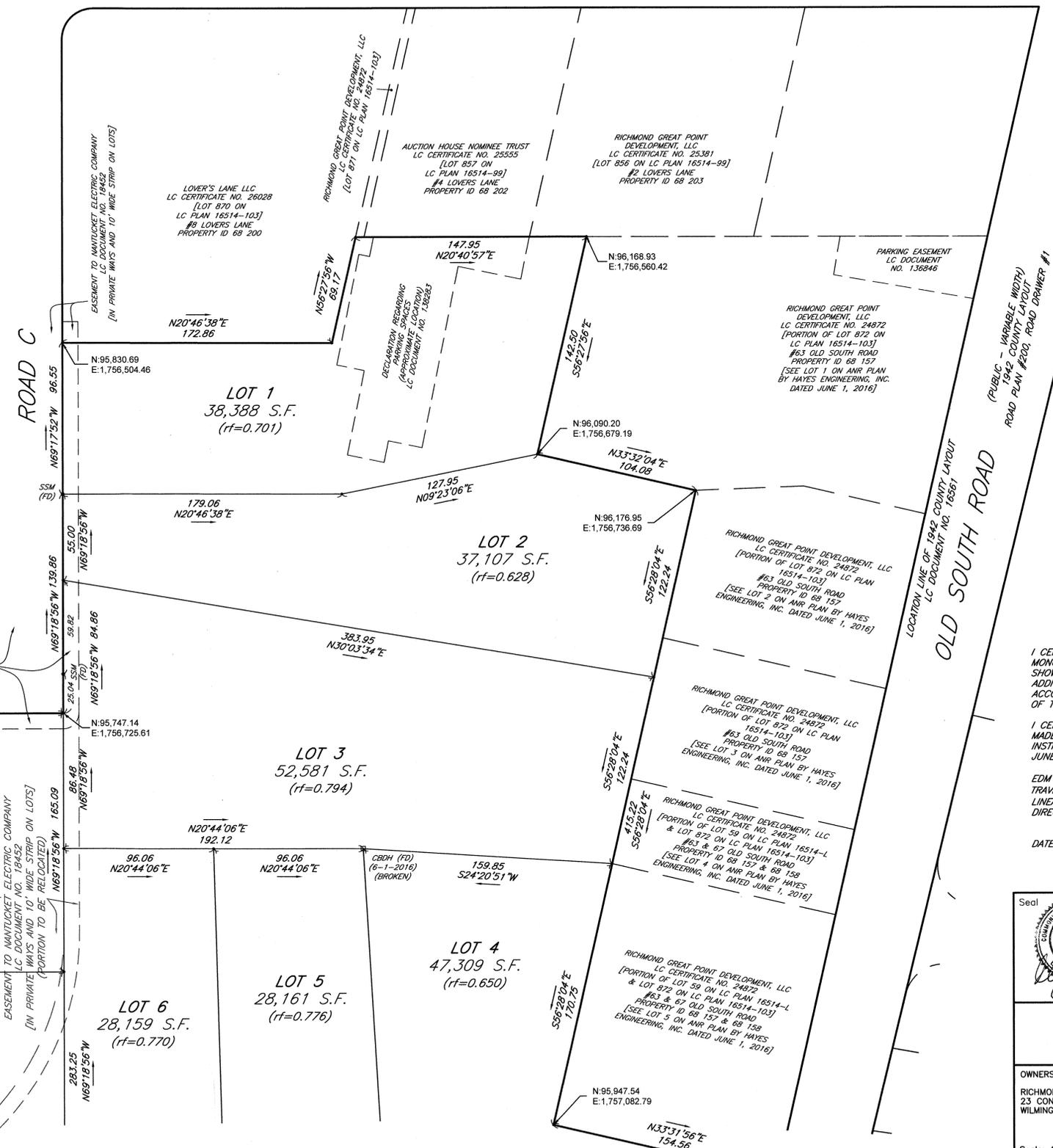
Scale: 1" = 40' June 9, 2016

10	NANTUCKET PLANNING BOARD	Application Filed: _____
9		Final Plan Filed: _____
8		Hearing Date: _____
7		Plan Approved: _____
6		Plan Signed: _____
5		
4		
3		
2		
1		
No.	Revision	Date

PLAN SHEET 1 OF 4

SHEET 2 OF 11

LOVERS LANE



Subdivision Plan of Land in NANTUCKET, MASS.

Being a Subdivision of Lot 59 on LC Plan 16514-L, Lots 159, 160, 161, 177, 179, 180, 181, 182, 183 & 184 on LC Plan 16514-Z, Lot 853 on LC Plan 16514-97, Lot 858 on LC Plan 16514-100, & Lots 869 & 872 on LC Plan 16514-103

Hayes Engineering, Inc. Telephone: 781.246.2800
Civil Engineers & Land Surveyors Facsimile: 781.246.7596
603 Salem Street Wakefield, MA 01880 www.hayeseng.com

Scale: 1" = 40' Date: June 9, 2016

Coordinate System

N 92,823.98
E 1,761,414.97
Massachusetts State Plane
Coordinates, Island Zone in
US Survey Feet based upon
Nantucket Primary Airport
Control Station designation
ACK ARP (FD - AB3245)
NAD 83(2011) position.

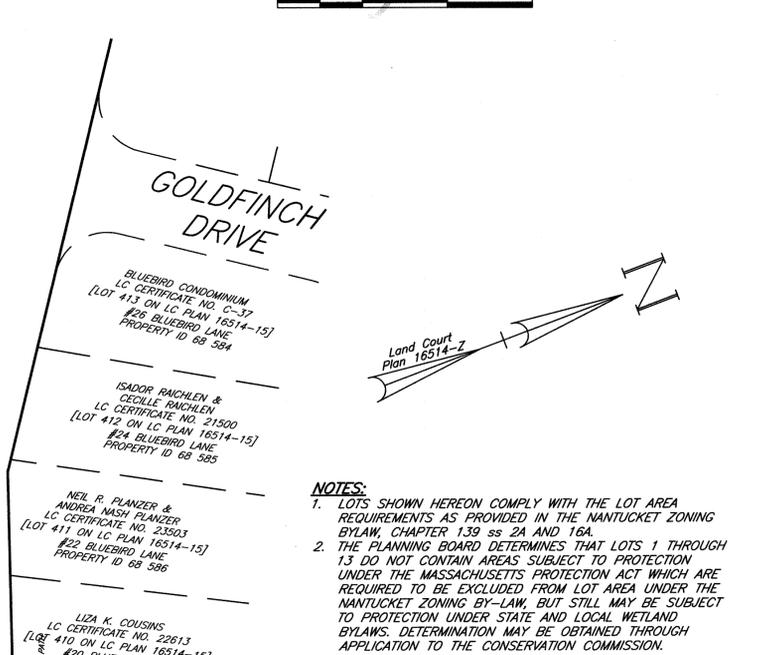
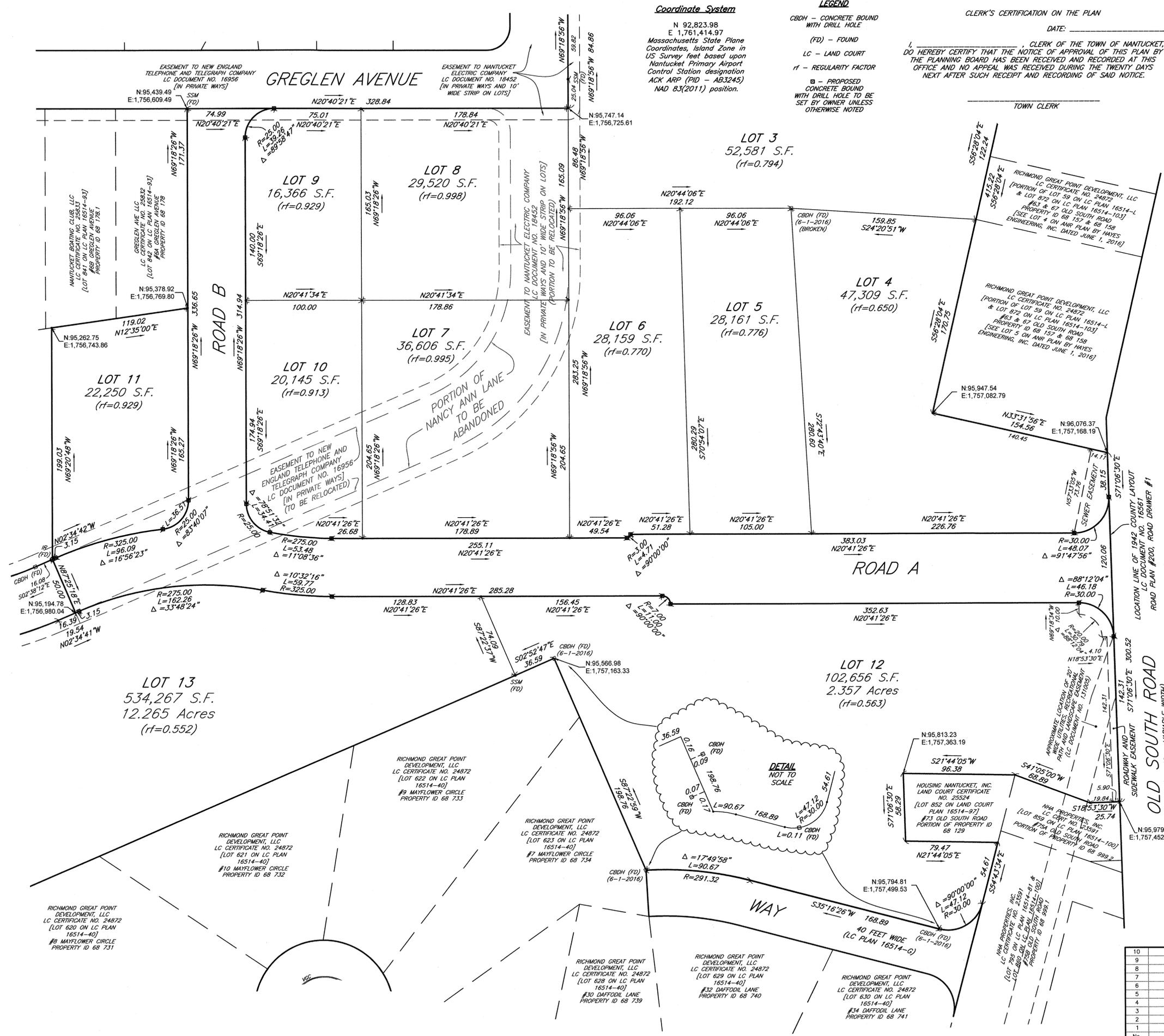
LEGEND

- CBDH - CONCRETE BOUND WITH DRILL HOLE
- (FD) - FOUND
- LC - LAND COURT
- rf - REGULARITY FACTOR
- - PROPOSED CONCRETE BOUND WITH DRILL HOLE TO BE SET BY OWNER UNLESS OTHERWISE NOTED

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK



NOTES:
1. LOTS SHOWN HEREON COMPLY WITH THE LOT AREA REQUIREMENTS AS PROVIDED IN THE NANTUCKET ZONING BYLAW, CHAPTER 139 ss 2A AND 16A.
2. THE PLANNING BOARD DETERMINES THAT LOTS 1 THROUGH 13 DO NOT CONTAIN AREAS SUBJECT TO PROTECTION UNDER THE MASSACHUSETTS PROTECTION ACT WHICH ARE REQUIRED TO BE EXCLUDED FROM LOT AREA UNDER THE NANTUCKET ZONING BY-LAW, BUT STILL MAY BE SUBJECT TO PROTECTION UNDER STATE AND LOCAL WETLAND BYLAWS. DETERMINATION MAY BE OBTAINED THROUGH APPLICATION TO THE CONSERVATION COMMISSION.

I CERTIFY THAT AS OF THE DATE OF THIS SURVEY, THE MONUMENTS CONTROLLING PRIOR PLANS ARE IN THE GROUND AS SHOWN AND DESCRIBED HEREON. I FURTHER CERTIFY THAT ANY ADDITIONAL MONUMENTS SHOWN HEREON HAVE BEEN SET IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 AS OF THE DATE OF THIS SURVEY.
I CERTIFY THAT THIS PLAN WAS DRAWN FROM AN ACTUAL SURVEY MADE ON THE GROUND IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 BETWEEN NOVEMBER 20, 2012 AND JUNE 3, 2016.
EDM ACCURACY ±(2 MM + 2 PPM)
TRAVERSE PRECISION (RAW) = 1:52,714
LINEAR ERROR OF CLOSURE (RAW) = 0.16 FEET
DIRECTIONAL ERROR OF CLOSURE = S53°E

DATE: JUNE 9, 2016
PROFESSIONAL LAND SURVEYOR

Seal of Thomas F. Winslow, Professional Land Surveyor, No. 30320, State of Massachusetts. Signature of Thomas F. Winslow.

DEFINITIVE PLAN OLD SOUTH ROAD CROSSING NANTUCKET, MASS.

OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
Engineer: Hayes Engineering, Inc. 603 Salem Street, Wakefield, Mass. 01880, www.hayeseng.com

10	Revision	Date
9		
8		
7		
6		
5		
4		
3		
2		
1		

Scale: 1" = 40' June 9, 2016

NANTUCKET PLANNING BOARD	Application Filed: _____
	Final Plan Filed: _____
	Hearing Date: _____
	Plan Approved: _____
	Plan Signed: _____

PLAN SHEET 2 OF 4
SHEET 3 OF 11

Subdivision Plan of Land in NANTUCKET, MASS.

Being a Subdivision of Lot 59 on LC Plan 16514-L, Lots 159, 160, 161, 177, 179, 180, 181, 182, 183 & 184 on LC Plan 16514-Z, Lot 853 on LC Plan 16514-97, Lot 858 on LC Plan 16514-100, & Lots 869 & 872 on LC Plan 16514-103

Hayes Engineering, Inc.
Civil Engineers & Land Surveyors
603 Salem Street
Wakefield, MA 01880

Telephone: 781.246.2800
Facsimile: 781.246.7596
www.hayeseng.com

Scale: 1" = 40'



June 9, 2016

CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

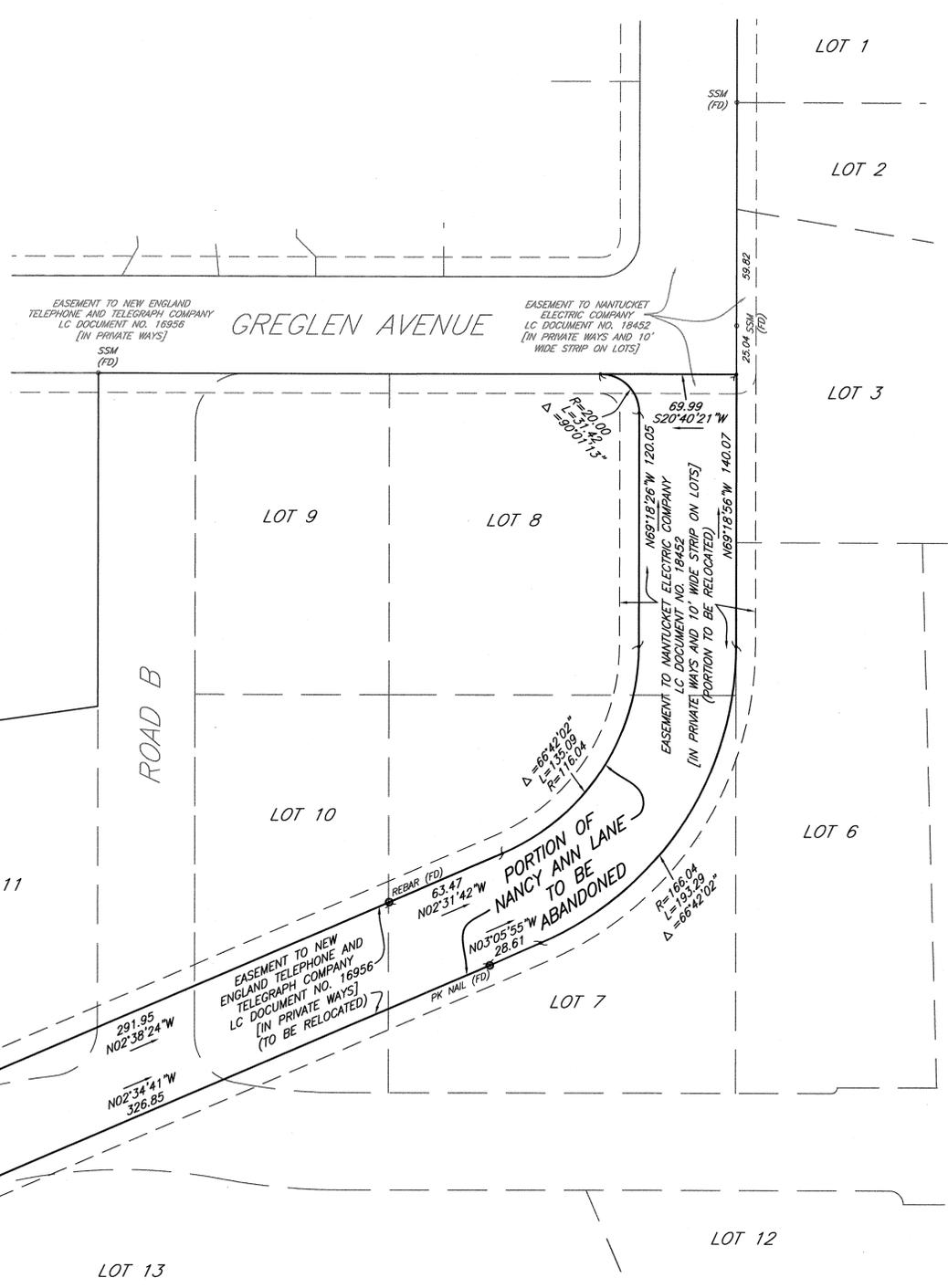
TOWN CLERK

Coordinate System

N 92,823.98
E 1,761,414.97
Massachusetts State Plane
Coordinates, Island Zone in
US Survey feet based upon
Nantucket Primary Airport
Control Station designation
ACK ARP (PID - AB3245)
NAD 83(2011) position.

LEGEND

CBDH - CONCRETE BOUND
WITH DRILL HOLE
(FD) - FOUND
LC - LAND COURT
r - REGULARITY FACTOR
□ - PROPOSED
CONCRETE BOUND
WITH DRILL HOLE TO BE
SET BY OWNER UNLESS
OTHERWISE NOTED



NOTES:

- LOTS SHOWN HEREON COMPLY WITH THE LOT AREA REQUIREMENTS AS PROVIDED IN THE NANTUCKET ZONING BYLAW, CHAPTER 139 ss 2A AND 16A.
- THE PLANNING BOARD DETERMINES THAT LOTS 1 THROUGH 13 DO NOT CONTAIN AREAS SUBJECT TO PROTECTION UNDER THE MASSACHUSETTS PROTECTION ACT WHICH ARE REQUIRED TO BE EXCLUDED FROM LOT AREA UNDER THE NANTUCKET ZONING BY-LAW, BUT STILL MAY BE SUBJECT TO PROTECTION UNDER STATE AND LOCAL WETLAND BYLAWS. DETERMINATION MAY BE OBTAINED THROUGH APPLICATION TO THE CONSERVATION COMMISSION.

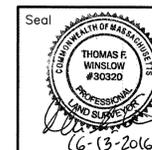
I CERTIFY THAT AS OF THE DATE OF THIS SURVEY, THE MONUMENTS CONTROLLING PRIOR PLANS ARE IN THE GROUND AS SHOWN AND DESCRIBED HEREON. I FURTHER CERTIFY THAT ANY ADDITIONAL MONUMENTS SHOWN HEREON HAVE BEEN SET IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 AS OF THE DATE OF THIS SURVEY.

I CERTIFY THAT THIS PLAN WAS DRAWN FROM AN ACTUAL SURVEY MADE ON THE GROUND IN ACCORDANCE WITH THE LAND COURT INSTRUCTIONS OF 2006 BETWEEN NOVEMBER 20, 2012 AND JUNE 3, 2016.

EDM ACCURACY ±(2 MM + 2 PPM)
TRAVERSE PRECISION (RAW) = 1:52,714
LINEAR ERROR OF CLOSURE (RAW) = 0.16 FEET
DIRECTIONAL ERROR OF CLOSURE = S53°E

DATE: JUNE 9, 2016

PROFESSIONAL LAND SURVEYOR



DEFINITIVE PLAN OLD SOUTH ROAD CROSSING NANTUCKET, MASS.

OWNERS: _____ Engineer
RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887
Hayes Engineering, Inc.
603 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

Scale: 1" = 40'

June 9, 2016

10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
No.	Revision	Date

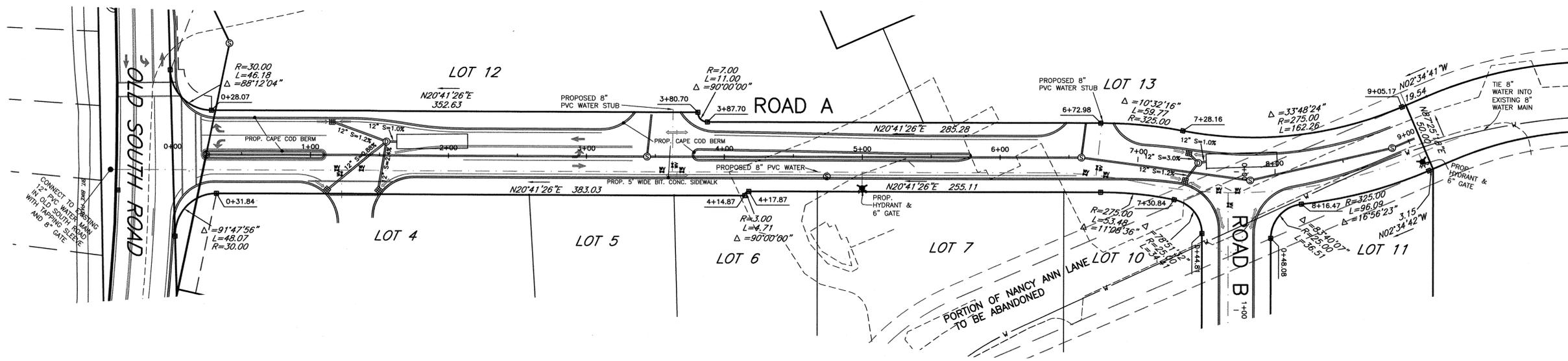
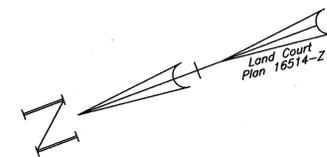
NANTUCKET PLANNING BOARD	Application Filed: _____
	Final Plan Filed: _____
	Hearing Date: _____
	Plan Approved: _____
	Plan Signed: _____
PLAN SHEET 4 OF 4	
SHEET 5 OF 11	

CLERK'S CERTIFICATION ON THE PLAN

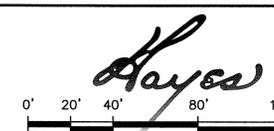
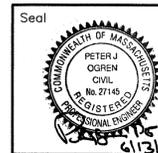
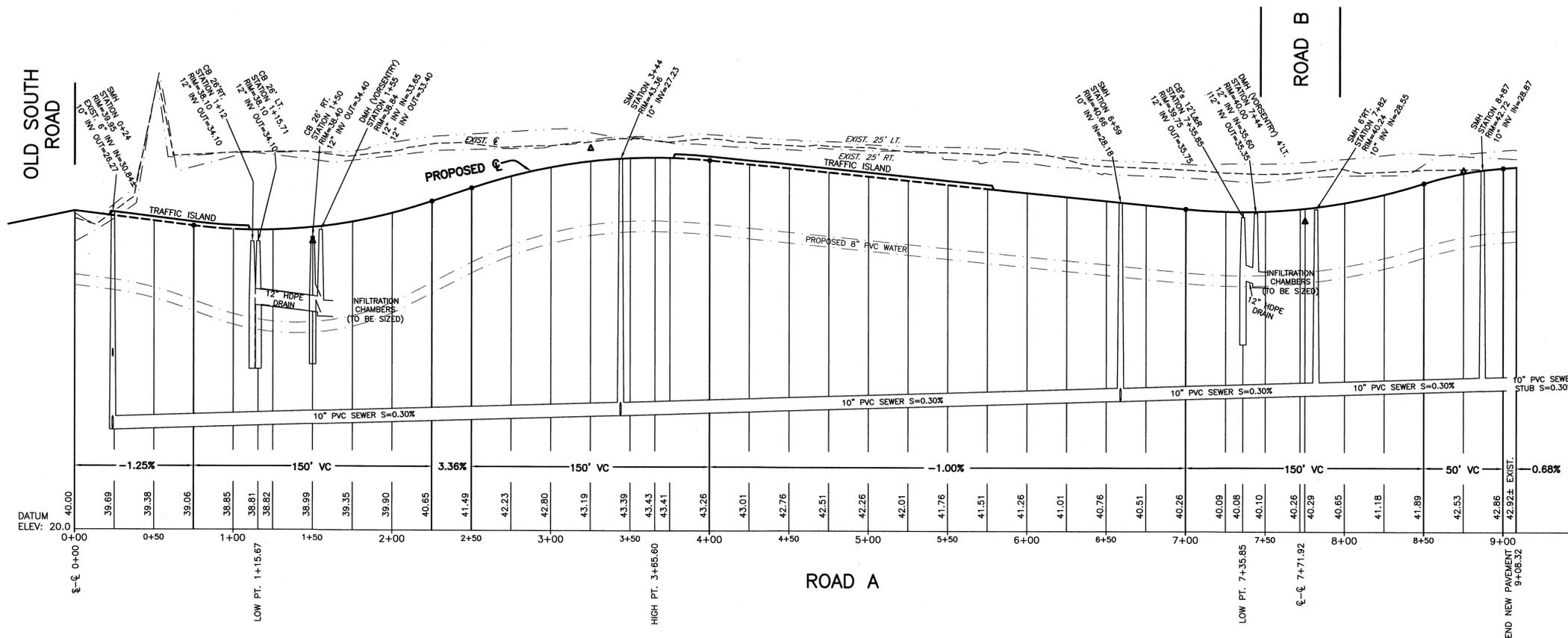
DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK



NOTE: EXISTING UTILITIES AND PAVEMENT IN THE PORTION OF NANCY ANN LANE TO BE ABANDONED ARE TO BE REMOVED.



DEFINITIVE PLAN & PROFILE ROAD A NANTUCKET, MASS.

OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887

Engineer: Hayes Engineering, Inc.
603 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

Scale: 1"=40' (Hor.) & 4' (Ver.) June 9, 2016

10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
No.	Revision	Date

NANTUCKET
PLANNING BOARD

Application Filed: _____
Final Plan Filed: _____
Hearing Date: _____
Plan Approved: _____
Plan Signed: _____

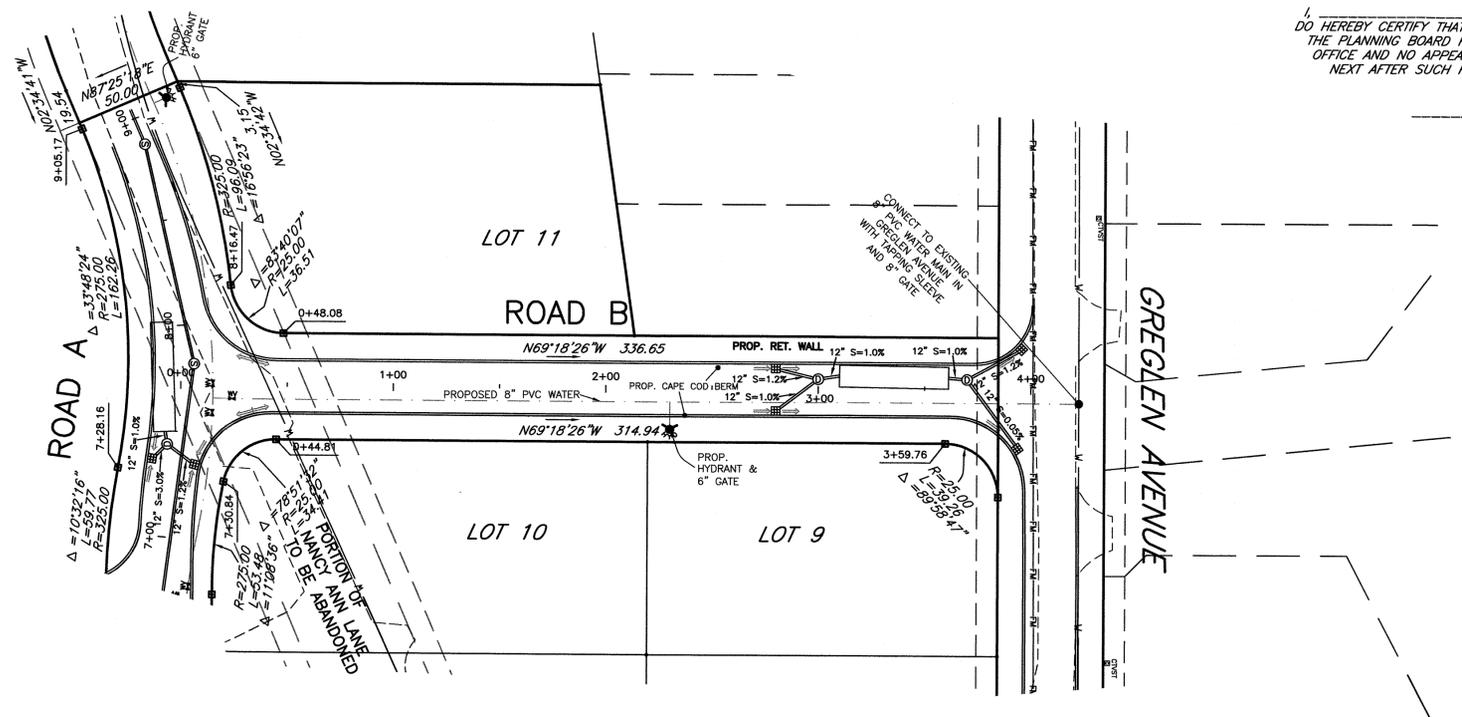
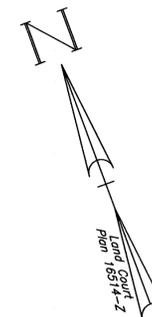
PROFILE SHEET 1 OF 2
SHEET 7 OF 11

CLERK'S CERTIFICATION ON THE PLAN

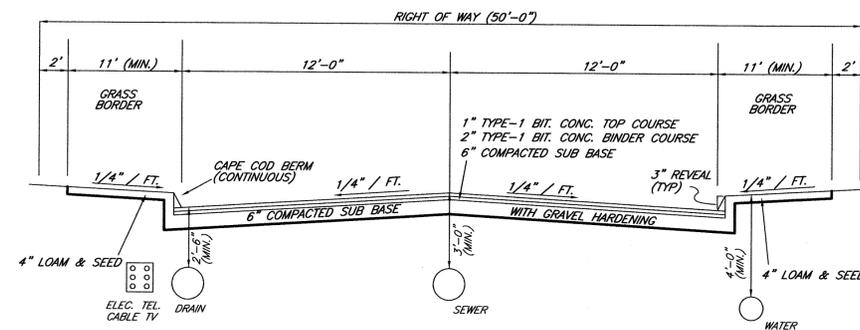
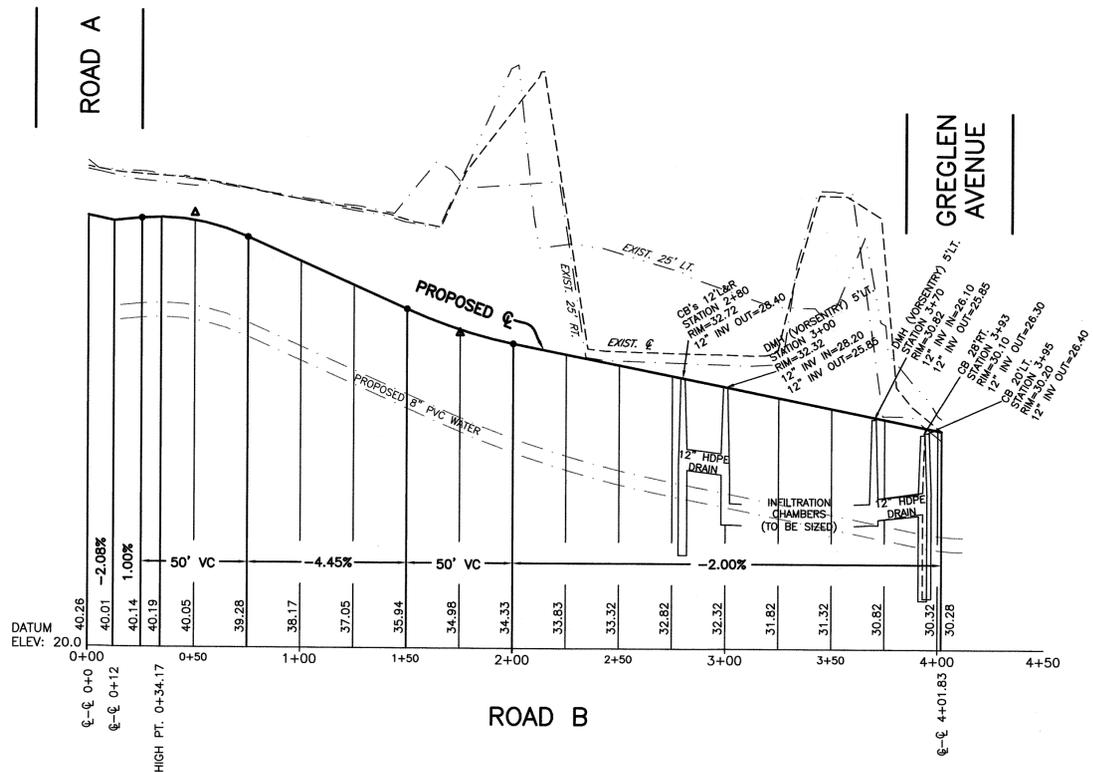
DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

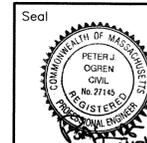
TOWN CLERK



NOTE: EXISTING UTILITIES AND PAVEMENT IN THE PORTION OF NANCY ANN LANE TO BE ABANDONED ARE TO BE REMOVED.



TYPICAL ROADWAY CROSS SECTION
NOT TO SCALE



**DEFINITIVE PLAN & PROFILE
ROAD B
NANTUCKET, MASS.**

OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887

Engineer: Hayes Engineering, Inc.
603 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

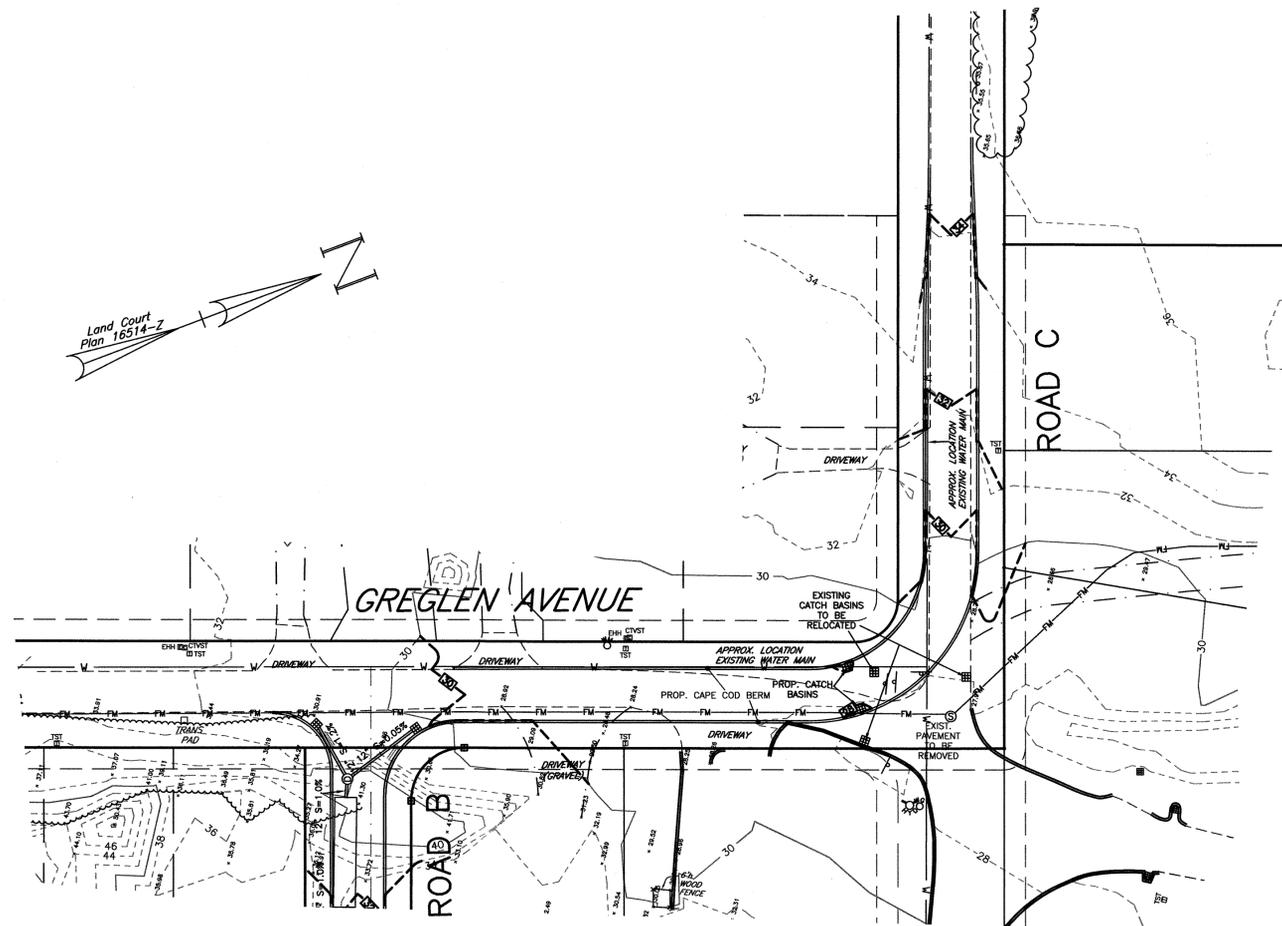
Scale: 1"=40' (Hor.) & 4' (Ver.) June 9, 2016

10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
No.	Revision	Date

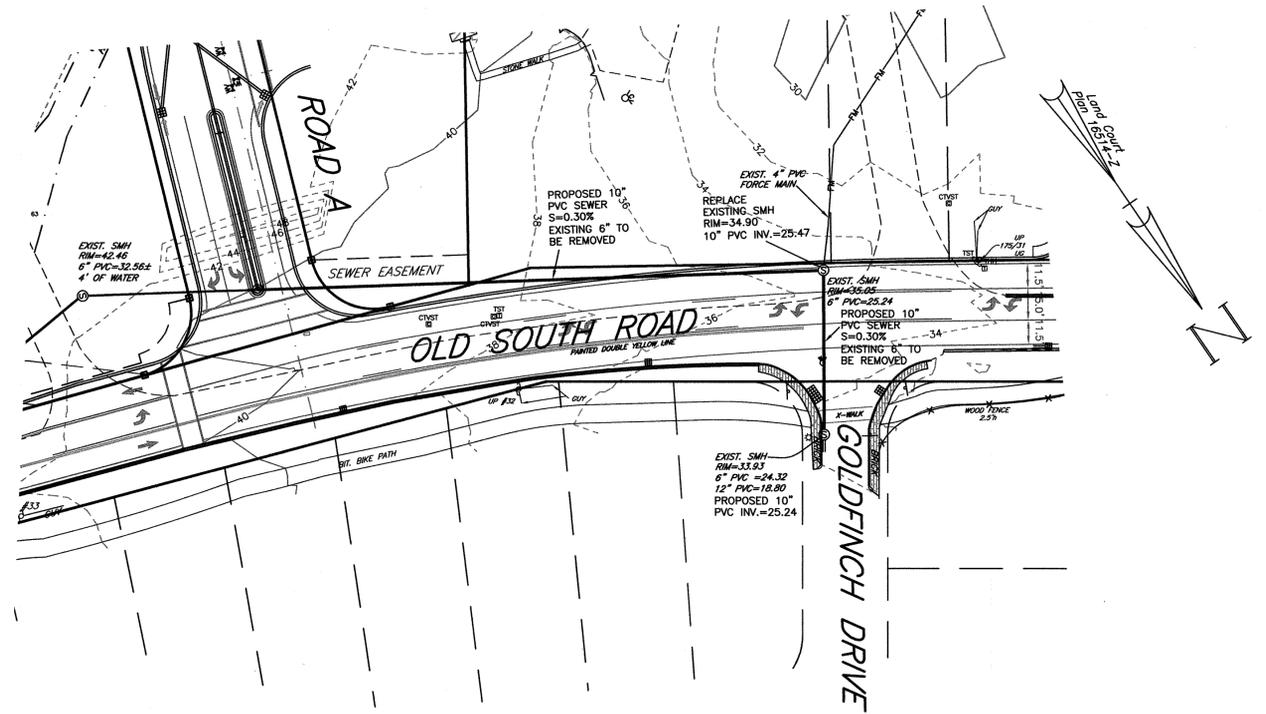
NANTUCKET
PLANNING BOARD

Application Filed: _____
Final Plan Filed: _____
Hearing Date: _____
Plan Approved: _____
Plan Signed: _____

PROFILE SHEET 2 OF 2
SHEET 8 OF 11



GRE GLEN AVENUE & ROAD C
ROADWAY IMPROVEMENTS



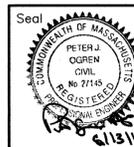
PROPOSED SEWER FROM
ROAD A TO EXISTING SEWER
IN GOLDFINCH DRIVE

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET,
DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY
THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS
OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS
NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK



**GRE GLEN AVENUE & NANCY ANN
ROADWAY IMPROVEMENTS & SEWER
NANTUCKET, MASS.**

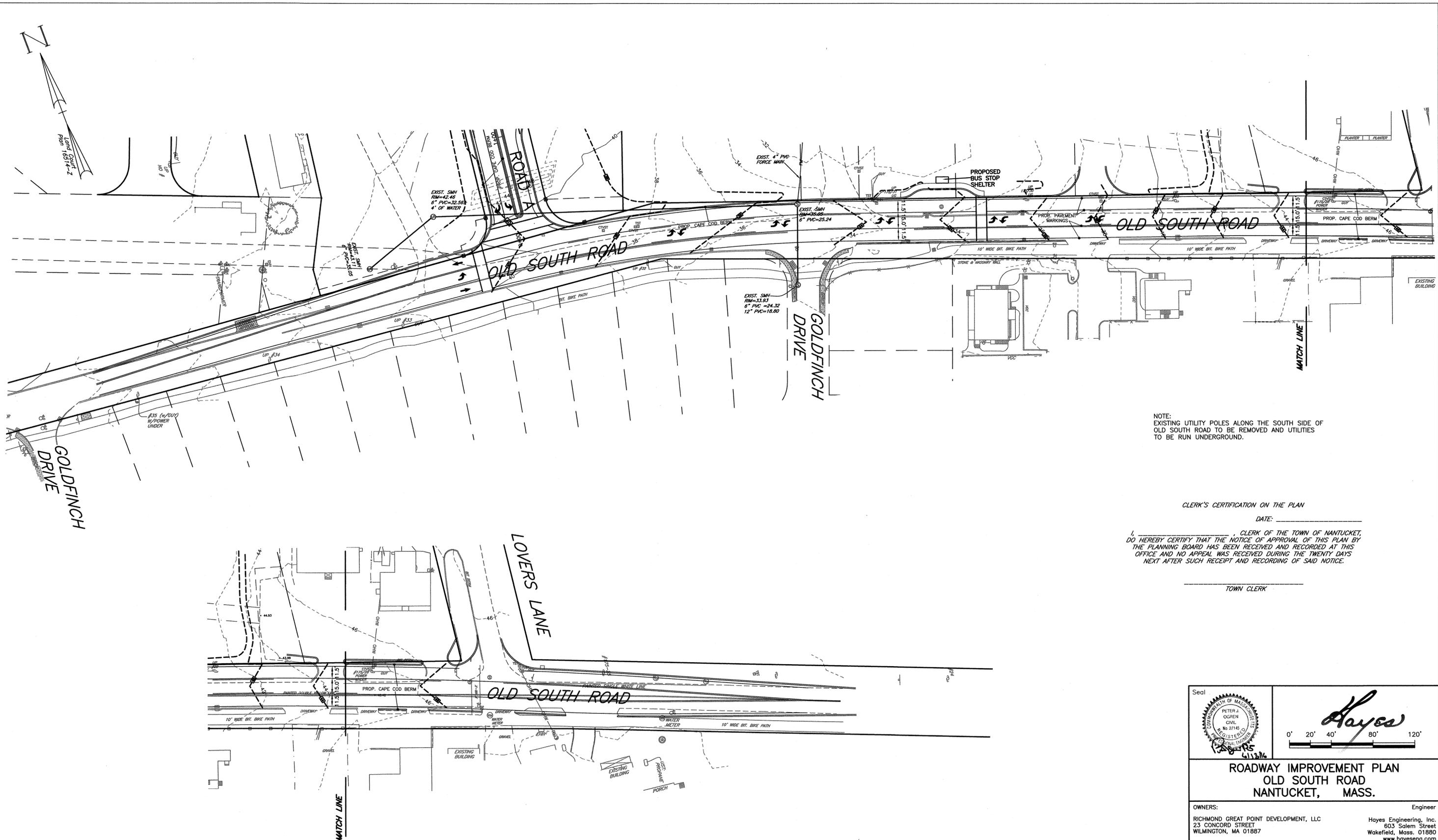
OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887

Engineer
Hayes Engineering, Inc.
603 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

Scale: 1"=40' NANTUCKET PLANNING BOARD Application Filed: _____
Final Plan Filed: _____
Hearing Date: _____
Plan Approved: _____
Plan Signed: _____

10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
No.	Revision	Date

IMPROVEMENT SHEET 1 OF 2
SHEET 9 OF 11

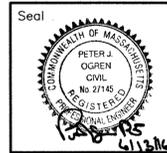


NOTE:
EXISTING UTILITY POLES ALONG THE SOUTH SIDE OF
OLD SOUTH ROAD TO BE REMOVED AND UTILITIES
TO BE RUN UNDERGROUND.

CLERK'S CERTIFICATION ON THE PLAN
DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET,
DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY
THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS
OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS
NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK



**ROADWAY IMPROVEMENT PLAN
OLD SOUTH ROAD
NANTUCKET, MASS.**

OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887

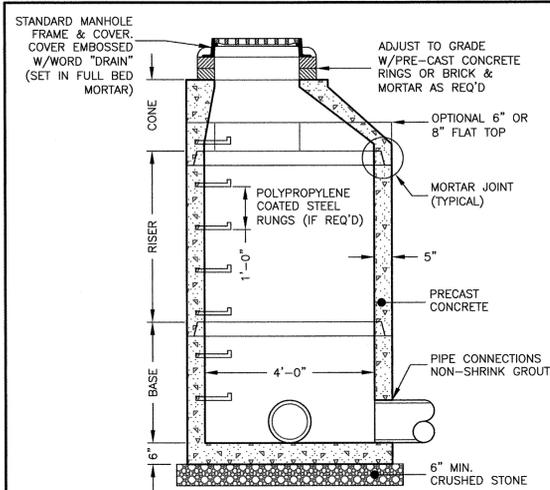
Engineer: Hayes Engineering, Inc.
803 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

Scale: 1" = 40' June 9, 2016

NANTUCKET PLANNING BOARD	Application Filed: _____
	Final Plan Filed: _____
	Hearing Date: _____
	Plan Approved: _____
IMPROVEMENT SHEET 2 OF 2	
SHEET 10 OF 11	

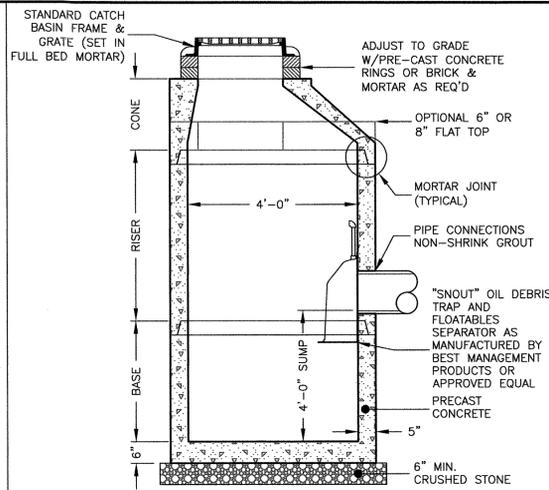
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
No.	Revision	Date

N:\MAN66\0hancym.dwg, 6/13/2016 1:50:51 PM, JO



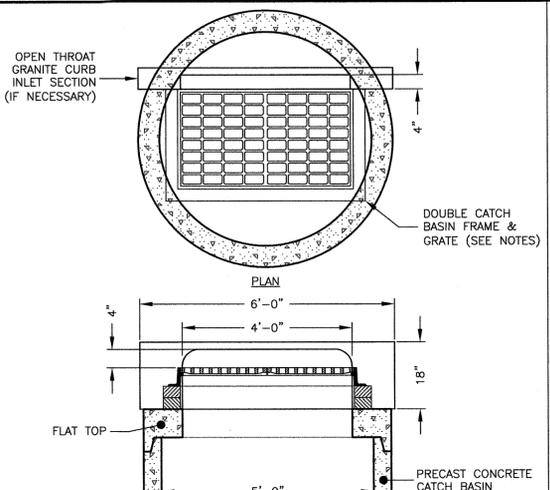
PRE-CAST DRAIN MANHOLE
NOT TO SCALE

- NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
 2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
 3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."



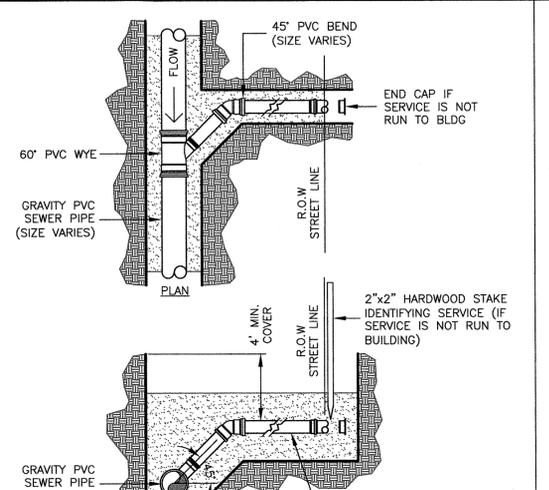
PRE-CAST CATCH BASIN
NOT TO SCALE

- NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
 2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
 3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."



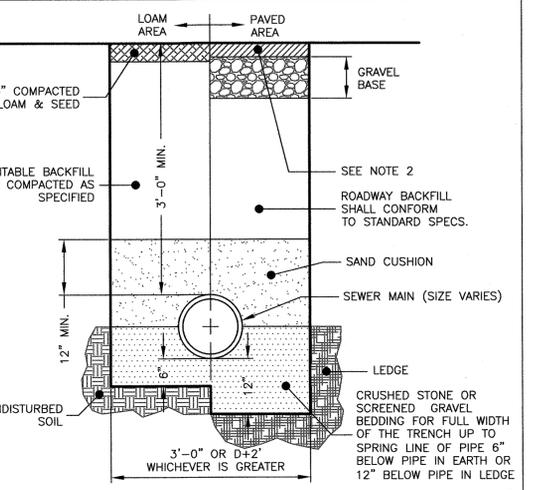
DOUBLE FRAME & GRATE
NOT TO SCALE

- NOTES:
1. ON SLOPES USE LEBARON LV2448-2-000 FRAME W/LEBARON LK1200-300 3 FLANGE CASCADE GRATE OR APPROVED EQUAL.
 2. AT LOW POINTS USE LEBARON LV2448-2-000 FRAME W/LEBARON LF248-2-000 3 FLANGE GRATE OR APPROVED EQUAL.



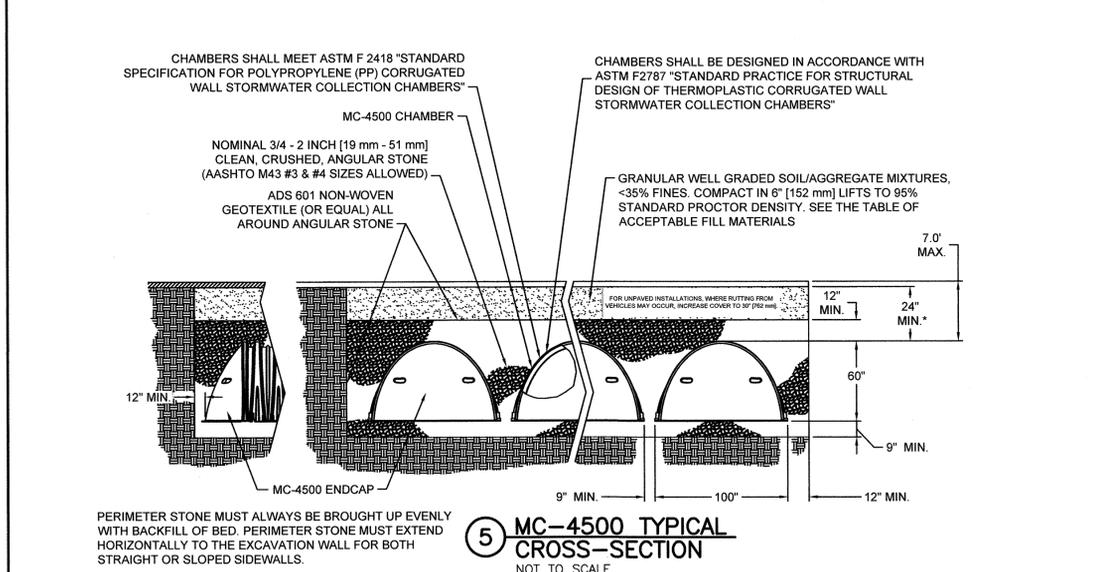
SEWER SERVICE CONNECTION
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12" GRAVEL COURSE AND 9" OF CRUSHED GRAVEL, 18" OF CRUSHED GRAVEL OR RECLAIMED STABILIZED BASE MAY BE USED AS A BASE FOR THE PAVEMENT REPAIR.
 4. MATERIAL SHALL BE REPLACED IN KIND WHENEVER POSSIBLE.
 5. A MINIMUM 2' CUTBACK IS REQUIRED AT THE TOP OF THE TRENCH WALL OVER UNDISTURBED MATERIAL.



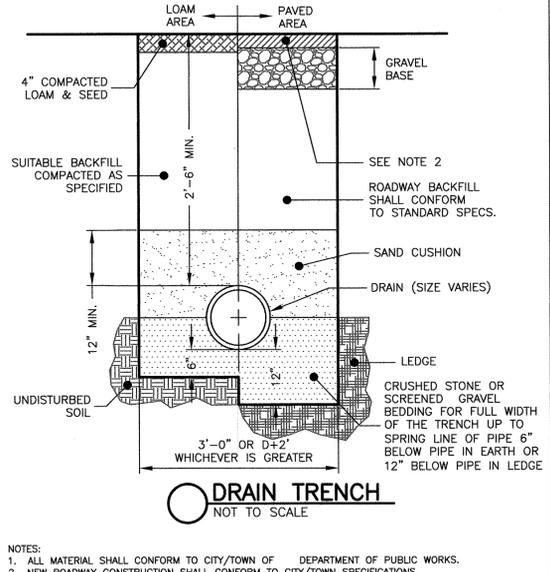
SEWER TRENCH
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12" GRAVEL COURSE AND 9" OF CRUSHED GRAVEL, 18" OF CRUSHED GRAVEL OR RECLAIMED STABILIZED BASE MAY BE USED AS A BASE FOR THE PAVEMENT REPAIR.
 4. MATERIAL SHALL BE REPLACED IN KIND WHENEVER POSSIBLE.
 5. A MINIMUM 2' CUTBACK IS REQUIRED AT THE TOP OF THE TRENCH WALL OVER UNDISTURBED MATERIAL.



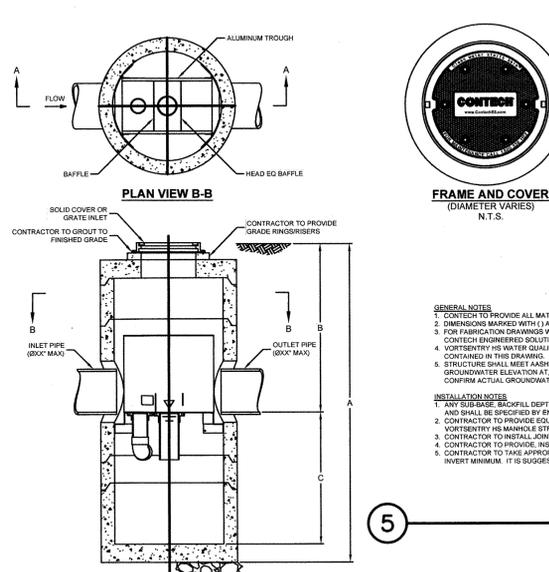
MC-4500 TYPICAL CROSS-SECTION
NOT TO SCALE

- NOTES:
1. CHAMBERS SHALL MEET ASTM F 2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
 2. CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
 3. NOMINAL 3/4 - 2 INCH [19 mm - 51 mm] CLEAN, CRUSHED, ANGULAR STONE (AASHTO M43 #3 & #4 SIZES ALLOWED)
 4. ADS 601 NON-WOVEN GEOTEXTILE (OR EQUAL) ALL AROUND ANGULAR STONE
 5. GRANULAR WELL GRADED SOIL/AGGREGATE MIXTURES, <35% FINES COMPACT IN 6" [152 mm] LIFTS TO 95% STANDARD PROCTOR DENSITY. SEE THE TABLE OF ACCEPTABLE FILL MATERIALS
 6. PERIMETER STONE MUST ALWAYS BE BROUGHT UP EVENLY WITH BACKFILL OF BED. PERIMETER STONE MUST EXTEND HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH STRAIGHT OR SLOPED SIDEWALLS.



DRAIN TRENCH
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12" GRAVEL COURSE AND 9" OF CRUSHED GRAVEL, 18" OF CRUSHED GRAVEL OR RECLAIMED STABILIZED BASE MAY BE USED AS A BASE FOR THE PAVEMENT REPAIR.
 4. MATERIAL SHALL BE REPLACED IN KIND WHENEVER POSSIBLE.
 5. A MINIMUM 2' CUTBACK IS REQUIRED AT THE TOP OF THE TRENCH WALL OVER UNDISTURBED MATERIAL.



VORTSENTRY HS STANDARD DETAIL
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12" GRAVEL COURSE AND 9" OF CRUSHED GRAVEL, 18" OF CRUSHED GRAVEL OR RECLAIMED STABILIZED BASE MAY BE USED AS A BASE FOR THE PAVEMENT REPAIR.
 4. MATERIAL SHALL BE REPLACED IN KIND WHENEVER POSSIBLE.
 5. A MINIMUM 2' CUTBACK IS REQUIRED AT THE TOP OF THE TRENCH WALL OVER UNDISTURBED MATERIAL.

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL HAS BEEN RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

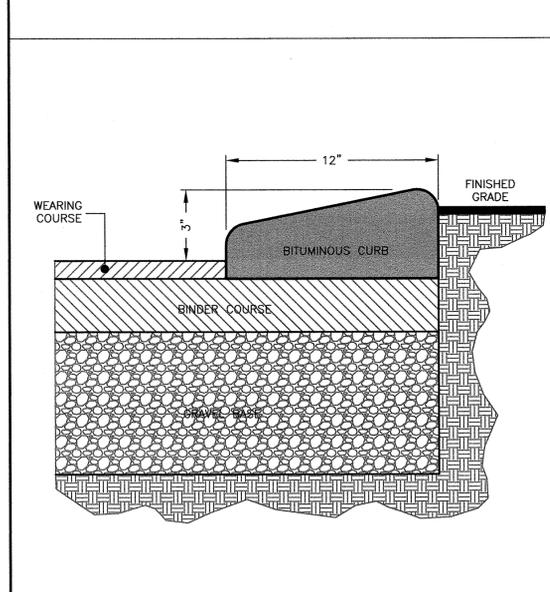
TOWN CLERK

GENERAL NOTES:

1. CONTRACTOR TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH (1) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH RETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTRACT ENGINEER'S SOLUTIONS LLC REPRESENTATIVE. WWW.CONTECH.COM
4. VORTSENTRY HS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M206 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT OR BELOW THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.

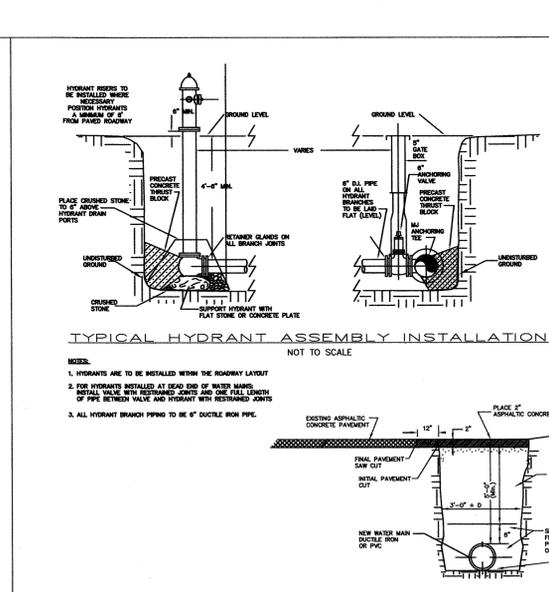
INSTALLATION NOTES:

1. ANY STRUCTURE SHALL BE SET AT THE PROPER DEPTH AND ANTI-FLOUTATION PROVIDERS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REGRAB CAPACITY TO LIFT AND SET THE VORTSENTRY HS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO PROVIDE JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
5. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE THAT WATER TIGHT HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.



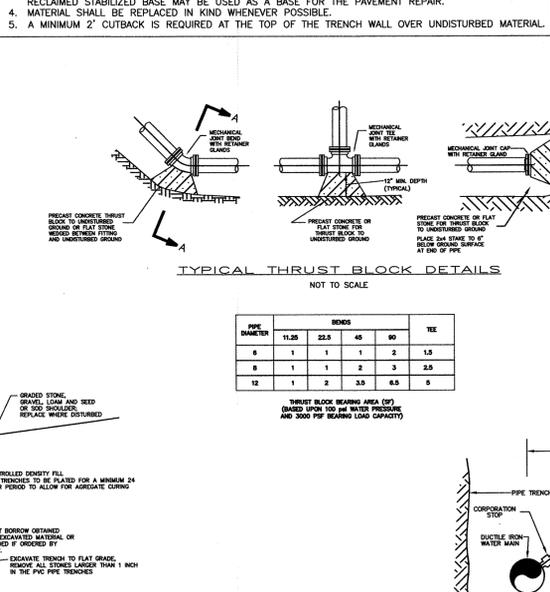
CAPE COD CURB
NOT TO SCALE

- NOTES:
1. HYDRANT HEADS TO BE INSTALLED WITHIN THE ROADWAY LAYOUT.
 2. FOR HYDRANT HEADS AT GRADE OR BELOW GRADE, INITIAL VALVE WITH REPAIRABLE GATE AND ONE FULL LENGTH OF PIPE BETWEEN VALVE AND HYDRANT WITH REPAIRABLE JOINTS.
 3. ALL HYDRANT BRANCH PIPING TO BE 4" DUCTILE IRON PIPE.



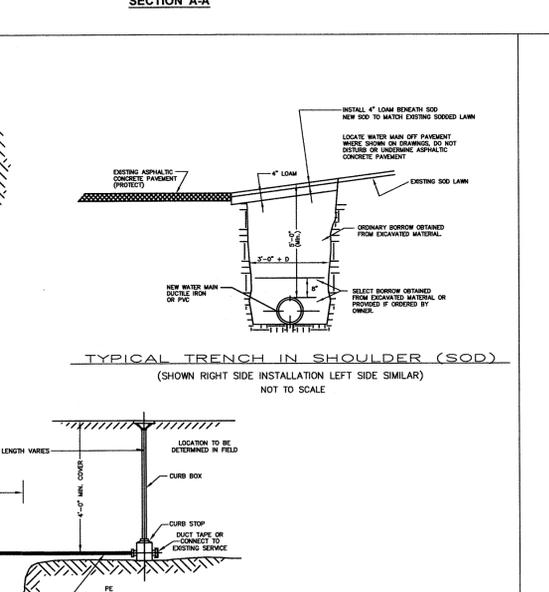
TYPICAL HYDRANT ASSEMBLY INSTALLATION
NOT TO SCALE

- NOTES:
1. HYDRANT HEADS TO BE INSTALLED WITHIN THE ROADWAY LAYOUT.
 2. FOR HYDRANT HEADS AT GRADE OR BELOW GRADE, INITIAL VALVE WITH REPAIRABLE GATE AND ONE FULL LENGTH OF PIPE BETWEEN VALVE AND HYDRANT WITH REPAIRABLE JOINTS.
 3. ALL HYDRANT BRANCH PIPING TO BE 4" DUCTILE IRON PIPE.



TYPICAL CROSS TRENCH IN ROADWAY SURFACE
(SHOWN RIGHT SIDE INSTALLATION LEFT SIDE SIMILAR)
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12" GRAVEL COURSE AND 9" OF CRUSHED GRAVEL, 18" OF CRUSHED GRAVEL OR RECLAIMED STABILIZED BASE MAY BE USED AS A BASE FOR THE PAVEMENT REPAIR.
 4. MATERIAL SHALL BE REPLACED IN KIND WHENEVER POSSIBLE.
 5. A MINIMUM 2' CUTBACK IS REQUIRED AT THE TOP OF THE TRENCH WALL OVER UNDISTURBED MATERIAL.



TYPICAL TRENCH IN SHOULDER (SOD)
(SHOWN RIGHT SIDE INSTALLATION LEFT SIDE SIMILAR)
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12" GRAVEL COURSE AND 9" OF CRUSHED GRAVEL, 18" OF CRUSHED GRAVEL OR RECLAIMED STABILIZED BASE MAY BE USED AS A BASE FOR THE PAVEMENT REPAIR.
 4. MATERIAL SHALL BE REPLACED IN KIND WHENEVER POSSIBLE.
 5. A MINIMUM 2' CUTBACK IS REQUIRED AT THE TOP OF THE TRENCH WALL OVER UNDISTURBED MATERIAL.

SEAL

UNION BUREAU OF MASSACHUSETTS
PETER A. OGDEN
CIVIL ENGINEER
REGISTERED PROFESSIONAL ENGINEER
No. 21745
Exp. 6/15/16

Scale: 1" = N.T.S.

Application Filed: _____
Hearing Date: _____
Plan Approved: _____
Plan Signed: _____

DETAIL SHEET 1 OF 1
SHEET 11 OF 11

No.	Revision	Date
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		

OWNERS: RICHMOND GREAT POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887

Engineer: Hayes Engineering, Inc.
603 Salem Street
Wakefield, Mass. 01880
www.hayeseng.com

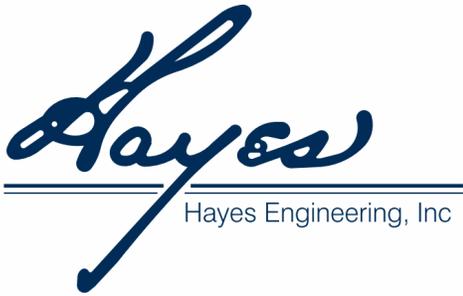
June 9, 2016

**REQUESTED WAIVERS
OLD SOUTH ROAD CROSSING
NANTUCKET, MASSACHUSETTS**

June 2016

Town of Nantucket Rules and Regulations

Section 2.06b(10)	The elevations shown on the plan are NAVD88 rather than half-tide datum.
Section 2.06b(14)(a)	Landscape Plan to be provided prior to Planning Board approval.
Section 2.06b(14)(b)	Existing trees to be saved will be decided during construction.
Section 4.03e	No Right-of-way rounding is proposed on the south side of the intersection of Road B and Greglen Avenue. However, a 28 foot curb radius is being proposed.
Section 4.06(b)(3)	Stormtech® MC-4500 stormwater chambers to be substituted for the leaching basin (Appendix A, Plate No. 12)
Section 4.13	Dry sewer lines are not proposed to be installed.
Section 4.16	Same as Section 2.06b(14)(a) & (b) above.
Section 4.18	No sidewalks are proposed along the sides of the proposed roadway Road B and one sidewalk is proposed along a portion of Road A.
Section 4.23	Soil tests will be provided prior to Planning Board approval.



603 Salem Street
 Wakefield, MA 01880
 Tel: (781) 246-2800
 Fax: (781) 246-7596

Nantucket, MA 02554
 Tel: (508) 228-7909

Refer to File No. NAN-0107J

**SITE ANALYSIS REPORT
 OLD SOUTH ROAD CROSSING
 NANTUCKET, MASSACHUSETTS**

June 10, 2016

This site analysis report was prepared as part of the submission requirements of a definitive subdivision plan in accordance with Section II, 2.06(a) (11) of the Rules and Regulations of the Planning Board for the Town of Nantucket, as amended. This subdivision plan proposes the creation of thirteen (13) lots, in conjunction with 1,268 linear feet of roadway, together with approximately 2,300 linear feet of improvements to Old South Road, Greglen Avenue and Nancy Ann Lane (Road C) as shown on the subdivision plans. The new roadways, known as Road A and Road B are proposed to be constructed as shown on the typical cross-sections illustrated on the profile plans, in order to provide frontage and adequate access to the lots within the parcel in a safe and convenient manner.

The site, being approximately 24.3 acres in extent, is located approximately 2.1 miles southeast of the town center, and is currently consists of undeveloped meadow, areas of interspersed scrub oak and pines (brush) and areas of developed residential and commercial lands, buildings and driveways. The topography of the site ranges from approximately 22 feet above the North American Vertical Datum of 1988 (NAVD88) to approximately elevation 43.

The area in which the project is proposed to be constructed is within the CN, R-5 and CTEC zoning districts. Zoning requirements for each district are summarized in the table below:

Criteria	CN Zoning District	R-5 Zoning District	CTEC Zoning District
Lot Area	7,500 sf.	5,000 sf.	10,000 sf.
Lot Frontage	50 feet	50 feet	50 feet
Front Yard	10 feet	10 feet	10 feet
Side Yard	5 feet	10 feet on one-side, 5 feet thereafter	5 feet
Rear Yard	10 feet	5 feet	10 feet
Ground Cover	40%	40%	40%

Lot areas of proposed lots vary from 16,000 sf. to 534,000 sf.

The property is comprised of Evesboro soils and were determined by using the Web Soil Survey from the National Cooperative Soil Survey for Nantucket County. The Evesboro sands consist of excessively-drained soil, generally found in smooth, irregular-shaped areas, as reported by the Soil Conservation Service. It is expected that the permeability of the soil is rapid in the surface layer and subsoil, and very rapid in the substratum.

Due to the granular nature and the grain size of the Evesboro soils coupled with the site topography and proposed drainage design leads us to believe that erosion is not expected to be a problem. Likewise, these soils are largely void of the small grain sizes, and do not produce excessively dusty conditions. Should dust control be required, it would be handled by wetting the surface of exposed areas during periods of activity of construction vehicles or in highly windy conditions. No other form of dust control is anticipated.

No surface water resources are present on the parcel being developed, nor are any portion of the site subject to the Wetlands Protection Act for Coastal Wetland Areas (M.G.L. Chapter 131, Section 40).

No areas of the site are represented as having severe limitations due to seasonal high water table. Similarly, no portion of the site is designated as being in a Zone A, B or V, as shown on the Flood Insurance Rate Map (FIRM), Community Panel #25019C0089G, effective date June 9, 2014.

The Evesboro sands typically provide poor potential for growth of vegetation.. The site is generally comprised of a sand and gravel pit with paved areas, numerous storage structures and gravel drives. There exists scattered clusters of vegetation on the southern end of the property of vegetation with the remained either pavement or devoid of vegetation. Any tree removal for the proposed roadways will be minimal as the majority of the area within the proposed roadway is currently gravel driveways or the sand and gravel pit.

An examination of the profile sheets submitted with the plan reveals that no major changes in watershed areas or directions are contemplated by construction of the subdivision proposed in this application. The general design approach for management of storm water is to collect the roadway drainage as well as runoff from portions of the site. This runoff is to be collected in deep sump catch basins, and then directed via a closed pipe system VortSentry treatment devices and discharge to proposed subsurface infiltration areas. The closed piping system shall be designed with sufficient capacity to accommodate the 25-year design storm and mitigation for the 100-year design storm. Stormwater entering the proposed subsurface infiltration area will provide for groundwater recharge in the proposed development. Also, the proposed deep sump catch basins and VortSentry devices will improve the water quality of the runoff from the proposed roadway.

The improvements which are contemplated for construction of the subdivision roadways include rights-of-ways with varying width as depicted on the plans. Existing roadways to be abandoned shall have pavement and infrastructure removed. Minimum pavement width for newly proposed roadways having two-way (bidirectional) traffic is 24-feet.

Sanitary sewer from the lots are proposed to be connected to municipal sanitary facilities available in Old South Road proximate to the intersection with Goldfinch Drive.

Potable water will be provided for domestic purposes by connecting to the Town water supply. The proposed eight (8) inch water main through the project will be connected to an existing twelve (12) inch water main in Old South Road and existing eight (8) inch water main in Nancy Ann Lane.

The project roadways are provided to service future commercial and residential\multifamily developments within the project limits. The proposed roadway system will connect two existing roadways, Greglen Avenue and Nancy Ann Lane to Old South Road. These connection will provide for adequate site distances so as to enable vehicles to safely enter and exit the property, as well as providing adequate access for emergency vehicles.

The traffic generated by uses adjacent to the proposed roadway will add to the existing traffic volumes of the surrounding streets. Roadway improvements are proposed in Old South Road to mitigate new traffic generation. The geometry and construction of the proposed roadway system will provide for a safe and convenient alignment for vehicular traffic and access to the lots by emergency vehicles.

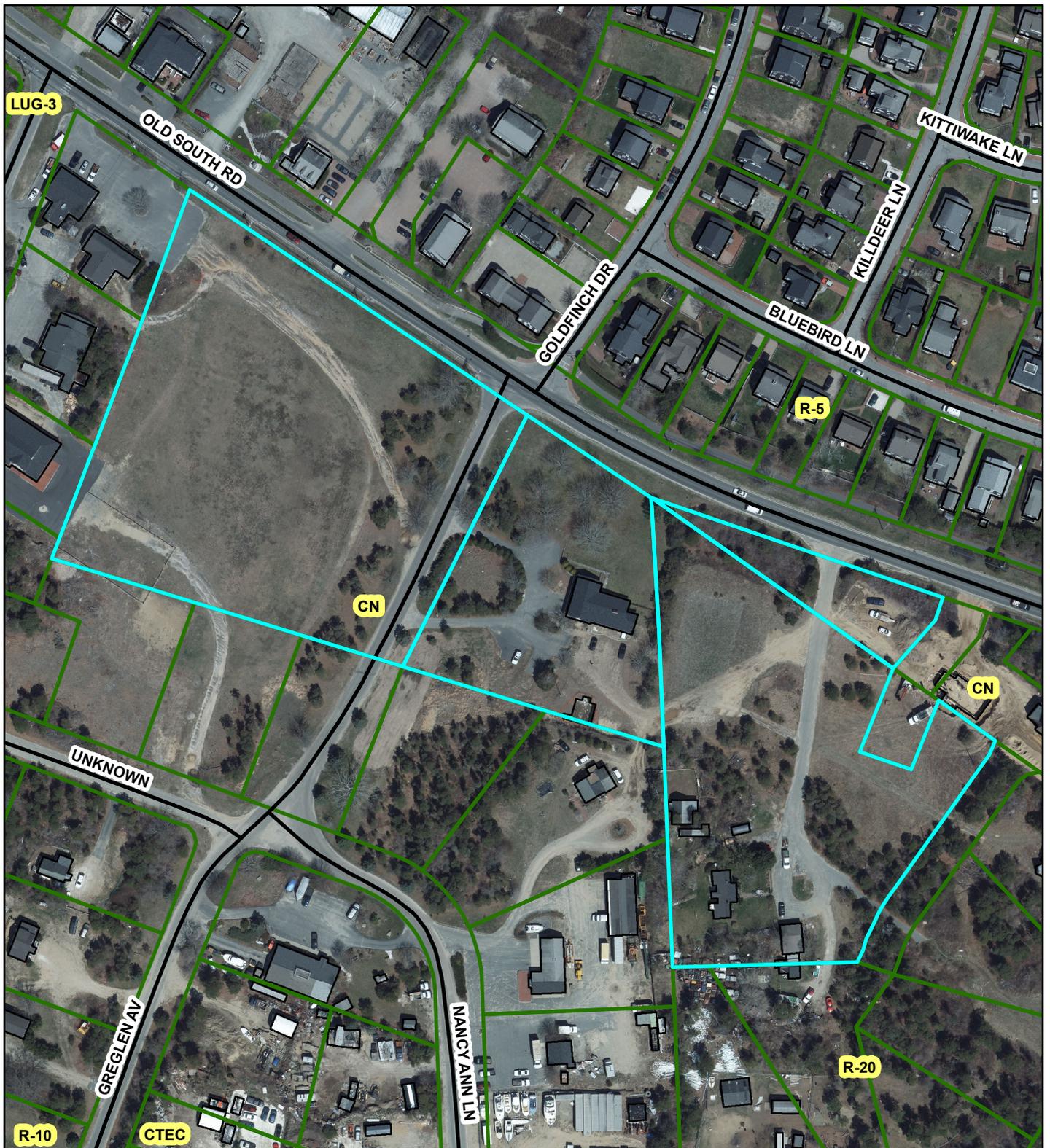
A sidewalk is being proposed along one side of the proposed Road A right-of-way.

It is presently anticipated that all construction related to the physical roadway and infrastructure improvements would be completed within two (2) years following the receipt of all necessary approvals.

There are no proposed common open spaces associated with this development.



#39-16 Richmond Great Point Development, LLC
Old South Road Crossing Retail Liner Buildings
63, 67, 73, 75A Old South Road
Map 68 Parcels 157, 158, 129 & 999.2





The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

June 13, 2016

TOWN OF NANTUCKET
TOWN CLERK
16 Broad Street
Nantucket, Massachusetts 02554

Attention: Catherine Flanagan Stover, MMC, CMMC

Subject: Submittal of Application for Special Permit (Retail Major Commercial Development)
Richmond Great Point Development LLC (Owner / Developer)
Old South Road Crossing Retail "Liner" Buildings Development

Dear Mrs. Stover:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to document submittal of the completed application to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the issuance of a special permit to allow for the development of the "Old South Road Crossing" retail "liner" buildings development, comprised of +/- 15,500 gross square feet of retail buildings on a series of five (5) contiguous properties totaling +/- 2.4 acres of land located on portions of the 63, 67, 73 and 75 (A) Old South Road properties.

The submittal of the application to your office is being completed as prescribed in Section 139-30(B)(1) of the Town of Nantucket Zoning Bylaw.

Upon your acknowledgment of receipt of the application (by way of time / date stamping the application), we will proceed to file a copy of the application (and all other required materials) forthwith to the Town of Nantucket Planning Board to obtain its review and subsequent action (as prescribed in Section 139-30(B)(2) of the Town of Nantucket Zoning Bylaw.

Should you have any questions with respect to the application and submittal, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,

David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc.
On Behalf of Richmond Great Point Development LLC

Cc: Andrew Burek, Esq., TRC
Arthur Reade, Jr., Esq., RGH



Nantucket Planning Board

Application for a Special Permit

Date: June 13, 2016 File #: 39-16

Name of development: Old South Road Crossing Retail "Liner" Buildings

Owner(s) name(s): Richmond Great Point Development LLC (Philip Pastan)

Mailing address: 23 Concord Street, Wilmington MA 01887

Phone number: 978-988-3900 Fax number: 978-988-3950

E-mail: ppastan@richmondco.com

Applicant's name: The Richmond Company, Inc. (David Armanetti and Patty Roggeveen)

Mailing address: 23 Concord Street, Wilmington MA 01887

Phone number: 978-988-3900 Fax number: 978-988-3950

E-mail: darmanetti@richmondco.com; proggeveen@richmondco.com

Engineer / surveyor's name: Hayes Engineering, Inc. (John Ogren)

Mailing address: 603 Salem Street, Wakefield MA 01880 Phone

number: 781-246-2800 Fax number: 781-246-7596 E-mail: jogren@hayeseng.com

Location of lot(s):

Street address Portions of 63, 67, 73, and 75(A) Old South Road

Tax Assessors Map _____ Parcel See Attachment "A" for Detail of Multiple Parcels

Nantucket Registry of Deed: See Attachment "B" for Detail of Multiple Parcels

Plan Book Page **OR**

Plan File # _____ **OR** Land Court Plan # _____ at Certificate # _____

Size of parcel: 104,109 SF (2.39 Acres) sq. ft. Zoning District: Commercial Neighborhood (CN)

Special Permit sought: (check one)

- Cluster subdivision
- Commercial WECS
- Driveway Access/Curb Cut Special Permit
- Harbor Overlay District (HOD)
- Major Commercial Development (MCD)

Nantucket Planning and Land Use Services ▪ 2 Fairgrounds Road ▪ Nantucket ▪ MA ▪ 02554 ▪ (508) 325-7587

- Multi-family Special Permit
- Moorlands Management District Subdivision or Construction (MMD)
- NEHOD (Neighborhood Employee Housing Overlay District)
- MRD (Major Residential Development)
- MIPOD (Mid-Island Planned Overlay District)
- Other Uses Requiring a Special Permit (specify all uses and *Nantucket Code* sections)

Section	Description
_____	_____
_____	_____
_____	_____
_____	_____

Specify all associated Zoning Code relief sought:

Section	Description
139-18(B)	Required parking spaces - request a waiver for four (4) parking space deficit (93 required, 89 provided)
139-18(A)(4)	Required parking to be provided on same lot - request a waiver for several parking spaces in immediately adjacent lots to be shared in common through binding easement).
139-20.1(B)(2)(f)[1]	Maximum driveway cornering roundings - request waiver to allow driveway corner roundings with radii up to twenty-eight (28) feet, to better accomodate truck traffic and deliveries.

Only the zoning relief expressly requested above will be considered as part of this application.

If applying for a Major Commercial Development, specify how the application will comply with Section 139-11 (J) of the *Zoning Code of the Town of Nantucket*, also known as the Town's Affordable Housing Effort:

Owner / Applicant for this MCD is concurrently developing 56 statutorily affordable rental units and 26 statutorily affordable home ownership units on immediately adjacent properties.

Planning Board filing fee due: \$ _____

Engineering Inspection Escrow Deposit due: \$ _____

I/ we hereby certify that the applicant(s) cited above have been authorized by me/ us to file a Special Permit application with the Planning Board on property that I/ we own.

Owner(s)' Signature(s) Philip Pastan, as Manager of Richmond Great Point Development LLC

Applicant's Signature

OK/
JP
6/13/16

I/we _____, the undersigned, hereby authorize _____ to act as agent(s) on my/our behalf and to make any necessary revisions on this filed application as they may be requested by the Board to meet its governing rules and guidelines.

Owner(s)' signature(s)

Check List:

- Planning Board Special Permit abutters list – to be obtained at the Tax Assessor's office
- Completed application form entitled "Application to the Planning Board for a Special Permit"
- Application fee of \$250.00 payable to Town of Nantucket
- Abutters fee of \$6.11 per abutters payable to Pitney Bowes Reserved Funds
- Four (4) sets of mailing labels with each abutter's name and address
 - 1" x 2 5/8" size, typed labels, are preferred
 - duplicate labels are not necessary if the same owner is listed for more than one abutting property
- Completed application form
- Town Clerk's stamped application (provide 2 copies-one for Town Clerk and one for Planning Board)

"Attachment A" to
Major Commercial Development / Special Permit Application

Old South Crossing Retail "Liner" Buildings Development
63, 67, 73, and 75(A) Old South Road, Town of Nantucket MA

ADDITIONAL SPACE NEEDED TO PROVIDE DETAILED INFORMATION FOR MULTIPLE PARCELS

63 Old South Road (Portion of 3.41 Acre Total)

Tax Assessors Map Information: Map # 68, Parcel # 157

Registry / Plan Information: Lot # 872 on Land Court Plan # 16514-103)
(Land Court Certificate # 24872)

67 Old South Road (Portion of 1.69 Acre Total)

Tax Assessors Map Information: Map # 68, Parcel # 158

Registry / Plan Information: Lot # 59 on Land Court Plan # 16514-L)
(Land Court Certificate # 24872)

73 Old South Road (Portion of 2.92 Acre Total)

Tax Assessors Map Information: Map # 68, Parcel # 129

Registry / Plan Information: Lot # 853 on Land Court Plan # 16514-97)
(Land Court Certificate # 24872)

75(A) Old South Road (Portion of 0.35 Acre Total)

Tax Assessors Map Information: Map # 68, Parcel # 999.2

Registry / Plan Information: Lot # 858 on Land Court Plan # 16514-100)
(Land Court Certificate # 25525)

"Attachment B" to
Major Commercial Development / Special Permit Application

Old South Crossing Retail "Liner" Buildings Development
63, 67, 73, and 75(A) Old South Road, Town of Nantucket MA

The title to the land included in the above-referenced application is derived as follows:

As to the Owner of One Hundred Percent (100%) of the 63 Old South Road Property

RICHMOND GREAT POINT DEVELOPMENT LLC

"Deed" dated August 7, 2013, recorded at the Nantucket County Registry of Deeds, in Book # 01397, Page # 312, recorded on August 8, 2013 (referred to as "Recorded Land – Parcel Thirty-Three" on Page 7 of the "Deed").

As to the Owner of One Hundred Percent (100%) of the 67 Old South Road Property

RICHMOND GREAT POINT DEVELOPMENT LLC

"Deed" dated August 7, 2013, recorded at the Nantucket County Registry of Deeds, in Book # 01397, Page # 312, recorded on August 8, 2013 (referred to as "Recorded Land – Parcel One" on Page 1 of the "Deed").

As to the Owner of One Hundred Percent (100%) of the 73 Old South Road Property

RICHMOND GREAT POINT DEVELOPMENT LLC

"Deed" dated August 7, 2013, recorded at the Nantucket County Registry of Deeds, in Book # 01397, Page # 312, recorded on August 8, 2013 (referred to as "Recorded Land – Parcel Forty-Three" on Page 9 of the "Deed").

As to the Owner of One Hundred Percent (100%) of the 75(A) Old South Road Property

RICHMOND GREAT POINT DEVELOPMENT LLC

"Deed" dated February 5, 2015, recorded at the Nantucket County Registry of Deeds, as Certificate # 25525, Document # 00147075, recorded on February 6, 2015 (referred to as "Lot 858 on Land Court Plan numbered 16514-100").



The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

June 10, 2016

TOWN OF NANTUCKET
PLANNING BOARD
2 Fairgrounds Road
Nantucket, Massachusetts 02554

Attention: Leslie Woodson Snell, AICP, LEED AP, Deputy Director of Planning

Subject: Submittal of Application for Major Commercial Development / Special Permit (Retail)
Old South Crossing Retail "Liner" Buildings / 63, 67, 73, and 75(A) Old South Road
Richmond Great Point Development LLC (Owner / Developer)

Dear Ms. Snell:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to submit the completed application form, plans, drainage reports, and related materials which are required to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the issuance of a master commercial development / special permit to allow for the development of the series of retail "liner" buildings which are proposed to be located on a combination of five contiguous properties comprising +/- 2.39 acres of land located on portions of 63, 67, 73, and 75(A) Old South Road, fronting on Old South Road, east of Lovers Lane, in the northwestern core of the properties which were acquired by Richmond Great Point Development LLC from Walter J. Glowacki in August of 2013.

The proposed project is comprised of a cumulative total of +/- 15,500 gross square feet of retail, personal services, and restaurant space, allocated within a series of five (5) single story buildings, running from west to east along the frontage of Old South Road, integrated with connecting walkways, parking, and vehicular access. The size of the individual buildings, running from west to east, range in size from 5,170 gross square feet, to 3,235 gross square feet, to 2,400 gross square feet, to 1,500 gross square feet, to 3,200 gross square feet (with an additional 1,200 square feet area for outdoor seating).

The uses, sizes, location, orientation (fronting on Old South Road) and the character of the buildings are expressly consistent with the objectives and recommendations set forth in the land use section of the 'Naushop Crossing Area Plan' which was created over a two year period by the Naushop Crossing Area Plan Work Group, and was adopted by the Nantucket Planning and Economic Development Commission in March of 2014.

The entirety of the property is designated within the Commercial-Neighborhood (CN) zoning district, which permits the development of retail, personal services, and restaurant uses (small / up to 70 seats).

Because the proposed project is comprised of 5,000 gross square feet or more of commercial use, "located on contiguous tracts of land and held in common or control" in the aggregate, it is subject to the issuance of a major commercial development / special permit by the Planning Board (as set forth in Section 139-11 and Section 139-30 of the Town of Nantucket Zoning Bylaw).

The proposed project is also subject to compliance with the applicable intensity and dimensional criteria set forth in Section 139-16 of the Town of Nantucket Zoning Bylaw (including but not limited to minimum lot size, frontage, yard setbacks, ground cover ratio, and (lot) regularity factor).

Because it is subject to issuance of a major commercial development / special permit, the proposed subject is subject to major site plan review (MSPR) by the Planning Board (as set forth in Section 139-23, and specifically Section 139-23(B)(2) of the Town of Nantucket Zoning Bylaw).

Each of the five (5) individual proposed buildings is located on a separate buildable lot (the subdivision for which will be achieved by way of the processing and endorsement of an Approval Not Required (ANR) Plan) which has been submitted to and is expected to be endorsed by the Planning Board at its June 13, 2016 meeting.

The lots resulting from the proposed subdivision action (in order to accommodate the development of the proposed project) will meet or exceed the relevant dimensional criteria and related requirements, as such are established in the local zoning bylaw for the applicable zoning district, including but not limited to the following:

- Minimum Lot Area (Not Less than 7,500 Square Feet)
- Minimum Lot Frontage (Not Less than 50 Linear Feet)
- Minimum Lot Regularity Factor (Not Less than 0.55)

The specific dimensional characteristics of the five (5) lots that are proposed to be created (in order to accommodate the development of the proposed project) will be as follows:

**Old South Crossing Retail Liner Buildings Project
Summary of Dimensional Characteristics (Proposed Lots / Buildings)**

Lot Number on Plan	Lot Area (Square Footage)	Lot Frontage (Linear Feet)	Lot Regularity Factor (rf)
Lot # 1 / Building # 1	40,925	181.78	0.939
Lot # 2 / Building # 2	16,232	114.52	1.009
Lot # 3 / Building # 3	13,583	92.41	0.948
Lot # 4 / Building # 4	8,163	55.54	0.796
Lot # 5 / Building # 5	25,206	171.72	0.992
Subtotal (Average)	104,109 (2.39 A)	123.19	0.937

The proposed project meets or exceeds all of the applicable intensity and dimensional criteria set forth in the Town of Nantucket Zoning Bylaw, including the maximum ground cover and the regularity factor. A summary of the proposal for most of the relevant criteria, broken out by lot / building for each of the five (5) individual buildings, are depicted in the "Zoning Table" that is included on the cover sheet of the plan set that is included as part of this submittal.

A total of eighty-nine (89) off street parking spaces have been proposed to serve the project. A total of ninety-three (93) spaces are required, based on the minimum parking requirements set forth in Section 139-18 of the Town of Nantucket Zoning Bylaw (Off Street Parking Requirements), resulting in the project providing ninety-six percent (96%) of the total required off street parking. Based on the foregoing, a waiver is requested to allow for approval of the project with the anticipated deficit of four (4) off street parking spaces.

Old South Road Crossing Retail "Liner" Buildings
MCD / Special Permit Application
June 10, 2016
Page Three

The basis and justification for the requested waiver is set forth herein. Because the parking, as designed, is located in adjacent, physically interconnected lots and because the nature of the retail, personal services, and restaurant uses that are anticipated often generate multiple uses by the same patrons during a single trip to the property, and because the nature and operating hours of the specific uses that generally occupy such multi-building and multi-tenant retail clusters create different peaks of operation and gaps in opening / closing times and operating hours, we believe that the four (4) parking space deficit will be de minimus and will not adversely impact the operation of the proposed project and that the parking provided will be more than sufficient.

In addition, because of the nature of the design of the vehicular circulation system and "parking islands" in order to meet the required subdivision and frontage requirements, and to allow for greater open space and a better aesthetic layout overall, the parking lots serving several of the buildings have been consolidated and interconnected as such to where some of the individual parking spaces overlap into adjacent (interior) lots. As a result, a second parking-related waiver is requested, from the requirement set forth in Section 139-18(A)(4) that "all off street parking spaces shall be provided on the same lot as the principal or accessory use they are required to serve".

Should the Planning Board approve the relief described above, the rights and conditions of the shared parking between the lots and uses will be documented in a binding easement that will be recorded and will be applicable to all of the lots, which will essentially function as a small, integrated shopping center.

We appreciate the opportunity to submit the application, plans, and supporting materials for this important development proposal for your review and for consideration by the Planning Board and we look forward to commencing with the public hearing and public review process.

If you have any immediate questions with respect to the proposed project or any of the submittal materials, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,



David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc.
On Behalf of Richmond Great Point Development LLC

Cc: Philip Pastan, TRC
Kathryn Fossa, TRC
Patricia Roggeveen, RGPDLLC
Shane Valero, RGPDLLC
Andrew Burek, Esq., RGPDLLC
Arthur Reade Jr., Esq., RGH
John Ogren, Hayes Engineering

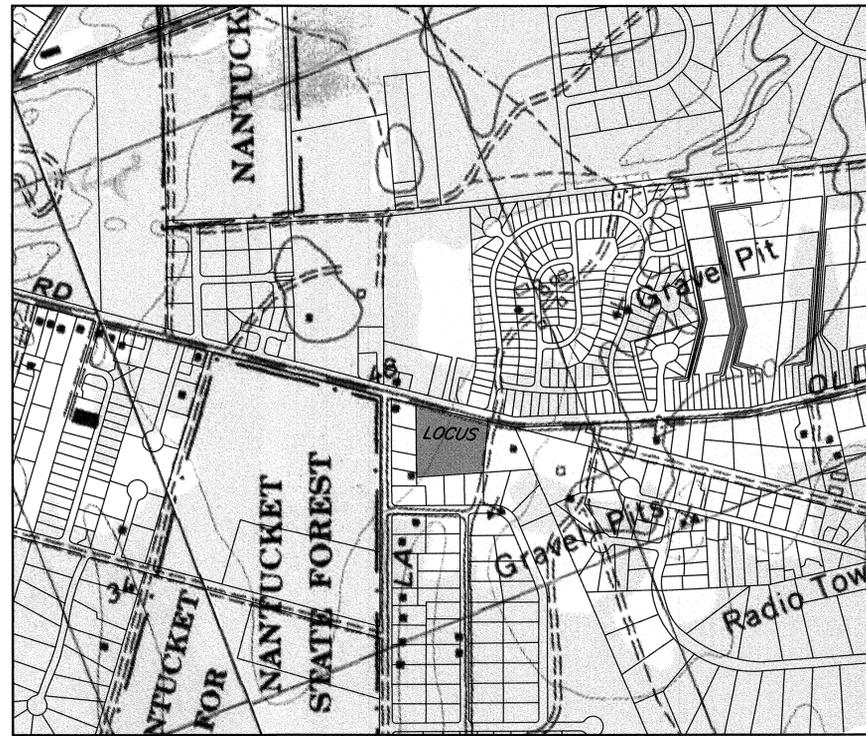
OLD SOUTH ROAD CROSSING RETAIL "LINER BUILDINGS" MAJOR COMMERCIAL DEVELOPMENT/ SPECIAL PERMIT SITE PLAN

AT
63, 67, 73 and 75A OLD SOUTH ROAD
NANTUCKET, MASSACHUSETTS

LEGEND OF SYMBOLS & ABBREVIATIONS

EXISTING **PROPOSED**

	BENCH MARK		P-BM No. 1
	BITUMINOUS CAPE COD BERM		PCCB
	BUILDING		P-CATV
	UNDERGROUND CABLE		57
	COUNTOUR (1')		60
	COUNTOUR (5')		N/A
	ZONE A (100-YEAR FLOOD ZONE)		CONC.
	CEMENT CONCRETE		P-SGC
	SLOPED GRANITE CURB		P-VGC
	VERTICAL GRANITE CURB		LOW
	EDGE OF DISTURBANCE		D
	UNDERGROUND DRAIN PIPE		CATCH BASIN
	CATCH BASIN		DRAIN MANHOLE
	DRAIN MANHOLE		ROUND CATCH BASIN
	ROUND CATCH BASIN		E
	UNDERGROUND ELECTRIC		X
	CHAIN LINK FENCE		POST & RAIL FENCE
	POST & RAIL FENCE		STOCKADE FENCE
	STOCKADE FENCE		VINYL FENCE
	VINYL FENCE		FF=60.43
	FINISHED FLOOR ELEVATION		GF=57.65
	GARAGE FLOOR ELEVATION		FDN
	FOUNDATION		G
	UNDERGROUND GAS MAIN		GS
	UNDERGROUND GAS SERVICE		GRAVEL
	EDGE OF GRAVEL		SPOT GRADE
	SPOT GRADE		GUARD RAIL
	GUARD RAIL		HANDICAP PLACARD PARKING
	HANDICAP PLACARD PARKING		WHEEL CHAIR RAMP
	WHEEL CHAIR RAMP		HEADWALL
	HEADWALL		LANDSCAPE AREA
	LANDSCAPE AREA		LEDGE OUTCROP
	LEDGE OUTCROP		BOLLARD
	BOLLARD		OVERHEAD WIRE
	OVERHEAD WIRE		UTILITY POLE
	UTILITY POLE		PAINTED PARKING & SPACE COUNT
	PAINTED PARKING & SPACE COUNT		PATH
	PATH		PR. PATH
	PR. PATH		EDGE OF PAVEMENT
	EDGE OF PAVEMENT		BOULDER RIP-RAP & SLOPE
	BOULDER RIP-RAP & SLOPE		UNDERGROUND SEWER
	UNDERGROUND SEWER		SEWER MANHOLE
	SEWER MANHOLE		SEWER CLEANOUT
	SEWER CLEANOUT		BIT. SIDEWALK 2' W
	BITUMINOUS CONCRETE SIDEWALK		SIGN
	SIGN		EROSION & SEDIMENTATION CONTROL
	EROSION & SEDIMENTATION CONTROL		STEPS
	STEPS		BOULDER
	BOULDER		STONEWALL
	STONEWALL		CENTERLINE OF SWALE
	CENTERLINE OF SWALE		T
	UNDERGROUND TELEPHONE		TESTHOLE LOCATION
	TESTHOLE LOCATION		MONITORING WELL LOCATION
	MONITORING WELL LOCATION		PERCOLATION TEST LOCATION
	PERCOLATION TEST LOCATION		PAINTED TRAFFIC LINE & TYPE
	PAINTED TRAFFIC LINE & TYPE		DECIDUOUS TREE, SIZE & TYPE
	DECIDUOUS TREE, SIZE & TYPE		CONIFEROUS TREE, SIZE & TYPE
	CONIFEROUS TREE, SIZE & TYPE		HEDGE ROW AND TYPE
	HEDGE ROW AND TYPE		RETAINING WALL
	RETAINING WALL		UNDERGROUND WATER MAIN
	UNDERGROUND WATER MAIN		WS
	UNDERGROUND WATER SERVICE		W-PNT
	PAINTED UNDERGROUND WATER		WATER GATE VALVE BOX
	WATER GATE VALVE BOX		WATER SERVICE CURB BOX
	WATER SERVICE CURB BOX		



ZONING TABLE						
ZONE	CN	LOT 1	LOT 2	LOT 3	LOT 4	LOT 5
DIMENSIONAL CONTROLS	REQUIRED/ALLOWED	PROVIDED	PROVIDED	PROVIDED	PROVIDED	PROVIDED
FRONT YARD SETBACK	10 ft.	40.0 ft.	24.2 ft.	25.2 ft.	25.1 ft.	25.2 ft.
SIDE YARD SETBACK	5 ft.	39.9 ft.	14.1 ft.	10.0 ft.	8.0 ft.	42.5 ft.
REAR YARD SETBACK	10 ft.	97.4 ft.	73.2 ft.	72.2 ft.	72.1 ft.	72.2 ft.
MIN. FRONTAGE	50 ft.	181.78 ft.	114.52	92.41 ft.	55.54 ft.	171.72 ft.
MIN. LOT AREA	7,500 s.f.	40,925 sf.	16,232 sf.	13,583 sf.	8,163 sf.	25,206 sf.
MAX. GROUND COVER RATIO	40%	12.6%	19.9%	17.7%	18.4%	12.7%
MIN. OPEN AREA	30% (MCD)	41.5%	31.3%	29.9%	37.3%	39.2%

PROPERTY LIES WITHIN THE WELLHEAD PROTECTION DISTRICT.

NOTES:

- LOT LINES DEPICTED HEREON ARE TAKEN FROM "SUBDIVISION PLAN OF LAND IN NANTUCKET, MASS." DATE JULY 16, 2015 REVISED THROUGH OCTOBER 5, 2015 PREPARED BY HAYES ENGINEERING, INC.
- TOPOGRAPHIC INFORMATION DEPICTED HEREON IS THE RESULT OF AN ACTUAL FIELD SURVEY PERFORMED BY HAYES ENGINEERING, INC. ON THE FOLLOWING DATES:
 - SEPTEMBER 22, 2014
 - JUNE 16, 2015
 - SEPTEMBER 17, 2015
- THE DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
- THE ENTIRE PARCEL IS LOCATED WITHIN THE WATER RESOURCE PROTECTION DISTRICT, ZONE II WELLHEAD PROTECTION AREA.
- THE PROPERTY IS NOT LOCATED WITHIN A FLOOD HAZARD ZONE (A or V) AS DEPICTED ON FLOOD INSURANCE RATE MAP COMMUNITY PANEL NUMBER 25019C 0089G EFFECTIVE JUNE 9, 2014.
- THE UNDERGROUND UTILITIES SHOWN HAVE BEEN COMPILED FROM FIELD SURVEY INFORMATION AND AVAILABLE EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER, THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES AND DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING AND VERIFYING THE LOCATIONS, SIZES, AND ELEVATIONS OF ALL EXISTING UTILITIES SHOWN OR NOT SHOWN ON THESE PLANS AND SHALL NOTIFY THE ENGINEER IN WRITING OF ANY UTILITIES INTERFERING WITH THE PROPOSED DESIGN AND THE APPROPRIATE REMEDIAL ACTION PRIOR TO PROCEEDING WITH THE WORK.
- THE CONTRACTORS ARE RESPONSIBLE FOR CONTACTING DIG SAFE AT (800) 322-4844 PRIOR TO THE START OF ANY CONSTRUCTION.

WAIVERS REQUESTED:

- §139-20.1.B(2)(f)[1] MAXIMUM DRIVEWAY CORNER ROUNDINGS: ALLOW CORNER ROUNDINGS WITH RADII UP TO 28'.
- §139-18.A(4) REQUIRED OFF STREET PARKING SHALL BE PROVIDED ON THE SAME LOT AS THE PRINCIPAL OR ACCESSORY USE THEY ARE REQUIRED TO SERVE: ALLOW CROSS ACCESS EASEMENTS FOR PARKING.
- §139-18.B PARKING REQUIREMENTS: ALLOW 89 SPACES IN PLACE OF THE 93 SPACES REQUIRED.

PARKING CALCULATIONS		
LOT NO.	REQUIRED	PROVIDED
LOT 1	RETAIL - 1 space PER 200sf OF GROSS FLOOR AREA (GFA) (5,170sf GFA)(1sp/200sf) = 25.8 spaces 1 space PER 3 employees on peak shift (6 employees)(1sp/3emp) = 2 spaces Total = 28 spaces REQUIRED HANDICAPPED ACCESSIBLE SPACES REQUIRED = 2sp	22 spaces (2 handicapped accessible)
LOT 2	RETAIL - 1 space PER 200sf OF GROSS FLOOR AREA (GFA) (3,235sf GFA)(1sp/200sf) = 16.2 spaces 1 space PER 3 employees on peak shift (3 employees)(1sp/3emp) = 1 spaces Total = 17 spaces REQUIRED HANDICAPPED ACCESSIBLE SPACES REQUIRED = 1sp	17 spaces (1 handicapped accessible)
LOT 3	RETAIL - 1 space PER 200sf OF GROSS FLOOR AREA (GFA) (2,400sf GFA)(1sp/200sf) = 12 spaces 1 space PER 3 employees on peak shift (3 employees)(1sp/3emp) = 1 spaces Total = 13 spaces REQUIRED HANDICAPPED ACCESSIBLE SPACES REQUIRED = 1sp	14 spaces (1 handicapped accessible)
LOT 4	RETAIL - 1 space PER 200sf OF GROSS FLOOR AREA (GFA) (1,500sf GFA)(1sp/200sf) = 7.5 spaces 1 space PER 3 employees on peak shift (3 employees)(1sp/3emp) = 1 spaces Total = 9 spaces REQUIRED HANDICAPPED ACCESSIBLE SPACES REQUIRED = 1sp	9 spaces (1 handicapped accessible)
LOT 5	RESTAURANT, TAVERNS AND BARS, including outside seated-service areas - 1 space PER 3 seats (70 seats)(1sp/3 seats) = 23.3 spaces 1 space PER 3 employees on peak shift (9 employees)(1sp/3emp) = 3 spaces Total = 26 spaces REQUIRED HANDICAPPED ACCESSIBLE SPACES REQUIRED = 2sp	27 spaces (2 handicapped accessible)
TOTAL	93 PARKING SPACES	89 PARKING SPACES

NOTE:

CROSS ACCESS AND PARKING EASEMENTS TO BE PROVIDED FOR ALL DRIVEWAYS AND PARKING DEPICTED HEREON.

SHEET INDEX	
PLAN TITLE	SHEET DESIGNATION
INDEX	C1
EXISTING CONDITIONS	C2
LAYOUT	C3
GRADING	C4
UTILITIES	C5
DETAILS	C6
DETAILS	C7
INTERIM SITE PLAN	C8



Prepared For:

Owner / Applicant
RICHMOND GREY POINT DEVELOPMENT, LLC
23 CONCORD STREET
WILMINGTON, MA 01887
(978) 988-3600

Prepared By:
Hayes Engineering, Inc.
603 Salem Street
Wakefield, MA 01880
Ph: 781.246.2800
Fax: 781.246.7586
www.hayeseng.com

Design By: PJO
Drawn By: AMC
Checked By: PJO
Project File: NAN-01077
Comp. No: NAN66
 Issued For Permit
 Issued For Review
 Issued For Bid
 Issued For Construction
 Not For Construction

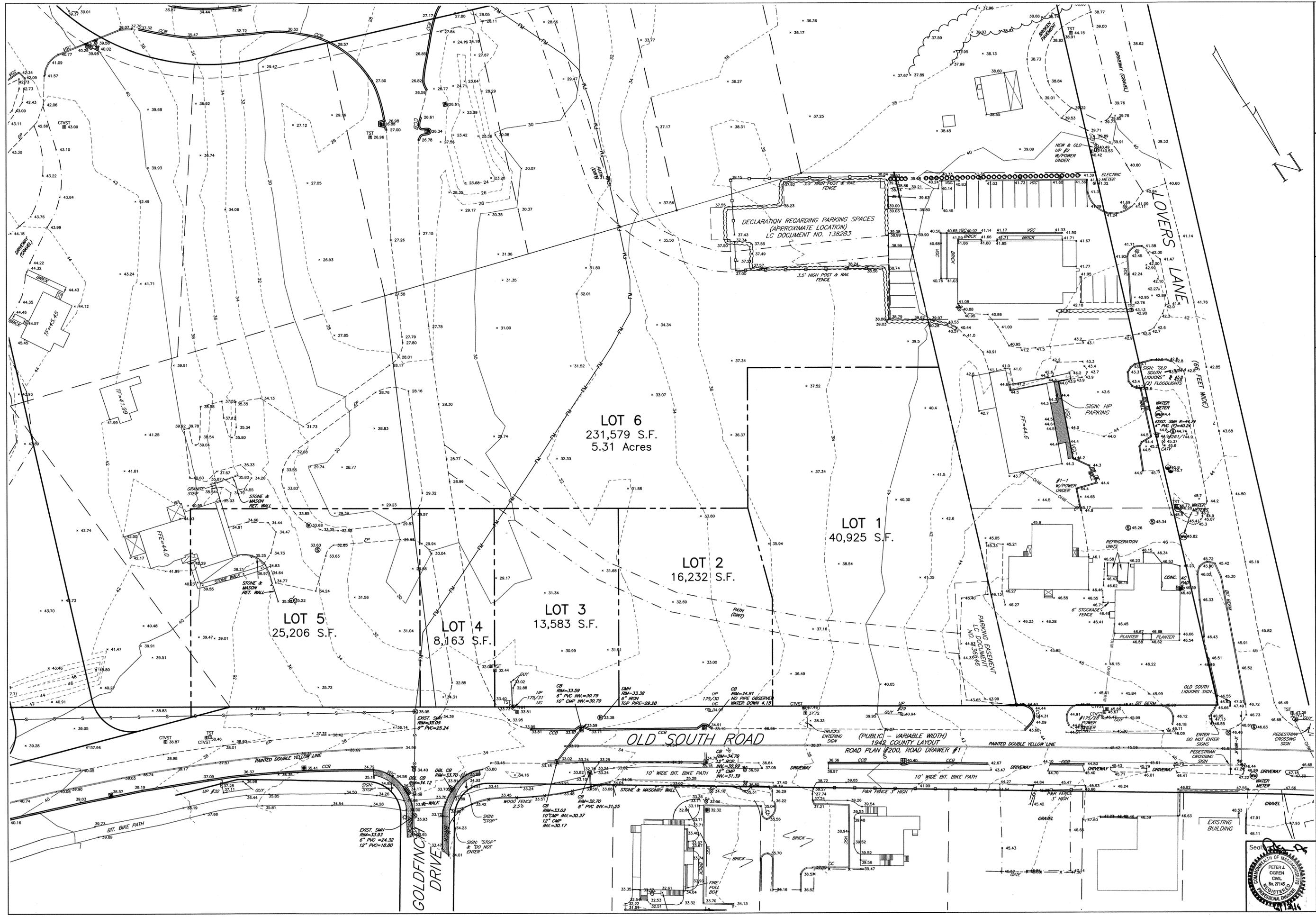
Scale: 1"=30'
0' 15' 30' 60'

Date: June 10, 2016

Drawing Title:
**OLD SOUTH ROAD CROSSING
INDEX PLAN
OLD SOUTH ROAD
NANTUCKET, MASS.**

Drawing No.:
C1

SHEET 1 OF 8



Prepared For:
 Owner / Applicant
 RICHMOND GREAT POINT
 RICHMOND, VT
 25 CONCORD STREET
 WILMINGTON, MA 01887
 (978) 988-3900

Prepared By:
 Hayes Engineering, Inc.
 Hayes Engineering, Inc.
 633 Salem Street
 Waverland, MA 01880
 Ph: 781.246.2800
 Fax: 781.246.7596
 www.hayeseng.com

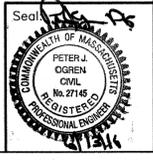
Design By: PUJ
 Drawn By: AMC
 Checked By: PUJ
 Project File: NAN-0107T
 Comp. No: NAN66
 Issued For Permit
 Issued For Review
 Issued For Bid
 Issued For Construction
 Not For Construction

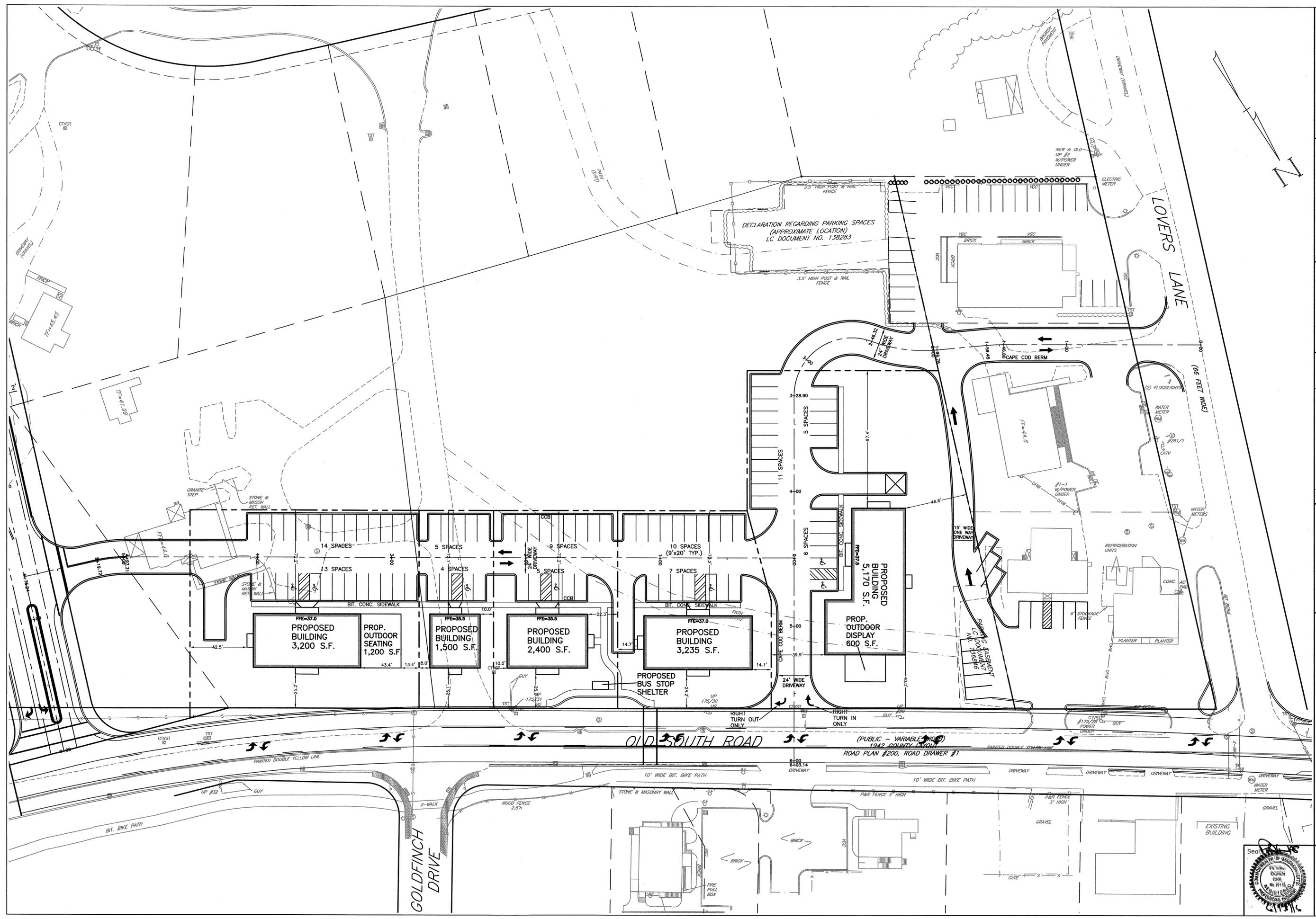
No.	Revision	Date
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Scale: 1"=30'
 0' 15' 30' 60'
 Date: June 10, 2016

Drawing Title:
**OLD SOUTH ROAD CROSSING
 EXISTING CONDITIONS PLAN
 OLD SOUTH ROAD
 NANTUCKET, MASS.**

Drawing No.:
C2
 SHEET 2 OF 8





Prepared For:
 Owner / Applicant
 RICHMOND GREAT POINT
 LLC
 23 CONCORD STREET
 WILMINGTON, MA 01887
 (978) 988-3900

Prepared By:
 Hayes Engineering, Inc.
 603 Salem Street
 Wakefield, MA 01880
 Ph: 781.246.2900
 Fax: 781.246.7596
 www.hayeseng.com

Design By: PJO
 Drawn By: AMC
 Checked By: PJO
 Project File: NAN-0107T
 Comp. No: NAN66
 Issued For Permit
 Issued For Review
 Issued For Bid
 Issued For Construction
 Not For Construction

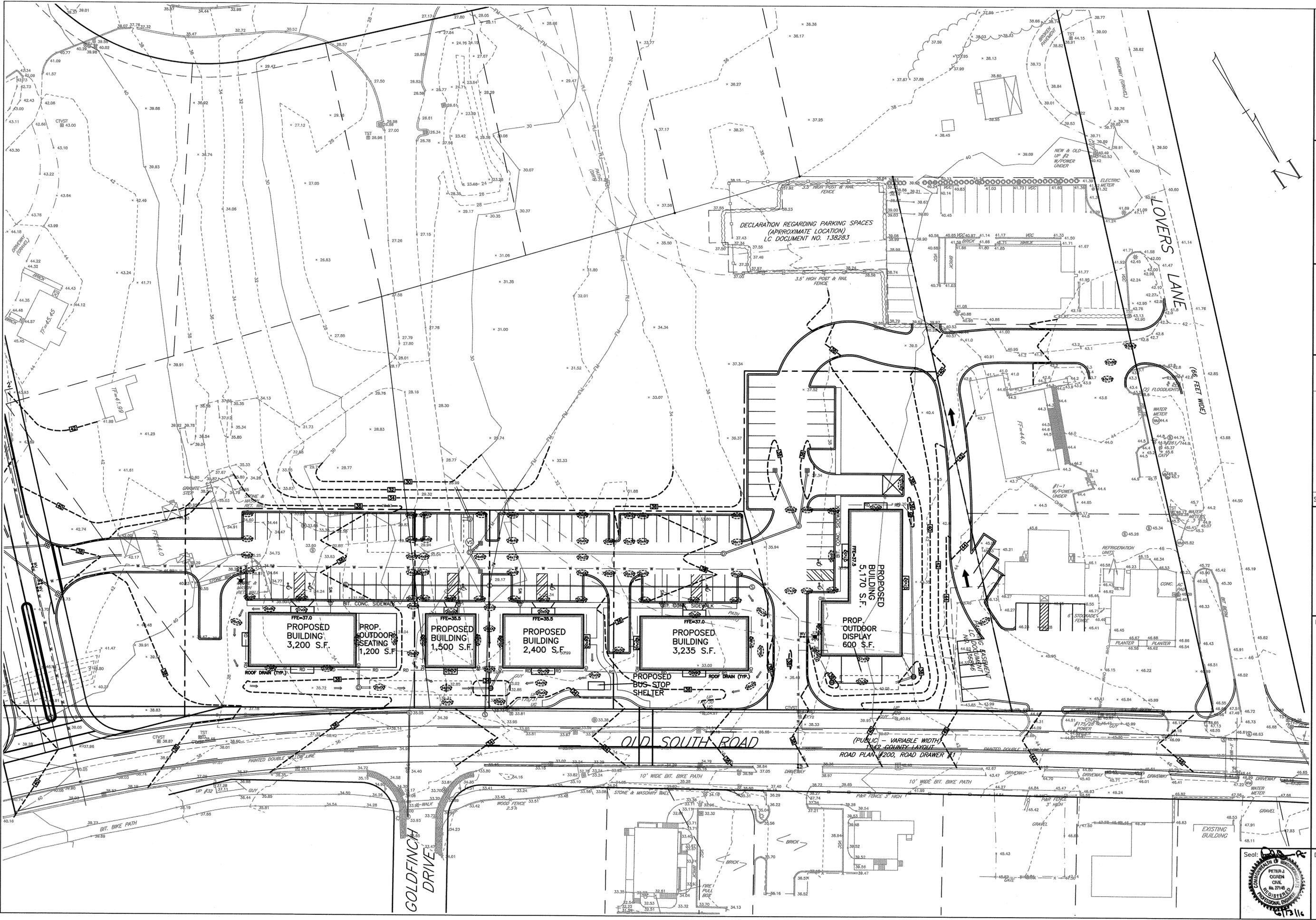
No.	Revision	Date
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		

Scale: 1"=30'
 0' 15' 30' 60'
 Date: June 10, 2016

Drawing Title:
**OLD SOUTH ROAD CROSSING
 LAYOUT PLAN
 OLD SOUTH ROAD
 NANTUCKET, MASS.**

Drawing No.:
C3
 SHEET 3 OF 8





Prepared For:
 RICHMOND GREAT POINT
 DEVELOPMENT, LLC
 23 CONCORD STREET
 WILMINGTON, MA 01887
 (978) 988-3900

Prepared By:
 Hayes Engineering, Inc.
 603 Salem Street
 Wakefield, MA 01880
 Ph: 781.246.2800
 Fax: 781.246.7596
 www.hayeseng.com

Design By: PJO
 Drawn By: AMC
 Checked By: PJO
 Project File: NAN-0107T
 Comp. No: NAN66
 Issued For Permit
 Issued For Review
 Issued For Bid
 Issued For Construction
 Not For Construction

No.	Revision	Date
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
NS		

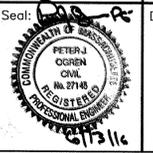
Scale: 1"=30'
 0' 15' 30' 60'

Date: June 10, 2016

Drawing Title:
**OLD SOUTH ROAD CROSSING
 GRADING PLAN
 OLD SOUTH ROAD
 NANTUCKET, MASS.**

Drawing No.:
C4

SHEET 4 OF 8



Prepared For:

Owner / Applicant
RICHMOND GREAT POINT
DEVELOPMENT STREET
WILMINGTON, MA 01887
(978) 988-3800

Prepared By:

Hayes Engineering, Inc.
Hayes
66 Waverfield, MA 01880
Ph: 781.246.2800
Fax: 781.246.7596
www.hayeseng.com

Design By: PJO
Drawn By: AMC
Checked By: PJO
Project File: NAN-0107T
Comp. No: NAN66
 Issued For Permit
 Issued For Review
 Issued For Bid
 Issued For Construction
 Not For Construction

No.	Revision	Date
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		

Scale: 1"=30'
0' 15' 30' 60'
Date: June 10, 2016

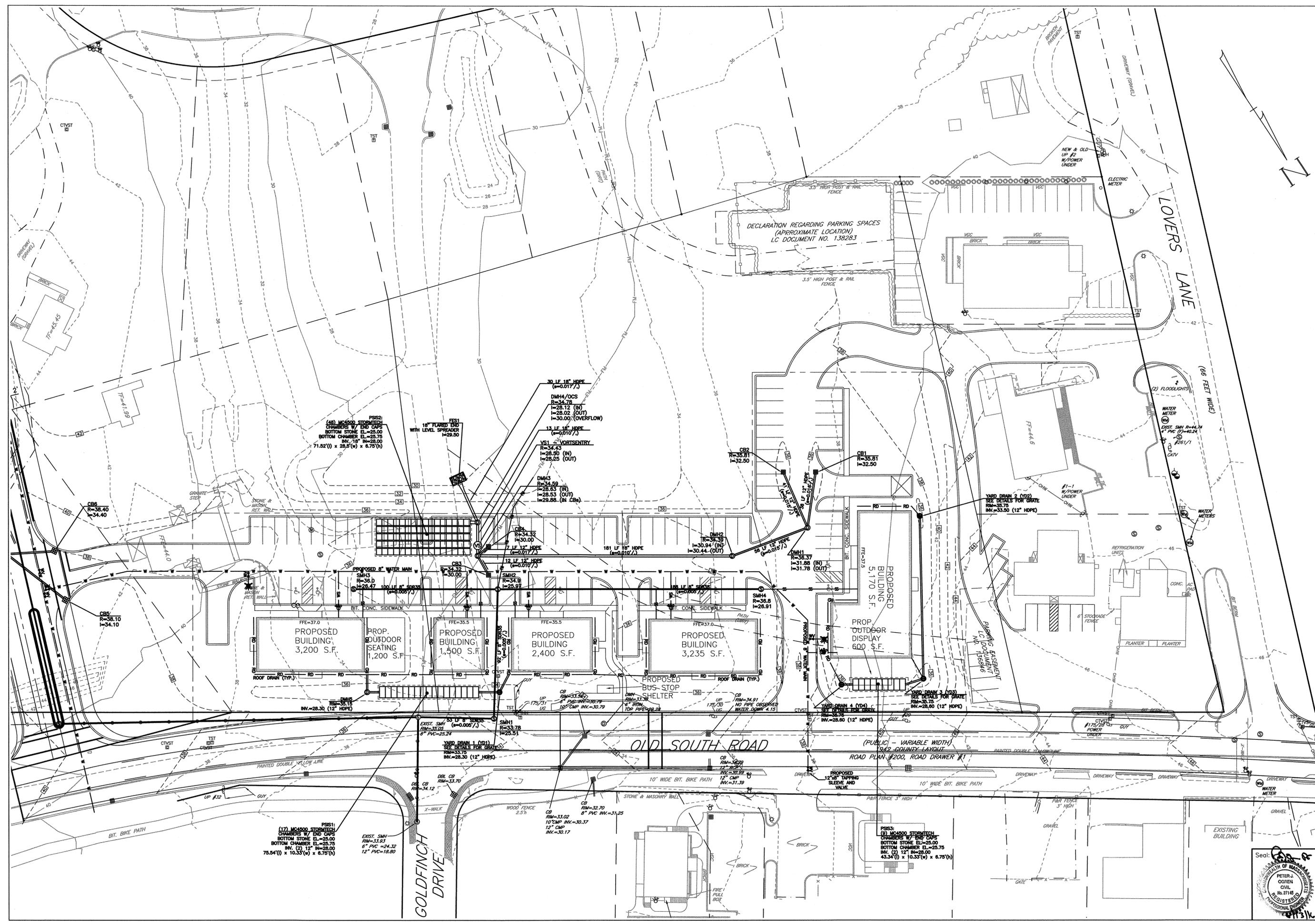
Drawing Title:

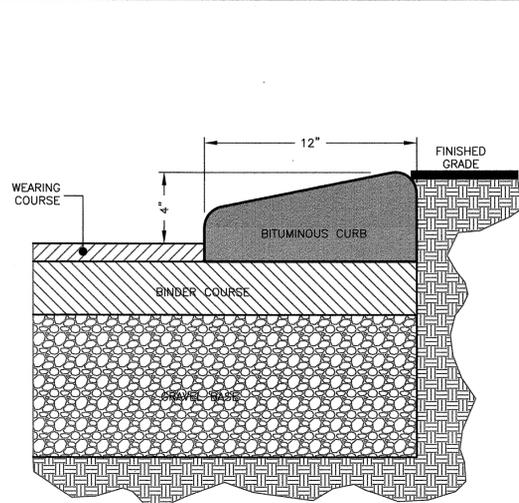
OLD SOUTH ROAD CROSSING
UTILITIES PLAN
OLD SOUTH ROAD
NANTUCKET, MASS.

Drawing No.:

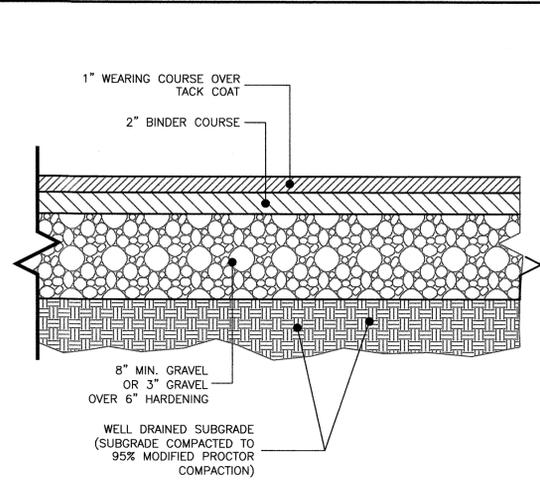
C5

SHEET 5 OF 8



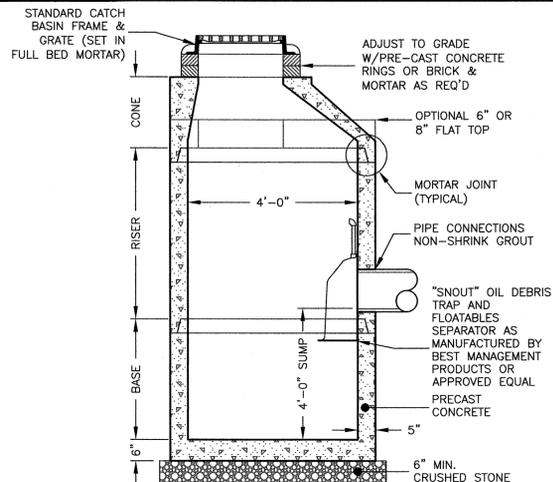


1 CAPE COD CURB
NOT TO SCALE



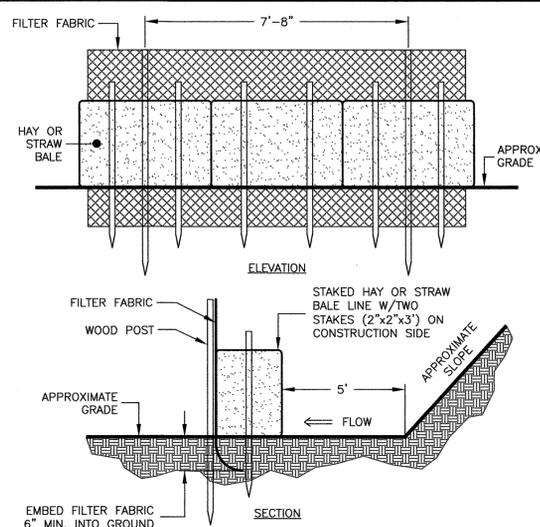
2 PAVEMENT SECTION
NOT TO SCALE

NOTE: THIS PAVEMENT SECTION DETAIL REFLECTS MINIMUM REQUIREMENTS. ENGINEER TO DETERMINE DESIGN BASED ON GEOTECHNICAL DATA.



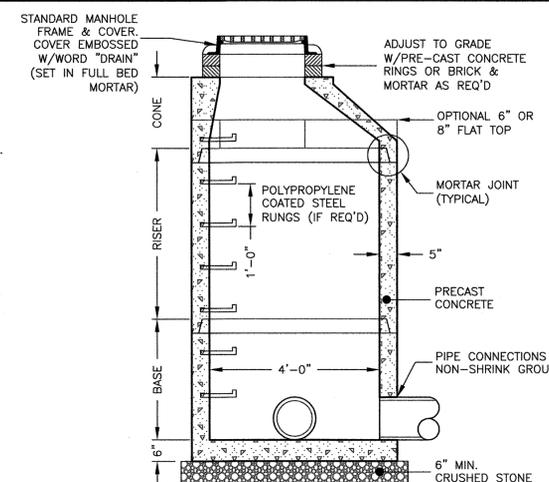
3 PRE-CAST CATCH BASIN
NOT TO SCALE

NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."



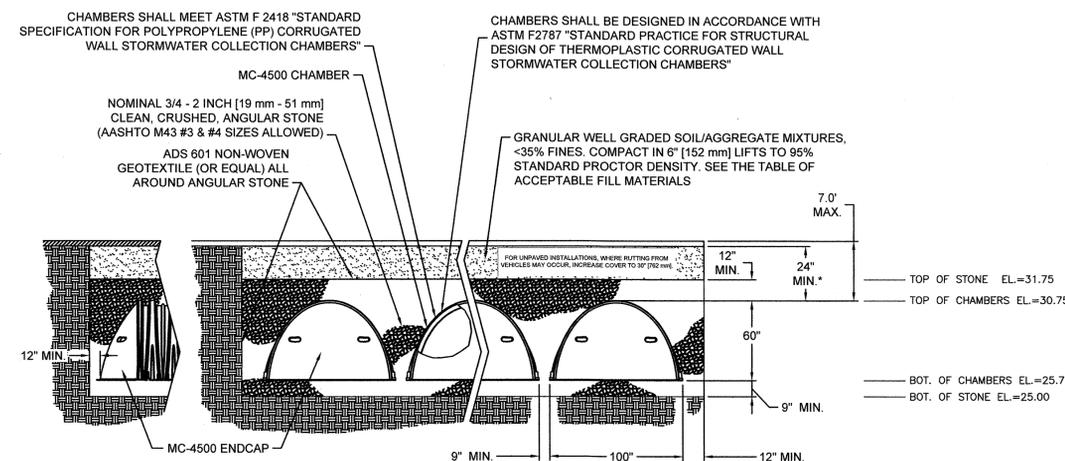
4 SILT FENCE & HAY/STRAW BALE
NOT TO SCALE

NOTE: USE STRAW BALES ADJACENT TO WETLANDS



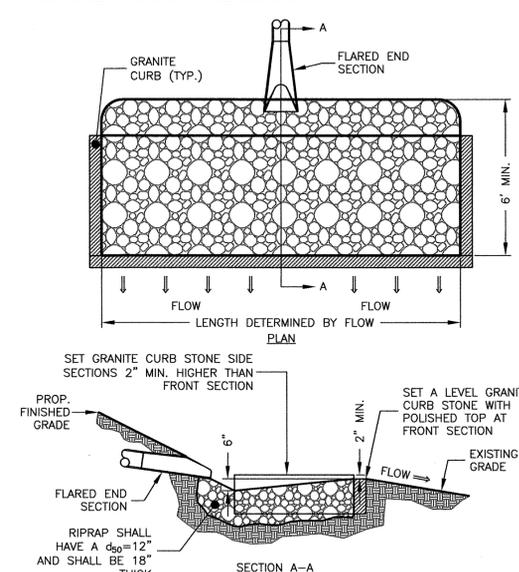
5 PRE-CAST DRAIN MANHOLE
NOT TO SCALE

NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."



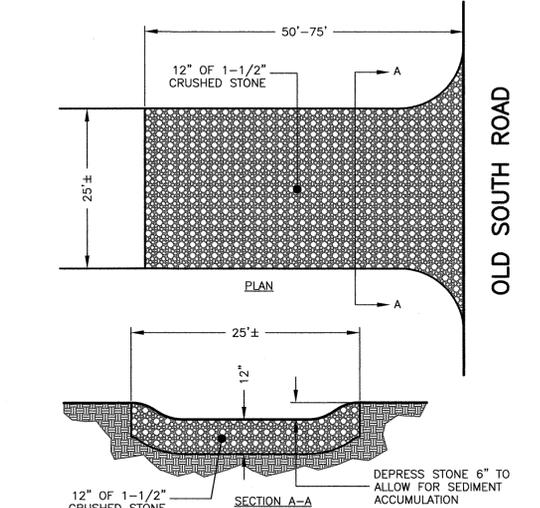
5 MC-4500 TYPICAL CROSS-SECTION
NOT TO SCALE

PERIMETER STONE MUST ALWAYS BE BROUGHT UP EVENLY WITH BACKFILL OF BED. PERIMETER STONE MUST EXTEND HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH STRAIGHT OR SLOPED SIDEWALLS.



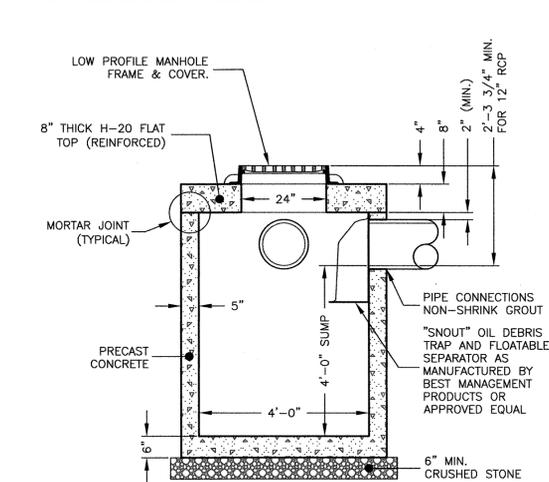
6 LEVEL SPREADER
NOT TO SCALE

SET GRANITE CURB STONE SIDE SECTIONS 2" MIN. HIGHER THAN FRONT SECTION
SET A LEVEL GRANITE CURB STONE WITH POLISHED TOP AT FRONT SECTION
RIPRAP SHALL HAVE A $d_{90} = 12"$ AND SHALL BE 18" THICK



7 TIRE TRACKING PAD
NOT TO SCALE

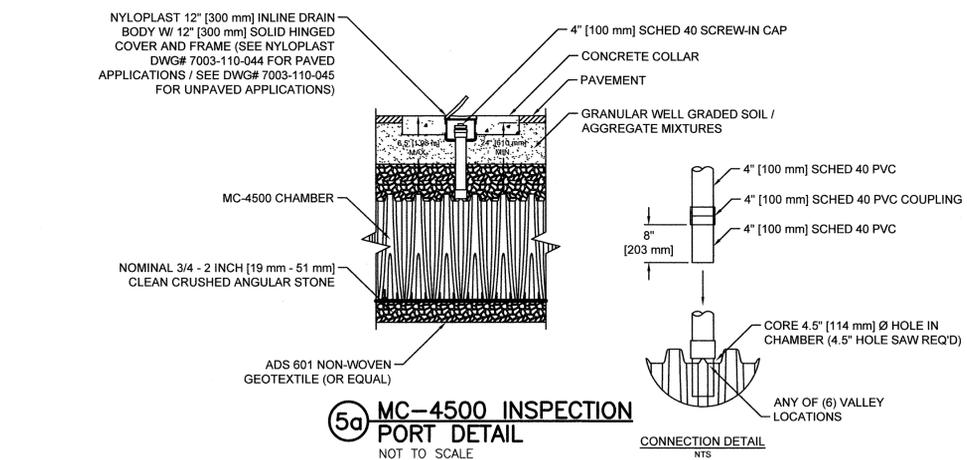
NOTE: PROVIDE TRANSITION BETWEEN CONSTRUCTION ENTRANCE AND PUBLIC RIGHT-OF-WAY. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT THE TRACKING OF SEDIMENT INTO PUBLIC RIGHT-OF-WAY



8 REDUCED COVER CATCH BASIN
NOT TO SCALE

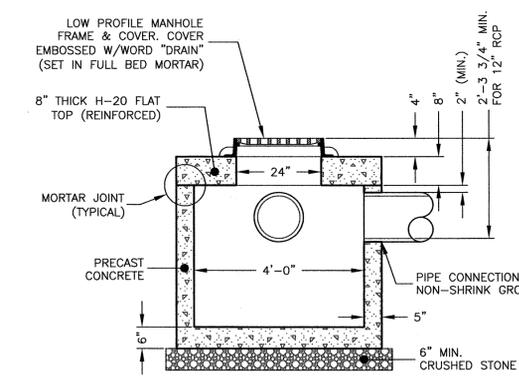
NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."

NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY OF (6) CHAMBER CORRUGATION VALLEYS
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.



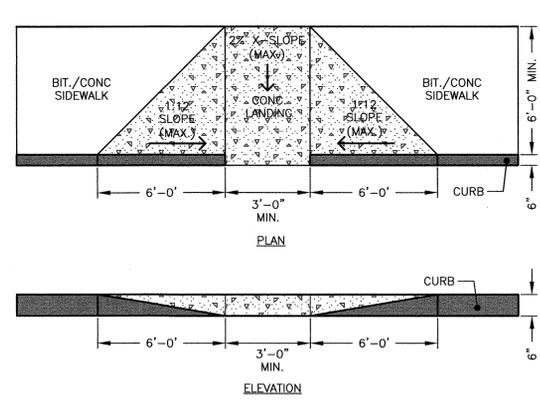
5a MC-4500 INSPECTION PORT DETAIL
NOT TO SCALE

CONNECTION DETAIL NTS



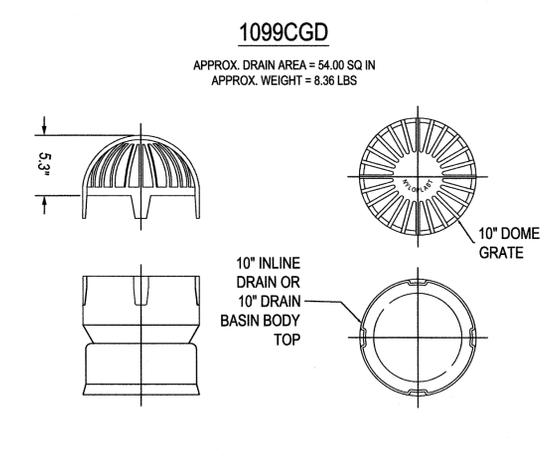
9 REDUCED COVER DRAIN MANHOLE
NOT TO SCALE

NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."

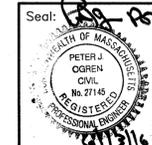


10 WHEELCHAIR RAMP
NOT TO SCALE

NOTE: WHEELCHAIR RAMP SHALL COMPLY WITH ALL STATE AND FEDERAL RULES AND REGULATIONS.



11 NYOPLAST YARD DRAIN INLET
NOT TO SCALE



Prepared For:

Owner / Applicant
RICHMOND GREAT POINT
RECREATION CENTER
23 CONCORD STREET
WILMINGTON, MA 01897
(978) 988-3800

Prepared By:

Hayes Engineering, Inc.
695 South Street
Wakefield, MA 01880
Ph: 781.246.2800
Fax: 781.246.7596
www.hayeseng.com

Design By: EES

Drawn By: AMC

Checked By: PJO

Project File: NAN-0139

Comp. No: NAN66

Issued For Permit

Issued For Review

Issued For Bid

Issued For Construction

Not For Construction

No.	Revision	Date
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		

Scale: 1"=NTS
Date: June 10, 2016

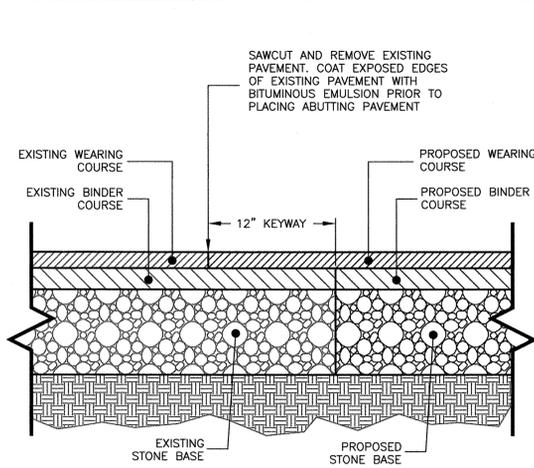
Drawing Title:

OLD SOUTH ROAD CROSSING
DETAIL SHEET 1
OLD SOUTH ROAD
NANTUCKET, MASS.

Drawing No.:

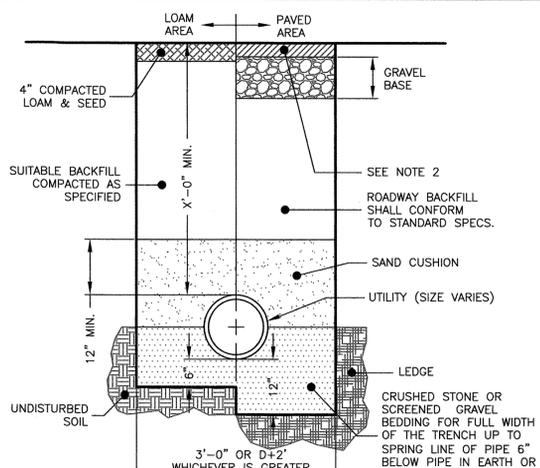
C6

SHEET 6 OF 8



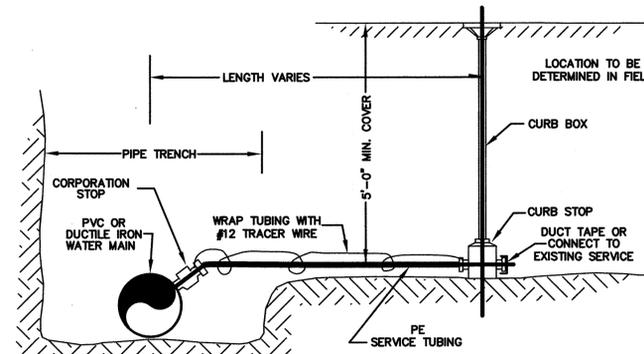
1 PAVEMENT KEYWAY
NOT TO SCALE

NOTE: THIS PAVEMENT SECTION DETAIL REFLECTS MINIMUM REQUIREMENTS. ENGINEER TO DETERMINE DESIGN BASED ON GEOTECHNICAL DATA.

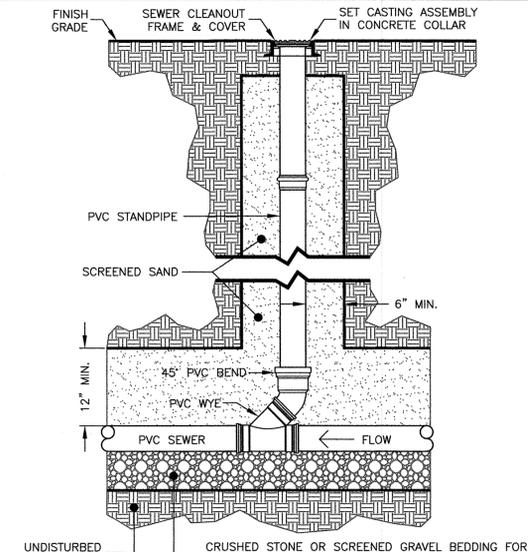


2 UTILITY TRENCH
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12\"/>



3 TYPICAL WATER SERVICE CONNECTION
NOT TO SCALE

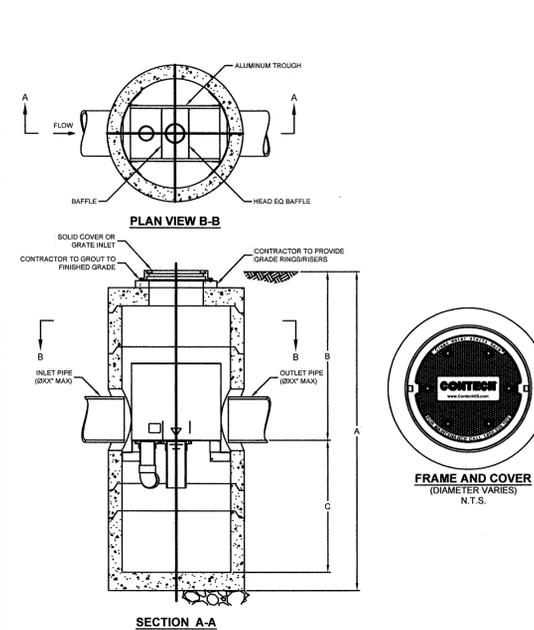


4 SEWER SERVICE CLEANOUT
NOT TO SCALE

Prepared For:
Owner / Applicant
RICHMOND GREAT POINT
REVEALING, LLC
23 WILMINGTON STREET
WILMINGTON, MA 01887
(978) 988-3300

Prepared By:
Hayes Engineering, Inc.
603 So. Main Street
Warefield, MA 01880
Ph: 781.246.2800
Fax: 781.246.7596
www.hayeseng.com

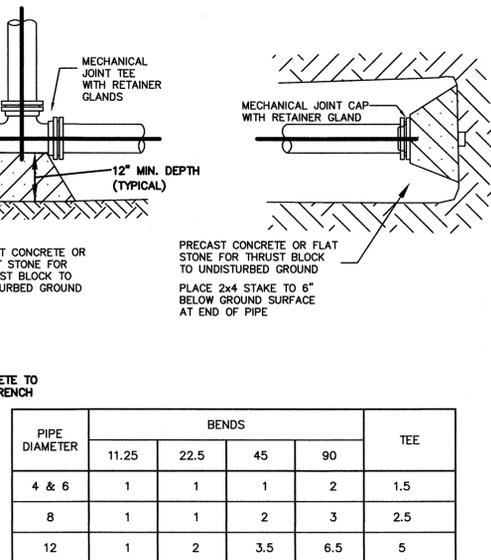
Design By: EES
Drawn By: AMC
Checked By: PJO
Project File: NAN-0139
Comp. No: NAN66
 Issued For Permit
 Issued For Review
 Issued For Bid
 Issued For Construction
 Not For Construction



5 VORTSENTRY HS STANDARD DETAIL

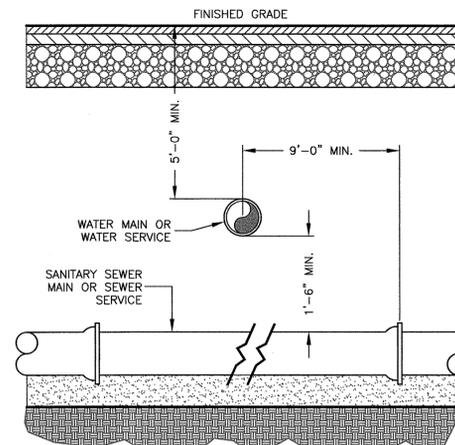
6 TYPICAL THRUST BLOCK
NOT TO SCALE

- GENERAL NOTES:
1. CONTRACTOR TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
 2. DIMENSIONS MARKED WITH (1) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
 3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTRACTOR ENGINEER'S SOLUTIONS, L.L.C. REPRESENTATIVE. WWW.CONTECH.COM
 4. VORTSENTRY HS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
 5. STRUCTURE SHALL MEET AASHTO H250 AND CASTINGS SHALL MEET AASHTO M240 LOAD RATINGS, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- INSTALLATION NOTES:
1. ANY SUBSIDIARY BACKFILL, DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
 2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTSENTRY HS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
 3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
 4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
 5. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.



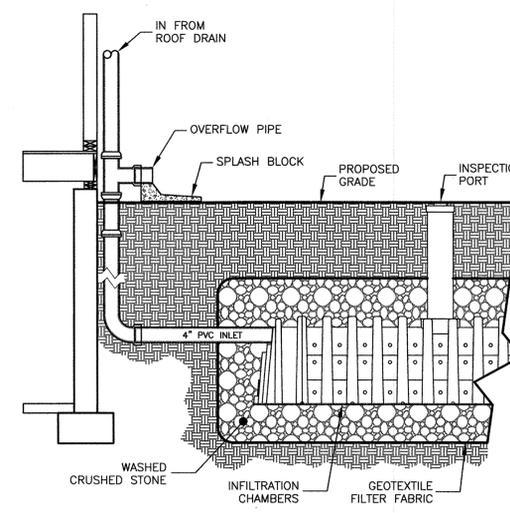
PIPE DIAMETER	BENDS					TEE
	11.25	22.5	45	90		
4 & 6	1	1	1	2	1.5	
8	1	1	2	3	2.5	
12	1	2	3.5	6.5	5	

THRUST BLOCK BEARING AREA (SF)
(BASED UPON 100 PSI WATER PRESSURE
AND 3000 PSF BEARING LOAD CAPACITY)



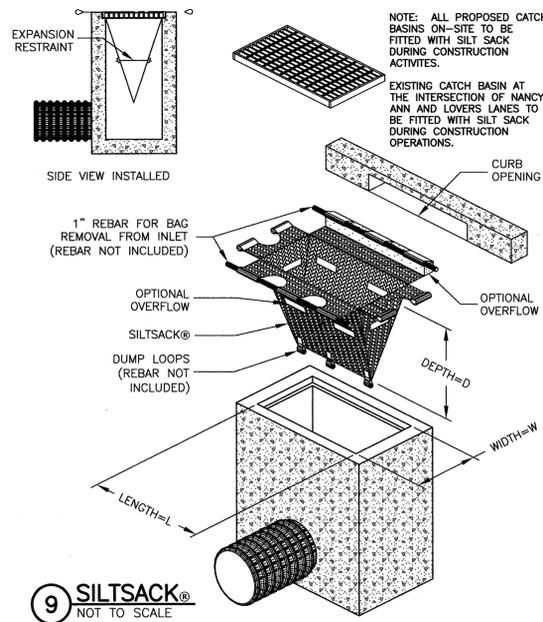
7 WATER/SEWER CROSSING
NOT TO SCALE

- NOTES:
1. WHEREVER FEASIBLE, SEWERS WILL BE LAID AT A MINIMUM OF 10 FEET, HORIZONTALLY, FROM ANY EXISTING OR PROPOSED WATER MAIN. SHOULD LOCAL CONDITIONS PREVENT A LATERAL SEPARATION OF 10 FEET TO A WATER MAIN THE SEWER MAIN WILL BE LAID IN A SEPARATE TRENCH AND THE ELEVATION OF THE CROWN OF THE SEWER PLACED AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN. WHENEVER SEWERS MUST CROSS UNDER WATER MAINS, THE SEWER SHALL BE LAID AT SUCH AN ELEVATION THAT THE CROWN OF THE SEWER IS AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN. WHEN IT IS IMPOSSIBLE TO OBTAIN HORIZONTAL OR VERTICAL SEPARATION AS STIPULATED ABOVE, BOTH THE WATER MAIN AND SEWER SHOULD BE ENCASED IN CONCRETE FOR 10 FEET EITHER SIDE OF THE CROSSING.
 2. IN LOCATIONS WHERE THE SEWER MAIN DOES NOT HAVE 48\"/>



8 ROOF DRAIN TO CHAMBER
NOT TO SCALE

- NOTE:
1. CURTECS SHALL BE INSTALLED A MINIMUM OF 10' FROM HOUSE.



9 SILTSACK
NOT TO SCALE

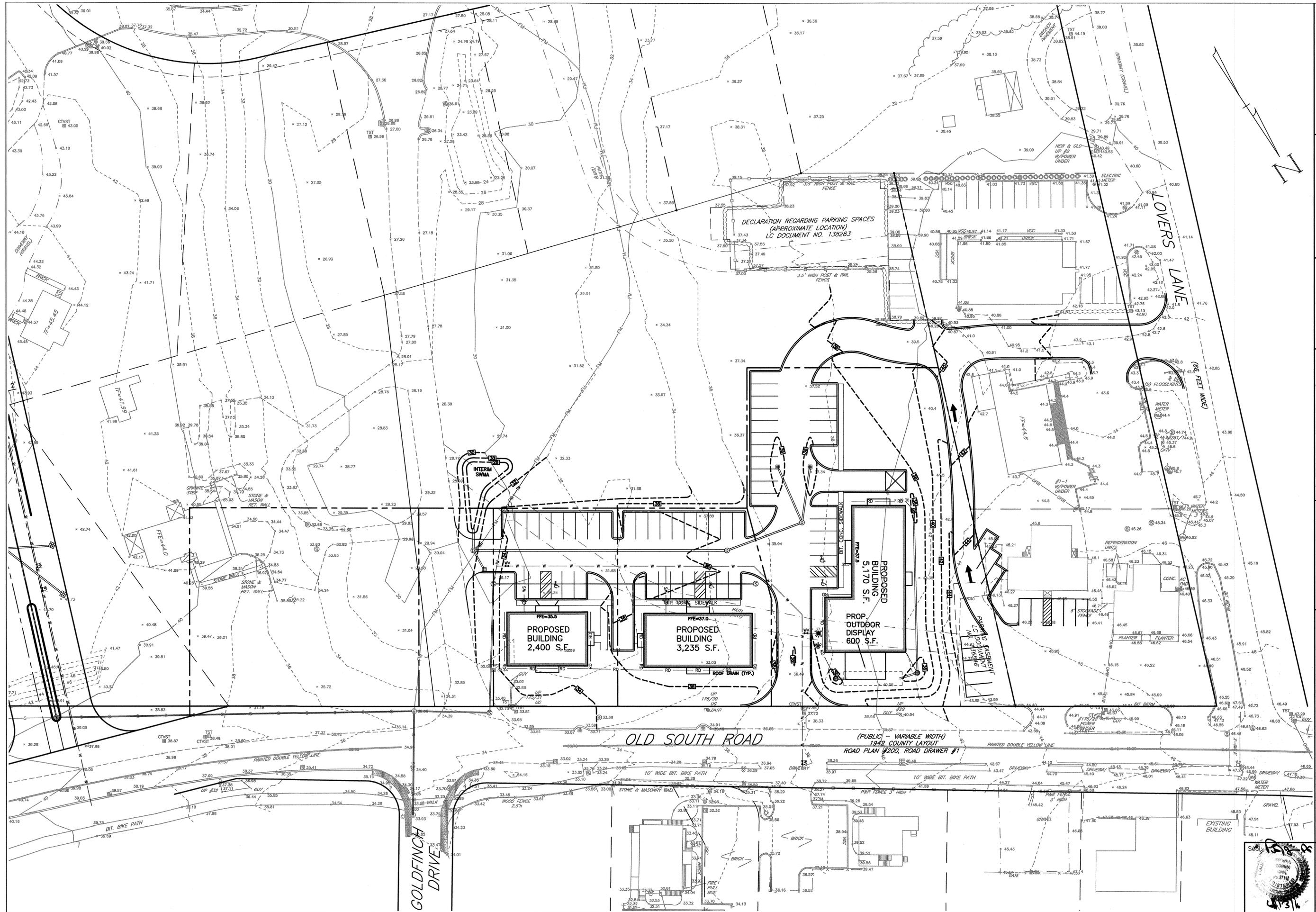
No.	Revision	Date
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		

Scale: 1"=10'
Date: June 10, 2016

Drawing Title:
**OLD SOUTH ROAD CROSSING
INDEX PLAN
OLD SOUTH ROAD
NANTUCKET, MASS.**

Seal: [Signature]
PETER OGRON
6/13/16

Drawing No.:
C7
SHEET 7 OF 8



Prepared For:
 Owner / Applicant
 RICHMOND GREAT POINT
 WILMINGTON, MA 01897
 (978) 988-3500

Prepared By:
 Hayes Engineering, Inc.
 603 Salem Street
 WILMINGTON, MA 01897
 Ph: 781.246.2800
 Fax: 781.246.7596
 www.hayeseng.com

Design By: PJO
 Drawn By: AMC
 Checked By: PJO
 Project File: NAN-0107T
 Comp. No: NAN66
 Issued For Permit
 Issued For Review
 Issued For Bid
 Issued For Construction
 Not For Construction

No.	Revision	Date
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		

Scale: 1" = 30'
 0' 15' 30' 60'
 Date: June 10, 2016

Drawing Title:
**OLD SOUTH ROAD CROSSING
 INTERIM SITE PLAN
 OLD SOUTH ROAD
 NANTUCKET, MASS.**

Drawing No.:
C8
 SHEET 8 OF 8



603 Salem Street
Wakefield, MA 01880
Tel: (781) 246-2800
Fax: (781) 246-7596

Nantucket, MA 02554
Tel: (508) 228-7909

Refer to File No. NAN-0107J

Storm Water Management Report



Major Commercial Development
Special Permit Site Plan
Old South Road Crossing
Nantucket, Massachusetts



June 10, 2016

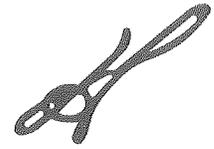
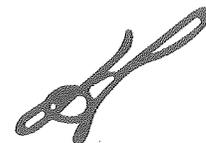


Table of Contents

1.0	Introduction	1
1.1	Pre-Development Conditions	1
1.2	Post-Development Conditions.....	2
1.3	Ground Cover Conditions	2
2.0	Storm Water Management	3
2.1	Pre-Development Conditions	3
2.1.1	Drainage System	3
2.1.2	Watersheds	3
2.1.3	Runoff Calculations.....	3
2.2	Post-Development Conditions.....	5
2.2.1	Drainage System	5
2.2.2	Watersheds	5
2.2.3	Runoff Calculations.....	7
3.0	Massachusetts DEP Storm Water Management Standards.....	9
3.1	Standard 1: No New Untreated Discharges	9
3.2	Standard 2: Peak Rate Attenuation.....	9
3.3	Standard 3: Recharge.....	10
3.4	Standard 4: Water Quality.....	11
3.5	Standard 5: Land Uses with Higher Potential Pollution Loads.....	12
3.6	Standard 6: Critical Areas	13
3.7	Standard 7: Redevelopment Projects.....	13
3.8	Standard 8: Construction Period Pollution Prevention.....	13
3.9	Standard 9: Operation and Maintenance Plan	14
3.10	Standard 10: Illicit Discharges.....	14
4.0	Conclusion	14



List of Tables

Table 1 - Ground Cover Conditions.....	2
Table 2 - Design Storms	5
Table 3 - Pre-Development Condition Peak Rates of Runoff.....	5
Table 4 - Pre-Development Condition Peak Volume of Runoff.....	5
Table 5 - Hydrologic Soil Properties by Soil Texture (Rawls, Brakensiek & Saxton, 1982).....	8
Table 6 - Post-Development Peak Rate of Runoff.....	8
Table 7 - Post-Development Peak Volume of Runoff	8
Table 8 - Peak Rates of Runoff Comparison.....	10
Table 9 - Runoff Volume Comparison	10
Table 10 - Recharge Target Depth by Hydrologic Soil Group.....	11

List of Figures

Figure 1- USGS Vicinity Map	1
Figure 2 - Pre-Development Watershed Map.....	4
Figure 3 - Post-Development Watershed Map	6

List of Appendices

Appendix A:	NRCS Soil Mapping and Data
Appendix B:	HydroCAD® Calculations
Appendix C:	Massachusetts DEP Storm Water Checklist
Appendix D:	Water Quality Calculations
Appendix E:	Construction Period Pollution Prevention Plan
Appendix F:	Operations and Maintenance Plan



1.0 Introduction

Richmond Great Point Development, LLC (the "Applicant") propose to construct a multi-unit retail development to be known as "Old South Road Crossing" (the "Project") proximate to the intersection of Old South Road and Lovers Lane. The Project area is depicted on Figure 1 below showing a portion of the United States Geologic Survey (USGS) topographic map. The Project is a portion of a larger project including both residential and commercial uses; this larger project will include improvements to infrastructure through the relocation, improvement and reconfiguration of portions of Old South Road, Nancy Ann Drive, and Davkim Road.

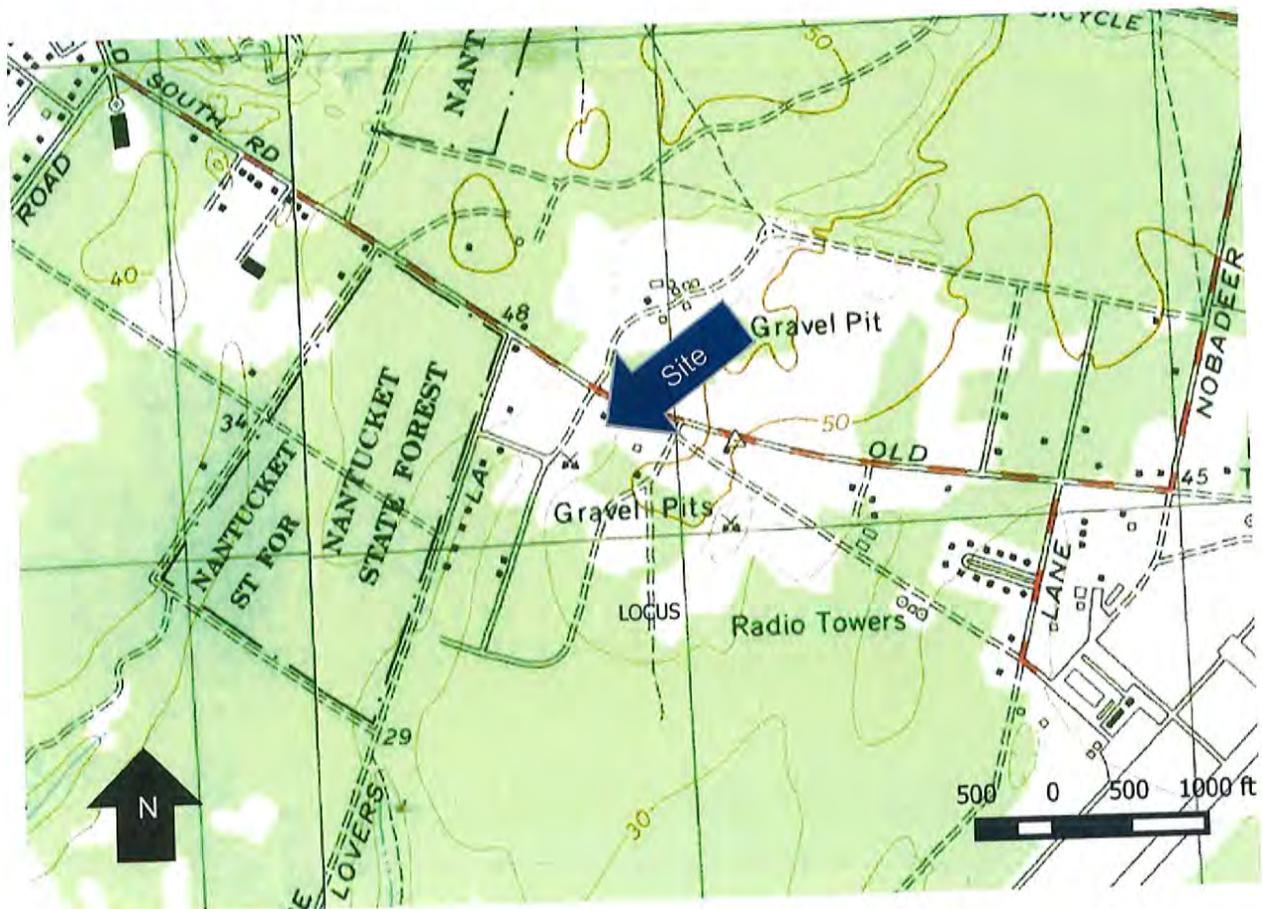
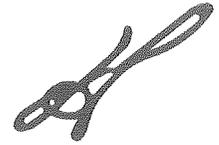


Figure 1- USGS Vicinity Map

1.1 Pre-Development Conditions

The Project site in its existing condition consists of developed and undeveloped areas near the intersection of Old South Road and Lovers Lane.

The United States Department of Agriculture Natural Resource Conservation Service (NRCS) Soil Survey mapping indicates soils representative of Evesboro sand within the Project area. This well drained soil exhibits deep ground water and is classified as Hydrologic Soil Group (HSG) "A."



The NRCS identifies the following characteristics of soils classified as 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.

NRCS Soil Survey Mapping and Soil Data accompany this report as Appendix A.

1.2 Post-Development Conditions

The Project as proposed includes the construction of a five (5) retail structures varying in size between 1,500 and 5,170 square feet, associated parking and driveways. A comprehensive storm water management and drainage system will also be constructed to capture, convey and treat runoff from the Project.

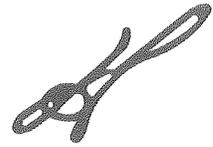
1.3 Ground Cover Conditions

The hydrologic study area consists of approximately 6.5± acres in land area. The following table summarizes the pre- and post-development ground cover conditions for the study area(s):

Table 1 - Ground Cover Conditions

Cover Type	Existing Area (Acres)	Proposed Area (Acres)	Change (Acres)
Impervious Surfaces	0.87	2.46	+1.59
Bare Soil	0.92	0.11	-0.81
Brush, Poor	2.00	0.00	-2.00
Meadow	0.64	0.00	-0.64
Grass, Good	2.06	4.17	+2.11
Total	6.49	6.75	+0.26

Note: HydroCAD® Calculations provided in Appendix B summarize cover conditions for each sub-catchment.



2.0 Storm Water Management

2.1 Pre-Development Conditions

2.1.1 Drainage System

The proposed site generates surface runoff conveyed by overland flow to the South via a broad valley that bisects the site. There is no structured drainage system in this area.

2.1.2 Watersheds

Under existing conditions, the site is divided into one (1) sub-catchment area. (See Figure 2 – Pre-Development Watershed Map).

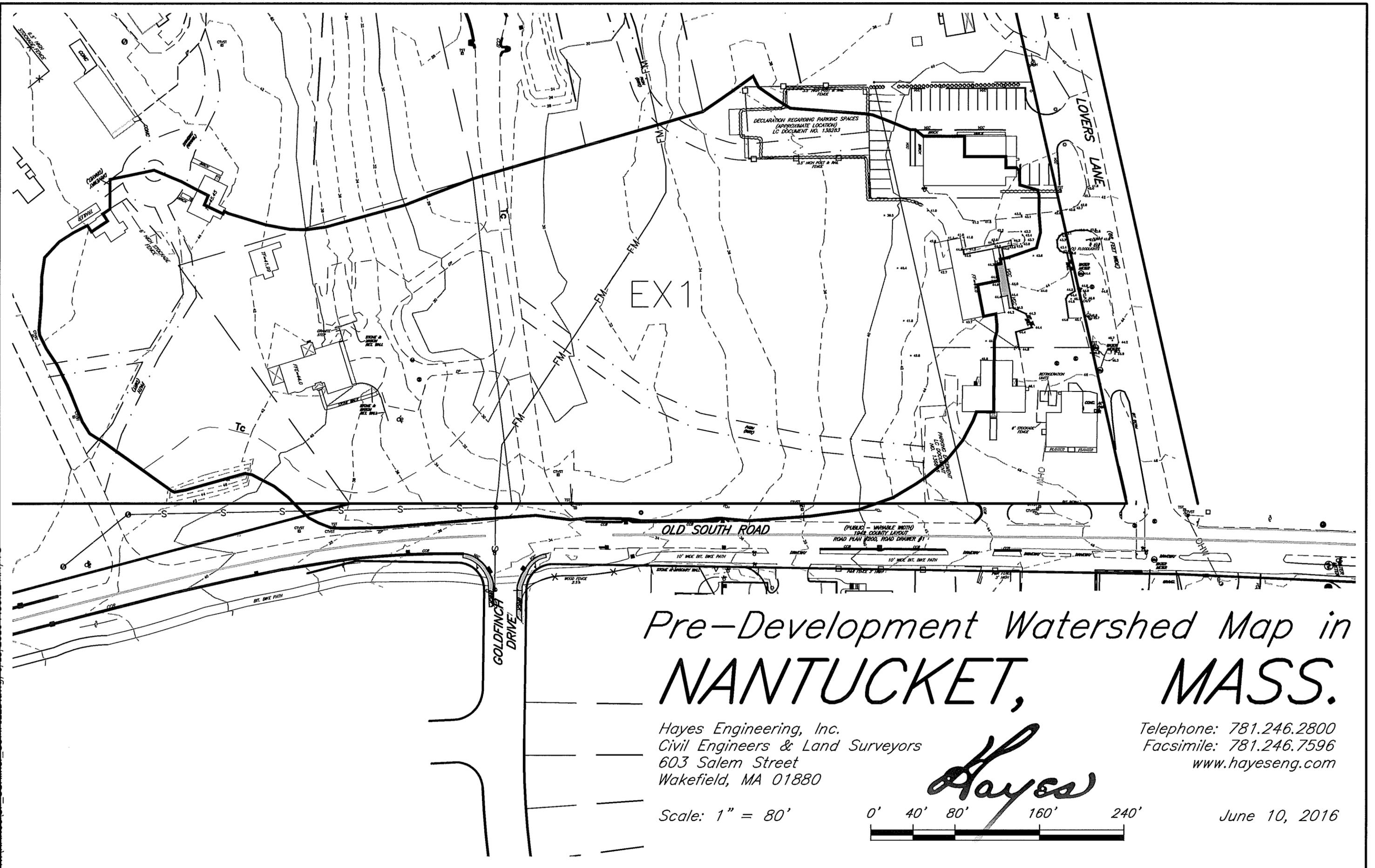
The study point of comparison, Point of Comparison 1, is at the intersection of the above aforementioned valley and the downgradient property line of Lot 6.

Sub-catchment EX1 is tributary to Study Point of Comparison 1 (POC1). EX1 encompasses the Project area and consists of undeveloped meadow, areas of interspersed scrub oak and pines (brush) and areas of developed residential and commercial lands, buildings and driveways near the perimeter of the sub-catchment.

2.1.3 Runoff Calculations

Runoff calculations were performed in accordance with the methodology outlined in the NRCS Soil Conservation Service (SCS) methods as defined in Technical Release 55 (TR-55) and Technical Release 20 (TR-20) which are the basis for the HydroCAD® hydrologic model. Existing cover conditions and times of concentrations were used to generate runoff hydrographs for each of the three (3) sub-catchments in each of the Type III design storms in accordance with Technical Paper 40 (TP-40) as identified in Table 2.

N:\MAN6\SP_OS\liner_compiled.dwg, 6/13/2016 7:58:22 AM, TC



Pre-Development Watershed Map in NANTUCKET, MASS.

Hayes Engineering, Inc.
Civil Engineers & Land Surveyors
603 Salem Street
Wakefield, MA 01880

Telephone: 781.246.2800
Facsimile: 781.246.7596
www.hayeseng.com



Scale: 1" = 80'



June 10, 2016

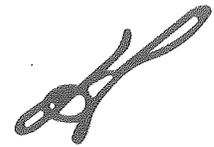


Table 2 - Design Storms

DESIGN STORM (RETURN FREQUENCY)	RAINFALL (INCHES/24-HOURS)
2-year	2.6
10-year	4.9
25-year	5.4
50-year	6.5
100-year	7.2

Pre-development peak rate and volumes of runoff to the Study Points of Comparison are shown in Table 3 and Table 3, below.

Table 3 - Pre-Development Condition Peak Rates of Runoff

Study Point	2-yr Storm Peak Flow (Q_p) (cfs)	10-yr Storm Peak Flow (Q_p) (cfs)	25-yr Storm Peak Flow (Q_p) (cfs)	50-yr Storm Peak Flow (Q_p) (cfs)	100-yr Storm Peak Flow (Q_p) (cfs)
POC1	0.9	3.2	5.4	7.4	9.5

Table 4 - Pre-Development Condition Peak Volume of Runoff

Study Point	2-yr Storm Peak Volume (V_p) (ac-ft.)	10-yr Storm Peak Volume (V_p) (ac-ft.)	25-yr Storm Peak Volume (V_p) (ac-ft.)	50-yr Storm Peak Volume (V_p) (ac-ft.)	100-yr Storm Peak Volume (V_p) (ac-ft.)
POC1	0.2	0.5	0.7	0.9	1.2

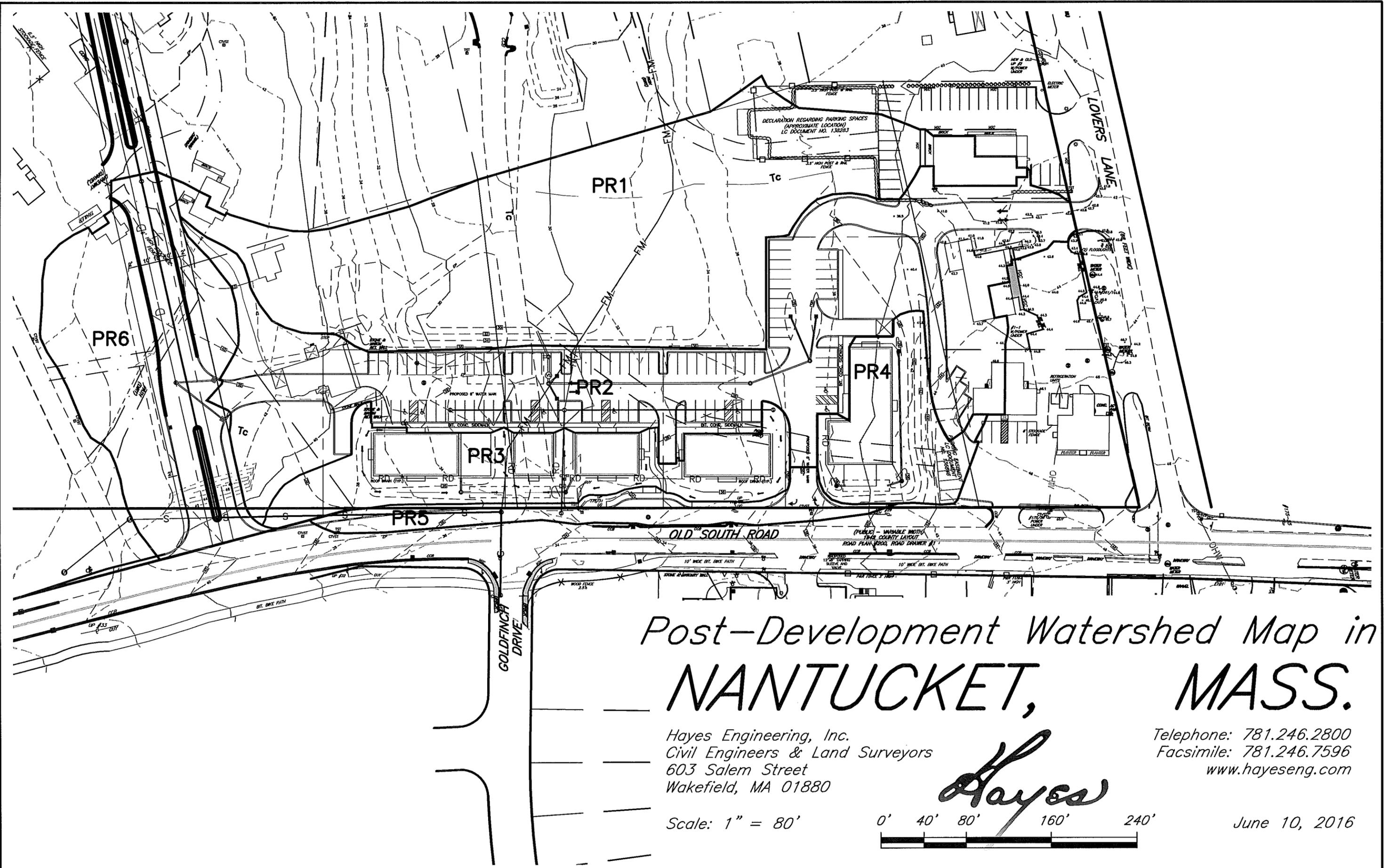
2.2 Post-Development Conditions

2.2.1 Drainage System

The proposed drainage system consists of swales, catch basins, manholes and culverts that direct runoff to treatment and infiltration best management practices (BMPs) on-site.

2.2.2 Watersheds

The Project as proposed divides the study area into six (6) sub-catchments that are ultimately tributary to the Study Point of Comparison (See Figure 3 – Post-Development Watershed Map). The Study Point of



Post-Development Watershed Map in NANTUCKET, MASS.

Hayes Engineering, Inc.
Civil Engineers & Land Surveyors
603 Salem Street
Wakefield, MA 01880

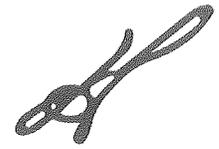
Telephone: 781.246.2800
Facsimile: 781.246.7596
www.hayeseng.com

Hayes

Scale: 1" = 80'



June 10, 2016



Comparison and its respective sub-catchment areas are described below:

POC1 – Existing valley at the downgradient property boundary of Lot 6:

- Sub-catchment PR1 consists of the undeveloped portions of the project area to the south including the majority of Lot 6;
- Sub-Catchment PR2 consists of the parking and driveways associated with the Project;
- Sub-catchment PR3 consists of the rooftops and rear landscaped areas for the proposed retail buildings on lots 2 through 5.
- Sub-catchment PR4 consists of the rooftop and rear landscaped area for the proposed retail building on lots 4.
- Sub-catchments PR5 and PR6 are areas of the Project site that are to be modified by the infrastructure improvements proposed as part of the overall development plan of the area. Runoff from these sub-catchments will be addressed by the infrastructure servicing the new and/or modified roadways.

Sub-catchments PR2, PR3 and PR4 are collected and directed to Proposed Sub-Surface Infiltration Systems (PSISs).

- PSIS1 to be constructed under the proposed swale in sub-catchment PR3;
- PSIS2 to be constructed under the parking lot in sub-catchment PR2. Runoff in excess of the infiltration capacity of the PSIS will flow overland to Study Point of Comparison 1.; and
- PSIS3 to be constructed adjacent to the proposed building on Lot 1 in sub-catchment PR4.

2.2.3 Runoff Calculations

As in the pre-development condition, runoff calculations were performed in accordance with the methodology outlined in the NRCS Soil Conservation Service (SCS) methods as defined in Technical Release 55 (TR-55) and Technical Release 20 (TR-20) which are the basis for the HydroCAD® hydrologic model. Proposed cover conditions and times of concentrations were used to generate runoff hydrographs for each of the six (6) sub-catchments in each of the Type III design storms in accordance with Technical Paper 40 (TP-40) as identified in Table 2.

The developed runoff hydrographs were then flood routed through the proposed sub-surface infiltration systems factoring the respective infiltration rates for the corresponding soil types as identified in the Rawls Table of Infiltration Rates (see Table 5, below).

Storm Water Management Report
 Old South Road Crossing – Nantucket, MA
 June 11, 2016

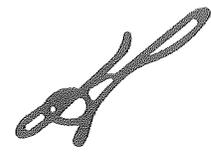


Table 5 - Hydrologic Soil Properties by Soil Texture (Rawls, Brakensiek & Saxton, 1982)

Texture Class	Effective Water Capacity (C_w) (inch per inch)	Minimum Infiltration Rate (f) (inches per hour)	Hydrologic Soil Group
Sand	0.35	8.27	A
Loamy Sand	0.31	2.41	A
Sandy Loam	0.25	1.02	A
Loam	0.19	0.52	B
Silt Loam	0.17	0.27	B
Sandy Clay Loam	0.14	0.17	C
Clay Loam	0.14	0.09	D
Silty Clay Loam	0.11	0.06	D
Sandy Clay	0.09	0.05	D
Silty Clay	0.09	0.04	D
Clay	0.08	0.02	D

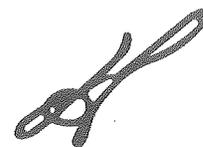
Post-development peak rate and volumes of runoff to the Study Points of Comparison are shown in Table 6 and Table 7, below.

Table 6 - Post-Development Peak Rate of Runoff

Study Point	2-yr Storm Peak Flow (Q_p) (cfs)	10-yr Storm Peak Flow (Q_p) (cfs)	25-yr Storm Peak Flow (Q_p) (cfs)	50-yr Storm Peak Flow (Q_p) (cfs)	100-yr Storm Peak Flow (Q_p) (cfs)
POC1	0.0	0.6	3.7	6.1	8.8

Table 7 - Post-Development Peak Volume of Runoff

Study Point	2-yr Storm Runoff Volume (V_p) (ac-ft.)	10-yr Storm Runoff Volume (V_p) (ac-ft.)	25-yr Storm Runoff Volume (V_p) (ac-ft.)	50-yr Storm Runoff Volume (V_p) (ac-ft.)	100-yr Storm Runoff Volume (V_p) (ac-ft.)
POC1	0.0	0.1	0.2	0.4	0.5



2.2.4 Hydraulic Calculations

The closed drainage system piping was sized for the twenty-five (25) year storm using the peak flow rates calculated for the respective post-development sub-catchments tributary to each catch-basin and Manning's Equation for each section of pipe. Please refer to Appendix C for pipe sizing calculations for the project.

3.0 Massachusetts DEP Storm Water Management Standards

Although the proposed subdivision is not located within areas under jurisdiction the Massachusetts Department of Environmental Protection's (MaDEPs) Wetlands Protection Act (WPA), the proposed storm water management system has been designed to comply with the ten (10) standards of the MaDEP Storm Water Management Policy to the maximum extent practicable. Each of the standards and the extent of Project compliance are summarized below. Please refer to Appendix D for the completed MassDEP Storm Water Checklist.

3.1 Standard 1: No New Untreated Discharges

No new storm water conveyances (e.g. outfalls) may discharge untreated storm water directly to or cause erosion in wetlands or waters of the Commonwealth.

The Project does not discharge any storm water directly to a wetland or water of the Commonwealth. Storm water quality controls are proposed with the project including: deep-sump and hooded catch basins, and sub-surface infiltration areas.

3.2 Standard 2: Peak Rate Attenuation

Storm water management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Storm water management controls to mitigate peak rates of runoff from the Project were developed for the 2, 10, 25, 50 and 100-year, 24-hour design storm events. As previously stated, runoff calculations were performed in accordance with the methodology outlined in the NRCS Soil Conservation Service (SCS) methods as defined in Technical Release 55 (TR-55) and Technical Release 20 (TR-20) which are the basis for they HydroCAD® hydrologic model. Calculations are provided as Appendix B to this report.

Table 8 summarizes the pre- and post-development peak rates of runoff for the Project and Table 9 summarizes the pre- and post-development volumes of runoff for the Project

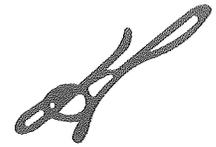


Table 8 - Peak Rates of Runoff Comparison

Study Point	2y Storm			10y Storm			25yStorm			50y Storm			100yStorm		
	Q _p (cfs)			Q _p (cfs)			Q _p (cfs)			Q _p (cfs)			Q _p (cfs)		
	Pre	Post	Δ												
POC1	0.9	0.0	-0.9	3.2	0.6	-2.7	5.4	3.7	-1.7	7.4	6.1	-1.3	9.5	8.5	-1.0

Table 9 - Runoff Volume Comparison

Study Point	2y Storm			10y Storm			25yStorm			50y Storm			100yStorm		
	Runoff Volume (V _p) (ac-ft.)			Runoff Volume (V _p) (ac-ft.)			Runoff Volume (V _p) (ac-ft.)			Runoff Volume (V _p) (ac-ft.)			Runoff Volume (V _p) (ac-ft.)		
	Pre	Post	Δ												
POC1	0.2	0.0	-0.2	0.5	0.1	-0.4	0.7	0.2	-0.5	0.9	0.4	-0.5	1.2	0.5	-0.7

3.3 Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration ... At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the storm water management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Storm Water Handbook.

The Project approximates the annual recharge to groundwater through the use of structural and non-structural best management practices (BMPs) including a sub-surface infiltration system and existing surface infiltration as well as through implementation of the proposed long-term operations and maintenance plan.

In accordance with the Massachusetts Storm Water Handbook the required recharge volume (R_v) for the Project equals a depth of runoff corresponding to the soil type time the impervious areas covering that soil type at the post-development site.

As previously stated and documented in Appendix A, soils on-site are best represented by hydrologic soil group A. The target depth factor (F) identified for hydrologic soil type A is identified as 0.6-inches in Table 2.3.2: Recharge Depth by Hydrologic Soil Group of the Massachusetts Storm Water Handbook (and included as Table 10, below).

Storm Water Management Report
 Old South Road Crossing – Nantucket, MA
 June 11, 2016



Table 10 - Recharge Target Depth by Hydrologic Soil Group

NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TARGET DEPTH FACTOR (F)
A	sand	0.6-inch
B	loam	0.35-inch
C	silty loam	0.25-inch
D	clay	0.1-inch

The proposed increase in impervious area at the post-development site was listed previously as 1.59 acres in Table 1 of this report.

The required recharge volume (R_v) for the Project can be calculated as indicated below:

$$\begin{aligned}
 R_v &= F \times \text{Impervious Area} \\
 &= (0.6 \text{ inches}) \left(\frac{1 \text{ foot}}{12 \text{ inches}} \right) (1.59 \text{ acres}) \\
 &= 0.08 \text{ acre - feet} = 3,485 \text{ cubic feet}
 \end{aligned}$$

The Storm Water Handbook also requires that recharge facilities be constructed in soils capable of absorbing the recharge volume within 72 hours. Drawdown time (in hours) can be calculated as indicated below:

$$t_d = \frac{R_v}{(f)(A_b)}$$

Where,

t_d = Drawdown Time (hours)

R_v = Required Recharge Volume in cubic feet (Calculated above)

f = Rawls Infiltration Rate (See Table 3) in feet per hour

A_b = Bottom Area of Infiltration Systems in square feet

(from PSIS1-3, Appendix B)

$$\begin{aligned}
 t_d &= \frac{3,485 \text{ cf}}{\left(\frac{8.27 \text{ inches}}{\text{hour}} \right) \left(\frac{1 \text{ ft}}{12 \text{ inches}} \right) (780 + 2,038 + 448 \text{ sf})} \\
 t_d &= 1.5 \text{ hours}
 \end{aligned}$$

The proposed sub-surface infiltration systems (PSIS1, PSIS2 and PSIS3) will infiltrate the required recharge volume in approximately 1.5 hours.



3.4 Standard 4: Water Quality

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). The standard is met with pollution prevention plans, storm water best management practices sized to capture the required water quality volume, and pretreatment measures.

Runoff generated by new impervious surfaces will be collected and, when required, treated with deep sump and hooded catch basins, a proprietary swirl particle separator (VortSentry HS) and then infiltrated to achieve a presumptive removal rate of 80%. TSS Removal Calculations and VortSentry sizing tables are included as Appendix D to this report.

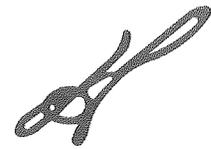
Operations and maintenance plans for construction and post-development phases of the Project are included as Appendix E and Appendix F, respectively, to this report.

3.5 Standard 5: Land Uses with Higher Potential Pollution Loads

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Storm Water Handbook to eliminate or reduce the discharge of storm water runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and storm water runoff, the proponent shall use the specific structural storm water BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Storm Water Handbook. Storm water discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 is not applicable to the Project. The Project is not associated with uses that will subject the site to higher potential pollutant loads as defined in the MaDEP Wetlands and Water Quality regulations.

Land Uses with Higher Potential Pollutant Loads (LUHPPLs) are identified in 310 CMR 22.20B(2) and C(2) a through k and m and in 310 CMR 22.21(2)(a) 1 through 8 and (b) 1 through 6; areas within a site that are the location of activities that are subject to an individual National Pollutant Discharge Elimination System (NPDES) permit or the NPRDE Multi-Sector General Permit; automotive fueling facilities, exterior fleet storage areas, exterior vehicle service and equipment cleaning areas; marinas and boatyards; parking lots with high-intensity use; confined disposal facilities and disposal sites.



3.6 Standard 6: Critical Areas

Storm water discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and storm water discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural storm water best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Storm Water Handbook.

The Project is located within the Zone II of the Town of Nantucket public water supply. As such, the Project uses structural and non-structural BMPs suitable for use within this critical area. Water calculations included in Appendix E are based upon more stringent standards for critical areas that include:

- One-inch of run-off over impervious surfaces to calculate the Required Water Quality Volume
- Achieving a minimum of 44-percent TSS removal prior to discharge into infiltration BMPs.

3.7 Standard 7: Redevelopment Projects

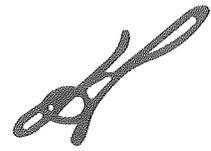
A redevelopment project is required to meet the following Storm Water Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing storm water discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Storm Water Management Standards and improve existing conditions.

Standard 7 is not applicable to the Project. The MaDEP Storm Water Management Handbook definition of a redevelopment project identifies the, “development, rehabilitation, expansion, and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area.”

3.8 Standard 8: Construction Period Pollution Prevention

A plan to control construction-related impacts, including erosion sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan), must be developed and implemented.

A Construction Period Pollution Prevention and Erosion Control Plan is included as Appendix F to this report. This program details the construction period operation and maintenance for best management practices employed on the project and provides sequencing for pollution prevention measures and erosion and sedimentation controls. Locations of erosion control measures are depicted on the Definitive Plan set.



3.9 Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan must be developed and implemented to ensure that storm water management systems function as designed.

A Long Term Operation and Maintenance Plan is included as Appendix G to this report. The Operation and Maintenance program provides details and scheduled for routine and non-routine maintenance to the selected best management practices used in the Project.

3.10 Standard 10: Illicit Discharges

All illicit discharges to the storm water management system are prohibited.

Illicit discharges to the storm water management system are discharged that are not entirely comprised of storm water. Discharges to the storm water management system from the following activities or facilities are permissible:

- Firefighting
- Water Main Flushing
- Landscape Irrigation
- Uncontaminated Groundwater
- Potable Water Sources
- Foundation Drains
- Air Conditioning Condensation
- Footing Drains
- Individual Resident Car Washing
- Flows from Riparian Habitats and Wetlands
- Dechlorinated Water from Swimming Pools
- Water Used for Street Sweeping
- Water Used to Clean Residential Buildings (without detergents)

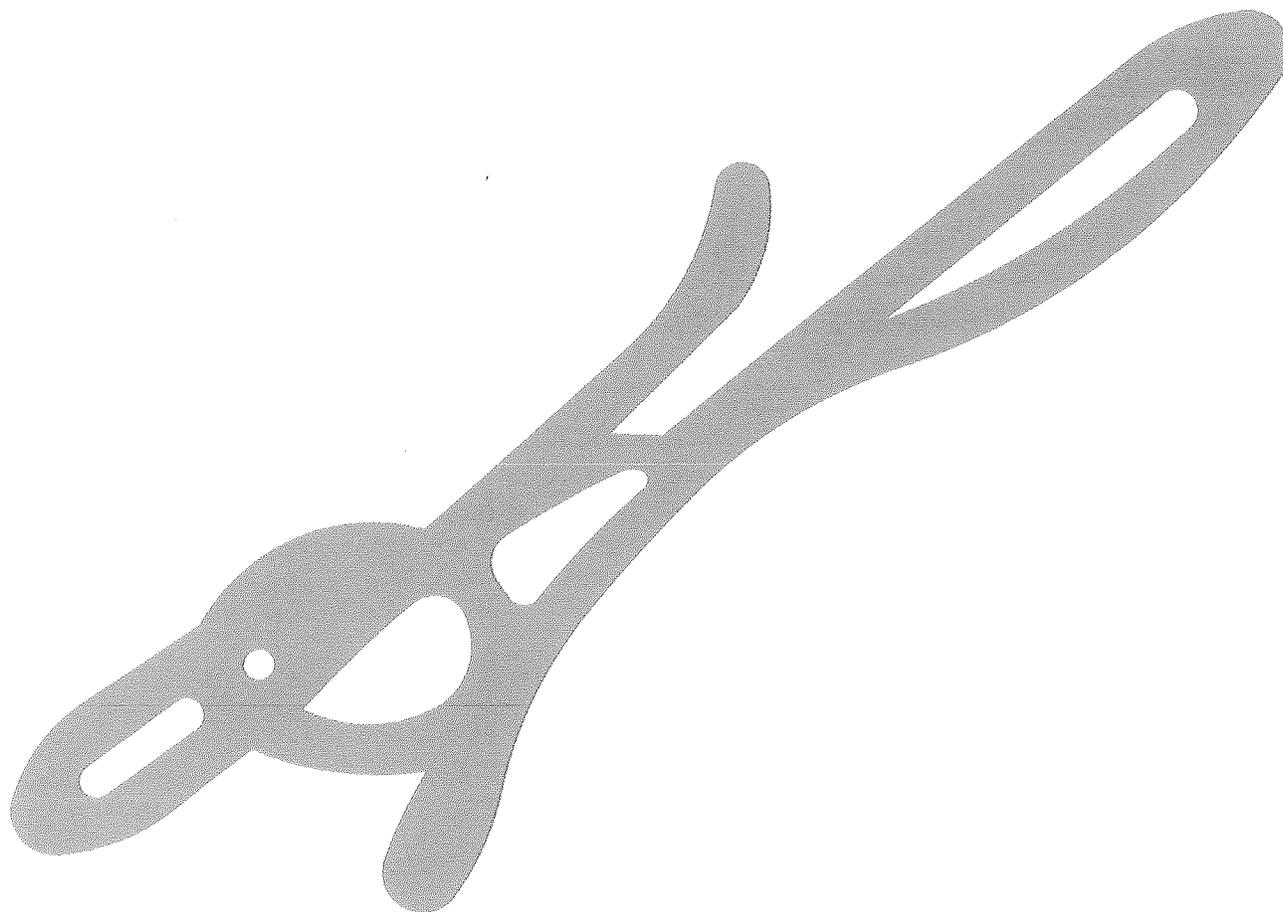
All other illicit discharges to the storm water management system are prohibited.

There are no known illicit discharges anticipated through the completion of this project. Post-construction prevention of illicit discharges is addressed in the Good Housekeeping Practices section of Appendix G.

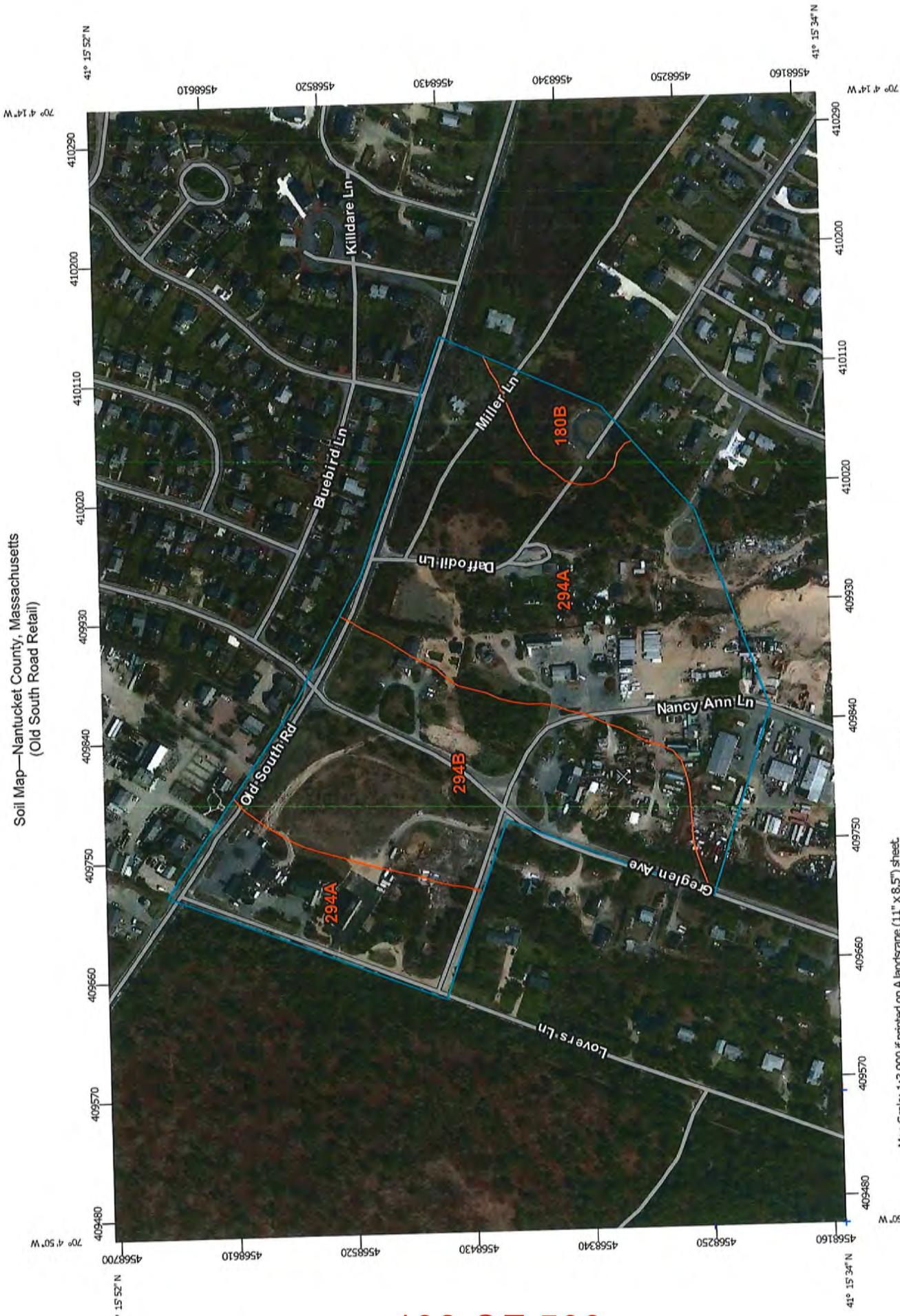
4.0 Conclusion

The Project as proposed has been designed to address both the quality and quantity of storm water runoff from the site improvements. The Project is not subject to the MaDEP Storm Water Standards; however, it has been designed to meet or exceed each of the ten (10) standards to the maximum extent practicable.

APPENDIX A:
NRCS Soil Mapping and Data



Soil Map—Nantucket County, Massachusetts
(Old South Road Retail)



132 OF 503

MAP LEGEND

 Area of Interest (AOI)	 Spoil Area
 Area of Interest (AOI)	 Stony Spot
 Soil Map Unit Polygons	 Very Stony Spot
 Soil Map Unit Lines	 Wet Spot
 Soil Map Unit Points	 Other
 Special Point Features	 Special Line Features
 Blowout	 Streams and Canals
 Borrow Pit	 Transportation
 Clay Spot	 Rails
 Closed Depression	 Interstate Highways
 Gravel Pit	 US Routes
 Gravelly Spot	 Major Roads
 Landfill	 Local Roads
 Lava Flow	 Background
 Marsh or swamp	 Aerial Photography
 Mine or Quarry	
 Miscellaneous Water	
 Perennial Water	
 Rock Outcrop	
 Saline Spot	
 Sandy Spot	
 Severely Eroded Spot	
 Sinkhole	
 Slide or Slip	
 Sodic Spot	

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: Nantucket County, Massachusetts
Survey Area Data: Version 12, Sep 19, 2014

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

Date(s) aerial images were photographed: Mar 30, 2011—Oct 8, 2011

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

Map Unit Legend

Nantucket County, Massachusetts (MA019)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
180B	Chilmark sandy loam, 3 to 8 percent slopes	1.3	4.1%
294A	Evesboro sand, 0 to 3 percent slopes	18.7	61.9%
294B	Evesboro sand, 3 to 8 percent slopes	10.3	34.0%
Totals for Area of Interest		30.3	100.0%

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Nantucket County, Massachusetts

180B—Chilmark sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 996s

Mean annual precipitation: 41 to 48 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 175 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Chilmark and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chilmark**Setting**

Landform: Moraines

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy eolian deposits over dense fine-loamy lodgment till derived from granite and gneiss

Typical profile

H1 - 0 to 10 inches: sandy loam

H2 - 10 to 31 inches: sandy loam

H3 - 31 to 60 inches: stratified sandy clay loam to clay

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat):

Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Minor Components**Nantucket**

Percent of map unit: 4 percent

Plymouth

Percent of map unit: 4 percent

Evesboro

Percent of map unit: 4 percent

Woodbridge variant

Percent of map unit: 3 percent

294A—Evesboro sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 996v
Elevation: 10 to 450 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 175 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Evesboro and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Evesboro

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: sand
H2 - 6 to 20 inches: loamy sand
H3 - 20 to 60 inches: stratified sand to sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A

Minor Components

Udipsamments

Percent of map unit: 5 percent

Klej

Percent of map unit: 5 percent

Riverhead

Percent of map unit: 3 percent

Katama

Percent of map unit: 2 percent

294B—Evesboro sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 996w

Elevation: 10 to 450 feet

Mean annual precipitation: 41 to 48 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 175 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Evesboro and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Evesboro

Setting

Landform: Outwash plains

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Riser

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: sand

H2 - 6 to 26 inches: loamy sand

H3 - 26 to 60 inches: stratified sand to sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: A

Minor Components

Riverhead

Percent of map unit: 5 percent

Klej

Percent of map unit: 5 percent

Udipsamments

Percent of map unit: 5 percent

Data Source Information

Soil Survey Area: Nantucket County, Massachusetts

Survey Area Data: Version 12, Sep 19, 2014

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk "*" denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007 (<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>).

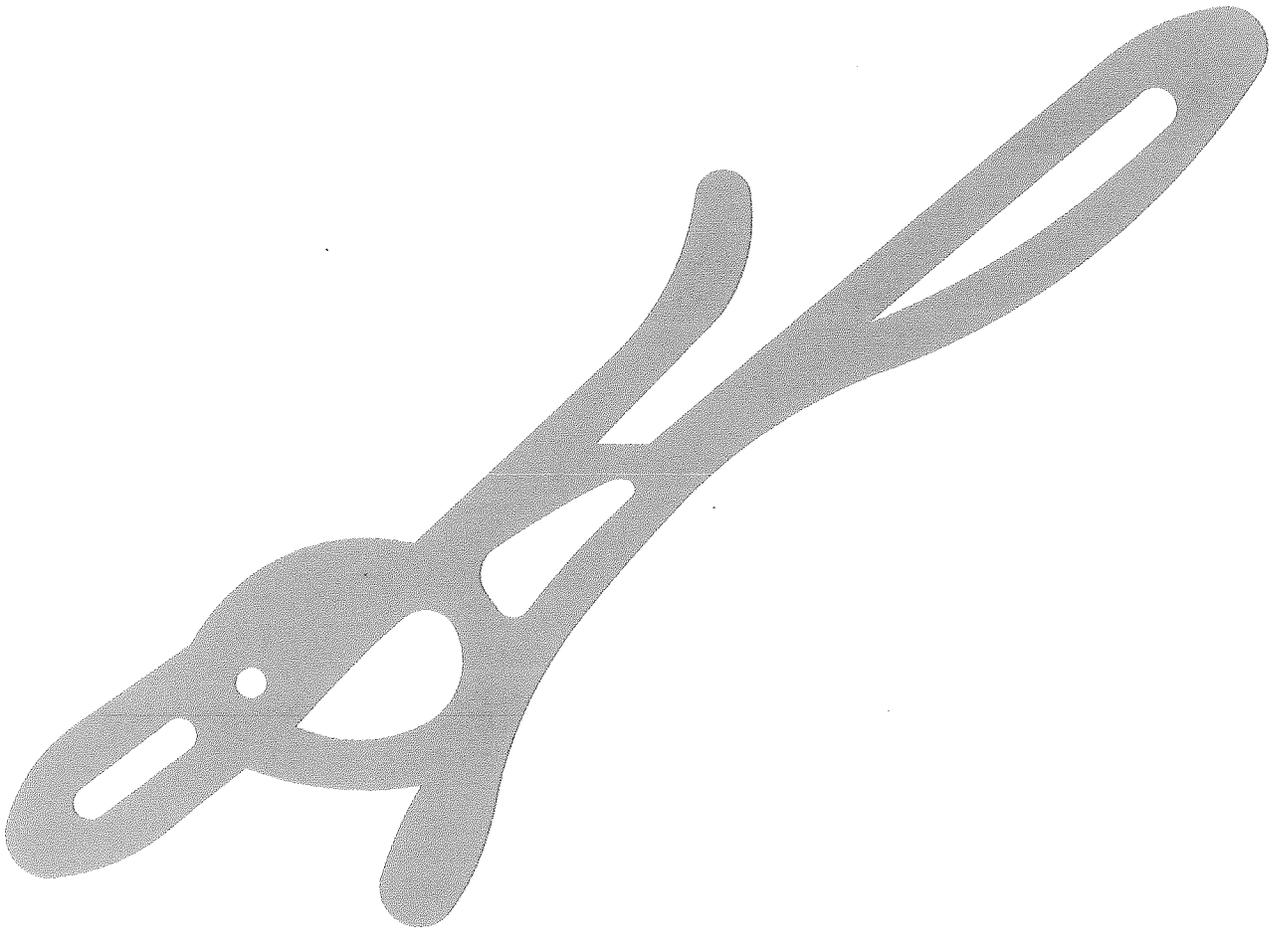
Engineering Properties—Nantucket County, Massachusetts														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
180B—Chilmark sandy loam, 3 to 8 percent slopes			In											
Chilmark	85	C	0-10	Sandy loam	ML, SM	A-1, A-2, A-4	0-0-0	0-2-3	95-98-100	90-95-100	45-65-85	15-35-55		NP
			10-31	Sandy loam	SM	A-1, A-2, A-4	0-0-0	0-2-3	95-98-100	90-95-100	45-60-75	15-28-40		NP
			31-60	Stratified sandy clay loam to clay	CL, CL-ML, ML	A-4	0-0-0	0-2-3	95-98-100	95-98-100	90-95-100	80-88-95	12-19-26	2-6-10
294A—Evesboro sand, 0 to 3 percent slopes														
Evesboro	85	A	0-6	Sand	SP, SP-SM	A-1, A-2, A-3	0-0-0	0-0-0	90-95-100	85-93-100	40-65-90	0-6-12	10-13-15	NP-2-3
			6-20	Loamy sand	SP, SP-SM	A-1, A-2, A-3	0-0-0	0-0-0	90-95-100	85-93-100	40-65-90	0-6-12	10-13-15	NP-2-3
			20-60	Stratified sand to sandy loam	SC-SM, SM, SP, SP-SM	A-1, A-2, A-3	0-0-0	0-0-0	75-88-100	65-83-100	35-65-95	0-18-35	10-13-15	NP-3-5

Engineering Properties—Nantucket County, Massachusetts														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
294B—Evesboro sand, 3 to 8 percent slopes			In											
Evesboro	85	A	0-6	Sand	SP, SP-SM	A-1, A-2, A-3	0-0-0	0-0-0	90-95-1 .00	85-93-1 00	40-65- 90	10-13 -15	NP-2-3	
			6-26	Loamy sand	SP, SP-SM	A-1, A-2, A-3	0-0-0	0-0-0	90-95-1 00	85-93-1 00	40-65- 90	10-13 -15	NP-2-3	
			26-60	Stratified sand to sandy loam	SC-SM, SM, SP, SP-SM	A-1, A-2, A-3	0-0-0	0-0-0	75-88-1 00	65-83-1 00	35-65- 95	10-13 -15	NP-3-5	

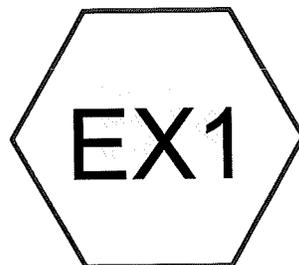
Data Source Information

Soil Survey Area: Nantucket County, Massachusetts
 Survey Area Data: Version 12, Sep 19, 2014

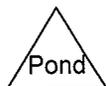
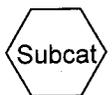
APPENDIX B:
HydroCAD[®] Calculations



EXISTING RUNOFF



Existing Watershed



Routing Diagram for NAN-0107J-E
Prepared by Hayes Engineering, Inc., Printed 6/13/2016
HydroCAD® 10.00-16 s/n 03206 © 2015 HydroCAD Software Solutions LLC

NAN-0107J-E

Prepared by Hayes Engineering, Inc.

HydroCAD® 10.00-16 s/n 03206 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
89,730	39	>75% Grass cover, Good, HSG A (EX1)
87,123	48	Brush, Poor, HSG A (EX1)
28,003	30	Meadow, non-grazed, HSG A (EX1)
40,269	77	Newly graded area, HSG A (EX1)
38,088	98	Roofs, HSG A (EX1)
283,213	54	TOTAL AREA

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchme Numbers
89,730	0	0	0	0	89,730	>75% Grass cover, Good	E X 1
87,123	0	0	0	0	87,123	Brush, Poor	E X 1
28,003	0	0	0	0	28,003	Meadow, non-grazed	E X 1
40,269	0	0	0	0	40,269	Newly graded area	E X 1
38,088	0	0	0	0	38,088	Roofs	E X 1
283,213	0	0	0	0	283,213	TOTAL AREA	

Time span=0.00-40.00 hrs, dt=0.02 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1: Existing Watershed

Runoff Area=283,213 sf 13.45% Impervious Runoff Depth=0.35"
Flow Length=610' Tc=24.0 min CN=54 Runoff=0.86 cfs 8,149 cf

Total Runoff Area = 283,213 sf Runoff Volume = 8,149 cf Average Runoff Depth = 0.35"
86.55% Pervious = 245,125 sf 13.45% Impervious = 38,088 sf

Summary for Subcatchment EX1: Existing Watershed

Runoff = 0.86 cfs @ 12.56 hrs, Volume= 8,149 cf, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 Year Rainfall=3.60"

Area (sf)	CN	Description
38,088	98	Roofs, HSG A
40,269	77	Newly graded area, HSG A
28,003	30	Meadow, non-grazed, HSG A
87,123	48	Brush, Poor, HSG A
89,730	39	>75% Grass cover, Good, HSG A
283,213	54	Weighted Average
245,125		86.55% Pervious Area
38,088		13.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		Sheet Flow, Sheet1 Woods: Light underbrush n= 0.400 P2= 3.60"
2.0	368	0.0375	3.12		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	192	0.0120	1.76		Shallow Concentrated Flow, Shallow2 Unpaved Kv= 16.1 fps
24.0	610	Total			

Time span=0.00-40.00 hrs, dt=0.02 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1: Existing Watershed

Runoff Area=283,213 sf 13.45% Impervious Runoff Depth=0.87"
Flow Length=610' Tc=24.0 min CN=54 Runoff=3.19 cfs 20,582 cf

Total Runoff Area = 283,213 sf Runoff Volume = 20,582 cf Average Runoff Depth = 0.87"
86.55% Pervious = 245,125 sf 13.45% Impervious = 38,088 sf

Summary for Subcatchment EX1: Existing Watershed

Runoff = 3.19 cfs @ 12.42 hrs, Volume= 20,582 cf, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 Year Rainfall=4.90"

Area (sf)	CN	Description
38,088	98	Roofs, HSG A
40,269	77	Newly graded area, HSG A
28,003	30	Meadow, non-grazed, HSG A
87,123	48	Brush, Poor, HSG A
89,730	39	>75% Grass cover, Good, HSG A
283,213	54	Weighted Average
245,125		86.55% Pervious Area
38,088		13.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		Sheet Flow, Sheet1 Woods: Light underbrush n= 0.400 P2= 3.60"
2.0	368	0.0375	3.12		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	192	0.0120	1.76		Shallow Concentrated Flow, Shallow2 Unpaved Kv= 16.1 fps
24.0	610	Total			

Time span=0.00-40.00 hrs, dt=0.02 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1: Existing Watershed

Runoff Area=283,213 sf 13.45% Impervious Runoff Depth=1.33"
Flow Length=610' Tc=24.0 min CN=54 Runoff=5.42 cfs 31,393 cf

Total Runoff Area = 283,213 sf Runoff Volume = 31,393 cf Average Runoff Depth = 1.33"
86.55% Pervious = 245,125 sf 13.45% Impervious = 38,088 sf

Summary for Subcatchment EX1: Existing Watershed

Runoff = 5.42 cfs @ 12.39 hrs, Volume= 31,393 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25 Year Rainfall=5.80"

Area (sf)	CN	Description
38,088	98	Roofs, HSG A
40,269	77	Newly graded area, HSG A
28,003	30	Meadow, non-grazed, HSG A
87,123	48	Brush, Poor, HSG A
89,730	39	>75% Grass cover, Good, HSG A
283,213	54	Weighted Average
245,125		86.55% Pervious Area
38,088		13.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		Sheet Flow, Sheet1 Woods: Light underbrush n= 0.400 P2= 3.60"
2.0	368	0.0375	3.12		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	192	0.0120	1.76		Shallow Concentrated Flow, Shallow2 Unpaved Kv= 16.1 fps
24.0	610	Total			

Time span=0.00-40.00 hrs, dt=0.02 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1: Existing Watershed

Runoff Area=283,213 sf 13.45% Impervious Runoff Depth=1.73"
Flow Length=610' Tc=24.0 min CN=54 Runoff=7.37 cfs 40,776 cf

Total Runoff Area = 283,213 sf Runoff Volume = 40,776 cf Average Runoff Depth = 1.73"
86.55% Pervious = 245,125 sf 13.45% Impervious = 38,088 sf

Summary for Subcatchment EX1: Existing Watershed

Runoff = 7.37 cfs @ 12.38 hrs, Volume= 40,776 cf, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.02 hrs
 Type III 24-hr 50 Year Rainfall=6.50"

Area (sf)	CN	Description
38,088	98	Roofs, HSG A
40,269	77	Newly graded area, HSG A
28,003	30	Meadow, non-grazed, HSG A
87,123	48	Brush, Poor, HSG A
89,730	39	>75% Grass cover, Good, HSG A
283,213	54	Weighted Average
245,125		86.55% Pervious Area
38,088		13.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		Sheet Flow, Sheet1 Woods: Light underbrush n= 0.400 P2= 3.60"
2.0	368	0.0375	3.12		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	192	0.0120	1.76		Shallow Concentrated Flow, Shallow2 Unpaved Kv= 16.1 fps
24.0	610	Total			

Time span=0.00-40.00 hrs, dt=0.02 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1: Existing Watershed

Runoff Area=283,213 sf 13.45% Impervious Runoff Depth=2.16"
Flow Length=610' Tc=24.0 min CN=54 Runoff=9.49 cfs 50,873 cf

Total Runoff Area = 283,213 sf Runoff Volume = 50,873 cf Average Runoff Depth = 2.16"
86.55% Pervious = 245,125 sf 13.45% Impervious = 38,088 sf

Summary for Subcatchment EX1: Existing Watershed

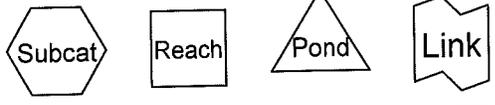
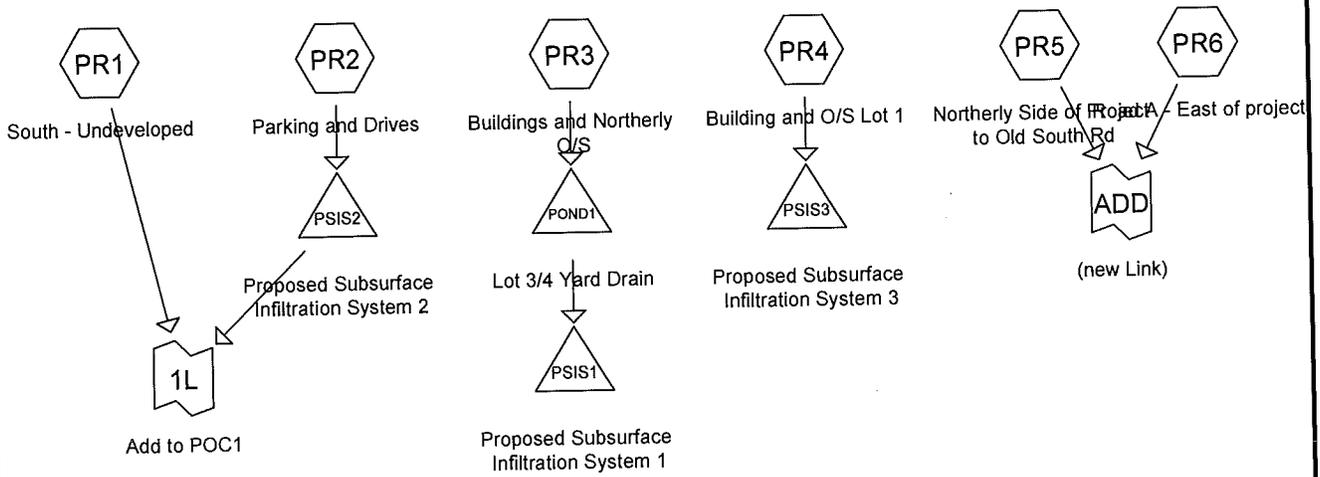
Runoff = 9.49 cfs @ 12.37 hrs, Volume= 50,873 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 Year Rainfall=7.20"

Area (sf)	CN	Description
38,088	98	Roofs, HSG A
40,269	77	Newly graded area, HSG A
28,003	30	Meadow, non-grazed, HSG A
87,123	48	Brush, Poor, HSG A
89,730	39	>75% Grass cover, Good, HSG A
283,213	54	Weighted Average
245,125		86.55% Pervious Area
38,088		13.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		Sheet Flow, Sheet1 Woods: Light underbrush n= 0.400 P2= 3.60"
2.0	368	0.0375	3.12		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	192	0.0120	1.76		Shallow Concentrated Flow, Shallow2 Unpaved Kv= 16.1 fps
24.0	610	Total			

PROPOSED RUNOFF



Routing Diagram for NAN-0107J-P
 Prepared by Hayes Engineering, Inc., Printed 6/13/2016
 HydroCAD® 10.00-16 s/n 03206 © 2015 HydroCAD Software Solutions LLC

NAN-0107J-P

Prepared by Hayes Engineering, Inc.

Printed 6/13/2016

HydroCAD® 10.00-16 s/n 03206 © 2015 HydroCAD Software Solutions LLC

Page 15

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
181,857	39	>75% Grass cover, Good, HSG A (PR1, PR2, PR3, PR4, PR5, PR6)
4,949	77	Newly graded area, HSG A (PR1)
59,246	98	Paved parking, HSG A (PR2)
23,968	98	Paved roads w/curbs & sewers, HSG A (PR5, PR6)
5,900	98	Roofs, HSG A (PR4)
6,075	98	Unconnected pavement, HSG A (PR1)
11,922	98	Unconnected roofs, HSG A (PR3)
293,917	61	TOTAL AREA

H:\NAN-0107J OSR_Retail\

NAN-0107J-P

Prepared by Hayes Engineering, Inc.

HydroCAD® 10.00-16 s/n 03206 © 2015 HydroCAD Software Solutions LLC

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcar Number
181,857	0	0	0	0	181,857	>75% Grass cover, Good	
4,949	0	0	0	0	4,949	Newly graded area	
59,246	0	0	0	0	59,246	Paved parking	
23,968	0	0	0	0	23,968	Paved roads w/curbs & sewers	
5,900	0	0	0	0	5,900	Roofs	
6,075	0	0	0	0	6,075	Unconnected pavement	
11,922	0	0	0	0	11,922	Unconnected roofs	
293,917	0	0	0	0	293,917	TOTAL AREA	

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR1: South - Undeveloped Runoff Area=96,297 sf 6.31% Impervious Runoff Depth=0.06"
 Flow Length=365' Tc=11.4 min UI Adjusted CN=43 Runoff=0.02 cfs 509 cf

Subcatchment PR2: Parking and Drives Runoff Area=93,320 sf 63.49% Impervious Runoff Depth=1.44"
 Flow Length=392' Tc=10.1 min CN=76 Runoff=3.05 cfs 11,185 cf

Subcatchment PR3: Buildings and Northerly O/S Runoff Area=29,748 sf 40.08% Impervious Runoff Depth=0.71"
 Flow Length=272' Slope=0.0100 '/' Tc=12.5 min CN=63 Runoff=0.36 cfs 1,757 cf

Subcatchment PR4: Building and O/S Lot 1 Runoff Area=17,215 sf 34.27% Impervious Runoff Depth=0.53"
 Flow Length=67' Slope=0.0100 '/' Tc=10.4 min CN=59 Runoff=0.14 cfs 765 cf

Subcatchment PR5: Northerly Side of Project to Old Runoff Area=12,291 sf 74.09% Impervious Runoff Depth=1.94"
 Tc=6.0 min CN=83 Runoff=0.63 cfs 1,990 cf

Subcatchment PR6: Road A - East of project Runoff Area=45,046 sf 32.99% Impervious Runoff Depth=0.49"
 Tc=6.0 min CN=58 Runoff=0.36 cfs 1,850 cf

Pond POND1: Lot 3/4 Yard Drain Peak Elev=33.86' Storage=7 cf Inflow=0.36 cfs 1,757 cf
 Discarded=0.02 cfs 153 cf Primary=0.34 cfs 1,604 cf Outflow=0.37 cfs 1,757 cf

Pond PSIS1: Proposed Subsurface Infiltration System 1 Peak Elev=25.65' Storage=202 cf Inflow=0.34 cfs 1,604 cf
 Outflow=0.15 cfs 1,605 cf

Pond PSIS2: Proposed Subsurface Infiltration System Peak Elev=27.68' Storage=3,850 cf Inflow=3.05 cfs 11,185 cf
 Discarded=0.39 cfs 11,191 cf Primary=0.00 cfs 0 cf Outflow=0.39 cfs 11,191 cf

Pond PSIS3: Proposed Subsurface Infiltration System 3 Peak Elev=25.25' Storage=45 cf Inflow=0.14 cfs 765 cf
 Outflow=0.09 cfs 769 cf

Link 1L: Add to POC1 Inflow=0.02 cfs 509 cf
 Primary=0.02 cfs 509 cf

Link ADD: (new Link) Inflow=0.98 cfs 3,840 cf
 Primary=0.98 cfs 3,840 cf

Total Runoff Area = 293,917 sf Runoff Volume = 18,057 cf Average Runoff Depth = 0.74"
63.56% Pervious = 186,806 sf 36.44% Impervious = 107,111 sf

Summary for Subcatchment PR1: South - Undeveloped

Runoff = 0.02 cfs @ 15.17 hrs, Volume= 509 cf, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.60"

Area (sf)	CN	Adj	Description
6,075	98		Unconnected pavement, HSG A
4,949	77		Newly graded area, HSG A
85,273	39		>75% Grass cover, Good, HSG A
96,297	45	43	Weighted Average, UI Adjusted
90,222			93.69% Pervious Area
6,075			6.31% Impervious Area
6,075			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0120	0.09		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
1.9	315	0.0300	2.79		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
11.4	365	Total			

Summary for Subcatchment PR2: Parking and Drives

Runoff = 3.05 cfs @ 12.15 hrs, Volume= 11,185 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.60"

Area (sf)	CN	Description
59,246	98	Paved parking, HSG A
34,074	39	>75% Grass cover, Good, HSG A
93,320	76	Weighted Average
34,074		36.51% Pervious Area
59,246		63.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0200	0.11		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
0.6	127	0.0500	3.60		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	215	0.0100	2.03		Shallow Concentrated Flow, Shallow2 Paved Kv= 20.3 fps
10.1	392	Total			

Summary for Subcatchment PR3: Buildings and Northerly O/S

Runoff = 0.36 cfs @ 12.21 hrs, Volume= 1,757 cf, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.60"

Area (sf)	CN	Description
11,922	98	Unconnected roofs, HSG A
17,826	39	>75% Grass cover, Good, HSG A
29,748	63	Weighted Average
17,826		59.92% Pervious Area
11,922		40.08% Impervious Area
11,922		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
2.3	222	0.0100	1.61		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
12.5	272	Total			

Summary for Subcatchment PR4: Building and O/S Lot 1

Runoff = 0.14 cfs @ 12.20 hrs, Volume= 765 cf, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.60"

Area (sf)	CN	Description
5,900	98	Roofs, HSG A
11,315	39	>75% Grass cover, Good, HSG A
17,215	59	Weighted Average
11,315		65.73% Pervious Area
5,900		34.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
0.2	17	0.0100	1.61		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
10.4	67	Total			

Summary for Subcatchment PR5: Northerly Side of Project to Old South Rd

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 1,990 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.60"

Area (sf)	CN	Description
9,106	98	Paved roads w/curbs & sewers, HSG A
3,185	39	>75% Grass cover, Good, HSG A
12,291	83	Weighted Average
3,185		25.91% Pervious Area
9,106		74.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Subcatchment PR6: Road A - East of project

Runoff = 0.36 cfs @ 12.13 hrs, Volume= 1,850 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.60"

Area (sf)	CN	Description
14,862	98	Paved roads w/curbs & sewers, HSG A
30,184	39	>75% Grass cover, Good, HSG A
45,046	58	Weighted Average
30,184		67.01% Pervious Area
14,862		32.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Pond POND1: Lot 3/4 Yard Drain

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 0.71" for 2 Year event
 Inflow = 0.36 cfs @ 12.21 hrs, Volume= 1,757 cf
 Outflow = 0.37 cfs @ 12.21 hrs, Volume= 1,757 cf, Atten= 0%, Lag= 0.2 min
 Discarded = 0.02 cfs @ 12.21 hrs, Volume= 153 cf
 Primary = 0.34 cfs @ 12.21 hrs, Volume= 1,604 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 33.86' @ 12.21 hrs Surf.Area= 125 sf Storage= 7 cf

Plug-Flow detention time= 0.1 min calculated for 1,755 cf (100% of inflow)
 Center-of-Mass det. time= 0.1 min (898.5 - 898.4)

Volume	Invert	Avail.Storage	Storage Description
#1	33.75'	1,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.75	4	0	0
34.00	275	35	35
34.50	750	256	291
35.00	2,100	713	1,004

Device	Routing	Invert	Outlet Devices
#1	Discarded	33.75'	8.270 in/hr Exfiltration over Surface area
#2	Primary	33.75'	Nyoplast 10" Dome Grate Inlet
			Head (feet) 0.00 0.10 0.20 1.00
			Disch. (cfs) 0.000 0.280 0.800 1.800

Discarded OutFlow Max=0.02 cfs @ 12.21 hrs HW=33.86' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.34 cfs @ 12.21 hrs HW=33.86' TW=25.19' (Dynamic Tailwater)
 ↑2=Nyoplast 10" Dome Grate Inlet (Custom Controls 0.34 cfs)

Summary for Pond PSIS1: Proposed Subsurface Infiltration System 1

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 0.65" for 2 Year event
 Inflow = 0.34 cfs @ 12.21 hrs, Volume= 1,604 cf
 Outflow = 0.15 cfs @ 12.15 hrs, Volume= 1,605 cf, Atten= 56%, Lag= 0.0 min
 Discarded = 0.15 cfs @ 12.15 hrs, Volume= 1,605 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 25.65' @ 12.61 hrs Surf.Area= 781 sf Storage= 202 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 6.1 min (900.8 - 894.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	1,355 cf	10.33'W x 75.54'L x 6.75'H Field A
			5,269 cf Overall - 1,882 cf Embedded = 3,387 cf x 40.0% Voids
#2A	25.75'	1,882 cf	StormTech MC-4500 +Cap x 17 Inside #1
			Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
			Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
			Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		3,237 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.15 cfs @ 12.15 hrs HW=25.07' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.15 cfs)

Summary for Pond PSIS2: Proposed Subsurface Infiltration System 2

Inflow Area = 93,320 sf, 63.49% Impervious, Inflow Depth = 1.44" for 2 Year event
 Inflow = 3.05 cfs @ 12.15 hrs, Volume= 11,185 cf
 Outflow = 0.39 cfs @ 11.85 hrs, Volume= 11,191 cf, Atten= 87%, Lag= 0.0 min
 Discarded = 0.39 cfs @ 11.85 hrs, Volume= 11,191 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.68' @ 13.09 hrs Surf.Area= 2,038 sf Storage= 3,850 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 83.7 min (936.4 - 852.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	3,373 cf	28.50'W x 71.52'L x 6.75'H Field A 13,758 cf Overall - 5,326 cf Embedded = 8,432 cf x 40.0% Voids
#2A	25.75'	5,326 cf	StormTech MC-4500 +Cap x 48 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 16 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,699 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area
#2	Primary	30.00'	18.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.00' / 29.50' S= 0.0167 ' ' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Discarded OutFlow Max=0.39 cfs @ 11.85 hrs HW=25.07' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' TW=0.00' (Dynamic Tailwater)

↑2=Culvert (Controls 0.00 cfs)

Summary for Pond PSIS3: Proposed Subsurface Infiltration System 3

Inflow Area = 17,215 sf, 34.27% Impervious, Inflow Depth = 0.53" for 2 Year event
 Inflow = 0.14 cfs @ 12.20 hrs, Volume= 765 cf
 Outflow = 0.09 cfs @ 12.20 hrs, Volume= 769 cf, Atten= 38%, Lag= 0.0 min
 Discarded = 0.09 cfs @ 12.20 hrs, Volume= 769 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 25.25' @ 12.51 hrs Surf.Area= 448 sf Storage= 45 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 2.0 min (916.5 - 914.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	797 cf	10.33'W x 43.34'L x 6.75'H Field A 3,023 cf Overall - 1,030 cf Embedded = 1,993 cf x 40.0% Voids
#2A	25.75'	1,030 cf	StormTech MC-4500 +Cap x 9 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		1,827 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.09 cfs @ 12.20 hrs HW=25.08' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.09 cfs)

Summary for Link 1L: Add to POC1

Inflow Area = 189,617 sf, 34.45% Impervious, Inflow Depth = 0.03" for 2 Year event
Inflow = 0.02 cfs @ 15.17 hrs, Volume= 509 cf
Primary = 0.02 cfs @ 15.17 hrs, Volume= 509 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Summary for Link ADD: (new Link)

Inflow Area = 57,337 sf, 41.80% Impervious, Inflow Depth = 0.80" for 2 Year event
Inflow = 0.98 cfs @ 12.11 hrs, Volume= 3,840 cf
Primary = 0.98 cfs @ 12.11 hrs, Volume= 3,840 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR1: South - Undeveloped
Runoff Area=96,297 sf 6.31% Impervious Runoff Depth=0.33"
Flow Length=365' Tc=11.4 min UI Adjusted CN=43 Runoff=0.25 cfs 2,617 cf

Subcatchment PR2: Parking and Drives
Runoff Area=93,320 sf 63.49% Impervious Runoff Depth=2.45"
Flow Length=392' Tc=10.1 min CN=76 Runoff=5.30 cfs 19,079 cf

Subcatchment PR3: Buildings and Northerly O/S
Runoff Area=29,748 sf 40.08% Impervious Runoff Depth=1.45"
Flow Length=272' Slope=0.0100 ' ' Tc=12.5 min CN=63 Runoff=0.85 cfs 3,584 cf

Subcatchment PR4: Building and O/S Lot 1
Runoff Area=17,215 sf 34.27% Impervious Runoff Depth=1.18"
Flow Length=67' Slope=0.0100 ' ' Tc=10.4 min CN=59 Runoff=0.40 cfs 1,690 cf

Subcatchment PR5: Northerly Side of Project to Old
Runoff Area=12,291 sf 74.09% Impervious Runoff Depth=3.08"
Tc=6.0 min CN=83 Runoff=0.99 cfs 3,159 cf

Subcatchment PR6: Road A - East of project
Runoff Area=45,046 sf 32.99% Impervious Runoff Depth=1.11"
Tc=6.0 min CN=58 Runoff=1.14 cfs 4,183 cf

Pond POND1: Lot 3/4 Yard Drain
Peak Elev=33.95' Storage=23 cf Inflow=0.85 cfs 3,584 cf
Discarded=0.04 cfs 263 cf Primary=0.81 cfs 3,321 cf Outflow=0.85 cfs 3,584 cf

Pond PSIS1: Proposed Subsurface Infiltration System 1
Peak Elev=26.90' Storage=955 cf Inflow=0.81 cfs 3,321 cf
Outflow=0.15 cfs 3,325 cf

Pond PSIS2: Proposed Subsurface Infiltration System
Peak Elev=30.31' Storage=7,494 cf Inflow=5.30 cfs 19,079 cf
Discarded=0.39 cfs 17,781 cf Primary=0.49 cfs 1,302 cf Outflow=0.88 cfs 19,083 cf

Pond PSIS3: Proposed Subsurface Infiltration System 3
Peak Elev=26.54' Storage=412 cf Inflow=0.40 cfs 1,690 cf
Outflow=0.09 cfs 1,694 cf

Link 1L: Add to POC1
Inflow=0.64 cfs 3,920 cf
Primary=0.64 cfs 3,920 cf

Link ADD: (new Link)
Inflow=2.13 cfs 7,341 cf
Primary=2.13 cfs 7,341 cf

Total Runoff Area = 293,917 sf Runoff Volume = 34,312 cf Average Runoff Depth = 1.40"
63.56% Pervious = 186,806 sf 36.44% Impervious = 107,111 sf

Summary for Subcatchment PR1: South - Undeveloped

Runoff = 0.25 cfs @ 12.45 hrs, Volume= 2,617 cf, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.90"

Area (sf)	CN	Adj	Description
6,075	98		Unconnected pavement, HSG A
4,949	77		Newly graded area, HSG A
85,273	39		>75% Grass cover, Good, HSG A
96,297	45	43	Weighted Average, UI Adjusted
90,222			93.69% Pervious Area
6,075			6.31% Impervious Area
6,075			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0120	0.09		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
1.9	315	0.0300	2.79		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
11.4	365	Total			

Summary for Subcatchment PR2: Parking and Drives

Runoff = 5.30 cfs @ 12.15 hrs, Volume= 19,079 cf, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.90"

Area (sf)	CN	Description
59,246	98	Paved parking, HSG A
34,074	39	>75% Grass cover, Good, HSG A
93,320	76	Weighted Average
34,074		36.51% Pervious Area
59,246		63.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0200	0.11		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
0.6	127	0.0500	3.60		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	215	0.0100	2.03		Shallow Concentrated Flow, Shallow2 Paved Kv= 20.3 fps
10.1	392	Total			

Summary for Subcatchment PR3: Buildings and Northerly O/S

Runoff = 0.85 cfs @ 12.19 hrs, Volume= 3,584 cf, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.90"

Area (sf)	CN	Description
11,922	98	Unconnected roofs, HSG A
17,826	39	>75% Grass cover, Good, HSG A
29,748	63	Weighted Average
17,826		59.92% Pervious Area
11,922		40.08% Impervious Area
11,922		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
2.3	222	0.0100	1.61		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
12.5	272	Total			

Summary for Subcatchment PR4: Building and O/S Lot 1

Runoff = 0.40 cfs @ 12.17 hrs, Volume= 1,690 cf, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.90"

Area (sf)	CN	Description
5,900	98	Roofs, HSG A
11,315	39	>75% Grass cover, Good, HSG A
17,215	59	Weighted Average
11,315		65.73% Pervious Area
5,900		34.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
0.2	17	0.0100	1.61		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
10.4	67	Total			

Summary for Subcatchment PR5: Northerly Side of Project to Old South Rd

Runoff = 0.99 cfs @ 12.09 hrs, Volume= 3,159 cf, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.90"

Area (sf)	CN	Description
9,106	98	Paved roads w/curbs & sewers, HSG A
3,185	39	>75% Grass cover, Good, HSG A
12,291	83	Weighted Average
3,185		25.91% Pervious Area
9,106		74.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Subcatchment PR6: Road A - East of project

Runoff = 1.14 cfs @ 12.11 hrs, Volume= 4,183 cf, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.90"

Area (sf)	CN	Description
14,862	98	Paved roads w/curbs & sewers, HSG A
30,184	39	>75% Grass cover, Good, HSG A
45,046	58	Weighted Average
30,184		67.01% Pervious Area
14,862		32.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Pond POND1: Lot 3/4 Yard Drain

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 1.45" for 10 Year event
 Inflow = 0.85 cfs @ 12.19 hrs, Volume= 3,584 cf
 Outflow = 0.85 cfs @ 12.21 hrs, Volume= 3,584 cf, Atten= 1%, Lag= 0.9 min
 Discarded = 0.04 cfs @ 12.21 hrs, Volume= 263 cf
 Primary = 0.81 cfs @ 12.21 hrs, Volume= 3,321 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 33.95' @ 12.21 hrs Surf.Area= 226 sf Storage= 23 cf

Plug-Flow detention time= 0.2 min calculated for 3,580 cf (100% of inflow)
 Center-of-Mass det. time= 0.2 min (874.1 - 873.8)

Volume #1	Invert	Avail.Storage	Storage Description
	33.75'	1,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.75	4	0	0
34.00	275	35	35
34.50	750	256	291
35.00	2,100	713	1,004

Device	Routing	Invert	Outlet Devices
#1	Discarded	33.75'	8.270 in/hr Exfiltration over Surface area
#2	Primary	33.75'	Nyoplast 10" Dome Grate Inlet
			Head (feet) 0.00 0.10 0.20 1.00
			Disch. (cfs) 0.000 0.280 0.800 1.800

Discarded OutFlow Max=0.04 cfs @ 12.21 hrs HW=33.95' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.80 cfs @ 12.21 hrs HW=33.95' TW=25.90' (Dynamic Tailwater)
 ↑2=Nyoplast 10" Dome Grate Inlet (Custom Controls 0.80 cfs)

Summary for Pond PSIS1: Proposed Subsurface Infiltration System 1

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 1.34" for 10 Year event
 Inflow = 0.81 cfs @ 12.21 hrs, Volume= 3,321 cf
 Outflow = 0.15 cfs @ 12.05 hrs, Volume= 3,325 cf, Atten= 81%, Lag= 0.0 min
 Discarded = 0.15 cfs @ 12.05 hrs, Volume= 3,325 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 26.90' @ 12.96 hrs Surf.Area= 781 sf Storage= 955 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 49.4 min (920.7 - 871.3)

Volume	Invert	Avail. Storage	Storage Description
#1A	25.00'	1,355 cf	10.33'W x 75.54'L x 6.75'H Field A
			5,269 cf Overall - 1,882 cf Embedded = 3,387 cf x 40.0% Voids
#2A	25.75'	1,882 cf	StormTech MC-4500 +Cap x 17 Inside #1
			Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
			Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
			Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		3,237 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.15 cfs @ 12.05 hrs HW=25.16' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.15 cfs)

Summary for Pond PSIS2: Proposed Subsurface Infiltration System 2

Inflow Area = 93,320 sf, 63.49% Impervious, Inflow Depth = 2.45" for 10 Year event
 Inflow = 5.30 cfs @ 12.15 hrs, Volume= 19,079 cf
 Outflow = 0.88 cfs @ 12.77 hrs, Volume= 19,083 cf, Atten= 83%, Lag= 37.1 min
 Discarded = 0.39 cfs @ 11.70 hrs, Volume= 17,781 cf
 Primary = 0.49 cfs @ 12.77 hrs, Volume= 1,302 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 30.31' @ 12.77 hrs Surf.Area= 2,038 sf Storage= 7,494 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 168.8 min (1,005.8 - 837.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	3,373 cf	28.50'W x 71.52'L x 6.75'H Field A 13,758 cf Overall - 5,326 cf Embedded = 8,432 cf x 40.0% Voids
#2A	25.75'	5,326 cf	StormTech MC-4500 +Cap x 48 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 16 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,699 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area
#2	Primary	30.00'	18.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.00' / 29.50' S= 0.0167 ' / Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Discarded OutFlow Max=0.39 cfs @ 11.70 hrs HW=25.09' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=0.49 cfs @ 12.77 hrs HW=30.31' TW=0.00' (Dynamic Tailwater)
 ↑**2=Culvert** (Inlet Controls 0.49 cfs @ 1.88 fps)

Summary for Pond PSIS3: Proposed Subsurface Infiltration System 3

Inflow Area = 17,215 sf, 34.27% Impervious, Inflow Depth = 1.18" for 10 Year event
 Inflow = 0.40 cfs @ 12.17 hrs, Volume= 1,690 cf
 Outflow = 0.09 cfs @ 12.05 hrs, Volume= 1,694 cf, Atten= 79%, Lag= 0.0 min
 Discarded = 0.09 cfs @ 12.05 hrs, Volume= 1,694 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 26.54' @ 12.83 hrs Surf.Area= 448 sf Storage= 412 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 34.3 min (918.6 - 884.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	797 cf	10.33'W x 43.34'L x 6.75'H Field A 3,023 cf Overall - 1,030 cf Embedded = 1,993 cf x 40.0% Voids
#2A	25.75'	1,030 cf	StormTech MC-4500 +Cap x 9 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		1,827 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.09 cfs @ 12.05 hrs HW=25.11' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Summary for Link 1L: Add to POC1

Inflow Area = 189,617 sf, 34.45% Impervious, Inflow Depth = 0.25" for 10 Year event
Inflow = 0.64 cfs @ 12.76 hrs, Volume= 3,920 cf
Primary = 0.64 cfs @ 12.76 hrs, Volume= 3,920 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Summary for Link ADD: (new Link)

Inflow Area = 57,337 sf, 41.80% Impervious, Inflow Depth = 1.54" for 10 Year event
Inflow = 2.13 cfs @ 12.10 hrs, Volume= 7,341 cf
Primary = 2.13 cfs @ 12.10 hrs, Volume= 7,341 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR1: South - Undeveloped Runoff Area=96,297 sf 6.31% Impervious Runoff Depth=0.60"
Flow Length=365' Tc=11.4 min UI Adjusted CN=43 Runoff=0.64 cfs 4,850 cf

Subcatchment PR2: Parking and Drives Runoff Area=93,320 sf 63.49% Impervious Runoff Depth=3.21"
Flow Length=392' Tc=10.1 min CN=76 Runoff=6.94 cfs 24,949 cf

Subcatchment PR3: Buildings and Northerly O/S Runoff Area=29,748 sf 40.08% Impervious Runoff Depth=2.04"
Flow Length=272' Slope=0.0100 '/' Tc=12.5 min CN=63 Runoff=1.25 cfs 5,052 cf

Subcatchment PR4: Building and O/S Lot 1 Runoff Area=17,215 sf 34.27% Impervious Runoff Depth=1.71"
Flow Length=67' Slope=0.0100 '/' Tc=10.4 min CN=59 Runoff=0.63 cfs 2,456 cf

Subcatchment PR5: Northerly Side of Project to Old Runoff Area=12,291 sf 74.09% Impervious Runoff Depth=3.91"
Tc=6.0 min CN=83 Runoff=1.25 cfs 4,001 cf

Subcatchment PR6: Road A - East of project Runoff Area=45,046 sf 32.99% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=58 Runoff=1.79 cfs 6,132 cf

Pond POND1: Lot 3/4 Yard Drain Peak Elev=34.17' Storage=93 cf Inflow=1.25 cfs 5,052 cf
Discarded=0.08 cfs 369 cf Primary=1.07 cfs 4,683 cf Outflow=1.15 cfs 5,052 cf

Pond PSIS1: Proposed Subsurface Infiltration System 1 Peak Elev=28.11' Storage=1,673 cf Inflow=1.07 cfs 4,683 cf
Outflow=0.15 cfs 4,690 cf

Pond PSIS2: Proposed Subsurface Infiltration System 2 Peak Elev=30.82' Storage=7,940 cf Inflow=6.94 cfs 24,949 cf
Discarded=0.39 cfs 19,678 cf Primary=3.04 cfs 5,277 cf Outflow=3.44 cfs 24,955 cf

Pond PSIS3: Proposed Subsurface Infiltration System 3 Peak Elev=27.67' Storage=799 cf Inflow=0.63 cfs 2,456 cf
Outflow=0.09 cfs 2,462 cf

Link 1L: Add to POC1 Inflow=3.67 cfs 10,128 cf
Primary=3.67 cfs 10,128 cf

Link ADD: (new Link) Inflow=3.03 cfs 10,133 cf
Primary=3.03 cfs 10,133 cf

Total Runoff Area = 293,917 sf Runoff Volume = 47,440 cf Average Runoff Depth = 1.94"
63.56% Pervious = 186,806 sf 36.44% Impervious = 107,111 sf

Summary for Subcatchment PR1: South - Undeveloped

Runoff = 0.64 cfs @ 12.34 hrs, Volume= 4,850 cf, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.80"

Area (sf)	CN	Adj	Description
6,075	98		Unconnected pavement, HSG A
4,949	77		Newly graded area, HSG A
85,273	39		>75% Grass cover, Good, HSG A
96,297	45	43	Weighted Average, UI Adjusted
90,222			93.69% Pervious Area
6,075			6.31% Impervious Area
6,075			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0120	0.09		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
1.9	315	0.0300	2.79		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
11.4	365	Total			

Summary for Subcatchment PR2: Parking and Drives

Runoff = 6.94 cfs @ 12.15 hrs, Volume= 24,949 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.80"

Area (sf)	CN	Description
59,246	98	Paved parking, HSG A
34,074	39	>75% Grass cover, Good, HSG A
93,320	76	Weighted Average
34,074		36.51% Pervious Area
59,246		63.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0200	0.11		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
0.6	127	0.0500	3.60		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	215	0.0100	2.03		Shallow Concentrated Flow, Shallow2 Paved Kv= 20.3 fps
10.1	392	Total			

Summary for Subcatchment PR3: Buildings and Northerly O/S

Runoff = 1.25 cfs @ 12.19 hrs, Volume= 5,052 cf, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.80"

Area (sf)	CN	Description
11,922	98	Unconnected roofs, HSG A
17,826	39	>75% Grass cover, Good, HSG A
29,748	63	Weighted Average
17,826		59.92% Pervious Area
11,922		40.08% Impervious Area
11,922		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
2.3	222	0.0100	1.61		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
12.5	272	Total			

Summary for Subcatchment PR4: Building and O/S Lot 1

Runoff = 0.63 cfs @ 12.16 hrs, Volume= 2,456 cf, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.80"

Area (sf)	CN	Description
5,900	98	Roofs, HSG A
11,315	39	>75% Grass cover, Good, HSG A
17,215	59	Weighted Average
11,315		65.73% Pervious Area
5,900		34.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
0.2	17	0.0100	1.61		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
10.4	67	Total			

Summary for Subcatchment PR5: Northerly Side of Project to Old South Rd

Runoff = 1.25 cfs @ 12.09 hrs, Volume= 4,001 cf, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.80"

Area (sf)	CN	Description
9,106	98	Paved roads w/curbs & sewers, HSG A
3,185	39	>75% Grass cover, Good, HSG A
12,291	83	Weighted Average
3,185		25.91% Pervious Area
9,106		74.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Subcatchment PR6: Road A - East of project

Runoff = 1.79 cfs @ 12.10 hrs, Volume= 6,132 cf, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 Year Rainfall=5.80"

Area (sf)	CN	Description
14,862	98	Paved roads w/curbs & sewers, HSG A
30,184	39	>75% Grass cover, Good, HSG A
45,046	58	Weighted Average
30,184		67.01% Pervious Area
14,862		32.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Pond POND1: Lot 3/4 Yard Drain

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 2.04" for 25 Year event
 Inflow = 1.25 cfs @ 12.19 hrs, Volume= 5,052 cf
 Outflow = 1.15 cfs @ 12.25 hrs, Volume= 5,052 cf, Atten= 8%, Lag= 3.6 min
 Discarded = 0.08 cfs @ 12.25 hrs, Volume= 369 cf
 Primary = 1.07 cfs @ 12.25 hrs, Volume= 4,683 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.17' @ 12.25 hrs Surf.Area= 432 sf Storage= 93 cf

Plug-Flow detention time= 0.4 min calculated for 5,046 cf (100% of inflow)
 Center-of-Mass det. time= 0.4 min (863.5 - 863.1)

Volume	Invert	Avail.Storage	Storage Description
#1	33.75'	1,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.75	4	0	0
34.00	275	35	35
34.50	750	256	291
35.00	2,100	713	1,004

Device	Routing	Invert	Outlet Devices
#1	Discarded	33.75'	8.270 in/hr Exfiltration over Surface area
#2	Primary	33.75'	Nyoplast 10" Dome Grate Inlet
			Head (feet) 0.00 0.10 0.20 1.00
			Disch. (cfs) 0.000 0.280 0.800 1.800

Discarded OutFlow Max=0.08 cfs @ 12.25 hrs HW=34.16' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=1.07 cfs @ 12.25 hrs HW=34.16' TW=26.48' (Dynamic Tailwater)
 ↑2=Nyoplast 10" Dome Grate Inlet (Custom Controls 1.07 cfs)

Summary for Pond PSIS1: Proposed Subsurface Infiltration System 1

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 1.89" for 25 Year event
 Inflow = 1.07 cfs @ 12.25 hrs, Volume= 4,683 cf
 Outflow = 0.15 cfs @ 11.90 hrs, Volume= 4,690 cf, Atten= 86%, Lag= 0.0 min
 Discarded = 0.15 cfs @ 11.90 hrs, Volume= 4,690 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 28.11' @ 13.38 hrs Surf.Area= 781 sf Storage= 1,673 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 101.1 min (962.8 - 861.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	1,355 cf	10.33'W x 75.54'L x 6.75'H Field A
			5,269 cf Overall - 1,882 cf Embedded = 3,387 cf x 40.0% Voids
#2A	25.75'	1,882 cf	StormTech MC-4500 +Cap x 17 Inside #1
			Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
			Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
			Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		3,237 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.15 cfs @ 11.90 hrs HW=25.07' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.15 cfs)

Summary for Pond PSIS2: Proposed Subsurface Infiltration System 2

Inflow Area = 93,320 sf, 63.49% Impervious, Inflow Depth = 3.21" for 25 Year event
 Inflow = 6.94 cfs @ 12.15 hrs, Volume= 24,949 cf
 Outflow = 3.44 cfs @ 12.41 hrs, Volume= 24,955 cf, Atten= 51%, Lag= 15.6 min
 Discarded = 0.39 cfs @ 11.50 hrs, Volume= 19,678 cf
 Primary = 3.04 cfs @ 12.41 hrs, Volume= 5,277 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 30.82' @ 12.41 hrs Surf.Area= 2,038 sf Storage= 7,940 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 148.1 min (977.4 - 829.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	3,373 cf	28.50'W x 71.52'L x 6.75'H Field A 13,758 cf Overall - 5,326 cf Embedded = 8,432 cf x 40.0% Voids
#2A	25.75'	5,326 cf	StormTech MC-4500 +Cap x 48 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 16 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,699 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area
#2	Primary	30.00'	18.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.00' / 29.50' S= 0.0167 '/ Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Discarded OutFlow Max=0.39 cfs @ 11.50 hrs HW=25.09' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=3.00 cfs @ 12.41 hrs HW=30.81' TW=0.00' (Dynamic Tailwater)
 ↳ **2=Culvert** (Inlet Controls 3.00 cfs @ 3.07 fps)

Summary for Pond PSIS3: Proposed Subsurface Infiltration System 3

Inflow Area = 17,215 sf, 34.27% Impervious, Inflow Depth = 1.71" for 25 Year event
 Inflow = 0.63 cfs @ 12.16 hrs, Volume= 2,456 cf
 Outflow = 0.09 cfs @ 11.95 hrs, Volume= 2,462 cf, Atten= 86%, Lag= 0.0 min
 Discarded = 0.09 cfs @ 11.95 hrs, Volume= 2,462 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.67' @ 13.22 hrs Surf.Area= 448 sf Storage= 799 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 82.6 min (954.5 - 871.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	797 cf	10.33'W x 43.34'L x 6.75'H Field A 3,023 cf Overall - 1,030 cf Embedded = 1,993 cf x 40.0% Voids
#2A	25.75'	1,030 cf	StormTech MC-4500 +Cap x 9 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		1,827 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.09 cfs @ 11.95 hrs HW=25.10' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Summary for Link 1L: Add to POC1

Inflow Area = 189,617 sf, 34.45% Impervious, Inflow Depth = 0.64" for 25 Year event
Inflow = 3.67 cfs @ 12.40 hrs, Volume= 10,128 cf
Primary = 3.67 cfs @ 12.40 hrs, Volume= 10,128 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Summary for Link ADD: (new Link)

Inflow Area = 57,337 sf, 41.80% Impervious, Inflow Depth = 2.12" for 25 Year event
Inflow = 3.03 cfs @ 12.10 hrs, Volume= 10,133 cf
Primary = 3.03 cfs @ 12.10 hrs, Volume= 10,133 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR1: South - Undeveloped Runoff Area=96,297 sf 6.31% Impervious Runoff Depth=0.87"
 Flow Length=365' Tc=11.4 min UI Adjusted CN=43 Runoff=1.11 cfs 6,950 cf

Subcatchment PR2: Parking and Drives Runoff Area=93,320 sf 63.49% Impervious Runoff Depth=3.82"
 Flow Length=392' Tc=10.1 min CN=76 Runoff=8.25 cfs 29,671 cf

Subcatchment PR3: Buildings and Northerly O/S Runoff Area=29,748 sf 40.08% Impervious Runoff Depth=2.53"
 Flow Length=272' Slope=0.0100 '/ Tc=12.5 min CN=63 Runoff=1.58 cfs 6,278 cf

Subcatchment PR4: Building and O/S Lot 1 Runoff Area=17,215 sf 34.27% Impervious Runoff Depth=2.17"
 Flow Length=67' Slope=0.0100 '/ Tc=10.4 min CN=59 Runoff=0.81 cfs 3,107 cf

Subcatchment PR5: Northerly Side of Project to Old Runoff Area=12,291 sf 74.09% Impervious Runoff Depth=4.56"
 Tc=6.0 min CN=83 Runoff=1.45 cfs 4,668 cf

Subcatchment PR6: Road A - East of project Runoff Area=45,046 sf 32.99% Impervious Runoff Depth=2.08"
 Tc=6.0 min CN=58 Runoff=2.34 cfs 7,793 cf

Pond POND1: Lot 3/4 Yard Drain Peak Elev=34.34' Storage=181 cf Inflow=1.58 cfs 6,278 cf
 Discarded=0.11 cfs 467 cf Primary=1.28 cfs 5,811 cf Outflow=1.40 cfs 6,278 cf

Pond PSIS1: Proposed Subsurface Infiltration System 1 Peak Elev=29.33' Storage=2,337 cf Inflow=1.28 cfs 5,811 cf
 Outflow=0.15 cfs 5,814 cf

Pond PSIS2: Proposed Subsurface Infiltration System Peak Elev=31.11' Storage=8,180 cf Inflow=8.25 cfs 29,671 cf
 Discarded=0.39 cfs 21,037 cf Primary=5.06 cfs 8,666 cf Outflow=5.45 cfs 29,703 cf

Pond PSIS3: Proposed Subsurface Infiltration System 3 Peak Elev=28.86' Storage=1,176 cf Inflow=0.81 cfs 3,107 cf
 Outflow=0.09 cfs 3,108 cf

Link 1L: Add to POC1 Inflow=6.13 cfs 15,616 cf
 Primary=6.13 cfs 15,616 cf

Link ADD: (new Link) Inflow=3.79 cfs 12,461 cf
 Primary=3.79 cfs 12,461 cf

Total Runoff Area = 293,917 sf Runoff Volume = 58,466 cf Average Runoff Depth = 2.39"
63.56% Pervious = 186,806 sf 36.44% Impervious = 107,111 sf

Summary for Subcatchment PR1: South - Undeveloped

Runoff = 1.11 cfs @ 12.24 hrs, Volume= 6,950 cf, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 Year Rainfall=6.50"

Area (sf)	CN	Adj	Description
6,075	98		Unconnected pavement, HSG A
4,949	77		Newly graded area, HSG A
85,273	39		>75% Grass cover, Good, HSG A
96,297	45	43	Weighted Average, UI Adjusted
90,222			93.69% Pervious Area
6,075			6.31% Impervious Area
6,075			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0120	0.09		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
1.9	315	0.0300	2.79		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
11.4	365	Total			

Summary for Subcatchment PR2: Parking and Drives

Runoff = 8.25 cfs @ 12.14 hrs, Volume= 29,671 cf, Depth= 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 Year Rainfall=6.50"

Area (sf)	CN	Description
59,246	98	Paved parking, HSG A
34,074	39	>75% Grass cover, Good, HSG A
93,320	76	Weighted Average
34,074		36.51% Pervious Area
59,246		63.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0200	0.11		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
0.6	127	0.0500	3.60		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	215	0.0100	2.03		Shallow Concentrated Flow, Shallow2 Paved Kv= 20.3 fps
10.1	392	Total			

Summary for Subcatchment PR3: Buildings and Northerly O/S

Runoff = 1.58 cfs @ 12.18 hrs, Volume= 6,278 cf, Depth= 2.53"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 Year Rainfall=6.50"

Area (sf)	CN	Description
11,922	98	Unconnected roofs, HSG A
17,826	39	>75% Grass cover, Good, HSG A
29,748	63	Weighted Average
17,826		59.92% Pervious Area
11,922		40.08% Impervious Area
11,922		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
2.3	222	0.0100	1.61		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
12.5	272	Total			

Summary for Subcatchment PR4: Building and O/S Lot 1

Runoff = 0.81 cfs @ 12.16 hrs, Volume= 3,107 cf, Depth= 2.17"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 Year Rainfall=6.50"

Area (sf)	CN	Description
5,900	98	Roofs, HSG A
11,315	39	>75% Grass cover, Good, HSG A
17,215	59	Weighted Average
11,315		65.73% Pervious Area
5,900		34.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
0.2	17	0.0100	1.61		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
10.4	67	Total			

Summary for Subcatchment PR5: Northerly Side of Project to Old South Rd

Runoff = 1.45 cfs @ 12.09 hrs, Volume= 4,668 cf, Depth= 4.56"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 Year Rainfall=6.50"

Area (sf)	CN	Description
9,106	98	Paved roads w/curbs & sewers, HSG A
3,185	39	>75% Grass cover, Good, HSG A
12,291	83	Weighted Average
3,185		25.91% Pervious Area
9,106		74.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Subcatchment PR6: Road A - East of project

Runoff = 2.34 cfs @ 12.10 hrs, Volume= 7,793 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 Year Rainfall=6.50"

Area (sf)	CN	Description
14,862	98	Paved roads w/curbs & sewers, HSG A
30,184	39	>75% Grass cover, Good, HSG A
45,046	58	Weighted Average
30,184		67.01% Pervious Area
14,862		32.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Pond POND1: Lot 3/4 Yard Drain

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 2.53" for 50 Year event
 Inflow = 1.58 cfs @ 12.18 hrs, Volume= 6,278 cf
 Outflow = 1.40 cfs @ 12.26 hrs, Volume= 6,278 cf, Atten= 12%, Lag= 4.6 min
 Discarded = 0.11 cfs @ 12.26 hrs, Volume= 467 cf
 Primary = 1.28 cfs @ 12.26 hrs, Volume= 5,811 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.34' @ 12.26 hrs Surf.Area= 594 sf Storage= 181 cf

Plug-Flow detention time= 0.6 min calculated for 6,270 cf (100% of inflow)
 Center-of-Mass det. time= 0.6 min (857.2 - 856.6)

Volume	Invert	Avail.Storage	Storage Description
#1	33.75'	1,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.75	4	0	0
34.00	275	35	35
34.50	750	256	291
35.00	2,100	713	1,004

Device	Routing	Invert	Outlet Devices
#1	Discarded	33.75'	8.270 in/hr Exfiltration over Surface area Nyoplast 10" Dome Grate Inlet Head (feet) 0.00 0.10 0.20 1.00 Disch. (cfs) 0.000 0.280 0.800 1.800
#2	Primary	33.75'	

Discarded OutFlow Max=0.11 cfs @ 12.26 hrs HW=34.33' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=1.28 cfs @ 12.26 hrs HW=34.33' TW=26.93' (Dynamic Tailwater)
 ↑2=Nyoplast 10" Dome Grate Inlet (Custom Controls 1.28 cfs)

Summary for Pond PSIS1: Proposed Subsurface Infiltration System 1

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 2.34" for 50 Year event
 Inflow = 1.28 cfs @ 12.26 hrs, Volume= 5,811 cf
 Outflow = 0.15 cfs @ 11.85 hrs, Volume= 5,814 cf, Atten= 88%, Lag= 0.0 min
 Discarded = 0.15 cfs @ 11.85 hrs, Volume= 5,814 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 29.33' @ 13.92 hrs Surf.Area= 781 sf Storage= 2,337 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 149.5 min (1,005.5 - 856.0)

Volume	Invert	Avail. Storage	Storage Description
#1A	25.00'	1,355 cf	10.33'W x 75.54'L x 6.75'H Field A 5,269 cf Overall - 1,882 cf Embedded = 3,387 cf x 40.0% Voids
#2A	25.75'	1,882 cf	StormTech MC-4500 +Cap x 17 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		3,237 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.15 cfs @ 11.85 hrs HW=25.10' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.15 cfs)

Summary for Pond PSIS2: Proposed Subsurface Infiltration System 2

Inflow Area = 93,320 sf, 63.49% Impervious, Inflow Depth = 3.82" for 50 Year event
 Inflow = 8.25 cfs @ 12.14 hrs, Volume= 29,671 cf
 Outflow = 5.45 cfs @ 12.30 hrs, Volume= 29,703 cf, Atten= 34%, Lag= 9.6 min
 Discarded = 0.39 cfs @ 11.30 hrs, Volume= 21,037 cf
 Primary = 5.06 cfs @ 12.30 hrs, Volume= 8,666 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 31.11' @ 12.30 hrs Surf.Area= 2,038 sf Storage= 8,180 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 135.7 min (960.1 - 824.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	3,373 cf	28.50'W x 71.52'L x 6.75'H Field A 13,758 cf Overall - 5,326 cf Embedded = 8,432 cf x 40.0% Voids
#2A	25.75'	5,326 cf	StormTech MC-4500 +Cap x 48 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 16 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,699 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area
#2	Primary	30.00'	18.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.00' / 29.50' S= 0.0167 ' S= 0.0167 ' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Discarded OutFlow Max=0.39 cfs @ 11.30 hrs HW=25.08' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=5.00 cfs @ 12.30 hrs HW=31.11' TW=0.00' (Dynamic Tailwater)

↑2=Culvert (Inlet Controls 5.00 cfs @ 3.58 fps)

Summary for Pond PSIS3: Proposed Subsurface Infiltration System 3

Inflow Area = 17,215 sf, 34.27% Impervious, Inflow Depth = 2.17" for 50 Year event
 Inflow = 0.81 cfs @ 12.16 hrs, Volume= 3,107 cf
 Outflow = 0.09 cfs @ 11.85 hrs, Volume= 3,108 cf, Atten= 89%, Lag= 0.0 min
 Discarded = 0.09 cfs @ 11.85 hrs, Volume= 3,108 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 28.86' @ 13.82 hrs Surf.Area= 448 sf Storage= 1,176 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 131.5 min (996.0 - 864.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	797 cf	10.33'W x 43.34'L x 6.75'H Field A 3,023 cf Overall - 1,030 cf Embedded = 1,993 cf x 40.0% Voids
#2A	25.75'	1,030 cf	StormTech MC-4500 +Cap x 9 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		1,827 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.09 cfs @ 11.85 hrs HW=25.07' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.09 cfs)

Summary for Link 1L: Add to POC1

Inflow Area =	189,617 sf, 34.45% Impervious,	Inflow Depth = 0.99" for 50 Year event
Inflow =	6.13 cfs @ 12.30 hrs, Volume=	15,616 cf
Primary =	6.13 cfs @ 12.30 hrs, Volume=	15,616 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Summary for Link ADD: (new Link)

Inflow Area =	57,337 sf, 41.80% Impervious,	Inflow Depth = 2.61" for 50 Year event
Inflow =	3.79 cfs @ 12.10 hrs, Volume=	12,461 cf
Primary =	3.79 cfs @ 12.10 hrs, Volume=	12,461 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR1: South - Undeveloped Runoff Area=96,297 sf 6.31% Impervious Runoff Depth=1.16"
 Flow Length=365' Tc=11.4 min UI Adjusted CN=43 Runoff=1.75 cfs 9,326 cf

Subcatchment PR2: Parking and Drives Runoff Area=93,320 sf 63.49% Impervious Runoff Depth=4.44"
 Flow Length=392' Tc=10.1 min CN=76 Runoff=9.57 cfs 34,496 cf

Subcatchment PR3: Buildings and Northerly O/S Runoff Area=29,748 sf 40.08% Impervious Runoff Depth=3.05"
 Flow Length=272' Slope=0.0100 '/' Tc=12.5 min CN=63 Runoff=1.92 cfs 7,564 cf

Subcatchment PR4: Building and O/S Lot 1 Runoff Area=17,215 sf 34.27% Impervious Runoff Depth=2.65"
 Flow Length=67' Slope=0.0100 '/' Tc=10.4 min CN=59 Runoff=1.01 cfs 3,796 cf

Subcatchment PR5: Northerly Side of Project to Old Runoff Area=12,291 sf 74.09% Impervious Runoff Depth=5.22"
 Tc=6.0 min CN=83 Runoff=1.65 cfs 5,343 cf

Subcatchment PR6: Road A - East of project Runoff Area=45,046 sf 32.99% Impervious Runoff Depth=2.55"
 Tc=6.0 min CN=58 Runoff=2.92 cfs 9,558 cf

Pond POND1: Lot 3/4 Yard Drain Peak Elev=34.50' Storage=293 cf Inflow=1.92 cfs 7,564 cf
 Discarded=0.14 cfs 575 cf Primary=1.49 cfs 6,989 cf Outflow=1.63 cfs 7,564 cf

Pond PSIS1: Proposed Subsurface Infiltration System 1 Peak Elev=31.24' Storage=3,077 cf Inflow=1.49 cfs 6,989 cf
 Outflow=0.15 cfs 6,990 cf

Pond PSIS2: Proposed Subsurface Infiltration System Peak Elev=31.45' Storage=8,450 cf Inflow=9.57 cfs 34,496 cf
 Discarded=0.39 cfs 22,242 cf Primary=7.15 cfs 12,268 cf Outflow=7.54 cfs 34,509 cf

Pond PSIS3: Proposed Subsurface Infiltration System 3 Peak Elev=30.55' Storage=1,612 cf Inflow=1.01 cfs 3,796 cf
 Outflow=0.09 cfs 3,800 cf

Link 1L: Add to POC1 Inflow=8.84 cfs 21,594 cf
 Primary=8.84 cfs 21,594 cf

Link ADD: (new Link) Inflow=4.57 cfs 14,901 cf
 Primary=4.57 cfs 14,901 cf

Total Runoff Area = 293,917 sf Runoff Volume = 70,083 cf Average Runoff Depth = 2.86"
63.56% Pervious = 186,806 sf 36.44% Impervious = 107,111 sf

Summary for Subcatchment PR1: South - Undeveloped

Runoff = 1.75 cfs @ 12.21 hrs, Volume= 9,326 cf, Depth= 1.16"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 Year Rainfall=7.20"

Area (sf)	CN	Adj	Description
6,075	98		Unconnected pavement, HSG A
4,949	77		Newly graded area, HSG A
85,273	39		>75% Grass cover, Good, HSG A
96,297	45	43	Weighted Average, UI Adjusted
90,222			93.69% Pervious Area
6,075			6.31% Impervious Area
6,075			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0120	0.09		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
1.9	315	0.0300	2.79		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
11.4	365	Total			

Summary for Subcatchment PR2: Parking and Drives

Runoff = 9.57 cfs @ 12.14 hrs, Volume= 34,496 cf, Depth= 4.44"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 Year Rainfall=7.20"

Area (sf)	CN	Description
59,246	98	Paved parking, HSG A
34,074	39	>75% Grass cover, Good, HSG A
93,320	76	Weighted Average
34,074		36.51% Pervious Area
59,246		63.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0200	0.11		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
0.6	127	0.0500	3.60		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
1.8	215	0.0100	2.03		Shallow Concentrated Flow, Shallow2 Paved Kv= 20.3 fps
10.1	392	Total			

Summary for Subcatchment PR3: Buildings and Northerly O/S

Runoff = 1.92 cfs @ 12.18 hrs, Volume= 7,564 cf, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=7.20"

Area (sf)	CN	Description
11,922	98	Unconnected roofs, HSG A
17,826	39	>75% Grass cover, Good, HSG A
29,748	63	Weighted Average
17,826		59.92% Pervious Area
11,922		40.08% Impervious Area
11,922		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet Grass: Dense n= 0.240 P2= 3.60"
2.3	222	0.0100	1.61		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
12.5	272	Total			

Summary for Subcatchment PR4: Building and O/S Lot 1

Runoff = 1.01 cfs @ 12.16 hrs, Volume= 3,796 cf, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=7.20"

Area (sf)	CN	Description
5,900	98	Roofs, HSG A
11,315	39	>75% Grass cover, Good, HSG A
17,215	59	Weighted Average
11,315		65.73% Pervious Area
5,900		34.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		Sheet Flow, Sheet1 Grass: Dense n= 0.240 P2= 3.60"
0.2	17	0.0100	1.61		Shallow Concentrated Flow, Shallow1 Unpaved Kv= 16.1 fps
10.4	67	Total			

Summary for Subcatchment PR5: Northerly Side of Project to Old South Rd

Runoff = 1.65 cfs @ 12.09 hrs, Volume= 5,343 cf, Depth= 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=7.20"

NAN-0107J-P

Prepared by Hayes Engineering, Inc.
 HydroCAD® 10.00-16 s/n 03206 © 2015 HydroCAD Software Solutions LLC

Area (sf)	CN	Description
9,106	98	Paved roads w/curbs & sewers, HSG A
3,185	39	>75% Grass cover, Good, HSG A
12,291	83	Weighted Average
3,185		25.91% Pervious Area
9,106		74.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Subcatchment PR6: Road A - East of project

Runoff = 2.92 cfs @ 12.10 hrs, Volume= 9,558 cf, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 Year Rainfall=7.20"

Area (sf)	CN	Description
14,862	98	Paved roads w/curbs & sewers, HSG A
30,184	39	>75% Grass cover, Good, HSG A
45,046	58	Weighted Average
30,184		67.01% Pervious Area
14,862		32.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc = 0.1h

Summary for Pond POND1: Lot 3/4 Yard Drain

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 3.05" for 100 Year event
 Inflow = 1.92 cfs @ 12.18 hrs, Volume= 7,564 cf
 Outflow = 1.63 cfs @ 12.27 hrs, Volume= 7,564 cf, Atten= 15%, Lag= 5.3 min
 Discarded = 0.14 cfs @ 12.27 hrs, Volume= 575 cf
 Primary = 1.49 cfs @ 12.27 hrs, Volume= 6,989 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.50' @ 12.27 hrs Surf.Area= 756 sf Storage= 293 cf

Plug-Flow detention time= 0.9 min calculated for 7,555 cf (100% of inflow)
 Center-of-Mass det. time= 0.9 min (851.9 - 851.0)

Volume #1	Invert	Avail.Storage	Storage Description
	33.75'	1,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.75	4	0	0
34.00	275	35	35
34.50	750	256	291
35.00	2,100	713	1,004

Device	Routing	Invert	Outlet Devices
#1	Discarded	33.75'	8.270 in/hr Exfiltration over Surface area
#2	Primary	33.75'	Nyoplast 10" Dome Grate Inlet
			Head (feet) 0.00 0.10 0.20 1.00
			Disch. (cfs) 0.000 0.280 0.800 1.800

Discarded OutFlow Max=0.14 cfs @ 12.27 hrs HW=34.49' (Free Discharge)
 ↗**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=1.48 cfs @ 12.27 hrs HW=34.49' TW=27.41' (Dynamic Tailwater)
 ↗**2=Nyoplast 10" Dome Grate Inlet** (Custom Controls 1.48 cfs)

Summary for Pond PSIS1: Proposed Subsurface Infiltration System 1

Inflow Area = 29,748 sf, 40.08% Impervious, Inflow Depth = 2.82" for 100 Year event
 Inflow = 1.49 cfs @ 12.27 hrs, Volume= 6,989 cf
 Outflow = 0.15 cfs @ 11.80 hrs, Volume= 6,990 cf, Atten= 90%, Lag= 0.0 min
 Discarded = 0.15 cfs @ 11.80 hrs, Volume= 6,990 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 31.24' @ 14.38 hrs Surf.Area= 781 sf Storage= 3,077 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 204.2 min (1,055.4 - 851.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.00'	1,355 cf	10.33'W x 75.54'L x 6.75'H Field A
			5,269 cf Overall - 1,882 cf Embedded = 3,387 cf x 40.0% Voids
#2A	25.75'	1,882 cf	StormTech MC-4500 +Cap x 17 Inside #1
			Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
			Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
			Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		3,237 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.15 cfs @ 11.80 hrs HW=25.11' (Free Discharge)
 ↗**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Summary for Pond PSIS2: Proposed Subsurface Infiltration System 2

Inflow Area = 93,320 sf, 63.49% Impervious, Inflow Depth = 4.44" for 100 Year event
 Inflow = 9.57 cfs @ 12.14 hrs, Volume= 34,496 cf
 Outflow = 7.54 cfs @ 12.24 hrs, Volume= 34,509 cf, Atten= 21%, Lag= 6.1 min
 Discarded = 0.39 cfs @ 11.05 hrs, Volume= 22,242 cf
 Primary = 7.15 cfs @ 12.24 hrs, Volume= 12,268 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 31.45' @ 12.25 hrs Surf.Area= 2,038 sf Storage= 8,450 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 125.2 min (945.3 - 820.0)

NAN-0107J-P

Prepared by Hayes Engineering, Inc.
HydroCAD® 10.00-16 s/n 03206 © 2015 HydroCAD Software Solutions LLC

Volume	Invert	Avail. Storage	Storage Description
#1A	25.00'	3,373 cf	28.50'W x 71.52'L x 6.75'H Field A 13,758 cf Overall - 5,326 cf Embedded = 8,432 cf x 40.0% Voids
#2A	25.75'	5,326 cf	StormTech MC-4500 +Cap x 48 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 16 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,699 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area
#2	Primary	30.00'	18.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.00' / 29.50' S= 0.0167 ' /' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Discarded OutFlow Max=0.39 cfs @ 11.05 hrs HW=25.09' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=7.09 cfs @ 12.24 hrs HW=31.43' TW=0.00' (Dynamic Tailwater)
↑2=Culvert (Inlet Controls 7.09 cfs @ 4.08 fps)

Summary for Pond PSIS3: Proposed Subsurface Infiltration System 3

Inflow Area = 17,215 sf, 34.27% Impervious, Inflow Depth = 2.65" for 100 Year event
Inflow = 1.01 cfs @ 12.16 hrs, Volume= 3,796 cf
Outflow = 0.09 cfs @ 11.80 hrs, Volume= 3,800 cf, Atten= 92%, Lag= 0.0 min
Discarded = 0.09 cfs @ 11.80 hrs, Volume= 3,800 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 30.55' @ 14.31 hrs Surf.Area= 448 sf Storage= 1,612 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 189.3 min (1,047.6 - 858.4)

Volume	Invert	Avail. Storage	Storage Description
#1A	25.00'	797 cf	10.33'W x 43.34'L x 6.75'H Field A 3,023 cf Overall - 1,030 cf Embedded = 1,993 cf x 40.0% Voids
#2A	25.75'	1,030 cf	StormTech MC-4500 +Cap x 9 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		1,827 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.09 cfs @ 11.80 hrs HW=25.09' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.09 cfs)

Summary for Link 1L: Add to POC1

Inflow Area = 189,617 sf, 34.45% Impervious, Inflow Depth = 1.37" for 100 Year event
Inflow = 8.84 cfs @ 12.24 hrs, Volume= 21,594 cf
Primary = 8.84 cfs @ 12.24 hrs, Volume= 21,594 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

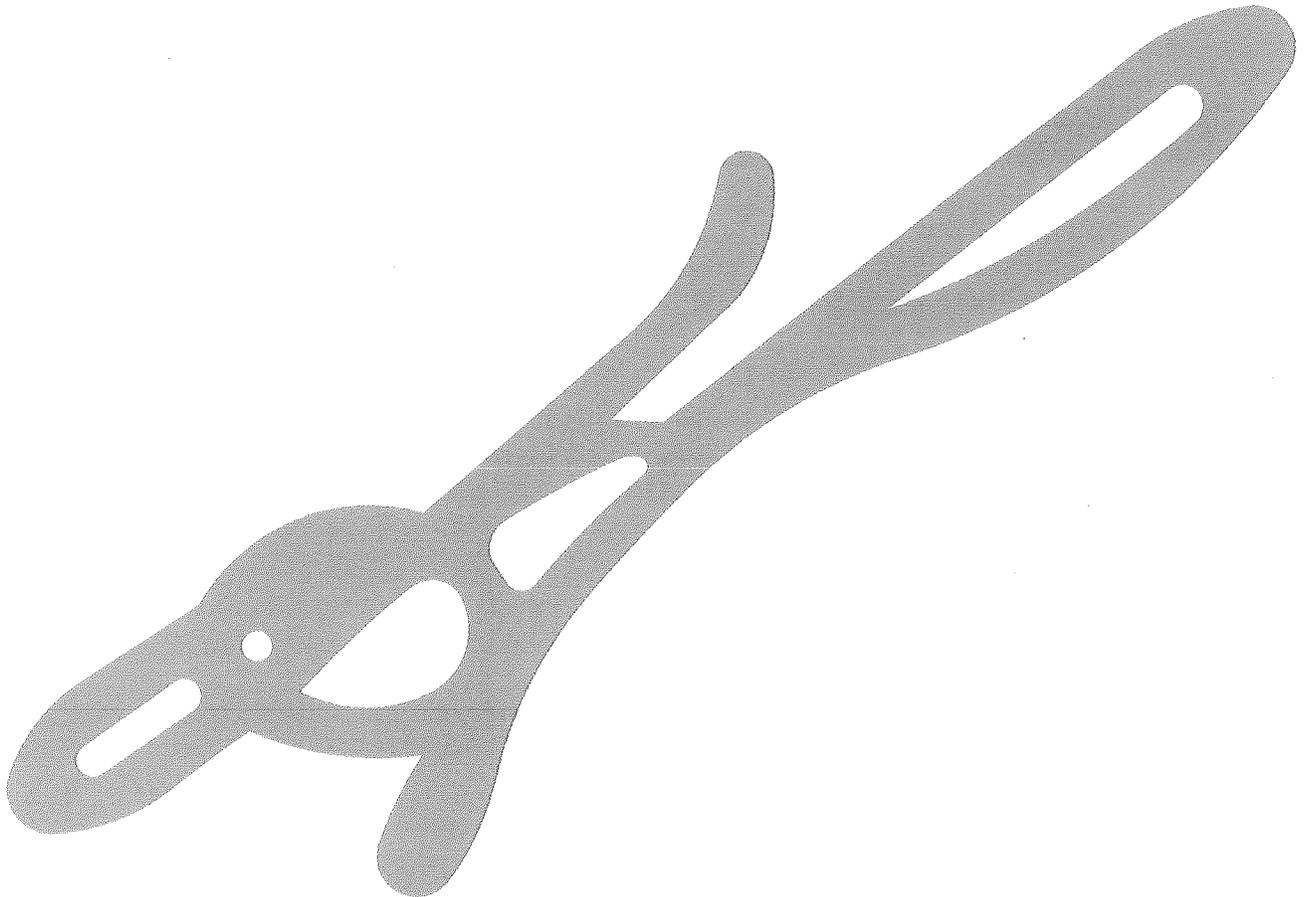
Summary for Link ADD: (new Link)

Inflow Area = 57,337 sf, 41.80% Impervious, Inflow Depth = 3.12" for 100 Year event
Inflow = 4.57 cfs @ 12.10 hrs, Volume= 14,901 cf
Primary = 4.57 cfs @ 12.10 hrs, Volume= 14,901 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

APPENDIX C:

Massachusetts DEP Storm Water Checklist





Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

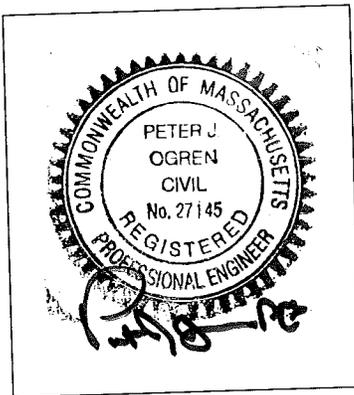
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



 6/13/16
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
 - Credit 1
 - Credit 2
 - Credit 3
- Use of "country drainage" versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): _____

Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

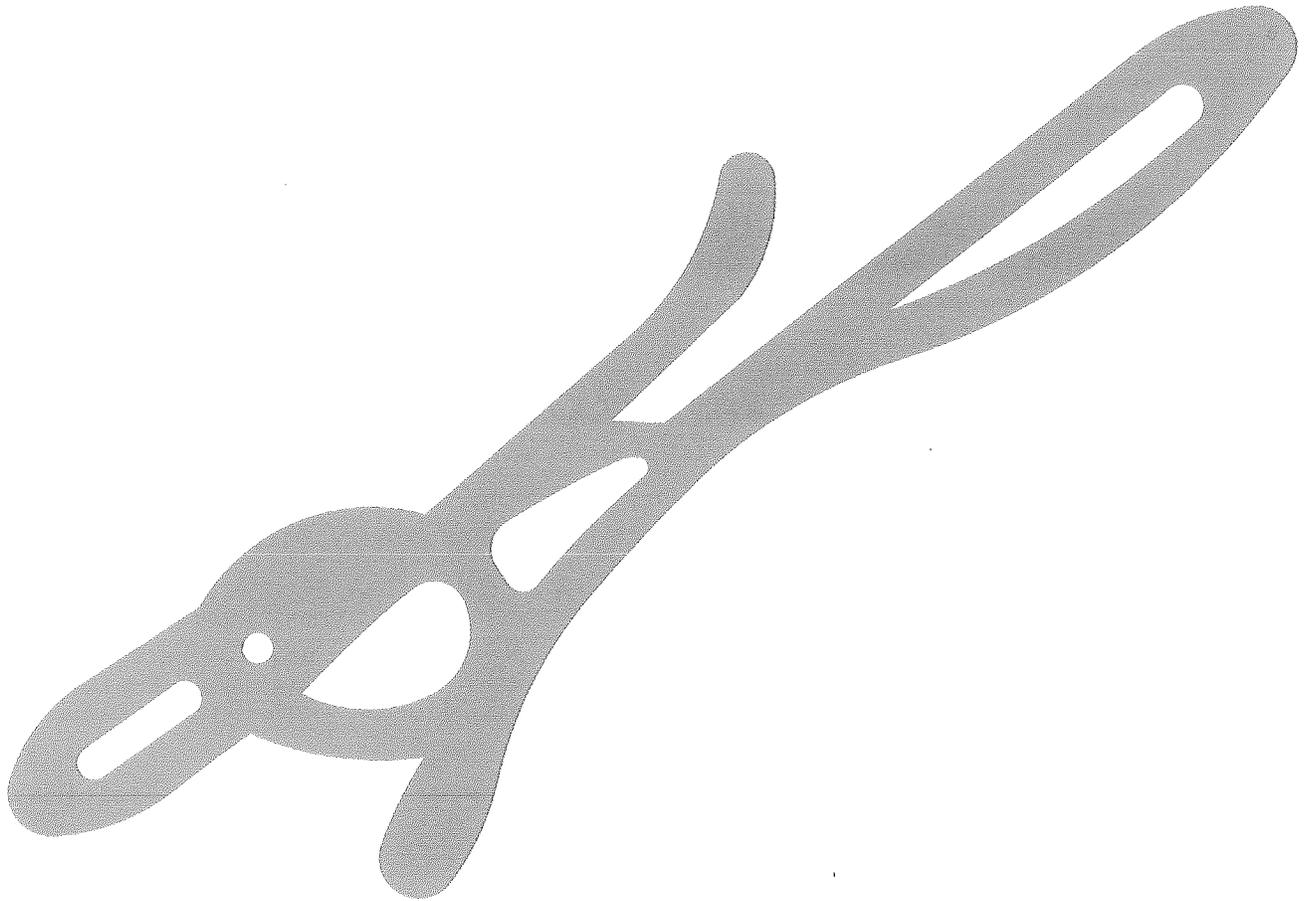
Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

APPENDIX D:
Water Quality Calculations



To POC 1:

Water Quality Volume Calculation:

$$V_{wq} = d_{wq} \times A_{imp}$$

Where,

V_{wq} = Water Quality Volume

d_{wq} = Water Quality Depth (1.0-inch for Critical Areas, ½-inch for Non-Critical Areas)

A_{imp} = Impervious Area Directed to BMP (Sub-catchment PR2)

$$V_{wq} = (1.0") \left(\frac{1 \text{ foot}}{12 \text{ inches}} \right) (59,246 \text{ sf})$$

$$V_{wq} = 4,937 \text{ cf}$$

PSIS2 Storage Volume = 8,576 cf

Proprietary Structure Sizing Calculation per MassDEP "Standard Method to Covert Required Water Quality Volume to a Discharge Rate (October 15, 2013):

Impervious Area to VortSentry = 59,246 sf (0.00213 sq. mi.).

Time of Concentration for Watershed PR1 = 10.1 minutes (0.17 hours)

Unit Peak Discharge (q_u) from DEP Figure 3: 700 csm/in

$$Q_{1.0"} = (q_u)(A_{imp})(d_{wq})$$

Where,

$Q_{1.0"}$ = Peak Flow Rate associated with the first 1.0-inches of runoff

q_u = Unit Peak Discharge, in Cubic Feet per Second per Square Mile per Inch (csm/in.)

A_{imp} = Impervious Area in Drainage Area in Square Miles

d_{wq} = Water Quality Depth in Inches

$$Q_{1.0"} = \left(700 \frac{\text{csm}}{\text{in}} \right) (0.00213 \text{ sq. mi.}) (1.0 \text{ in})$$

$$Q_{1.0"} = 1.49 \text{ cfs}$$

Maximum Design Flow Rate for VortSentry HS60 = 2.2 cfs

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Old South Road Crossing

B BMP ¹	C TSS Removal Rate ¹	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Proprietary Treatment Practice	0.75	0.75	0.56	0.19
Infiltration Basin	0.80	0.19	0.15	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04

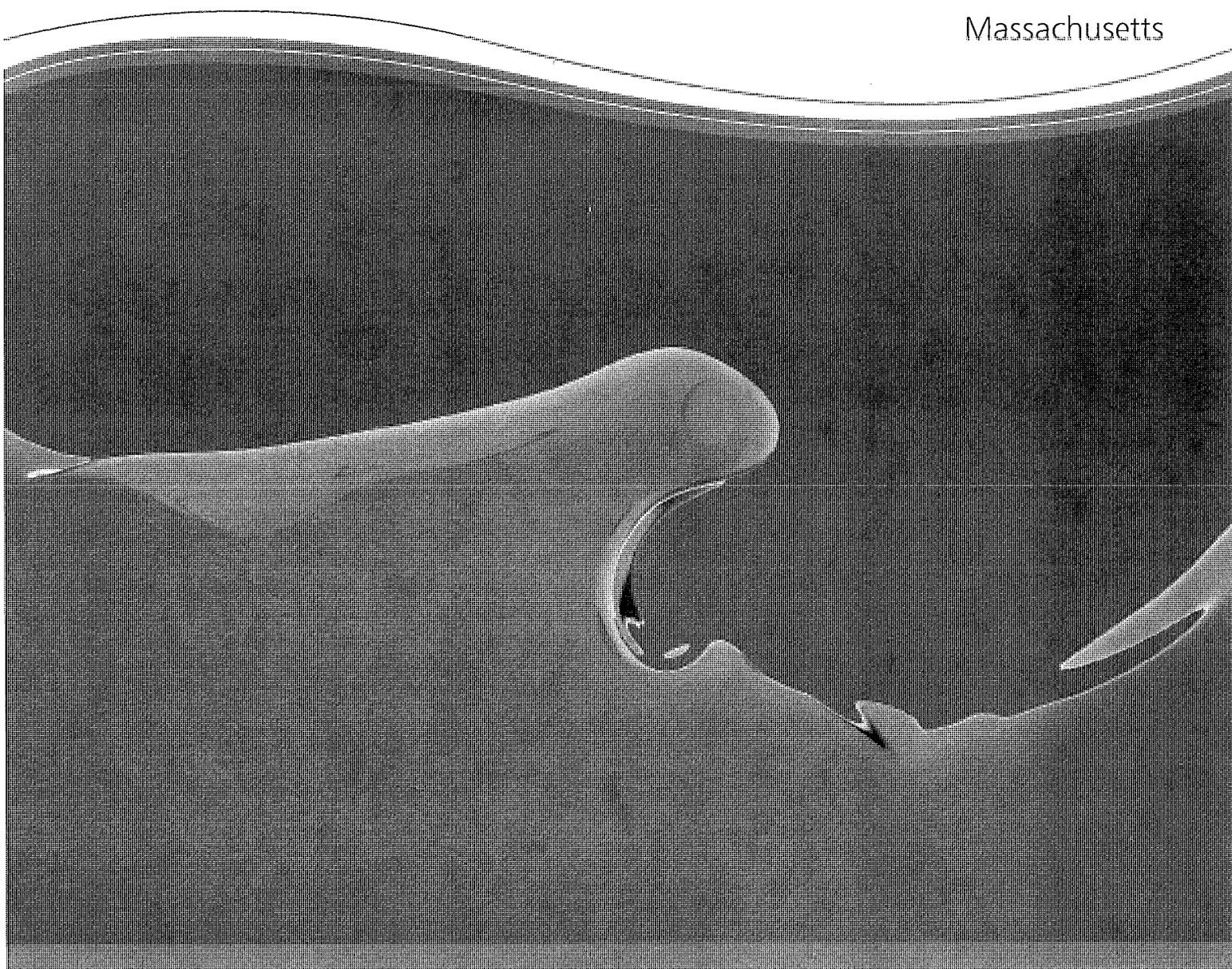
Total TSS Removal = 96%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: NAN-0107J
 Prepared By: AMC
 Date: 6/10/2016

*Equals remaining load from previous BMP (E) which enters the BMP

Hydrodynamic Separation Products Overview
Massachusetts



Available Models

Vortechs Model	Swirl Chamber Diameter		Internal Length		Peak Treatment Flow ¹		Sediment Storage ²	
	ft	m	ft	m	cfs	l/s	yd ³	m ³
	1000	3	0.9	9	2.7	1.6	45.3	0.7
2000	4	1.2	10	3	2.8	79.3	1.2	0.9
3000	5	1.5	11	3.4	4.5	127.4	1.8	1.4
4000	6	1.8	12	3.7	6	169.9	2.4	1.8
5000	7	2.1	13	4	8.5	240.7	3.2	2.4
7000	8	2.4	14	4.3	11	311.5	4	3.1
9000	9	2.7	15	4.6	14	396.4	4.8	3.7
11000	10	3	16	4.9	17.5	495.5	5.6	4.3
16000	12	3.7	18	5.5	25	707.9	7.1	5.4

1. Peak Treatment Flow is maximum flow treated for each unit listed. This flow represents an infrequent storm event such as a 10 or 25 yr storm. Standard Vortechs System depth below invert is 3' for all precast models. Cast-in-place system are available to treat higher flows. Check with your local representatives for specifications.
2. Maintenance recommended when sediment depth has accumulated to within 12-18 inches of the dry weather water surface elevation.

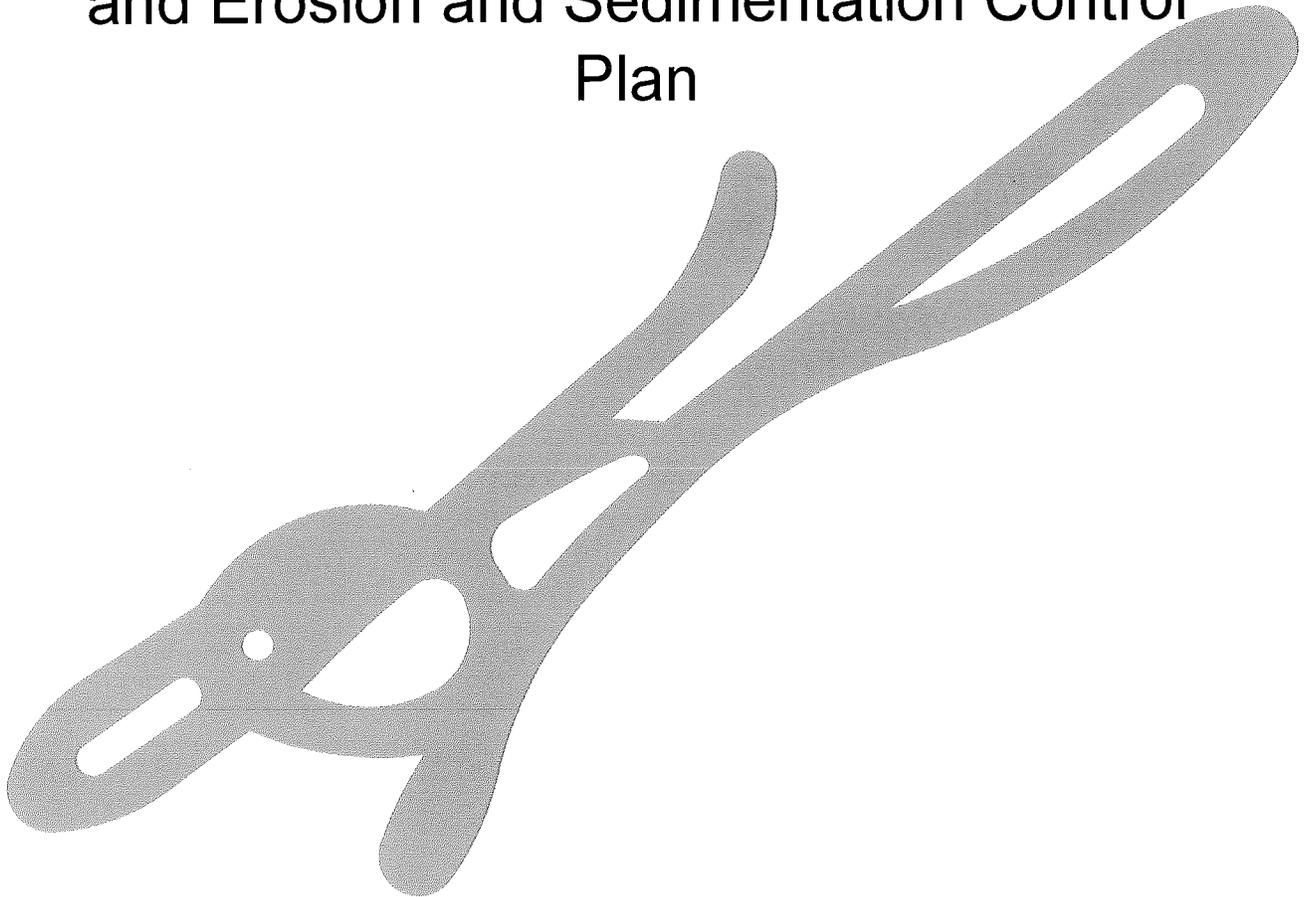
VortSentry HS Model	Swirl Chamber Diameter (ft)	Typical Depth Below Invert (ft)	Treatment Capacity (cfs) ¹	Max Inlet/Outlet Pipe Diameter (in)	Maximum Sediment Storage Capacity (CF)
VortSentry HS36*	3	5.6	0.55	18	39
w/ 1' added sump	3	6.6	0.55	18	47
w/ 2' added sump	3	7.6	0.55	18	54
w/ 3' added sump	3	8.6	0.55	18	61
w/ 4' added sump	3	9.6	0.55	18	68
w/ 5' added sump	3	10.6	0.55	18	75
VortSentry HS48**	4	6.8	1.2	24	85
w/ 1' added sump	4	7.8	1.2	24	97
w/ 2' added sump	4	8.8	1.2	24	110
w/ 3' added sump	4	9.8	1.2	24	123
w/ 4' added sump	4	10.8	1.2	24	135
VortSentry HS60***	5	8.0	2.2	30	156
w/ 1' added sump	5	9.0	2.2	30	176
w/ 2' added sump	5	10.0	2.2	30	196
w/ 3' added sump	5	11.0	2.2	30	215

- *maintenance recommended when sediment reaches a height of 3'-7" below water surface elevation in sump.
 - **maintenance recommended when sediment reaches a height of 4'-9" below water surface elevation in sump.
 - ***maintenance recommended when sediment reaches a height of 6.0' below water surface elevation in sump.
1. Design Flow Rate is based on 80% removal of particle size distribution with an average particle size of 240 micron. This flow also represents the maximum flow prior to which bypass occurs.

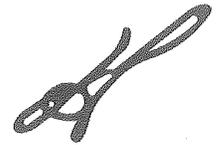
Notes: Systems can be sized based on a water quality flow (e.g. 1 inch storm) or on a net annual basis depending on the local regulatory requirement. When sizing based on a water quality storm, the required flow to be treated should be equal or less than the listed water quality flow for the selected system. Systems sized based on a water quality storm are generally more conservatively sized. Additional particle size distributions are available for sizing purposes upon request. Depth below invert is measured to the inside bottom of the system. This depth can be adjusted to meet specific storage or maintenance requirements. Contact our support staff for the most cost effective sizing for your area.

APPENDIX E:

Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan



Construction Period Pollution Prevention Plan
Old South Road Crossing – Nantucket, MA
June 10, 2016



Project Name: Old South Road Crossing
Retail Liner Buildings
Nantucket, MA

Owner's Name: Richmond Great Point Development, LLC
23 Concord Street
Wilmington, MA

Applicant's Name: Same as above

Party Responsible for Maintenance: To be determined

Project Description:

Richmond Great Point Development, LLC (the "Applicant") propose to construct a multi-unit retail development to be known as "Old South Road Crossing" (the "Project") proximate to the intersection of Old South Road and Lovers Lane.

Erosion and Sedimentation Control Measures During Construction Activities:

Siltation Fence and Hay Bales

Silt fence with hay bales are to be installed as shown on Sheet 8 of 8 (Erosion Control Plan) of the Definitive Plan Set. Silt fence and hay bales are to be installed prior to the commencement of work on the site and in accordance with the design plans. An additional supply of silt fence and hay bales shall be maintained on-site for repair and/or replacement of any disturbed silt fence or hay bales. The silt fence and hay bale line(s) shall be inspected and maintained on a weekly basis. Deposited sediment shall be removed when the level of deposition reaches approximately one-third (1/3) the height of the fence.

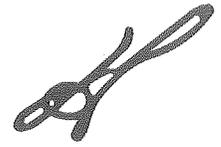
Storm Drain Inlet Protection

A temporary storm inlet protection filter will be placed in all catch basin units. The purpose of the filter is to prevent the inflow of sediment into the closed drainage system(s). The filters shall remain in place until a permanent vegetative cover is established and the transport of sediment is no longer visibly apparent. The filter shall be inspected and maintained on a weekly basis and after significant storm events. Significant storm events are those having greater than one-quarter (1/4) inch of precipitation in a 24-hour period.

Surface Stabilization

The surface of all disturbed areas shall be stabilized during and after construction. Temporary measures shall be taken during construction to prevent erosion and sedimentation. No construction sediment shall be allowed to enter infiltration areas. All disturbed slopes shall be stabilized with a permanent vegetative cover. Some or all of the following measures can be used on the Project as conditions may warrant:

Construction Period Pollution Prevention Plan
Old South Road Crossing – Nantucket, MA
June 10, 2016



- Temporary Seeding
- Temporary Mulching
- Placement of Hay
- Placement of Geo-Synthetic Fabrics
- Hydroseeding
- Permanent Seeding
- Placement of Sod

Surface and Subsurface Infiltration Facilities

No construction period runoff should be directed toward infiltration facilities. The performance of these facilities shall be checked weekly and after significant storm events throughout construction.



INSPECTION SCHEDULE and EVALUATION CHECKLIST

To be completed weekly and within 24-hours of significant rainfall events (greater than 1/4-inches in a 24-hour period).

Inspector's Name: _____ Date: _____

Qualifications: _____

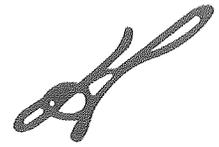
Days since last rainfall: _____ days Amount of last rainfall: _____ inches

Stabilization Measures

Sub-Catchment	Date of Last Disturbance	Date of Next Disturbance	Stabilized (Yes or No)	Stabilized With:	Condition
PR1					
PR2					
PR3					
PR4					
PR5					
PR6					

Stabilization required: _____

To be performed by: _____ on or before: _____



PERIMETER CONTROLS

Date of Inspection: _____

Silt Fence and Hay Bales:

To Study Area:	Has sediment reached 1/3 height of silt fence? (Yes or No)	Depth of Silt (inches)	Is fence secure? (Yes or No)	Is there evidence of bypass or overtopping? (Yes or No)	Describe location of Problem(s), if any.
POC1					

Maintenance required for silt fence and hay bales: _____

To be performed by: _____ on or before: _____

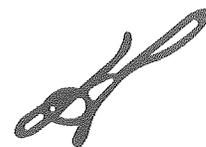
Stabilized Construction Entrance:

Location	Does much sediment get tracked onto roadway? (Yes or No)	Is gravel clean or full of sediment?	Is all traffic using the entrance to access/exit the site? (Yes or No)	Is the culvert beneath the entrance working? (Yes or No)
Old South Road				

Maintenance required for stabilized construction entrance: _____

To be performed by: _____ on or before: _____

Construction Period Pollution Prevention Plan
 Old South Road Crossing – Nantucket, MA
 June 10, 2016



Other Best Management Practices:

BMP	In use? (Yes or No)	Maintenance Required? (Yes or No)	Describe location of Problem(s), if any.
Sweeping of Adjacent Roads			
Catch Basin Inlet Protection			
VortSentry			
PSIS1			
PSIS2			
PSIS3			

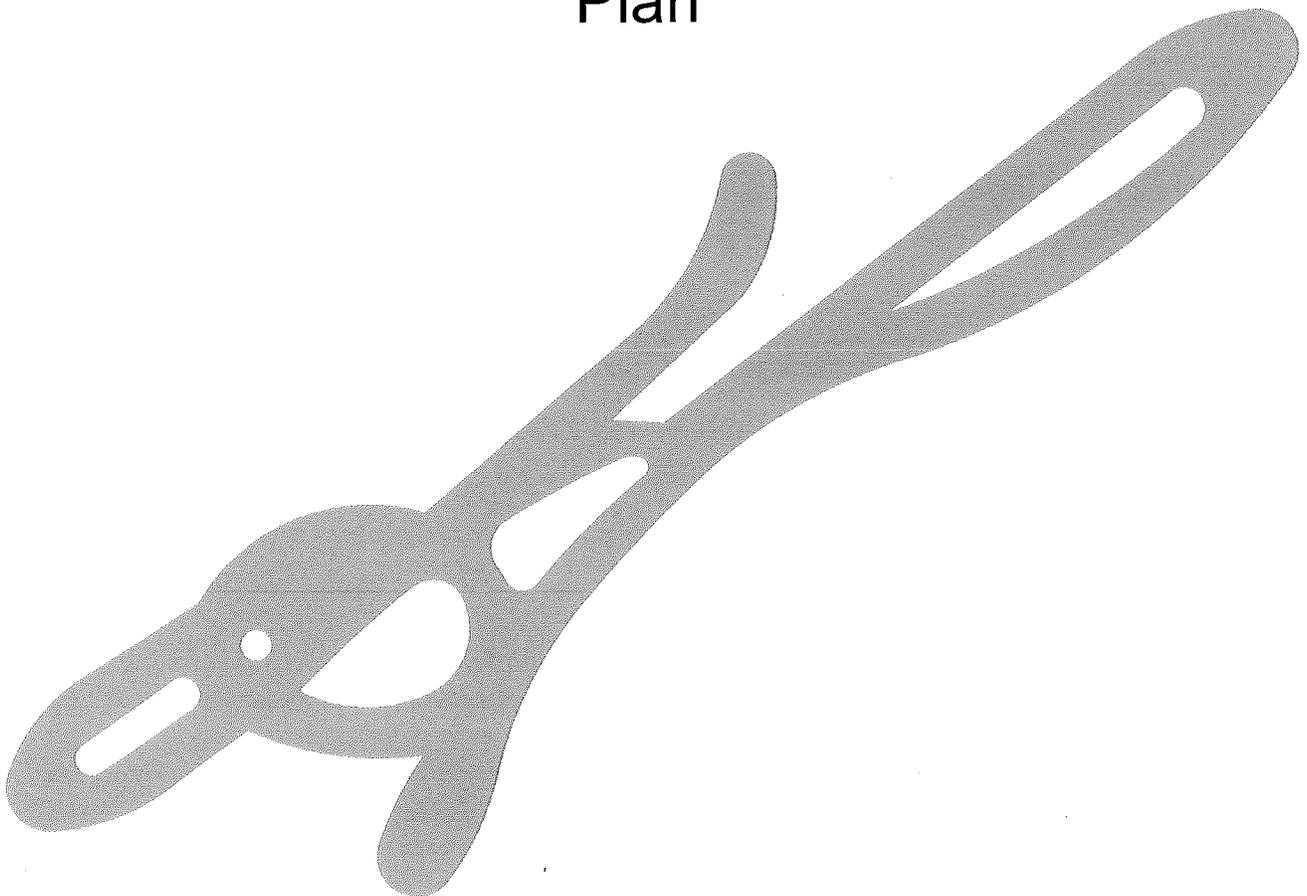
Maintenance required: _____

To be performed by: _____ on or before: _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature: _____ Date: _____

APPENDIX F:
Long Term Operation and Maintenance
Plan



Long Term Operations and Maintenance Plan
Old South Road Crossing – Nantucket, MA
June 10, 2016



Project Name: Old South Road Crossing
Retail Liner Buildings
Nantucket, MA

Owner's Name: Richmond Great Point Development, LLC and
23 Concord Street
Wilmington, MA

Applicant's Name: Same as above

Party Responsible for Maintenance: To be determined

Project Description:

Richmond Great Point Development, LLC (the "Applicant") propose to construct a multi-unit retail development to be known as "Old South Road Crossing" (the "Project") proximate to the intersection of Old South Road and Lovers Lane.

Post-Construction Inspection and Maintenance Measures:

Erosion Control

Sedimentation caused from erosion of soils can adversely affect the performance of the storm water management system. Areas that are barren and/or showing signs of erosion should be stabilized through immediate re-vegetation.

Debris and Litter Removal

Litter and other debris may collect in storm water best management practices (BMPs), potentially causing clogging of facilities. All debris and litter shall be removed as necessary, at a minimum of four (4) times per year in the spring, summer, fall and winter.

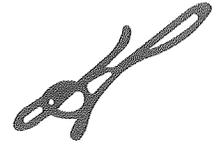
Deep Sump and Hooded Catch Basins

In accordance with Volume 2, Chapter 2 of the MaDEP Storm Water Handbook as summarized below:

Inspect or clean deep sump catch basins at least four (4) times per year and at the end of the foliage and snow-removal seasons. Sediments must also be removed four (4) times per year or whenever the depth of deposits is greater than or equal to one-half (1/2) the depth from the invert of the lowest pipe in the basin to the bottom of the basin (the sump). If handling runoff from land uses with higher potential pollutant loads (LUHPPLs) or discharging near or to a critical area, more frequent cleaning may be necessary.

Deep sump and hooded catch basins should be cleaned with vacuum trucks only. Clamshell buckets shall not be used to clean hooded catch basins. Vacuum trucks remove more sediment and supernatant, and is less likely to snap the hood within the deep sump basin.

Always consider the safety of the staff cleaning deep sump catch basins. Cleaning a deep sump catch basin within a road with active traffic or even within a parking lot is dangerous, and a police detail may be necessary to safeguard workers.



Although catch basin debris often contains concentrations of oil and hazardous materials such as petroleum hydrocarbons and metals, MassDEP classifies them as solid waste. Unless there is evidence that they have been contaminated by a spill or other means, MassDEP does not routinely require catch basin cleanings to be tested before disposal. Contaminated catch basin cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000, and handled as hazardous waste.

In the absence of evidence of contamination, catch basin cleanings may be taken to a landfill or other facility permitted by MassDEP to accept solid waste, without any prior approval by MassDEP. However, some landfills require catch basin cleanings to be tested before they are accepted.

With prior MassDEP approval, catch basin cleanings may be used as grading and shaping materials at landfills undergoing closure (see Revised Guidelines for Determining Closure Activities at Inactive Unlined Landfill Sites) or as daily cover at active landfills. MassDEP also encourages the beneficial reuse of catch basin cleanings whenever possible. A Beneficial Reuse Determination is required for such use.

MassDEP regulations prohibit landfills from accepting materials that contain free-draining liquids. One way to remove liquids is to use a hydraulic lift truck during cleaning operations so that the material can be decanted at the site. After loading material from several catch basins into a truck, elevate the truck so that any free-draining liquid can flow back into the structure. If there is no free water in the truck, the material may be deemed to be sufficiently dry. Otherwise the catch basin cleanings must undergo a Paint Filter Liquids Test. Go to www.Mass.gov/dep/recycle/laws/cafacts.doc for information on all of the MassDEP requirements pertaining to the disposal of catch basin cleanings.

VortSentry HS – Swirl Particle Separator

In accordance with Manufacturer's recommendations, accompanying this report.

Sub-Surface Infiltration Basin

In accordance with Volume 2, Chapter 2 of the MaDEP Storm Water Handbook and Manufacturer's recommendations as summarized below:

Inspect inlets at least twice per year.

Good Housekeeping Practices:

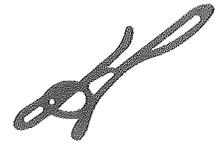
Provisions for storing paints, cleaners, automotive waste and other potentially hazardous household waste products inside or under cover:

- All materials stored on-site shall be in a neat, orderly manner in their appropriate containers with original manufacturer's label(s);
- Only store enough material as needed; whenever possible, all of a product shall be used prior to disposing of container;
- Manufacturer, federal, state and local recommendations for proper use and disposal shall be followed.

Long Term Operations and Maintenance Plan

Old South Road Crossing – Nantucket, MA

June 10, 2016



Vehicle Washing Controls:

- Use commercial car washes whenever possible. Car washes treat and/or recycle wash water;
- Cars shall be washed on gravel, grass or other permeable surfaces to allow filtration to occur;
- Use biodegradable soaps only;
- Use hose nozzles that automatically turn off when unattended.

Routine Inspection and Maintenance of Storm Water BMPs

- Previously addressed.

Spill Prevention and Response Plans

- Spill control practices shall be in conformance with the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) Storm Water Pollution Prevention Plan (SWPPP).

Maintenance of Lawns, Gardens and Other Landscaped Areas:

- Grass shall not be cut shorter than two (2) to three (3) inches and mulch clipping should be left on lawns as a natural fertilizer;
- Use low volume water approaches for irrigation such as drip-type or sprinkler systems. Water plants only when needed to enhance root growth and avoid runoff problems;
- Mulch shall be used wherever practicable. Mulch helps retain water and prevents erosion.

Storage and Use of Fertilizers, Herbicides and Pesticides:

- Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit exposure to storm water. Storage will be in covered areas only. Contents of partially used bags shall be transferred into sealable plastic containers to avoid spills;
- Do not fertilize before or during rain events;
- Consider the use of organic fertilizers;
- Pesticides shall be applied only when necessary and only in the minimum amounts recommended by the manufacturer.

Pet Waste Management

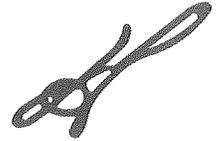
- Scoop up and seal pet waste in plastic bags. Dispose of in garbage.

Solid Waste Management

- All solid waste shall be disposed of or recycled in accordance with all federal, state and local regulations.

List of Emergency Contacts for Plan Implementation

To be determined by Owner.



**POST-CONSTRUCTION
 OPERATION AND MAINTENANCE LOG**

Inspector's Name: _____ Date: _____

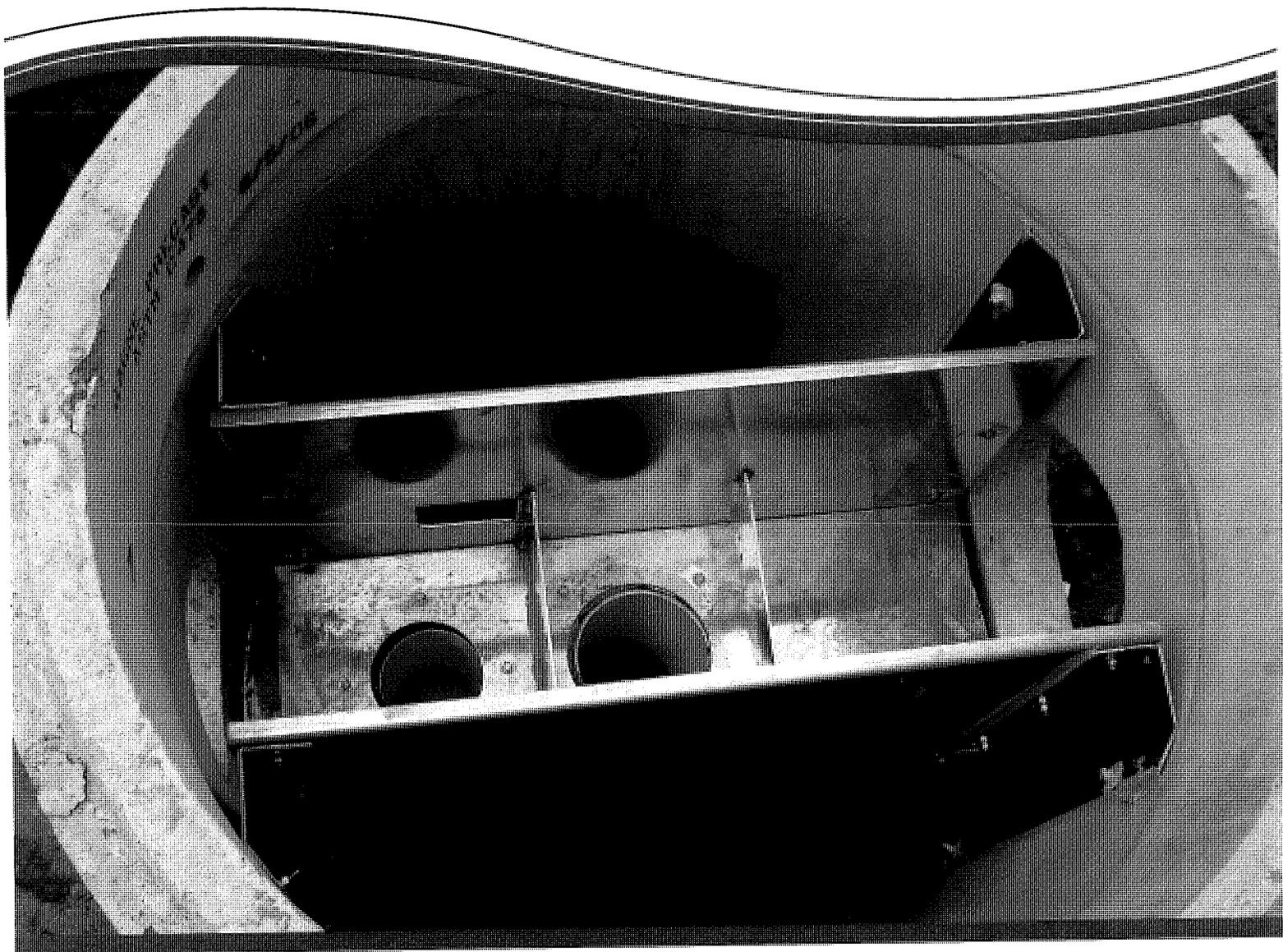
Qualifications: _____

Inspection Type: Routine Spill Other: _____

Post-Rainfall (Precipitation in Inches: _____)

BMP	Frequency	Date Last Performed	Comments
Litter and Debris Removal	After Significant Rain Events		
Deep Sump and Hooded Catch Basins	Inspect four (4) times per year		
	Maintenance as necessary		
Sub-Surface Infiltration System	Inspect two (2) times per year		
Vegetated Areas	Inspect as necessary for erosion		

**VortSentry[®] HS Guide
Operation, Design,
Performance and Maintenance**



VortSentry® HS

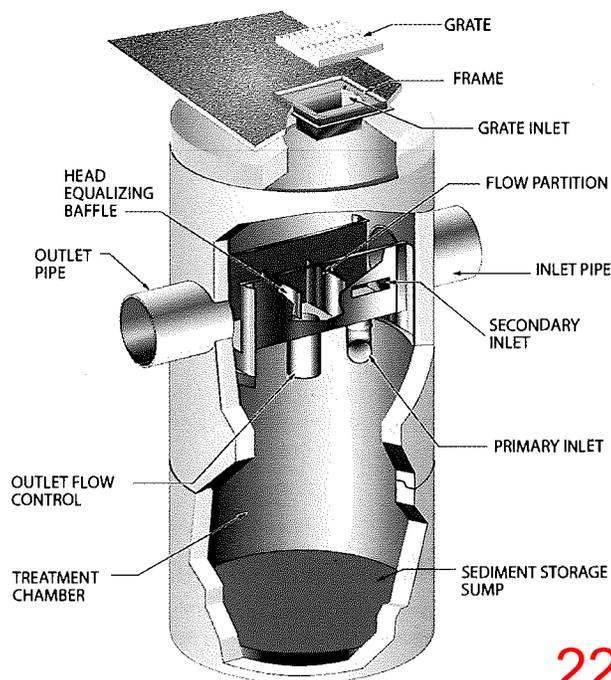
The VortSentry HS is a compact, below grade stormwater treatment system that employs helical flow technology to enhance gravitational separation of floating and settling pollutants from stormwater flows. With the ability to accept a wide range of pipe sizes, the VortSentry HS can treat and convey flows from small to large sites. A unique internal bypass design means higher flows can be diverted without the use of external bypass structures. The VortSentry HS is also available in a grate inlet configuration, which is ideal for retrofit installations.

Operation Overview

Low, frequently occurring storm flows are directed into the treatment chamber through the primary inlet. The tangentially oriented downward pipe induces a swirling motion in the treatment chamber that increases capture and containment abilities. Moderate storm flows are directed into the treatment chamber through the secondary inlet, which allows for capture of floating trash and debris. The secondary inlet also provides for treatment of higher flows without significantly increasing the velocity or turbulence in the treatment chamber. This allows for a more quiescent separation environment. Settleable solids and floating pollutants are captured and contained in the treatment chamber.

Flow exits the treatment chamber through the outlet flow control, which manages the amount of flow that is treated and helps maintain the helical flow patterns developed within the treatment chamber.

Flows exceeding the system's rated treatment flow are diverted away from the treatment chamber by the flow partition. Internal diversion of high flows eliminates the need for external bypass structures. During bypass, the head equalizing baffle applies head on the outlet flow control to limit the flow through the treatment chamber. This helps prevent re-suspension of previously captured pollutants.



Design Basics

There are two primary methods of sizing a VortSentry HS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow for a defined particle size. The summation process of the Rational Rainfall Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically, VortSentry HS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a particle gradation with an average particle size (d_{50}) of 240-microns (μm).

Water Quality Flow Rate Method

In many cases, regulations require that a specific flow rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval (i.e. the six-month storm) or a water quality depth (i.e. 1/2-inch of rainfall).

The VortSentry HS is designed to treat all flows up to the WQQ. Due to its internal bypass weir configuration, flow rates in the treatment chamber only increase minimally once the WQQ is surpassed. At influent rates higher than the WQQ, the flow partition will allow most flow exceeding the treatment flow rate to bypass the treatment chamber. This allows removal efficiency to remain relatively constant in the treatment chamber and reduces the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the VortSentry HS will remove a specific gradation of sediment at a specific removal efficiency. Therefore they are variable based on the gradation and removal efficiency specified by the design engineer and the unit size is scaled according to the project goal.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. The Rational Rainfall Method is a sizing program Contech uses to estimate a net annual sediment load reduction for a particular VortSentry HS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics. For more information on the Rational Rainfall Method, see *Vortechs Technical Bulletin 4: Modeling Long Term Load Reduction: The Rational Rainfall Method*, available at www.ContechES.com/stormwater

Treatment Flow Rate

The outlet flow control is sized to allow the WQQ to pass entirely through the treatment chamber at a water surface elevation equal to the crest of the flow partition. The head equalizing baffle applies head on the outlet flow control to limit the flow through the treatment chamber when bypass occurs, thus helping to prevent re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The VortSentry HS is available in three standard configurations: inline (with inlet and outlet pipes at 180° to each other), grated inlet, and a combination of grate and pipe inlets. All three configurations are available in 36-inch (900-mm) through 54-inch (1400-mm) diameter manholes.

The configuration of the system is determined by the suffix of the model name:

- A model name without a suffix denotes a standard pipe inlet (Example HS48).
- A "G" at the end of the model designation denotes a grate inlet (Example HS48G).
- A "GP" at the end of the model designation denotes a combination of grate and pipe inlets (Example HS48GP).

Performance

Full-Scale Laboratory Test Results

Laboratory testing of the VortSentry HS was conducted using F-55 Silica, a commercially available sand product with an average particle size of 240- μm (Table 1). This material was metered into a model HS48 VortSentry HS at an average concentration of between 250-mg/L and 300-mg/L at flow rates ranging from 0.50-cfs to 1.5-cfs (14-L/s to 56-L/s).

US Standard Sieve Size	Particle Size Micron (μm)	Cumulative Passing %
30	600	99.7%
40	425	95.7%
50	300	74.7%
70	212	33.7%
100	150	6.7%
140	106	0.7%

Table 1 : US Silica F-55 Particle Size Distribution

Removal efficiencies at each flow rate were calculated based on net sediment loads passing the influent and effluent sampling points. Results are illustrated in Figure 1.

Assuming that sediment in the inlet chamber is ideally mixed, removal rates through the system will decay according to the percentage of flow bypassed. This effect has been observed in the laboratory where the test system is designed to produce a

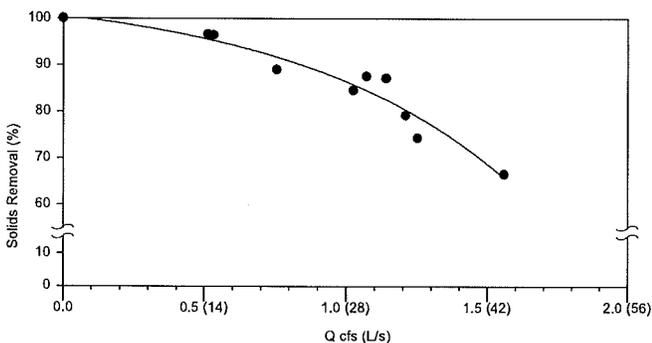


Figure 1: VortSentry HS Removal Efficiencies for 240- μm Particle Gradation

thoroughly mixed inlet stream. All VortSentry HS models have the same aspect ratio regardless of system diameter (i.e. an increase in diameter results in a corresponding increase in depth). Operating rates are expressed volumetrically.

Removal efficiency at each operating rate is calculated according to the average of volumetric and Froude scaling methods and is described by Equation 1.

$$\text{Equation 1: } \left(\frac{\text{Diameter Prototype}}{\text{Diameter Model}} \right)^{2.75} = \left(\frac{\text{Flow Rate Prototype}}{\text{Flow Rate Model}} \right)$$

Equation 1 and actual laboratory test results were used to determine the flow rate which would be required for the various VortSentry HS models to remove 80% of solids.

View report at www.ContechES.com/stormwater

Maintenance

The VortSentry HS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly, but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment washdown areas and in climates where winter sanding operations may lead to rapid accumulations of a large volume of sediment. It is useful and often required as part of a permit to keep a record of each inspection. A simple inspection and maintenance log form for doing so is available for download at www.ContechES.com/stormwater

The VortSentry HS should be cleaned when the sediment has accumulated to a depth of two feet in the treatment chamber. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the distance given in Table 2, the VortSentry HS should be maintained to ensure effective treatment.

Cleaning

Cleaning of the VortSentry HS should be done during dry weather conditions when no flow is entering the system. Cleanout of the VortSentry HS with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole cover and insert the vacuum hose into the sump. All pollutants can be removed from this one access point from the surface with no requirements for Confined Space Entry.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads, which solidify the oils. These are usually much easier to remove from the unit individually, and less expensive to dispose than the oil/water emulsion that may be

created by vacuuming the oily layer. Floating trash can be netted out if you wish to separate it from the other pollutants.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. If anyone physically enters the unit, Confined Space Entry procedures need to be followed.

Disposal of all material removed from the VortSentry HS should be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

VortSentry HS Model	Diameter		Distance Between Water Surface and Top of Storage Sump		Sediment Storage		Oil Spill Storage	
	in.	m	ft.	m	yd ³	m ³	gal.	liter
HS36	36	0.9	3.6	1.1	0.5	0.4	83	314
HS48	48	1.2	4.7	1.4	0.9	0.7	158	598
HS60	60	1.5	6.0	1.8	1.5	1.1	258	978
HS72	72	1.8	7.1	2.2	2.1	1.6	372	1409
HS84	84	2.1	8.4	2.6	2.9	2.2	649	2458
HS96	96	2.4	9.5	2.9	3.7	2.8	845	3199

Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile. Finer, silty particles at the top of the pile may be more difficult to feel with the measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.

Table 2: VortSentry HS Maintenance Indicators and Sediment Storage Capacities.

Logon to www.ContechES.com/stormwater to download the VortSentry HS Inspection and Maintenance Log.

For assistance with maintaining your VortSentry HS, contact us regarding the Contech Maintenance compliance certification program.



CONTECH[®] ENGINEERED SOLUTIONS

©2014 CONTECH ENGINEERED SOLUTIONS, LLC.
800-338-1122
www.ContechES.com

All Rights Reserved. Printed in the USA.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit ContechES.com or call 800.338.1122

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

The Stormwater Management StormFilter, MFS and CDS are trademarks, registered trademarks, or licensed trademarks of Contech Engineered Solutions LLC. LEED is a registered trademark of the U.S. Green Building Council.

Support

- Drawings and specifications are available at contechstormwater.com.
- Site-specific design support is available from our engineers.

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS AN EXPRESSED WARRANTY OR AN IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SEE THE CONTECH STANDARD CONDITIONS OF SALE (VIEWABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.



PESCE ENGINEERING & ASSOCIATES, INC.

**451 Raymond Road
Plymouth, MA 02360**

Phone: 508-743-9206 Cell: 508-333-7630
epesce@comcast.net

July 4, 2016

Nantucket Planning Board
Attn: Ms. Leslie Snell, AICP, LEED® AP
Deputy Director, Planning & Land Use Services
2 Fairgrounds Road
Nantucket, MA 02554

Subject: Engineering Review of the Proposed **Old South Road Crossing – Retail “Liner Buildings” MCD**

Dear Mrs. Snell & Members of the Board:

Pesce Engineering & Associates, Inc. is pleased to provide you this engineering review of the proposed Old South Road Crossing – Retail “Liner Buildings” Major Commercial Development, Nantucket, MA. We have evaluated the plans for consistency with the Town’s Zoning Bylaw, and general conformance with the Massachusetts Stormwater Management Regulations.

We have reviewed the following documents and information to prepare this letter report:

- Letter from The Richmond Company to the Town of Nantucket Planning Board, Subject: Submittal of Application for Major Commercial Development / Special Permit (Retail), Old South Road Crossing Retail “Liner” Buildings / 62, 67, 73 and 75(A) Old South Road, Richmond Great point Development LLC (Owner Developer), dated June 10, 2016.
- Site Development Plans: “*Old South Road Crossing Retail “Liner Buildings”, Major Commercial Development Special Permit Site Plan, at 62, 67, 73 and 75(A) Old South Road, Nantucket, MA,*” 8 sheets, prepared by Hayes Engineering, Inc., dated June 10, 2016.
- Storm Water Management Report, Major Commercial Development Special Permit Site Plan, Old South Road Crossing, Nantucket, MA, prepared by Hayes Engineering, Inc., dated June 10, 2016.
- Application for a Special Permit, dated June 13, 2016, with description of zoning relief sought.

This project involves approximately 2.39 acres of land as part of the proposed Old South Road Crossing development of the former Glowacki property. This site is located in the Commercial-Neighborhood (CN) Zoning District, and lies within the Nantucket Sewer and Wellhead Protection Districts, as well as a Zone II of a public drinking water supply. No wetlands are located on the property, and it is not located within the 100-yr. flood plain.

The MCD site involves the development of 5 lots for new commercial/retail uses abutting Old South Road. The lots propose the construction of 5 new buildings ranging from 1,500 sf to 5,1270 sf for a total of approximately 15,000 sf, with a 1,200 sf outdoor seating area included for Lot 5 (restaurant). Municipal water and sewer services are planned for this project. The design also calls for widening of Old South Road, and the addition of a center left or right turning lane between east-west Old South road travel lanes.

The following are our review comments:

Definitive Plans, Utilities, and Site Layout

1. We recommend that the applicant discuss with the Board the justification and explanation for the waivers requested. From our review of these waivers, we find they do not present any major additional engineering issues or concerns. Furthermore, we would support the request for larger corner turning radii to better accommodate truck traffic.
2. We recommend that the applicant review this plan with the Nantucket Fire Dept., and provide the Board with their written comments for the record.
3. As mentioned above, the plans also call for widening of Old South Road to add a center left or right turning lane between the east-west Old South road travel lanes. However, no construction details were included with the plans. We have been informed that this widening is shown as conceptual, in order to discuss this with the Board and obtain comment and direction for this project. We recommend that if the Board approves of this design concept, that a condition be added to the Special Permit requiring that additional design details be provided for the Board's review, including the relocation of the drainage and electrical infrastructure on Old South Road.
4. Again, we understand that these plans may represent a preliminary design to provide discussion points with the Board. However, we recommend that the following additional information be added to the future plan revision:

- a. The proposed locations for trash dumpster pads (especially for the proposed restaurant), and a pad construction detail, with screening fencing, as appropriate.
 - b. A Landscaping Plan and Lighting Plan.
 - c. An Erosion Control Plan, showing the proposed locations of silt fence erosion controls, and the locations for the details for the "Tire Tracking Pad," and "Silt Sack" shown on Sheets 6 & 7.
 - d. The locations for and a detail of Handicapped Parking signage.
 - e. A "Stop" sign (with painted stop line) at the intersections with Road "A" (the proposed Old South Road Crossing intersection), and at Lovers Lane.
 - f. Parking space dimensions, proposed aisle widths, and curb radii.
 - g. Proposed sidewalk width and a construction detail.
 - h. The Pavement Section detail on sheet 6 indicates "*8" Min. Gravel or 3" Gravel over 6" hardening.*" We recommend that this roadway base material be specified with a design sieve specification (such as MA DOT M2.01.7, M1.03.0 or similar).
 - i. The line type shown for the proposed grading is nearly identical to that for the existing grading, making it difficult to follow/read. We recommend that the proposed grading lines be changed to make them easier to read (perhaps thicken them, or change the line type, or both). NOTE: The line type shown on Sheet 8 for the proposed grades were much more legible than on the other sheets.
 - j. Add notes with leader arrows for the proposed removal and relocation of the existing sewer Force Main (FM) shown in the vicinity of CB 4, for better clarity during construction.
 - k. Add notes to indicate the connection of the outlet lines for CBs 5 & 6 to a downstream drainage structure.
5. The Sheet 8 shows the proposed "Interim Site Plan" layout and grading. We recommend that the phasing for this be discussed with the Board, and additional notes added to the plan regarding the timing, and other details/notes, as appropriate, or requested by the Board.

Stormwater Management

This project proposes to mitigate post-development runoff for the project roadway by collecting runoff into a series of deep sump catch basins and drain manholes, which flow to three subsurface infiltration areas. Additionally, the subsurface system that collects runoff from the main parking area will be pre-treated through the use of a VortSentry® HS stormwater treatment unit. This stormwater management system will remove over 80% of the Total Suspended Solids (TSS) in the stormwater, and recharge the stormwater to the aquifer. The proposed design also reduces the peak rate of runoff as compared to the existing conditions, and is additionally designed for the 100-yr. storm.

We have the following stormwater management comments:

1. The proposed Nyloplast Yard Drain Inlet detail is shown on Sheet 6, however no inlet basin detail was included on the plans. We recommend that an appropriate detail be added to the plans, which includes a 4 ft. sediment sump, and outlet tee or elbow, in accordance with Stormwater Best Management Practices.
2. No soil test pit data was provided to evaluate the separation distance from the bottom of the StormTech™ chambers from the estimated seasonal high groundwater elevation. Subject to the approval of the Board, we recommend that the requirement to provide test pit data be added as a condition of the Special Permit, to conduct these test pits and provide this information to the Board prior to the construction start.
3. Sheet 6 shows details for a “Reduced Cover Drain Manhole” and “Reduced Cover Catch Basin.” We recommend that the locations for these be shown on the plans (or removed if not needed).
4. We recommend that at least 2 inspection ports be shown for PSIS#1 & PSIS#3 (at each end of the chamber line), and that least 6 inspection ports be provided for PSIS#2 (1 at each corner, and 2 in the middle of the chamber field).
5. The proposed rim elevation of the Yard Drain #1 (Lot 3/4 area) is 33.75 ft. The drainage calculations in the Storm Water Management Report indicate a peak elevation of 34.17 ft. at this site for the 25-yr. storm. We recommend the infiltration system be modified/enlarged to contain the 25-yr. storm, and consideration be given for the same for the larger storms as well.
6. The drainage calculations for PSIS#2 indicate a peak storm elevation of 30.82 ft. for the 25-yr. storm, which exceeds the BMH4/OCS overflow elevation of 30.00 ft. We

recommend the infiltration system be modified/enlarged to contain the 25-yr. storm, and consideration be given for the same for the larger storms as well.

7. The Post-Development Watershed map included in the Storm Water Management Report is difficult to read. It is difficult to see the subcatchment area boundaries, the Tc flow lines for each subcatchment area, and the POC1 location is not indicated on the map. We recommend that this map be amended.

Thank you again for this opportunity to assist the Planning Board in their review of this project. As always, please call if you have any questions or comments.

Sincerely,

PESCE ENGINEERING & ASSOCIATES, INC.

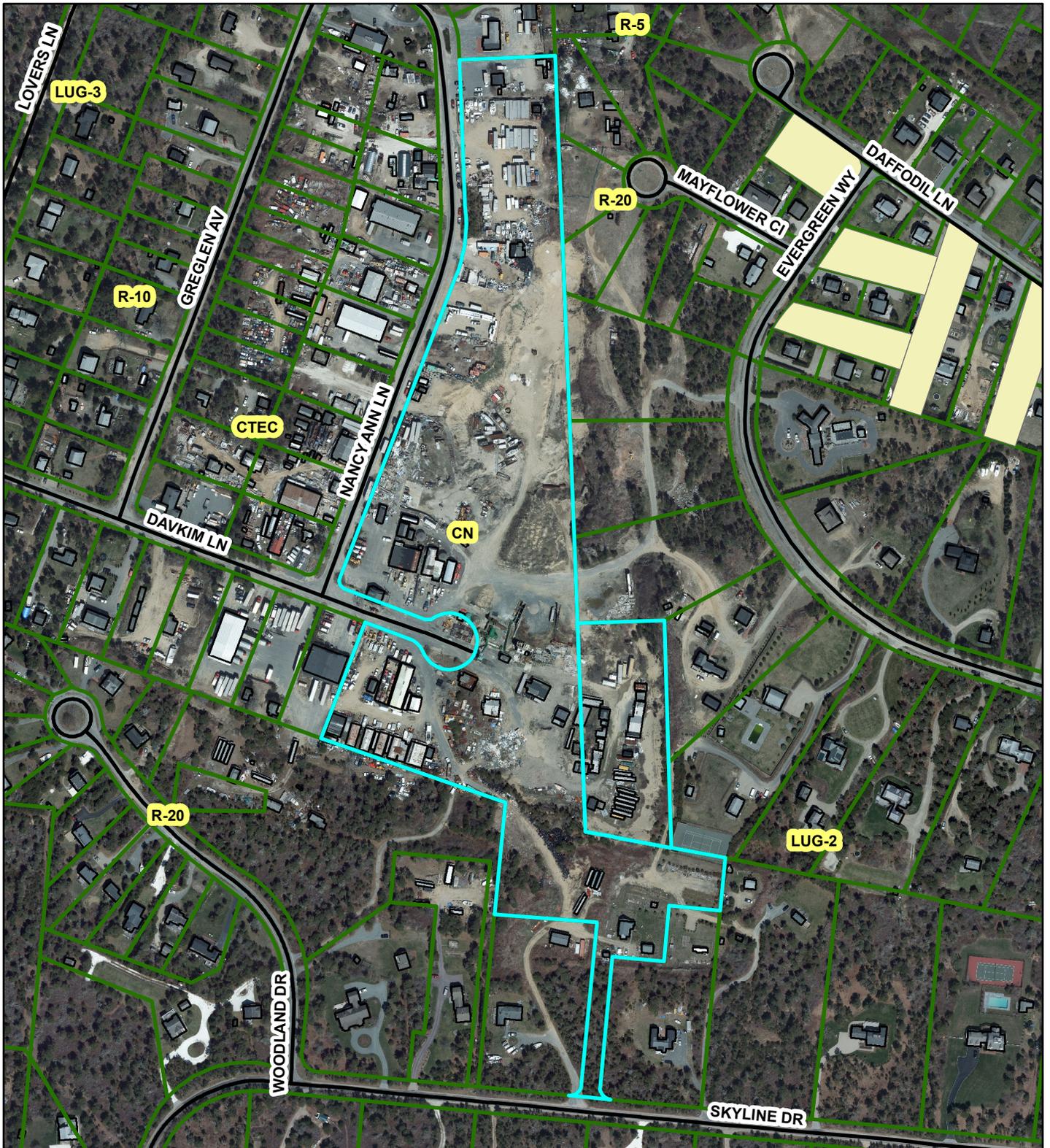


Edward L. Pesce., P.E., LEED® AP
Principal

David Armanetti, The Richmond Co.
P. John Ogren, P.E., Hayes Engineering, Inc.



#40-16 Richmond Great Point Development, LLC
Meadows II Rental Apartment Development Project
20 & 20R Davkim Lane
Map 68 Parcels 56.1 & 57



Town Clerk
Town & County Building
16 Broad St
Nantucket, MA 02554



JUN 15 2016

Nantucket Planning Board

Application for a Special Permit



Date: June 13, 2016 File #:

Name of development: "Meadows II" Rental Apartment Development Project

Owner(s) name(s): Richmond Great Point Development LLC (Philip Pastan)

Mailing address: 23 Concord Street, Wilmington MA 01887

Phone number: 978-988-3900 Fax number: 978-988-3950

E-mail: ppastan@richmondco.com

Applicant's name: The Richmond Company, Inc. (David Armanetti and Patty Roggeveen)

Mailing address: 23 Concord Street, Wilmington MA 01887

Phone number: 978-988-3900 Fax number: 978-988-3950

E-mail: darmanetti@richmondco.com; proggeveen@richmondco.com

Engineer / surveyor's name: Green Seal Environmental, Inc. (Heather Twiss)

Mailing address: 114 State Road, Sagamore Beach MA 02562 Phone number:

508-888-6034 Fax number: 508-888-1506 E-mail: htwiss@gseenv.com

Location of lot(s):

Street address 20 and 20 (R) Davkim Lane

Tax Assessors Map Parcel See Attachment "A" for Detail of Multiple Parcels

Nantucket Registry of Deed: See Attachment "B" for Detail of Multiple Parcels
Plan Book Page OR

Plan File # OR Land Court Plan # at Certificate #

Size of parcel: 631,620 SF (14.50 Acres) sq. ft. Zoning District: Commercial Neighborhood (CN)

Special Permit sought: (check one)

- Cluster subdivision
- Commercial WECS
- Driveway Access/Curb Cut Special Permit
- Harbor Overlay District (HOD)
- Major Commercial Development (MCD)

Nantucket Planning and Land Use Services ▪ 2 Fairgrounds Road ▪ Nantucket ▪ MA ▪ 02554 ▪ (508) 325-7587

- Multi-family Special Permit
- Moorlands Management District Subdivision or Construction (MMD)
- NEHOD (Neighborhood Employee Housing Overlay District)
- MRD (Major Residential Development)
- MIPOD (Mid-Island Planned Overlay District)
- Other Uses Requiring a Special Permit (specify all uses and *Nantucket Code* sections)

Section	Description
_____	_____
_____	_____
_____	_____
_____	_____

Specify all associated Zoning Code relief sought:

Section	Description
None	
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Only the zoning relief expressly requested above will be considered as part of this application.

If applying for a Major Commercial Development, specify how the application will comply with Section 139-11 (J) of the *Zoning Code of the Town of Nantucket*, also known as the Town's Affordable Housing Effort:
 Not Applicable (Application is not a Major Commercial Development Project)

Planning Board filing fee due: \$ _____

Engineering Inspection Escrow Deposit due: \$ _____

I/ we hereby certify that the applicant(s) cited above have been authorized by me/ us to file a Special Permit application with the Planning Board on property that I/ we own.

Nantucket Planning and Land Use Services ▪ 2 Fairgrounds Road ▪ Nantucket ▪ MA ▪ 02554 ▪ (508) 325-7587

Owner(s)' Signature(s) Philip Pastan, as Manager of Richmond Great Point Development LLC

Applicant's Signature



I/we _____, the undersigned, hereby authorize
_____ to act as agent(s) on my/our behalf and
to make any necessary revisions on this filed application as they may be requested by the Board to meet its
governing rules and guidelines.

Owner(s)' signature(s)

Check List:

- Planning Board Special Permit abutters list – to be obtained at the Tax Assessor's office
- Completed application form entitled "Application to the Planning Board for a Special Permit"
- Application fee of \$250.00 payable to Town of Nantucket
- Abutters fee of \$6.11 per abutters payable to Pitney Bowes Reserved Funds
- Four (4) sets of mailing labels with each abutter's name and address
 - 1" x 2 5/8" size, typed labels, are preferred
 - duplicate labels are not necessary if the same owner is listed for more than one abutting property
- Completed application form
- Town Clerk's stamped application (provide 2 copies-one for Town Clerk and one for Planning Board)

**"Attachment A" to
Special Permit Application**

**"Meadows II" Rental Apartments Development
20 and 20 (R) Davkim Lane, Town of Nantucket MA**

ADDITIONAL SPACE NEEDED TO PROVIDE DETAILED INFORMATION FOR MULTIPLE PARCELS

20 Davkim Lane (Entirety of 12.5 Acre Total)

Tax Assessors Map Information: Map # 68, Parcel # 57

Registry / Plan Information; Lot # 184 on Land Court Plan # 16514-Z)
(Land Court Certificate # 24872)

20 (R) Davkim Lane (Entirety of 2.00 Acre Total)

Tax Assessors Map Information: Map # 68, Parcel # 56.1

Registry / Plan Information; Lot # 206 on Land Court Plan # 16514-7)
(Land Court Certificate # 24872)

**"Attachment B" to
Special Permit Application**

**"Meadows II" Rental Apartments Development
20 and 20 (R) Davkim Lane, Town of Nantucket MA**

The title to the land included in the above-referenced application is derived as follows:

As to the Owner of One Hundred Percent (100%) of the 20 Davkim Lane Property

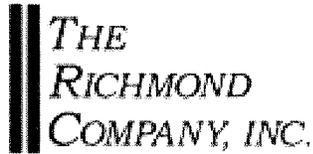
RICHMOND GREAT POINT DEVELOPMENT LLC

"Deed" dated August 7, 2013, recorded at the Nantucket County Registry of Deeds, in Book # 01397, Page # 312, recorded on August 8, 2013 (referred to as "Recorded Land – Parcel Thirty-Two" on Page 7 of the "Deed").

As to the Owner of One Hundred Percent (100%) of the 20 (R) Davkim Lane Property

RICHMOND GREAT POINT DEVELOPMENT LLC

"Deed" dated August 7, 2013, recorded at the Nantucket County Registry of Deeds, in Book # 01397, Page # 312, recorded on August 8, 2013 (referred to as "Recorded Land – Parcel Forty-Two" on Page 9 of the "Deed").



The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

June 10, 2016

TOWN OF NANTUCKET
PLANNING BOARD
2 Fairgrounds Road
Nantucket, Massachusetts 02554

Attention: Leslie Woodson Snell, AICP, LEED AP, Deputy Director of Planning

Subject: Submittal of Application for Special Permit (Workforce Rental Community)
Richmond Great Point Development LLC (Owner / Developer)
"Meadows II" Multi-Family Workforce Rental Community Development
20 Davkim Lane and 20 (R) Davkim Lane

Dear Ms. Snell:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to submit the completed application form, plans, drainage reports, and related materials which are required to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the issuance of a special permit to allow for the development of the "workforce rental community" project which is proposed to be located on a combination of two (2) contiguous properties comprising +/- 14.5 acres of land located at 20 Davkim Lane and 20(R) Davkim Lane (this land comprises the existing asphalt plant / gravel pit" and storage yard components of the former Glowacki property).

The proposed project is comprised of the land area that was specifically re-zoned for this purpose, to the Commercial Neighborhood (CN) zoning district and to qualify as a "workforce rental community" by the approval of Article 1 and Article 2 at the Nantucket Special Town Meeting of November 9, 2015, the provisions of which have been codified as Section 139-8(D) (Residential Development Options) of the Town of Nantucket Zoning Bylaw.

The proposed project is also expressly consistent with and complies with the terms and provisions of the "2015 Richmond Great Point Development, LLC / Town of Nantucket Memorandum of Agreement" dated November 9, 2015, which memorializes the specific terms under which a workforce homeownership housing community could be developed on the above-captioned properties (the "MOA").

As reflected on the attached site plan, the development program includes a total of 225 apartment units in a series of approximately forty (40) low density, two story, residential structures, designed in a "campus" style layout with interconnected walkways and bike paths and generous off street parking, well in excess of the off street parking required under Section 139-18(B) of the Town of Nantucket Zoning Bylaw, which is equal to requiring one (1) off street parking space per bedroom.

The proposed project will be served by a range of new infrastructure improvements (including water, sewer, drainage, street lighting, landscaping, etc.).

The proposed project will offer a mix / range of studio, one bedroom, two bedroom, and three bedroom units. The mix of units that are proposed to be created, are as follows (this unit mix is preliminary and is subject to change, based on further market research by the owner / developer or a change in conditions prior to the issuance of final approval for the proposed project.

**“Meadows II” Workforce Rental Community Project
 Summary of Preliminary Proposed Unit Mix**

Unit Types	Number of Units (Per Type)	Percentage of All Units (Per Type)
Studio (S) Units	22	10 %
One (1) Bedroom Units	87	39 %
Two (2) Bedroom Units	94	42 %
Three (3) Bedroom Units	22	10 %
Subtotal	225 Units	100 %

Based on the preliminary unit mix described above, the proposed project will have a total of three hundred and sixty-three (363) individual bedrooms, which is equal to a bedroom per unit ratio of 1.61 bedrooms per unit.

Twenty-five percent of all of the proposed units, equal to fifty-six (56) units will be rented to tenants who qualify under the household income and related eligibility criteria set forth in the MOA (including the local preference and lottery provisions described therein).

This will include the rental of all of the affordable units to tenants whose household incomes are equal to or less than eighty percent (80%) of the Area Median Income (AMI) established for Nantucket County by the US Department of Housing and Urban Development (HUD). In 2015, these (80% of AMI) annual income limits were equal to \$71,800 in annual income for a three person household and \$79,750 in annual income for a four person household. Based on these income limits and the formulas set by the Commonwealth of Massachusetts Department of Housing and Community Development and Mass Housing under how the maximum monthly rents for the affordable units are established, the maximum monthly rent for the (80% AMI) affordable apartment units will be +/- \$1,270 per month for a studio unit, +/- \$1,325 per month for a one bedroom unit, +/- \$1,590 per month for a two bedroom units, and +/- \$1,825 per month for a three bedroom unit (all of these monthly rents excludes utilities, which must be paid by the individual tenants, in addition to the monthly rent. By the time the proposed project is approved, these maximum income and monthly rent limits will likely be tied to the 2016 income data that is issued / updated by the federal and state government, so these limits will likely change (slightly).

"Meadows II" Workforce Rental Community Project
Special Permit Application Submittal
June 10, 2016
Page Three

Per the terms of the MOA, all of the affordable units will be dispersed uniformly throughout the project and the appearance and quality of finishes of the affordable units will be directly comparable to the market rate apartment units that are also being developed within the property.

Based on the foregoing and in accordance with the MOA, all of the fifty-six (56) affordable rental units in the proposed project will qualify for placement on the Town of Nantucket's Subsidized Housing Inventory List (the "SHI List") which is administered by the Commonwealth of Massachusetts Department of Housing and Community Development and is the official data base that determines whether the Town has met the provision of the statutory minimum of ten percent (10%) of its overall year round housing stock being rented or sold as qualifying affordable units which determines whether the Town is subject to development from so called "Chapter 40B" housing projects. The affordable units to be provided in the proposed project, which will be maintained as affordable in perpetuity, will significantly increase the Town's inventory of affordable units in its attempts to meet this objective.

The proposed project is also subject to compliance with the applicable intensity and dimensional criteria set forth in Section 139-16 of the Town of Nantucket Zoning Bylaw (including but not limited to minimum lot size, frontage, yard setbacks, ground cover ratio, and (lot) regularity factor, as modified by the site flexibility standards that are set forth in Section 139(8)(D) of the Town of Nantucket Zoning Bylaw for workforce rental community, which the proposed project is qualified for,

Because it is subject to issuance of a workforce rental community special permit, as specified in Section 139-8(D)(1)(a)[3] of the Town of Nantucket Zoning Bylaw, the proposed subject is subject to major site plan review (MSPR) by the Planning Board (as set forth in Section 139-23, and specifically Section 139-23(B)(2) of the Town of Nantucket Zoning Bylaw).

We appreciate the opportunity to submit the application, plans, and supporting materials for this important development proposal for your review and for consideration by the Planning Board and we look forward to commencing with the public hearing and public review process.

If you have any immediate questions with respect to the proposed project or any of the submittal materials, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,



David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc.
On Behalf of Richmond Great Point Development LLC

Cc: Philip Pastan, TRC
Kathryn Fossa, TRC
Patricia Roggeveen, RGPDLLC
Shane Valero, RGPDLLC
Andrew Burek, Esq., RGPDLLC
Arthur Reade Jr., Esq., RGH
John Ogren, Hayes Engineering



*The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900*

June 13, 2016

TOWN OF NANTUCKET
TOWN CLERK
16 Broad Street
Nantucket, Massachusetts 02554

Attention: Catherine Flanagan Stover, MMC, CMMC

Subject: Submittal of Application for Special Permit (Workforce Rental Community)
Richmond Great Point Development LLC (Owner / Developer)
"Meadows II" Multi-Family Workforce Rental Community Development

Dear Mrs. Stover:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to document submittal of the completed application to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the issuance of a special permit to allow for the development of the "Meadows II" workforce rental community development, comprised of two hundred and twenty-five (225) rental apartment units on a combination of two (2) properties totaling +/- 17.2 acres of land located at 20 Davkim Lane and 20 (R) Davkim Lane.

The submittal of the application to your office is being completed as prescribed in Section 139-30(B)(1) of the Town of Nantucket Zoning Bylaw.

Upon your acknowledgment of receipt of the application (by way of time / date stamping the application), we will proceed to file a copy of the application (and all other required materials) forthwith to the Town of Nantucket Planning Board to obtain its review and subsequent action (as prescribed in Section 139-30(B)(2) of the Town of Nantucket Zoning Bylaw.

Should you have any questions with respect to the application and submittal, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,

A handwritten signature in black ink, appearing to read 'David J. Armanetti', written in a cursive style.

David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc.
On Behalf of Richmond Great Point Development LLC

Cc: Andrew Burek, Esq., TRC
Arthur Reade, Jr., Esq., RGH



DEVELOPMENT SUMMARY	
SINGLE FAMILY	
	PROPOSED
UNIT COUNT	100
TYPE 'A'	26
TYPE 'B'	58
TYPE 'C'	16
ROADWAY	4760 LN. FT.
MULTI FAMILY	
	PROPOSED
BUILDINGS	38
PARKING SPACES	416
RATIO	10.94 / BLDG
ROADWAY	2895 LN. FT.
ROADWAY - PARKING	2860 LN. FT.
LINEAR RETAIL	
	PROPOSED
BUILDING SQ. FT.	15,505
PARKING SPACES	89
RATIO	51/1000



- PLAN NOTES**
- THIS PLAN HAS BEEN PREPARED BASED ON REFERENCES INCLUDING:
 - GOOGLE EARTH AERIAL IMAGERY
 - MASSGIS ORTHOMAGERY
 - CAD FILE TITLED "TOPD-P11.DWG" PREPARED BY HAYES ENGINEERING AND PROVIDED BY RICHMOND GREAT POINT DEVELOPMENT, LLC
 - TOWN OF NANTUCKET GIS
 - EXACT LOCATION OF PROPOSED BUILDING AND IMPROVEMENTS MUST BE CONFIRMED AND EVALUATED UPON COMPLETION OF SURVEY.
 - THIS PLAN IS INTENDED FOR CONCEPTUAL REVIEW PURPOSES ONLY. THE EXISTING CONDITIONS SHOWN HEREON IS BASED UPON INFORMATION THAT WAS SUPPLIED TO OUR OFFICE AT THE TIME OF PLAN PREPARATION AND MAY BE SUBJECT TO CHANGE AND MUST BE UPDATED UPON PERFORMANCE OF A SURVEY.

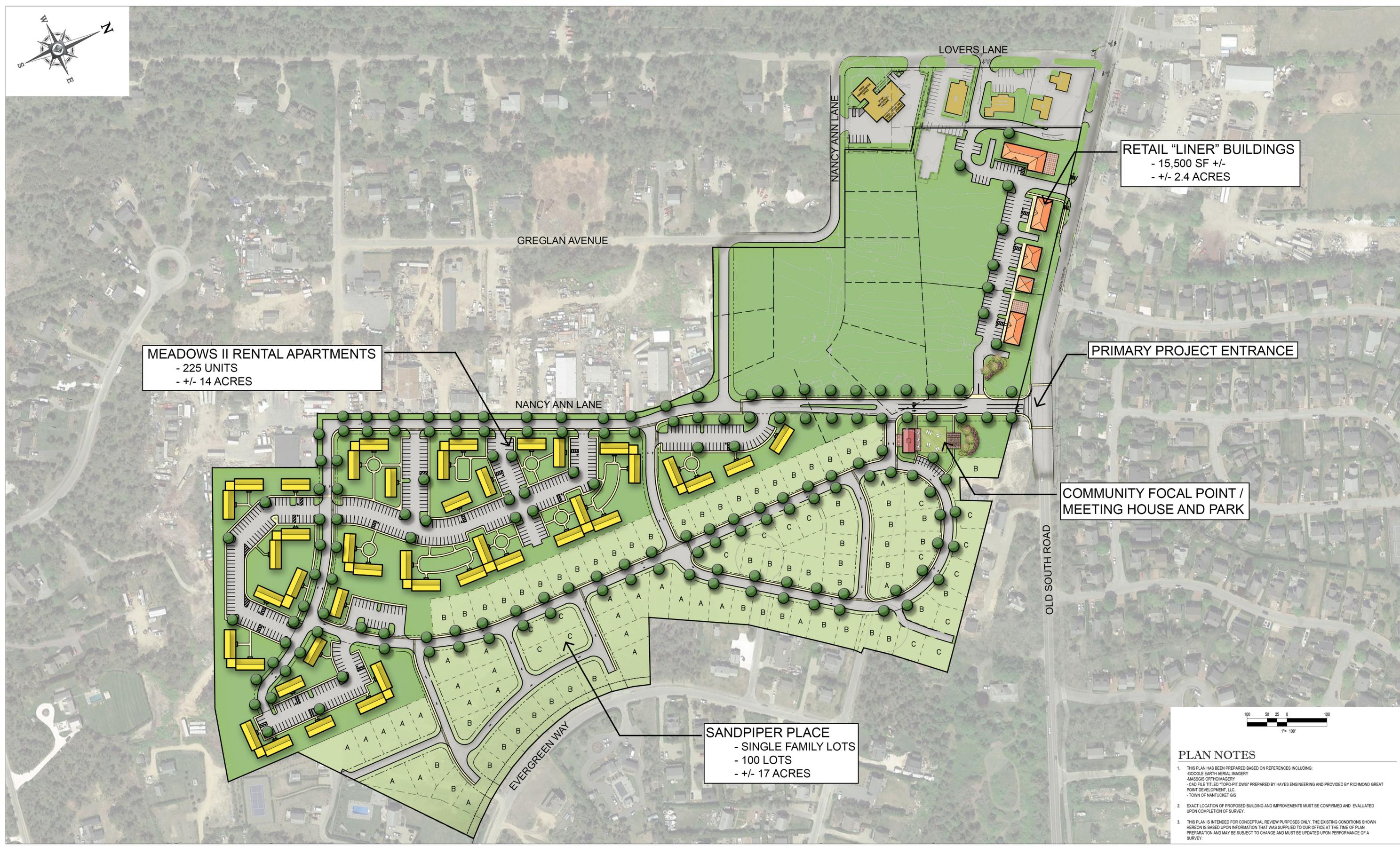
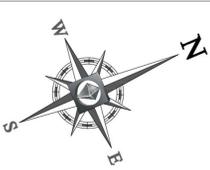
RICHMOND GREAT POINT DEVELOPMENT LLC
OLD SOUTH ROAD PROPERTIES
 NANTUCKET, MA

MASTER PLAN

SCALE: 1"=100'
 DATE: 06/16/2016
 PROJECT: W141196

REFERENCES:





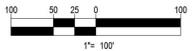
MEADOWS II RENTAL APARTMENTS
 - 225 UNITS
 - +/- 14 ACRES

RETAIL "LINER" BUILDINGS
 - 15,500 SF +/-
 - +/- 2.4 ACRES

PRIMARY PROJECT ENTRANCE

**COMMUNITY FOCAL POINT /
MEETING HOUSE AND PARK**

SANDPIPER PLACE
 - SINGLE FAMILY LOTS
 - 100 LOTS
 - +/- 17 ACRES



PLAN NOTES

1. THIS PLAN HAS BEEN PREPARED BASED ON REFERENCES INCLUDING:
 - GOOGLE EARTH AERIAL IMAGERY
 - MASSGIS ORTHOMAGERY
 - CAD FILE TITLED "TOPO-PIT.DWG" PREPARED BY HAYES ENGINEERING AND PROVIDED BY RICHMOND GREAT POINT DEVELOPMENT, LLC
 - TOWN OF NANTUCKET GIS
2. EXACT LOCATION OF PROPOSED BUILDING AND IMPROVEMENTS MUST BE CONFIRMED AND EVALUATED UPON COMPLETION OF SURVEY.
3. THIS PLAN IS INTENDED FOR CONCEPTUAL REVIEW PURPOSES ONLY. THE EXISTING CONDITIONS SHOWN HEREON IS BASED UPON INFORMATION THAT WAS SUPPLIED TO OUR OFFICE AT THE TIME OF PLAN PREPARATION AND MAY BE SUBJECT TO CHANGE AND MUST BE UPDATED UPON PERFORMANCE OF A SURVEY.

RICHMOND GREAT POINT DEVELOPMENT LLC
OLD SOUTH ROAD PROPERTIES
 NANTUCKET, MA

MASTER PLAN
 SCALE: 1"=100'
 DATE: 06/10/2016
 PROJECT #: W141196

REFERENCES:





The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

June 30, 2016

TOWN OF NANTUCKET
PLANNING BOARD
2 Fairgrounds Road
Nantucket, Massachusetts 02554

Attention: Leslie Woodson Snell, AICP, LEED AP, Deputy Director of Planning

Subject: Transmittal of Copy of Housing Initiatives "Memorandum of Agreement" (MOA)
Town of Nantucket Board of Selectmen and Richmond Great Point Development LLC

Dear Ms. Snell:

As part of the presentation that we will be making as the development manager on behalf of the applicant (Richmond Great Point Development LLC) on the two special permit applications that will be subject to consideration at the July 11, 2016 meeting of the Planning Board (the "Meadows II" Workforce Rental Housing Community and the "Sandpiper Place" Workforce Homeownership Housing) we intend to provide a summary of the status and the major provisions of the "Memorandum of Agreement" dated November 9, 2015 by and between the Town of Nantucket, by and through its Board of Selectmen, and Richmond Great Point Development LLC, as relates to these two major housing initiatives.

Accordingly, we have attached / submitted a PDF copy of the document herein and respectfully request that copies be provided to the respective members of the Planning Board in their agenda / meeting package for the July 11, 2016 meeting.

Should you have any questions with respect to the enclosed document or our request to provide copies to the members of the Planning Board, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,

David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc.
On Behalf of Richmond Great Point Development LLC

Cc: Patty Roggeveen, RGPDLLC
Andrew Burek, Esq., RGPDLLC
Arthur Reade, Jr., Esq., RGH

**2015 RICHMOND GREAT POINT DEVELOPMENT, LLC/TOWN OF NANTUCKET
MEMORANDUM OF AGREEMENT**

This Agreement (“Agreement”) is entered into by and between Richmond Great Point Development, LLC, a Delaware limited liability company, with a usual place of business at 23 Concord Street, Wilmington, MA 01887 and its successors in interest (“Richmond”), and the Town of Nantucket, a municipal corporation organized under the laws of the Commonwealth of Massachusetts, with a usual place of business at 16 Broad Street, Nantucket, MA (“Town”), acting by and through its duly elected Board of Selectmen (“Board of Selectmen”). Richmond, the Town and Board of Selectmen are collectively referred to herein as the “Parties.”

WHEREAS, the Town has not yet achieved and seeks to achieve the goal of having ten percent affordable housing placed on the Subsidized Housing Inventory Lists (“SHI List”) as such is inventoried by the Commonwealth of Massachusetts Department of Housing and Community Development (“DHCD”) as defined under the affordable housing statute and regulations, respectively, G.L. c.40B, §§20-23 and 760 CMR 56.00;

WHEREAS, the Town has 4,896 Year Round Housing units, based upon the 2010 Census;

WHEREAS, the Town, as of December 2014, has 121 units on the SHI List equal to the ratio of 2.5% affordable housing based upon its total year round housing inventory based upon the 2010 Census.

WHEREAS, the Town needs a total of 490 SHI Units to achieve 10 percent SHI affordable housing ratio, or a total of 369 additional SHI Units.

WHEREAS, Richmond is the fee owner of property in Nantucket, Massachusetts that is shown on the attached exhibits (Exhibits A and B), which depict land fronting on Nancy Ann Lane, Old South Lane, Mayflower Circle, Daffodil Lane, Evergreen Way and on both sides of Davkim Lane (the “Property”), which includes, the following parcels:

- Properties known as the entirety of 30, 32, 34 and 35 Daffodil Lane, the entirety of 3, 4, 5, 7, 8, 9 and 10 Mayflower Circle, the entirety of 75(A) Old South Road, the entirety of 73 Old South Road and the Mayflower Circle right of way and Daffodil Lane right of way, containing approximately 9 or more acres, being, at least in part, the entirety of Lots 615, 618, 621, 622, 623, 624, 625, 628, 629, 630, 631 and Lot 663 shown on Land Court Plan 16514-40, the entirety of Lot 858 shown on Land Court Plan 16514-100 and a portion of Lot 47 shown on Land Court Plan 16514-G, all as filed and recorded with the Nantucket Registry District of the Land Court and as shown on Exhibit C attached hereto and shown as the “Proposed 40B Homeownership Project (100 Single Family Homes) on Exhibit B and as the land owned by Richmond on Exhibit A;
- 20 Davkim Lane (Southern Portion) and 20 Davkim Land (Rear), containing approximately 12 or more acres, being Lots 184 and 206 shown on Land Court Plan

16514-Z and 16514-, as filed and recorded at the Nantucket Registry District of the Land Court and as shown on Exhibit D attached hereto and shown as the property “Being developed as a 40B Rental Project (150 Rental Units) on Exhibit B;

- Properties known as the entirety of 6 Mayflower Circle, 24 Evergreen Way, 26 Evergreen, 28 Evergreen Way and 30 Evergreen Way; and
- Properties that are shown on the areas shaded in gray on Exhibit A that are not already specified above. (Collectively, the above parcels and properties are referred to as the “Property”.)

WHEREAS, Richmond seeks to develop the Property for multi-family rental housing and single family home ownership, with an affordability component that is defined and guaranteed as provided for hereunder.

WHEREAS, Richmond has submitted applications to MassHousing for Project Eligibility Letters for two proposed 40B projects for a portion of the Property , which would create a total of 200 residential units, with 150 rental units and 50 home ownership units;

WHEREAS, Richmond intends to develop the entire Property with a total of 325 units (225 rental units and 100 ownership units);

WHEREAS, Richmond submitted two citizen petitions for the November 2015 Nantucket Special Town Meeting to: (1) rezone portions of the Property from Residential 20 (R-20) and Limited Use General 2 (LUG-2) to Residential 5 (R-5), and portions of the Property from Residential 20 (R-20) to Commercial Neighborhood (CN); and (2) introduce density bonuses in exchange for provision of affordable workforce housing in the R-5 and CN zoning districts;

WHEREAS, Richmond has requested the November 2015 Nantucket Town Meeting to rezone the following specific parcels of land under Article 1 of the Town Meeting Warrant:

Map	Parcel	Number	Street
68	129 (a portion of)	73	Old South Road
68	999.2 (a portion of)	75A	Old South Road
68	739	30	Daffodil Lane
68	740	32	Daffodil Lane
68	741	34	Daffodil Lane
68	742	35	Daffodil Lane
68	736	3	Mayflower Circle
68	735	5	Mayflower Circle
68	729	4	Mayflower Circle
68	730	6	Mayflower Circle
68	734	7	Mayflower Circle
68	731	8	Mayflower Circle
68	733	9	Mayflower Circle

68	732	10	Mayflower Circle
68	57	20	Nancy Ann Lane
68	56.1	20R	Davkim Lane
68	711	24	Evergreen Way
68	712	26	Evergreen Way
68	713	28	Evergreen Way
68	714	30	Evergreen Way

WHEREAS, Richmond has requested the November 2015 Town Meeting to adopt zoning changes to rezone portions of the Property (Article 1) and to adopt zoning provisions to provide for density bonuses in exchange for provision of defined and guaranteed affordable housing (Article 2), so as to allow the development of 325 units (225 rental and 100 home ownership);

WHEREAS, the Planning Board voted unanimously to provide a favorable report to Town Meeting, regarding Article 1 and Article 2, with modifications (which are set forth in Exhibit E), provided a development agreement is signed by Richmond with the Town (by and through the Board of Selectmen) prior to the November 2015 Town Meeting;

WHEREAS, Richmond has agreed with the Planning Board’s modifications to Article 1 and 2, which are attached hereto as Exhibit E;

WHEREAS, if Richmond designs and obtains all necessary approvals to construct and in fact constructs the 325 Units, including 225 rental Units that would all be SHI eligible under the Local Action Unit program maintained by DHCD and the 7 home ownership units that would be SHI eligible under the Local Action Unit program and 18 homeownership units that would be permanently restricted as affordable at 175% of Area Median Income (“AMI”), the Town would make significant progress toward achieving the necessary SHI Units to achieve the goal of provision of not less than a ten percent affordable housing ratio and toward providing significant additional affordable housing for Nantucket.

WHEREAS, to accomplish the above goals, Richmond is committed to designing, obtaining approval for, constructing and maintaining an affordable rental and home ownership housing project at the Property with the density and affordability and mitigation set forth below;

WHEREAS, the Board of Selectmen has supported the appropriateness of the Richmond site for issuance of Project Eligibility Letters, in comments made to Mass Housing, subject to stated concerns;

NOW THEREFORE, based upon good and valuable consideration, the receipt and value of which is hereby expressly and specifically acknowledged by the Parties, agree as follows:

I. Richmond's Undertakings

1. Richmond agrees, if Articles 1 and 2, as modified by the Planning Board and attached hereto as Exhibits A and B are adopted at the November 2015 Town Meeting, without substantive amendments, and go on to take final effect, final effect being defined as the adoption of said Articles, proper filing with the Secretary of the Commonwealth of Massachusetts and the expiration of any procedural or substantive challenge of the Office of the Attorney General, collectively referred to as perfection under MGL c. 40, §32, then Richmond shall design and then seek all necessary approvals to build and then shall build up to a total of 325 Units at the Property (up to a total of 225 rental apartments and up to a total of 100 single-family home ownership units). At least twenty-five (25%) percent of all units at the Property shall have a permanent affordability component and shall be restricted to being rented or sold as affordable Units and maintaining SHI eligibility as specified herein. A sufficient percentage of the rental units shall be restricted as affordable, so that all of the rental units shall be SHI eligible. All of the affordable rental units shall be restricted to occupancy by tenants (households) earning at or below eighty (80%) percent of the Area Median Income (“AMI”) at the maximum monthly rents prescribed for this income category under DHCD’s Guidelines and 760 CMR 56.00 or under the Zoning Bylaw, or Under MGL c. 40R. At least twenty-five percent of the homeownership units shall have a permanent affordability restriction. Not less than seventy-five (75%) percent of the affordable home ownership units shall be restricted to purchase by Buyers (households) earning at or below eighty (80%) of the AMI and shall be sold at the maximum initial sales prices prescribed for this income category under DHCD’s Guidelines and 760 CMR 56.00 or under the Zoning Bylaw, or under MGL c. 40R. Accordingly, not less than seventy-five (75%) of the affordable homeownership units shall be SHI eligible, with the remaining twenty-five (25%) percent restricted to being sold to Buyers (households) earning at or below one hundred seventy-five (175%) percent of AMI at the maximum initial sales prices prescribed for this income category under DHCD’s Guidelines and 760 CMR 56.00 or under the Zoning Bylaw, or under MGL c. 40R. For the purposes of this paragraph and as it pertains to amendments of Article 1 and Article 2 rendering them, in any way, different than as attached hereto, Richmond hereby expressly agrees that it shall state its position at Town Meeting as to each amendment, if any amendment is offered, as to whether Richmond asserts the proposed amendment is substantive and shall be bound by its stated position that an amendment is not substantive, and Articles 1 and 2, as modified and not substantively amended. Richmond shall so restrict those units and shall use all commercially reasonable efforts to comply with any requirement that is within its control that is required under DHCD’s Guidelines to make all of the up to 225 rental units SHI eligible and to make twenty-five (25%) percent of the affordable homeownership Units SHI eligible and shall cooperate with any requirement that the Town needs to undertake to render those units SHI eligible.

2. Richmond agrees that there shall be a maximum of up to 325 Units (including increments of up to 225 rental and up to 100 ownership), with a maximum of 700 bedrooms at the Property, the mix and allocation of which shall be within Richmond's sole and absolute discretion, subject to the review of the Nantucket Planning Board and the requirement that the bedroom mix for any affordable unit, including those "locally affordable" home ownership units to be restricted to sales to Buyers whose households earn at a maximum one hundred seventy-five (175%) percent of AMI, shall be the same bedroom mix as the bedroom mix used for the market rate units and the restricted units shall not be distinguishable from the non-restricted units as provided for under any requirement of DHCD.
3. Richmond agrees it shall as soon as reasonably practicable apply for and diligently pursue all necessary approvals for the first phase of the development of up to 325 units following the perfection of Articles 1 and 2, and then shall begin construction as phased below within ninety (90) calendar days of obtaining all necessary approvals required to construct the Project including the expiration of all applicable appeal periods, including but not limited to a Special Permit to be issued by the Town Planning Board, Major Site Plan approval to be issued by the Town Planning Board, endorsement of a definitive subdivision (or subdivisions) to be approved by the Town Planning Board and acceptance thereof for filing by Land Court for the District of Nantucket, certificates of appropriateness to be approved by the Town of Nantucket Historic District Commission, and building permits to be issued by the Town of Nantucket Building Commissioner. For purposes of this Agreement, approvals shall be defined as the final issuance of all necessary approvals and the expiration of all applicable appeal periods thereto.
4. Upon the issuance of the necessary approvals as described above and the endorsement of the subdivision plan by the Planning Board, each of which no longer being subject to any applicable appeal, Richmond agrees all of the rental units shall be subject to a permanent deed restriction that shall be delivered to the Town and accepted and recorded before any building permit issues which shall require that all of the rental units shall remain rental units and shall not be converted to ownership units without the approval of Town Meeting to release the restriction and that the affordable rental units shall remain affordable units permanently unless released by Town Meeting. The leases to any renter of any affordable unit shall strictly prohibit subletting of the unit and this requirement prohibiting subletting of rental units shall be set forth in the permanent deed restriction and enforceable by the Town. There shall be no short term rental of any of the rental units. A short term rental shall mean a rental period with a duration of less than thirty (30) calendar days.
5. Upon the issuance of the final relief, including but not limited to a Special Permit to be issued by the Town Planning Board, Major Site Plan approval to be issued by the Town Planning Board, endorsement of a definitive subdivision (or subdivisions) to be approved

by the Town Planning Board and acceptance thereof for filing by Land Court for the District of Nantucket, certificates of appropriateness to be approved by the Town of Nantucket Historic District Commission, and building permits to be issued by the Town of Nantucket Building Commissioner each of which no longer being subject to any applicable appeal, Richmond agrees the affordable ownership units (both the twenty-five (25%) percent of affordable home ownership Units restricted at 80% AMI and the remaining seventy-five (75%) percent restricted at 175% AMI) shall be subject to a permanent deed restriction upon the terms contained in the preceding parenthetical that shall be delivered to the Town and accepted and recorded before any building permit issues for any of the 100 home ownership units, which shall not be released from the restriction without Town Meeting approval. There shall be no short term rentals of any of the home ownership units. Leases to any renter of any affordable home ownership unit shall strictly prohibit short term rentals. For the purposes of this section 5, short term rentals shall mean a rental period the duration of which is as much as or less than thirty (30) calendar days and each such home ownership unit shall contain a permanent deed restriction conforming to the terms of this Section 5 which shall be enforceable by the Town.

6. Richmond agrees that it and its successors in interest shall be bound by the new zoning provided for under Articles 1 and 2 of the November 2015 Town Meeting, should that zoning take final effect as provided for hereunder, and Richmond shall be bound by this agreement and its requirements and hereby surrenders and releases any zoning freeze and/or any and all other so-called grandfathering protections that might be otherwise available to Richmond and its successors for the Property under G.L.c.40A, §6 and to all lienholder and owners for the Property, other than Walter Glowacki, that exists or may exist when Articles 1 and 2 take final effect, provided Richmond makes no waiver, whether express or implied, to any future Zoning changes. Richmond represents that there are no lienholders of record or other owners of the Property, other than Richmond or Walter Glowacki.
7. Richmond shall provide the Board of Selectmen, Finance Committee and the relevant permit granting authority (either the Planning Board or Zoning Board of Appeals, in the case of a 40B application) with an expert Fiscal Impact Report and a Student Projection Report, regarding the total number of children projected to reside at the Project and the number of school aged children that are projected to reside at the Project and the report shall be provided to the Nantucket Public School District for informational and planning purposes during the permit granting process and the Student Projection Report shall be updated by Richmond when building permits issue for the first phase of the project and then, thereafter, each time that an additional 75 new units are sought.

Richmond shall provide the Planning Board and Board of Selectmen a detailed traffic report as required Section 139 of the Code of the Town of Nantucket, which contains updated traffic counts and an analysis of recommended mitigation measures.

8. Richmond agrees to reimburse the Town of Nantucket, within three business days of receipt of a bill for professional services rendered, itemized hourly of the legal costs to the Board of Selectmen pursuant to G.L. c. 44, §53A in order for the Town to pay for the services of Kopelman and Paige, P.C., as attorneys for the Town of Nantucket, including but not limited to professional services rendered in assisting with the costs of preparing this Agreement, attendance at Special Town Meeting and any other services or costs incidental or related thereto. In no event shall Richmond's obligation under this Section 8 require reimbursement to the Town of Nantucket in excess of Twelve Thousand and No/100 (\$12,000.00) Dollars. As a separate matter, Richmond agrees to reimburse the Town of Nantucket, within three business days of receipt of a bill to fund the Town's costs of conducting the November 2015 Special Town Meeting, relating to notice and publication and other costs.
9. Whether Richmond elects to pursue the 40B projects or a Special Permit as provided for under Article 1 and 2, Richmond shall not assert to any party, any permitting authority, agency or court that the payment of any of the improvements or costs concerning any required water and sewer connection fees, as set forth in the Nantucket Code or in any duly adopted regulation or fee schedule for the Town or the Wannacomet Water Company, which causes or contributes towards causing the development of part or all of the 325 units to be uneconomic whether under G.L. c.40B or 760 CMR 56.00, et seq. or otherwise, and only provided that all of the terms of this Agreement are satisfied, including that only reasonable infrastructure upgrades shall be required. The parties to this Agreement agree and acknowledge that the provision of this Section 9 shall apply only as it relates to the above referenced water and sewer connection fees and Richmond in no way is subject to a waiver of its rights to the same as relates to any other improvements, mitigation or other costs that may be allowable by any agency with competent jurisdiction including with specificity the Zoning Board of Appeals and/or the Housing Appeals Committee. Additionally, Richmond agrees that the water bills for the 225 apartments shall be administered by and paid by Richmond to the Wannacomet Water Company and that the Wannacomet Water Company shall not be required to send individual bills to 225 rental units occupants, with Richmond, in its sole discretion, to decide whether it wishes to have one water meter per apartment building or one water for each rental unit, but with Richmond to be responsible for the cost of administration and collection of the water payments and to pay the Wannacomet Water Company the full charges due and owed for each building, regardless of how each building is metered. Nothing contained herein shall be interpreted to restrict Richmond from further sub-metering such services with a third-party provider.

10. Richmond and/or its successors shall pay all applicable water and sewer fees at the time customarily collected by the Town, including, as appropriate, when the infrastructure is permitted to be installed, but the connection fees for lateral connections to the individual homeownership units shall be paid at the time that building permits are issued. The timing of payment of the fees and the amount of fees shall be the same as that for market rate developers and Richmond agrees not to challenge the fees in any fashion, either as to the validity of the fees as adopted or the amount of the fees as imposed for any of the up to 325 units.
11. Richmond shall provide, at its sole expense, all of the necessary sewer and water infrastructure to serve the 325 units at the Property and connect them to the municipal infrastructure and shall comply with all of the rules and regulations and bylaws regarding water and sewer infrastructure design and installation. Richmond shall provide sewer and water main upgrades, as reasonably required by any Town permitting agency with jurisdiction, after consultation with the Nantucket DPW, the Nantucket Water and Sewer Commission and Wannacomet Water Company. The Town and Richmond agree that any infrastructure which is required to be funded or installed by Richmond in conjunction with the development of the Property shall be sufficiently sized to avoid multiple mains being installed in the public way.
12. Richmond agrees to, upon reasonable written request, use commercially reasonable efforts to provide the information to the relevant permit granting authority as requested in and shall address all of the concerns raised by the Board of Selectmen in Board's PEL comment letters, which were previously provided to Richmond.
13. As the 325 units at the Property receive final approval from local permitting boards, Richmond shall seek building permits based on a phased plan that shall be compatible with and allow the Town to satisfy the Town's Housing Production Plan goals on a yearly basis, but this shall not be interpreted as curtailing the provision of the affordable units as quickly as Richmond can produce them.
14. Construction of the 325 units at the Property shall be completed in accordance with a phased agreement to be completed by the Parties in the future.
15. As noted above, Richmond shall use its best efforts to satisfy all of the requirements imposed by DHCD to allow all of the 225 rental units and 19 of the 100 home ownership units to be SHI eligible and shall cooperate with the provision of all information and documents and execution of all required documents and procedures necessary for that to occur.
16. Richmond shall cooperate with the Town and shall, upon reasonable written request within 30 days provide the Town Manager with all relevant information and material to support applications by the Town to DHCD to add the eligible units to the SHI.

17. Richmond shall pay all reasonable monitoring fees as provided for under DHCD's Guidelines and under any regulatory agreement, as applicable.
18. Richmond shall place a prohibition in each lease for each and every rental unit that strictly prohibits exterior storage of personal property, including but not limited to: inoperable vehicles of any type, including mopeds, boats, bicycles, motorcycles, junk, building materials. Operable mopeds, boats, bicycles, motorcycles shall be allowed to be stored in appropriate locations at the Property. Each lease shall also provide for a maximum of number of vehicles, so that the maximum number of available parking spaces is not exceeded and so that there shall be sufficient visitor spaces in accordance with a Special Permit issued by the Town of Nantucket Planning Board or any other final approval. There shall be sufficient snow storage areas provided and excess snow shall be removed from the site if the ways are narrowed to less than 18 feet of clear, paved width following snow events for two-way access ways. Richmond shall provide for 24hour/7 day per week property management, which may consist of off-site personnel who are available by telephone or e-mail to timely respond to issues, problems and emergencies.
19. Richmond shall provide as-built plans to the Town for the water and sewer main infrastructure within 90 days of completion of the infrastructure and shall provide the remaining as-built plans within six months of completion of the Project, unless the Project is phased, in which case as-built plans for each Phase shall be provided within six (6) months of completion of each Phase or as otherwise provided by the relevant permit granting authority and any Special Permit or other final approval.
20. Richmond agrees to execute a mutually satisfactory written agreement with Housing Nantucket, subject to the Town's reasonable satisfaction within 30 days after the necessary prerequisites have been met, to complete the intent of the land exchange with Housing Nantucket to the extent the same is consistent with the Release of Restriction and Right of Reverter approved by the Town filed with the Nantucket County District of the Land Court as Document Number 146007 on October 17, 2014.
21. Richmond agrees that this agreement shall bind it and its successors in interest and that a mutually satisfactory Notice of the MOA, with approval not to be unreasonably withheld, may be recorded or filed with the Land Court, as the case may be, against the Property by the Town.

II. Town's Undertakings

1. Upon request by Richmond, the Town Manager shall review and respond to any inquiry by Richmond regarding proposed changes to the Project and the Manager shall refer any change that she deems substantial to the Board of Selectmen for action under this Agreement for a determination as to whether the proposed change would or would not

cause the Selectmen to exercise its rights to cancel this Agreement as provided for hereunder.

2. The Board of Selectmen shall support a LAU/LIP application or a 40R warrant article at a future Town Meeting, provided that the final terms and conditions of the LAU/LIP application or the 40R warrant article shall be consistent with this agreement and the final details are negotiated and mutually agreed to by the parties, with agreement not to be unreasonably withheld.
3. The Board of Selectmen shall not withdraw its PEL comment letters to MassHousing.
4. The Board of Selectmen is willing to discuss any Local Action Unit, G.L.c.40R and LIP proposal with Richmond in the future to attempt to develop a memorandum of agreement that is mutually satisfactory.
5. The Town acknowledges and agrees that should any of the affordable housing units generated by the Project be placed on the SHI List and should the Town be availed of any of the so called "safe harbor" protections set forth in G.L. c.40B or 760 CMR 56.00, et seq., as long as this Agreement shall be valid and in full force and effect, that the Town, by and through the Board of Selectmen, shall support the waiver of and/or support as consistent with local needs at any Zoning Board of Appeals or Housing Appeals Committee hearing, any such "safe harbor" protections to deny any future applications filed or processed by Richmond under G.L. c.40B or 760 CMR 56.00, et seq., on any portion of the Property, or any other land contiguous to the Property and currently owned by Richmond and located in the Town of Nantucket. This waiver and agreement of support relates only to the use of any such "safe harbor" protections and does not prevent or preclude the Town from otherwise commenting upon, opposing, or appealing any other such future applications filed or processed by Richmond under G.L. c.40B or 760 CMR 56.00, et seq., under any other grounds. The parties acknowledge that this agreement does not bind the Zoning Board of Appeals.

III. Parties' Right to Cancellation

1. In the event that Articles 1 and 2 are not adopted at the 2015 Special Town Meeting, as recommended by the Planning Board and attached hereto without any substantial amendments that Richmond does not agree to at Town Meeting, in writing, then this Agreement shall be of no further effect and shall immediately and irrevocably terminate by its own terms upon no further condition, express or implied, and neither party to this Agreement shall have any further obligation to or recourse against the other as it relates to the entire subject matter of this Agreement.
2. If the final approvals for a project proposed by Richmond for the Property are (1) denied by a decision of the Zoning Board of Appeals on the grounds that the Town has achieved

the Statutory Minima as relates to the Town having met its Housing Unit Minimum, or so-called “Safe Harbor”, or (2) a Regulatory Agreement subsequently entered into by the parties under the LAU/LIP Program or a Comprehensive Permit subsequently issued to Richmond for the development of the Property under the LIP program:

- (a) decrease the number of total units or total bedrooms as agreed to above; and/or
- (b) increases the number of affordable units other than as agreed to above and, unless voluntarily agreed to by Richmond,

Then Richmond shall have the right for those reasons, in its unfettered discretion, to void this Agreement by providing written notice of the same to the Board of Selectmen within 30 days of the final approval becoming final or the receipt of a denial by the Zoning Board of Appeals and the Parties shall have no further recourse against one another and a release instrument upon timely receipt of the notice may be recorded.

3. If the final approvals for a project proposed by Richmond for the Property:

- (a) does not include the improvements and costs required by this Agreement;
- (b) increases the number of total units or total bedrooms other than as agreed to above; and/or
- (c) decreases the number of affordable units as provided for herein (including the non-SHI affordable units),

then Richmond and the Board of Selectmen agree that the Board shall have the right for those reasons, in its unfettered discretion, to compel Richmond to limit the density at the Property to no more than 266 residential units, as allowed under current zoning, except under a comprehensive permit which has issued and taken final effect, provided that the Board gives notice of the exercise of this right within 20 days of the issuance of any such final permission and its filing with the Town Clerk’s Office and receipt of written notice by Richmond of the issuance of the relief to the Board of Selectmen, deliverable to the Town Manager.

Notwithstanding the foregoing, the Parties to this Agreement agree and acknowledge that this Section 3 is in no way intended as a waiver or limitation of Richmond’s rights under MGL c. 40B to apply for and pursue a Chapter 40B project on any portion of the Property.

IV. Miscellaneous

- 1. Richmond acknowledges that this Agreement impacts the terms and condition of relief that a local permitting agency may grant, but that no local permitting agency is bound by this Agreement, and a Notice of Memorandum of Agreement shall be recorded against

the Property when Articles 1 and 2 take final effect and this Agreement shall bind Richmond and its successors in interest and assigns. Richmond has provided a letter that represents and warrants that there are no other owners or lienholders of record other than Richmond and Walter Glowacki.

2. Notwithstanding any of the terms and provisions of this Agreement, nothing herein shall prohibit or prevent Richmond from continuing to pursue its current housing applications filed under G.L. c.40B or 760 CMR 56.00, et seq., or shall prohibit or prevent Richmond from pursuing future housing applications filed under G.L. c.40B or 760 CMR 56.00, et seq., at any other locations within the Property, and /or at any other locations in the Town of Nantucket.
3. Any breach of this Agreement shall be enforceable by the Parties.
4. Any amendment to this Agreement shall occur only pursuant to a written amendment that is duly voted and authorized by the Parties and then duly executed by the Parties.
5. The Parties acknowledge they had advice of counsel before executing the Agreement.
6. A mutually satisfactory Notice of this Agreement, with agreement to the notice to not be unreasonably withheld, may be recorded by either party once Articles 1 and 2 take final effect under G.L. c.40, §32, but a discharge of the Notice shall be provided and recorded if the Agreement is cancelled as provided for hereunder.
7. This Agreement may be executed in any number of counterparts which together shall constitute one instrument. An electronic signature on this Agreement shall have the same effect as an original.
8. All notices and other communications required or permitted to be given under or by reason of this Agreement shall be in writing and may be delivered by electronic mail, facsimile, US mail or overnight mail. Notices, demands, and communications will, unless another address is specified in writing, be sent to the persons and at the addresses indicated below:

To: Board of Selectmen: Ilana M. Quirk, Esq.
 Kopelman and Paige, P.C.
 101 Arch Street
 Boston, MA 02110
 iquirk@k-plaw.com

with a copy to the Town Manager and Board of Selectmen Chairman

To: Richmond: Andrew D. Burek, Esq.
 The Richmond Company, Inc.
 23 Concord Street

Wilmington, MA 01887
aburek@richmondco.com

with a copy to :

Arthur Reade, Esq.
Reade, Gullicksen, Hanley & Gifford, LLC
6 Young's Way
Nantucket, MA 02554
air@readelaw.com

[END OF INSTRUMENT. SIGNATURE PAGE(S) TO FOLLOW]

IN WITNESS, the parties hereunto set their hands and fixed their seals as of November 9, 2015.

NANTUCKET BOARD OF SELECTMEN*

By:


Robert DeCosta, Chairman


Matthew Fee, Vice Chairman


Tobias Glidden, Member


Dawn E. Hill Holdgate, Member

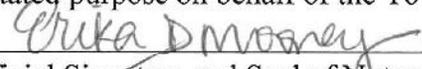

Rick Atherton, Member

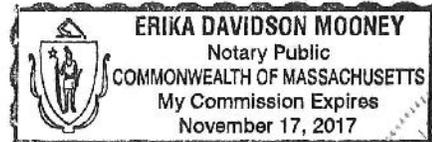
*Pursuant to a vote taken by the Board of Selectmen on November 9, 2015.

COMMONWEALTH OF MASSACHUSETTS

Nantucket, SS.

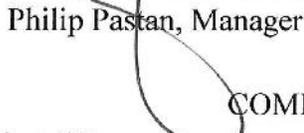
On this 9 day of November 2015, before me, the undersigned Notary Public, personally appeared Robert DeCosta, Chair of the Nantucket Board of Selectmen, as aforesaid, who proved to me through satisfactory evidence of identification, which was *personal knowledge*, to be the person whose name is signed on the preceding document, and acknowledged to me that he signed it voluntarily for its stated purpose on behalf of the Town of Nantucket.


(Official Signature and Seal of Notary)



Richmond Great Point Development, LLC

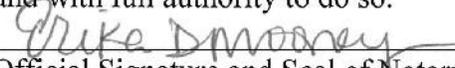
By:

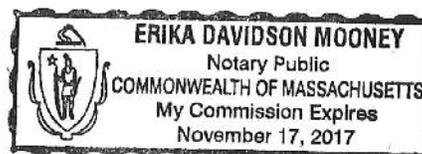

Philip Pastan, Manager

COMMONWEALTH OF MASSACHUSETTS

Nantucket, SS.

On this 9 day of NOV., 2015, before me, the undersigned Notary Public, personally appeared Philip Pastan, as Manager of Richmond Great Point Development, LLC, who proved to me through satisfactory evidence of identification, which was *personal knowledge*, to be the person whose name is signed above, and acknowledged he signed it voluntarily for its stated purpose on behalf of Richmond Great Point Development, LLC and with full authority to do so.


(Official Signature and Seal of Notary)



EXHIBITS:

Exhibit A Article 1 of November 9, 2015 Special Town Meeting

Exhibit B Article 2 of November 9, 2015 Special Town Meeting

535199/NANT40B/19729-0001

Exhibit A

ARTICLE 1

**(Zoning Map Change: R-20 to R-5 -- Daffodil Lane and Mayflower Circle;
LUG-2 to CN -- Davkim Lane; LUG-2 to R-5 -- Evergreen Way)**

To see if the Town will vote to amend the Zoning Map of the Town of Nantucket by taking the following actions:

1. By placing the following properties currently located in the Residential-20 (R-20) district in the Residential-5 (R-5) district:

Map	Lot	Number	Street
68	739	30	Daffodil Lane
68	740	32	Daffodil Lane
68	741	34	Daffodil Lane
68	742	35	Daffodil Lane
68	736	3	Mayflower Circle
68	729	4	Mayflower Circle
68	735	5	Mayflower Circle
68	730	6	Mayflower Circle
68	734	7	Mayflower Circle
68	731	8	Mayflower Circle
68	733	9	Mayflower Circle
68	732	10	Mayflower Circle
68	A Portion of Mayflower Circle, starting at a location formed by a line connecting the eastern property boundaries of the lots shown as 3 Mayflower Circle and 4 Mayflower Circle and extending in a westerly direction to include the bulb of the existing cul-de-sac of Mayflower Circle, being the westerly portion of Lot # 615 on Land Court Plan 16514-40.		
68	A Portion of Daffodil Lane, starting at a location formed by a line connecting the eastern property boundaries of the lots shown as 35 Daffodil Lane and 3 Mayflower Circle and extending in a westerly direction to include the bulb of the existing cul-de-sac of Daffodil Lane, being the westerly portion of Lot # 663 on Land Court Plan 16514-40.		

2. By placing the following property currently located in the Limited Use General-2 (LUG-2) district in the Commercial-Neighborhood (CN) district:

Map	Lot	Number	Street
68	56.1	20(R)	Davkim Lane

3. By placing the following properties currently located in the Limited Use General-2 (LUG-2) district in the Residential-5 (R-5) district:

Exhibit A

Map	Lot	Number	Street
68	711	24	Evergreen Way
68	712	26	Evergreen Way
68	713	28	Evergreen Way
68	714	30	Evergreen Way

All as shown on a map entitled “2015 Special Town Meeting Warrant Article __ R-20 to R-5: Daffodil Lane and Mayflower Circle: LUG-2 to CN –Davkim Lane: and LUG-2 to R-5: Evergreen Way” dated October 2015 and filed herewith at the Office of the Town Clerk.

Or to take any other action related thereto.

(Philip Pastan, et al)

PLANNING BOARD MOTION: Moved that the Zoning Map of the Town of Nantucket be amended by taking the following actions:

1. By placing the following properties currently located in the Residential-20 (R-20) district in the Residential-5 (R-5) district:

Map	Lot	Number	Street
68	739	30	Daffodil Lane
68	740	32	Daffodil Lane
68	741	34	Daffodil Lane
68	742	35	Daffodil Lane
68	736	3	Mayflower Circle
68	729	4	Mayflower Circle
68	735	5	Mayflower Circle
68	730	6	Mayflower Circle
68	734	7	Mayflower Circle
68	731	8	Mayflower Circle
68	733	9	Mayflower Circle
68	732	10	Mayflower Circle
68	<p>A Portion of Mayflower Circle, starting at a location formed by a line connecting the eastern property boundaries of the lots shown as 3 Mayflower Circle and 4 Mayflower Circle and extending in a westerly direction to include the bulb of the existing cul-de-sac of Mayflower Circle, being the westerly portion of Lot # 615 on Land Court Plan 16514-40.</p>		
68	<p>A Portion of Daffodil Lane, starting at a location formed by a line connecting the eastern property boundaries of the lots shown as 35 Daffodil Lane and 3 Mayflower Circle and extending in a westerly direction to include the bulb of the existing cul-de-sac of Daffodil Lane, being the westerly portion of Lot # 663 on Land Court Plan 16514-40.</p>		

Exhibit A

2. By placing the following property currently located in the Limited Use General-2 (LUG-2) district in the Commercial-Neighborhood (CN) district:

Map	Lot	Number	Street
68	56.1	20(R)	Davkim Lane

3. By placing the following properties currently located in the Limited Use General-2 (LUG-2) district in the Residential-5 (R-5) district:

Map	Lot	Number	Street
68	711	24	Evergreen Way
68	712	26	Evergreen Way
68	713	28	Evergreen Way
68	714	30	Evergreen Way

All as shown on a map entitled "2015 Special Town Meeting Warrant Article 1 R-20 to R-5: Daffodil Lane and Mayflower Circle: LUG-2 to CN –Davkim Lane: and LUG-2 to R-5: Evergreen Way" dated October 2015 and filed herewith at the Office of the Town Clerk.

PLANNING BOARD COMMENT: Articles 1 and 2 are companion articles. The motion printed in the Warrant is based upon passage of Article 2 as recommended by the Planning Board. The zoning changes proposed within this article were supported based upon the representation of Richmond Great Point Development, LLC ("RGP") that a Memorandum of Agreement followed by a Developer's Agreement would be executed between RGP and the Board of Selectmen ("BOS"). This binding agreement, if approved by the BOS, will require RGP to exercise the changes approved in Articles 1 and 2 as a package, and will not allow them to simply utilize the zoning map changes independently. The production of affordable housing is imperative to make progress toward the state mandated requirement of 10% of the year-round housing stock and implementation of the zoning provisions contained within Article 2 will provide for local control of the process.

FINANCE COMMITTEE COMMENT: To be provided at Town Meeting, pending review of the Memorandum of Agreement executed between the Board of Selectmen and Richmond Great Point Development, LLC.

Exhibit B

ARTICLE 2

(Zoning Bylaw Amendment: Workforce Housing)

To see if the Town will vote to amend the Code of the Town of Nantucket, Chapter 139 (Zoning), by taking the following actions:

1. Amend section 2 (definitions) to insert a new definition of “workforce housing” and to amend the existing definitions of “apartment building”, “affordable housing”, “apartment”, “eligible household”, “Nantucket Housing Needs Ownership Form”, to the extent necessary or required, and to insert any new definition or amend any existing definition to the extent necessary or required to implement the overall objectives of this article.
2. Amend section 7A (use chart) by inserting a new use(s) related to workforce housing dwelling units as necessary or required;
3. Insert a new section 8D, and/or to amend 8C, to provide new language, the purpose of which is as follows:
 - a. To incentivize the creation of workforce and affordable rental and ownership housing opportunities;
 - b. To promote consistency, quality, and flexibility in the site layout and design;
 - c. To mitigate traffic congestion by encouraging the creation of compact neighborhoods proximate to compatible adjacent commercial uses that reduce the need for vehicle trips to already congested areas, and;
 - d. To promote economic vitality and a greater diversity of housing opportunities in compliance with objectives contained within plans adopted or accepted by the Town of Nantucket, Nantucket Planning and Economic Development Commission, or the Nantucket Housing Authority.
4. Insert a new section 8D and/or amend 8C to provide new language for the allowance of density bonuses by the issuance of a special permit granted by the Planning Board, as follows:
 - a. To allow the aggregation of lots for apartment buildings for workforce housing at a density of 1 unit per 1,250 square feet of lot area in the CN district with a maximum of 20 dwelling units containing up to 40 bedrooms on a single lot;
 - b. To alter or remove the minimum lot size, frontage, setback(s), ground cover ratio, and regularity formula compliance as designated in section 16 for lots within the R-5 district.
 - c. To establish minimum “affordability” criteria, programmatic and design standards, including, but not limited to: establishing minimum percentages of units restricted based on income limits between 50% and 200% of the annual area median income, establishing the minimum duration of affordability

Exhibit B

restrictions, establishing interior and exterior features/finishes to marking rate units, requiring equal disbursement among market rate units.

5. To amend sections 16 (change 33 reference to 30) and 18 (specify apartment, apartment building, workforce housing apartment), 20 (screening waived where lots are in common ownership), 23 (exempt SF and duplex from site plan review), and any other section of the Bylaw implement the overall objectives of this article.

Or, to take any other action related thereto.

(Philip Pastan, et al)

PLANNING BOARD MOTION: Moved that Code of the Town of Nantucket, Chapter 139 (Zoning), be amended by taking the following actions:

1. Amend Section 2 (definitions) to insert two new definitions, of “workforce homeownership housing” and “workforce rental housing”, in alphabetical order with existing definitions, as follows:

WORKFORCE HOMEOWNERSHIP HOUSING

Ownership or rental of single family dwelling units, pursuant to §139-8D, where at least 25% of the total dwelling units are restricted to occupancy by households earning at or below the percentages of area median income set forth herein. An increment of 75% of the total 25% of the restricted units shall be restricted to occupancy by households earning at or below 80% of area median income. The remaining increment of 25% of the total 25% of the restricted units shall be restricted to occupancy by households earning at or below 175% of area median income.

WORKFORCE RENTAL HOUSING

Rental of multi-family dwelling units, pursuant to §139-8D, where at least 25% of the total dwelling units are restricted to occupancy by households earning at or below 80% of area median income.

2. Amend Section 7A (use chart) by inserting in the “Use” column, between “Duplex” and “Elder Housing Facilities” a new use “Workforce Rental Community” to be allowed by Special Permit (SP) in the CN district only.
3. Insert a new Section 8D as follows:

D. Special permit issued by the Planning Board to create workforce homeownership housing in the R-5 zoning district through a Workforce Homeownership Housing Bonus Lots allowance and in the CN zoning district through a Workforce Rental Community. The purpose of this provision is to incentivize the creation of workforce and affordable rental and ownership housing opportunities; to promote consistency, quality, and flexibility in the site layout and design; to mitigate traffic congestion by encouraging the creation of compact neighborhoods proximate to compatible adjacent commercial uses that reduce the need for vehicle trips to already congested areas, and; to promote economic vitality and a greater diversity of housing opportunities in compliance with objectives contained within plans adopted or accepted by the Town of Nantucket, Nantucket Planning and Economic

Exhibit B

Development Commission, or the Nantucket Housing Authority. This Bylaw, which sets a minimum size lot area, is intended to allow for aggregation of buildings, parking spaces, and open areas to improve design quality. Consistent design quality shall be applied to all dwelling units and affordable units shall be distributed evenly throughout the development.

(1) Requirements.

- a. The following requirements shall apply to Workforce Homeownership Housing Bonus Lots in the R-5 zoning district and to Workforce Housing Rental Community in the CN zoning district.
 - i. Minimum lot requirement of 60,000 square feet;
 - ii. The term of affordability shall be in perpetuity or the longest term allowed by law;
 - iii. The application shall be subject to Major Site Plan Review;
 - iv. The Planning Board shall be the sole special permit granting authority for any relief pursuant to any provision of this Chapter;
 - v. Planning Board approval of a special permit shall not substitute for approval of a definitive subdivision or approval not required (ANR) plan.
 - vi. Project must be eligible for approval as Local Action Units (LAU) through the Local Initiative Program (LIP) or otherwise included on the Town's Subsidized Housing Inventory. It shall be the responsibility of the applicant to take all reasonable steps necessary to ensure the units are included, including without limitation, preparation and execution of a Regulatory Agreement in a form to be approved by the Town of Nantucket, through its Board of Selectmen, and by the Department of Housing and Community Development ("DHCD") and provision of any other documents requested by DHCD.

(2) Workforce Homeownership Housing Bonus Lots.

- a. Bonus lots, subject to the requirements below, shall be based on the number of building lots which could have been created through a conventional subdivision plan. The maximum number of building lots, excluding any bonuses, shall not exceed the number which may have otherwise been created on a conventional subdivision plan meeting all dimensional and upland requirements of the Zoning Bylaw and in full conformance with (and requiring no waivers from) the "Rules and Regulations Governing the Subdivision of Land," as may be amended by the Planning Board from time to time, as demonstrated by the submission of a dimensioned lotting plan. For all density calculations that result in a fractional number, only fractions equal to or greater than 0.51 should be rounded to the next highest whole number.
 - i. The total number of lots shall be calculated by multiplying the number of lots allowed by-right, as described above, by a factor of 1.33.
 - ii. 25% of the total number of lots allowed, using the bonus provision, must be allocated and restricted to ownership by households earning at or below the area median income limits set forth in the definition of Workforce Homeownership Housing, as defined in §139-2, or, the rental dwelling units located on the lots achieved through the bonus provision must be restricted to households earning at or below 80% of area median income. Said lots shall be subject to a Nantucket

Exhibit B

Housing Needs Covenant -Ownership Form or other instrument restricting sale or rental to households earning at or below the area median income limits set forth in the definition of Workforce Homeownership Housing, as defined in §139-2.

- b. The Planning Board may reduce, by up to 100%: the front yard setback (but not the side or rear yard setbacks applied to the perimeter of the project area), internal side or rear yard setbacks (meaning setbacks between lots which are the subject of the application), side or rear yard setbacks between the lots which are the subject of the application and other land in common ownership or control of the applicant, and the required frontage, provided that the lot has sufficient vehicular access through an easement.
- c. The Planning Board may allow an increase in the ground cover ratio up to 50%.
- d. A minimum buffer area of at least 20 feet shall be established between the Workforce Homeownership Housing Bonus Lots and residentially zoned abutting properties. The Planning Board may require the buffer area to include plantings, fencing, walls, or other improvements to mitigate impacts to abutting properties.

(3) Workforce Rental Community

- a. Rental dwelling units in one or more structures, shall be subject to the following requirements:
 - i. The maximum number of dwelling units shall not exceed 32, at least 8 of which must (25% of which) be restricted to occupancy by households earning at or below 80% of area median income. An instrument, in a form approved by the Planning Board, restricting rental of at least 8 of the dwelling units to households earning at or below 80% of area median income must encumber the subject lot(s);
 - ii. The maximum number of bedrooms contained within the Workforce Rental Community Lot shall not exceed 57;
 - iii. At least 10% of the total dwelling units within the Workforce Housing Rental Community must contain at least 3 bedrooms, unless such requirement is reduced by a future binding directive from the Commonwealth of Massachusetts Department of Housing and Community Development which confirms that fewer than 10% three bedroom units may be included in the Workforce Rental Community while still confirming that all of the units in the Workforce Rental Community shall be eligible for inclusion on the Town's Subsidized Housing Inventory. In such an instance, the Planning Board shall have the discretion to approve fewer 3 bedroom units within the Workforce Rental Community, in conjunction with the issuance of the special permit, as long as the requirement described above with respect to confirmation of the eligibility of all of the units in the Workforce Rental Community relative to inclusion on the Town's Subsidized Housing Inventory has been met.
- b. A minimum buffer area of at least 20 feet shall be established between the Workforce Rental Community and residentially zoned abutting properties.

Exhibit B

The Planning Board may require the buffer area to include plantings, fencing, walls, or other improvements to mitigate impacts to abutting properties.

- c. The Planning Board may, in addition to those requirements included in §139-23, require submission of additional documentation, including without limitation, detailed floor plans, operation and management plan for the project, including maintenance of the structure(s) and the site.
 - d. The Planning Board may reduce, by up to 100%, the side and rear yard setbacks where two or more Workforce Rental Community Lot projects are adjacent to each other.
4. Amend Section 18B by adding an asterisk after “Apartment” and inserting the following language under the “Notes” section:

*For interpretation purposes, apartment shall include the following uses contained within the Use Table in §7A: apartment, apartment building, garage apartment, and workforce rental community.
 5. Amend Section 23A(1) as follows:

The construction or alteration of any single-family or duplex dwelling, or building accessory to such dwelling, except when such dwellings are an integral part of workforce homeownership housing bonus lots or a workforce rental community application pursuant to § 139-8 of this chapter, major commercial development application pursuant to § 139-11 of this chapter, and except where such dwellings are located in the Moorlands Management District, § 139-13 of this chapter;

6. Amend section 16A as follows:

Except as expressly provided by § 139-330 of this chapter...

PLANNING BOARD COMMENT: A locally based process for the creation of affordable/workforce housing units, as opposed to the 40B application process that is strictly controlled by the state, will become available if this zoning amendment is passed. Local regulations, including those regulations within the purview of the Historic District Commission, will guide the process for ownership and rental housing production.

FINANCE COMMITTEE COMMENT: To be provided at Town Meeting, pending review of the Memorandum of Agreement executed between the Board of Selectmen and Richmond Great Point Development, LLC.



HEALTH DEPARTMENT

AUG 04 2016

RECEIVED

2016 AUG -4 AM 10:44
NANTUCKET
TOWN CLERK

RECEIVED
AUG 04 2016
By _____

Nantucket Planning Board

Form B

Application for Approval of a Definitive Subdivision Plan (AR)

"Sandpiper Place" Single Family (Homeownership) Project

File one completed form with the Planning Board and one copy with the Town Clerk.

Date: _____ August 4, 2016 _____

To the Planning Board of Nantucket:

The undersigned, being the applicant as defined under Chapter 41, Section 81-L, for approval of a proposed subdivision shown on a plan ___ Definitive Subdivision Plan _____ designed by _ Green Seal Environmental, Inc., 114 State Road, Building B, Sagamore Beach MA 02562 ___ dated ___ August 3, 2016 __, and described as follows: located on _ Multiple Lots on Old South Road, Daffodil Lane, Mayflower Circle, and Evergreen Way (See "Attachment A" for List of Individual Parcels) _____, number of lots proposed _ One Hundred and Six (106), total acreage of tract __ +/- 16.3 Acres _____, hereby submits said plan as a **definitive** plan in accordance with the *Rules and Regulations Governing the Subdivision of Land* of the Nantucket Planning Board and makes application to the Board for approval of said plan.

(See "Attachment B" for List / Derivation of Title for Individual Parcels)

The undersigned's title to said land is derived from _____ by deed dated _____ and recorded in the Nantucket Registry of Deeds Book _____, Page _____, registered in the Nantucket Registry District of the Land Court, Certificate of Title # _____ and shown on Nantucket Assessor's Map # _____, Parcel _____, and said land is free of encumbrances except for the following: _____ (See "Attachment C" for List of Encumbrances)

Said plan has has not evolved from a preliminary plan submitted to the Board on _____ (date) and approved disapproved on _____ (date).

The undersigned hereby applies for the approval of said **definitive** plan by the Board, in belief that the plan conforms to the Board's *Rules and Regulations*.

Name(s) and address(es) of the Applicant(s):

(to include all the names and addresses of the principals of the owner entity such as principal officers of the corporation, trustees of a trust or partners of a partnership)

Philip Pastan, (Sole) Manager of Richmond Great Point Development LLC

Contact Phone #: (978) 988-3900 Fax #: (978) 988-3950 E-mail: ppastan@richmondco.com

Name of owner(s): Richmond Great Point Development LLC

Address of owner(s): 23 Concord Street, Wilmington MA 01887

I hereby certify that the applicant(s) listed above have been authorized by me to file a subdivision plan with the Planning Board on property that I own.

Owner's signature Philip Pastan, as Manager of Richmond Great Point Development LLC

(Handwritten signature and initials)
8/2/16

Received by Town Clerk: _____

Date: _____

Time: _____

Received by Board of Health: **HEALTH DEPARTMENT**

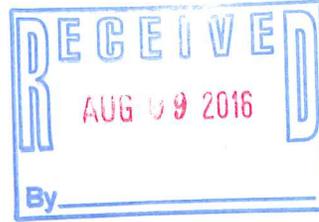
Date: AUG 04 2016

Time: **RECEIVED**

Planning Board File # _____

PLANNING BOARD

FILE # _____



August 3, 2016

The Richmond Company, Inc.
20 Davkim Lane
Nantucket, MA 02554

ATTN: Dave Armanetti, Director of Real Estate Development

RE: Meadows II Definitive Subdivision
Richmond Great Point Development
Nantucket, MA
Waiver List

Dave,

Pursuant to our recent discussions, Green Seal Environmental, Inc., (GSE) has prepared this letter to outline the waivers to be requested for the Meadows II definitive subdivision plans recently provided by this office.

The waiver list has been prepared using the “Rules and Regulations Governing the Subdivision of Land – Nantucket Island, Massachusetts” and “Article VI - Town of Nantucket – Sanitary Sewer Standards and Specifications” and the Nantucket Zoning Ordinance. The waivers to be requested are as follows:

Rules and Regulations Governing the Subdivision of Land – Nantucket Island, Massachusetts

- | | |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Section 2.06b(10) | The elevations depicted on the plans are NAVD 88 rather than the Nantucket half tide datum. |
| Section 2.06b(14)(a) | Existing trees to be preserved will be decided during construction. |
| Section 4.03e | Right-of-way rounding is not included on Road I at the intersection with Davkim Lane. |
| Section 4.06(b)(3) | Cultec MC-4500 Chambers and Cultec Recharger 330XL HD Chambers are to be substituted for the leaching basin depicted in Appendix A, Plate #12. |
| Section 4.13(b) | Sewage Design Flows have been determined using the Article VI - Town of Nantucket – Sanitary Sewer Standards and Specifications. A design flow of 110 gallons per day per bedroom has been used and the peak conversion factors in this document. |



- Section 4.16 Existing trees have not been located on this project. As significant cuts and fills are required as part of the re-grading required to reach finished grades, the location of existing trees is not warranted. See Sections 2.06b,(14)(a) above.
- Section 4.17 Fire Alarms are not proposed on this project
- Section 4.18 This section calls for 4 ft. wide brick or concrete sidewalks on both sides of the road along each way in a subdivision. We are proposing 5' wide asphalt sidewalk on one side only.
Plate No. 5 in Appendix A requires a 4-foot grass boarder between the sidewalk and traveled way. Grass strips are not proposed on this project.
- Section 4.19 Bicycle Paths are not proposed as shown on plate 11 in the project. We are proposing a 5' wide sidewalk to be used also as bike path.
- Section 4.20 Street Lights are not proposed on this project.

Article VI - Town of Nantucket – Sanitary Sewer Standards and Specifications

- Section 6.02.2 This section requires sewer mains in the roadway to be 7-8 feet in depth. In several locations, this depth is not met.

Please review the above information and contact this office with any questions or comments.

Thank you,

GREEN SEAL ENVIRONMENTAL, INC.

A handwritten signature in black ink, appearing to read "R. Bersin".

Robert L. Bersin, PE
Senior Engineer Project Manager

"ATTACHMENT A"
 LIST OF INDIVIDUAL PROPERTIES FOR PLANNING BOARD (FORM B) DEFINITIVE SUBDIVISION APPLICATION
 RICHMOND GREAT POINT DEVELOPMENT LLC
 "SANDPIPER PLACE" SINGLE FAMILY HOME OWNERSHIP DEVELOPMENT PROJECT

Index	Parcel Address	Assessor's Tax Map / Parcel ID		Land Court Plan Information	
		Map	Parcel	Plan Number	Lot
1	30 Daffodil Lane	68	739	16514-40	628
2	32 Daffodil Lane	68	740	16514-40	629
3	34 Daffodil Lane	68	741	16514-40	630
4	35 Daffodil Lane	68	742	16514-40	631
5	3 Mayflower Circle	68	736	16514-40	625
6	4 Mayflower Circle	68	729	16514-40	618
7	5 Mayflower Circle	68	735	16514-40	624
8	6 Mayflower Circle	68	730	16514-40	619
9	7 Mayflower Circle	68	734	16514-40	623
10	8 Mayflower Circle	68	731	16514-40	620
11	9 Mayflower Circle	68	733	16514-40	622
12	10 Mayflower Circle	68	732	16514-40	621
13	24 Evergreen Way	68	711	16514-16	431
14	26 Evergreen Way	68	712	16514-16	432
15	28 Evergreen Way	68	713	16514-16	433
16	30 Evergreen Way	68	714	16514-16	434
17	73 Old South Road	68	129	16514-97	853
18	75(A) Old South Road	68	999.2	16514-100	858
19	Private Way (Adjacent to 73 Old South Road)	n/a	n/a	16514-G	"40.00 Wide Way"
20	(Western Portion of) Daffodil Lane	n/a	n/a	16514-40	663
21	(Western Portion of) Mayflower Circle	n/a	n/a	16514-40	615

"ATTACHMENT B"
LIST OF INDIVIDUAL PROPERTIES FOR DERIVATION OF TITLE FOR (FORM B) DEFINITIVE SUBDIVISION APPLICATION
RICHMOND GREAT POINT DEVELOPMENT LLC
"SANDPIPER PLACE" SINGLE FAMILY HOME OWNERSHIP DEVELOPMENT PROJECT

Index	Parcel Address	Deed Recording Reference (Date, Book, Page)			Internal Reference in Deed	
		Date	Book	Page	Parcel Number	Page
1	30 Daffodil Lane	August 8, 2013	O1397	312	Fifty-Five	11
2	32 Daffodil Lane	August 8, 2013	O1397	312	Fifty-Six	11
3	34 Daffodil Lane	August 8, 2013	O1397	312	Fifty-Seven	11
4	35 Daffodil Lane	August 8, 2013	O1397	312	Fifty-Eight	11
5	3 Mayflower Circle	August 8, 2013	O1397	312	Fifty-Four	11
6	4 Mayflower Circle	August 8, 2013	O1397	312	Forty-Seven	9
7	5 Mayflower Circle	August 8, 2013	O1397	312	Fifty-Three	11
8	6 Mayflower Circle	August 8, 2013	O1397	312	Forty-Eight	10
9	7 Mayflower Circle	August 8, 2013	O1397	312	Fifty-Two	10
10	8 Mayflower Circle	August 8, 2013	O1397	312	Forty-Nine	10
11	9 Mayflower Circle	August 8, 2013	O1397	312	Fifty-One	10
12	10 Mayflower Circle	August 8, 2013	O1397	312	Fifty	10
13	24 Evergreen Way	August 8, 2013	O1397	312	Thirty-Seven	8
14	26 Evergreen Way	August 8, 2013	O1397	312	Thirty-Eight	8
15	28 Evergreen Way	August 8, 2013	O1397	312	Thirty-Nine	8
16	30 Evergreen Way	August 8, 2013	O1397	312	Forty	8
17	73 Old South Road	August 8, 2013	O1397	312	Forty-Three	9
18	75(A) Old South Road	February 6, 2015		Document # 00147075	n/a	n/a
19	Private Way (Adjacent to 73 Old South Road)	n/a	n/a	n/a	n/a	n/a
20	(Western Portion of) Daffodil Lane	August 8, 2013	O1397	312	Sixty-Three	12
21	(Western Portion of) Mayflower Circle	August 8, 2013	O1397	312	Sixty-Five	13

“Attachment C” to
(Form B) Definitive Subdivision Application

“Sandpiper Place” Single Family Homeownership Project
Multiple Properties Off Old South Road, Nancy Ann Lane, Daffodil Lane, Mayflower Circle, and
Evergreen Way

ADDITIONAL SPACE NEEDED TO PROVIDE LIST OF ENCUMBRANCES UPON THE PROPERTIES

30, 32, 34 & 35 Daffodil Lane, 3, 4, 5, 6, 7, 8, 9 & 10 Mayflower Circle

1. First Mortgage and Assignment of Leases and Rents from Richmond Great Point Development LLC to WJG Sales, LLC dated August 7, 2013 and recorded on August 8, 2013 in Book 1398, Page 1 and filed as Document No. 141847 at the Nantucket Registry District of the Land Court.
2. Covenant with the Nantucket Planning Board dated May 8, 2000, registered as Document No. 91590 at the Nantucket Registry District of the Land Court, as affected by Form J Release dated September 11, 2000, registered as Document No. 91622 at the Nantucket Registry District of the Land Court; as further affected by Form J Release dated January 5, 2004, registered as Document No. 106401 at the Nantucket Registry District of the Land Court; and as further affected by Form J Release dated July 22, 2008, registered as Document No. 133314 at the Nantucket Registry District of the Land Court.
3. Provisions of the Declaration of Trust of Cedar Crest III Homeowner’s Association Trust, dated May 10, 2000, registered as Document No. 91663 at the Nantucket Registry District of the Land Court.
4. Provisions of a Declaration of Restrictions and Easements dated July 24, 2000, registered as Document No. 91664 at the Nantucket Registry District of the Land Court, as affected by Grant of Right of Enforcement of Restrictions to the Nantucket Planning Board dated July 24, 2000, registered as Document No. 91665 at the Nantucket Registry District of the Land Court, and as further affected by a Modification dated May 7, 2001, registered as Document No. 93108 at the Nantucket Registry District of the Land Court.
5. Statement of Conditions of Subdivision Approval dated June 24, 2000, registered as Document No. 91666 at the Nantucket Registry District of the Land Court.
6. Grant of Easement to Nantucket Electric Company dated March 21, 2001, registered as Document No. 92622 at the Nantucket Registry District of the Land Court.
7. Grant of Easement to the Town of Nantucket, acting through its Board of Water Commissioners, dated April 23, 2001, registered as Document No. 92623 at the Nantucket Registry District of the Land Court.
8. Grant of Easement to Verizon New England Inc. dated April 25, 2001, registered as Document No. 92835 at the Nantucket Registry District of the Land Court.

9. Grant of Easement to MediaOne of Massachusetts, Inc. dated May 1, 2001, registered as Document No. 92966 at the Nantucket Registry District of the Land Court.

10. Grant of Easement to Nantucket Electric Company dated February 3, 2004, registered as Document No. 160385 at the Nantucket Registry District of the Land Court.

24, 28 & 30 Evergreen Way

1. First Mortgage and Assignment of Leases and Rents from Richmond Great Point Development LLC to WJG Sales, LLC dated August 7, 2013 and recorded on August 8, 2013 in Book 1398, Page 1 and filed as Document No. 141847 at the Nantucket Registry District of the Land Court.

2. Covenant with the Nantucket Planning Board dated August 24, 1989, registered as Document No. 47337 at the Nantucket Registry District of the Land Court; as may be affected by Form J Release dated November 23, 1992, registered as Document No. 61565 at the Nantucket Registry District of the Land Court; and as may be further affected by Form J Release dated June 27, 1994, registered as Document No. 65885 at the Nantucket Registry District of the Land Court.

3. Grant of Easement to Nantucket Electric Company dated December 30, 1991, registered as Document No. 56338 at the Nantucket Registry District of the Land Court.

4. Provisions of the Declaration of Cedar Crest I Homeowners Association Trust, dated March 10, 1994 registered as Document No. 64060 at the Nantucket Registry District of the Land Court.

5. Provisions of a Restrictive Covenant dated February 26, 1994, registered as Document No. 64062 at the Nantucket Registry District of the Land Court.

26 Evergreen Way

1. First Mortgage and Assignment of Leases and Rents from Richmond Great Point Development LLC to WJG Sales, LLC dated August 7, 2013 and recorded on August 8, 2013 in Book 1398, Page 1 and filed as Document No. 141847 at the Nantucket Registry District of the Land Court.

2. Covenant with the Nantucket Planning Board dated August 24, 1989, registered as Document No. 47337 at the Nantucket Registry District of the Land Court; as may be affected by Form J Release dated November 23, 1992, registered as Document No. 61565 at the Nantucket Registry District of the Land Court; and as may be further affected by Form J Release dated June 27, 1994, registered as Document No. 65885 at the Nantucket Registry District of the Land Court.

3. Grant of Easement to Nantucket Electric Company dated December 30, 1991, registered as Document No. 56338 at the Nantucket Registry District of the Land Court.

4. Provisions of the Declaration of Cedar Crest I Homeowners Association Trust, dated March 10, 1994 registered as Document No. 64060 at the Nantucket Registry District of the Land Court.

5. Provisions of a Restrictive Covenant dated February 26, 1994, registered as Document No. 64062 at the Nantucket Registry District of the Land Court.

6. Notice of Frontage Reduction dated March 10, 1993, registered as Document No. 64172 at the Nantucket Registry District of the Land Court.

73 Old South Road

1. First Mortgage and Assignment of Leases and Rents from Richmond Great Point Development LLC to WJG Sales, LLC dated August 7, 2013 and recorded on August 8, 2013 in Book 1398, Page 1 and filed as Document No. 141847 at the Nantucket Registry District of the Land Court.

2. Order of Taking by the County of Nantucket for the layout of Old South Road as a public highway, dated October 29, 1975, registered as Document No. 16561 at the Nantucket Registry District of the Land Court.

75A Old South Road

1. First Mortgage and Assignment of Leases and Rents from Richmond Great Point Development LLC to WJG Sales, LLC dated August 7, 2013 and recorded on August 8, 2013 in Book 1398, Page 1 and filed as Document No. 141847 at the Nantucket Registry District of the Land Court.

2. Order of Layout dated July 23, 2008, registered as Document No. 124811 at the Nantucket Registry District of the Land Court.

3. Easement in favor of Nantucket Electric Co., dated December 18, 2013, registered as Document No. 143696 at the Nantucket Registry District of the Land Court.

4. Release of right of reverter by instrument dated October 17, 2014 and registered as Document No. 146007 at the Nantucket Registry District of the Land Court.

END OF TEXT



*The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900*

August 4, 2016

TOWN OF NANTUCKET
PLANNING BOARD
2 Fairgrounds Road
Nantucket, Massachusetts 02554

Attention: Leslie Woodson Snell, AICP, LEED AP, Deputy Director of Planning

Subject: Submittal of Application for Definitive Subdivision
Richmond Great Point Development LLC (Owner / Developer)
"Sandpiper Place" Single Family (Homeownership) Project

Dear Ms. Snell:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to submit the completed application (Form B) and associated materials (plans, storm water management report, deeds, etc.) to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the approval of a definitive subdivision of land to allow for the subdivision of the subject properties into a series of one hundred and six (106) proposed lots and a +/- 4,350 linear foot (0.82 mile) long system of roadway segments, comprising a total of +/- 16.3 acres of land, located on a series of twenty-one (21) existing parcels located off Old South Road, Nancy Ann Lane, Mayflower Circle, Daffodil Lane, and Evergreen Way (including portions of two road parcels [being the western portions and cul-de-sac bulbs of Daffodil Lane and Mayflower Circle] and a private way located off of Old South Road.

The subject property comprises a substantial portion of the eastern area of the portfolio that Richmond Great Point Development LLC acquired from Walter Glowacki in August of 2013, including a series of twelve (12) existing lots and portions of two road parcels within the Cedar Crest III residential subdivision, which would be re-subdivided as part of this proposal.

The proposed definitive subdivision correlates with and will serve to facilitate the implementation of the application for a special permit that was submitted to your office for review and consideration by the Planning Board, dated June 10, 2016, which, if approved, would provide for the use of the subject property as a single family (homeownership) workforce rental housing community. The subdivision is comprised of a combination of one (1) community / public use lot, three (3) open space lots, ninety-nine (99) buildable lots to be owned by Richmond Great Point Development LLC, and three (3) buildable lots to be owned by Housing Nantucket (resulting from the consummation of a pending land exchange with that entity).

Both this (definitive subdivision) application and the aforementioned (special permit) application have been submitted in response to and in conjunction with the workforce housing initiative zoning warrants (# 1 and # 2) that were overwhelmingly approved by local voters at the Nantucket Special Town Meeting held on November 9, 2015.

Definitive Subdivision Plan Submittal
"Sandpiper Place" Single Family (Homeownership) Project
August 4, 2016
Page Two

As you know, the overall objective of all of these above-described and interrelated applications is to provide for the development of a new, high quality single family (homeownership) housing community that will provide much needed single family homes to begin to mitigate the almost unanimously recognized and severe housing crisis that is extant in the community, including the provision of a twenty-five percent (25%) statutorily restricted affordable component. In addition to helping to meet this important housing need, which is primarily targeted to year round Island residents and families, approval of the proposed project will serve to assist the Town of Nantucket in obtaining both "interim" and "long-term" safe harbor, in accordance with the provisions of applicable state law, as relates to the Town's ability to discourage and / or deny Chapter 40B housing development proposals in the future.

The submittal is being made in accordance with and conforms to the provisions of Section 2.06 of "The Rules and Regulations Governing the Subdivision of Land, Nantucket, Massachusetts" as well as "The Subdivision Control Law of Massachusetts" (M.G.L. Chapter 41, Sections 81K-81GG, inclusive).

The current (underlying) zoning of the +/- 16.3 acre subject properties are classified entirely within the Residential-5 (R-5) zoning district.

As shown in the attached plans, the proposal seeks to subdivide the subject property into a series of one hundred and six (106) lots in accordance with the density and dimensional criteria set forth in Section 139-16(A) and (D) and Section 139-8(D) of the Town of Nantucket Zoning Bylaw.

It is noted that before the proposed subdivision can be fully implemented and registered, the existing (easement) rights of access and passage which have been granted to other owners and the association of the existing Cedar Crest III residential subdivision, comprising portions of the Daffodil Lane and Mayflower Circle road parcels that also comprise portions of the proposed subdivision, must be modified. The owner / applicant will continue to undertake this easement modification process as the proposed subdivision is reviewed and acted upon by the Planning Board.

The proposed roadway segments include combination sidewalks / bike paths, which are linked into the adjacent existing residential neighborhoods, as well as to the adjacent commercial, retail, and industrial development located on abutting properties that are predominantly owned and will be developed by Richmond Great Point Development LLC.

The site has also been configured with a network of drainage that meets or exceeds all applicable design requirements and is comprised of a series of underground infiltration basins that will recharge runoff back into the ground water aquifer. The site is also proposed to be improved with appropriate (underground) utilities (including sanitary sewer, water, electrical, and telephone / cable / data infrastructure) along with street lighting and streetscape landscaping.

In addition to the completed (Form B) application, attached hereto, we have submitted the following plans and technical materials that are required to be submitted to provide for the processing and approval of the proposed subdivision, including: (1) the Definitive Subdivision Plan, "Sandpiper Place" Single Family Homeownership Project as prepared by Green Seal Environmental, Inc., dated August 3, 2016, depicting the subdivision of the lots along with the applicable / customary notes and details (totaling 31 sheets), (2) the Drainage Narrative (along with the customary calculations and technical attachments), as prepared by Green Seal Environmental, Inc., dated August 3, 2016, (3) the Drainage "Hydro-CAD Report", as prepared by Green Seal Environmental, Inc., dated August 3, 2016, and (4) the Requested Waivers, as prepared by Green Seal Environmental, Inc., dated August 3, 2016.

Definitive Subdivision Plan Submittal
"Sandpiper Place" Single Family (Homeownership) Project
August 4, 2016
Page Three

We have also attached "Attachment A" and "Attachment B" to the Form B application form, detailing the specifics of the two (2) existing parcels that comprise the proposed subdivision and the derivation of the title to the land comprising the proposed subdivision, given that the land includes multiple parcels, and given that title to several of the parcels has been derived from different sellers / grantors.

We trust that this submittal conforms to the applicable requirements for such a Definitive Subdivision Plan (AR) and we look forward to the completion of your review and the subsequent review and approval of the plan by the Town of Nantucket Planning Board.

If you have any immediate questions with respect to either the application or the enclosed materials, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,



David J. Armanetti, Director of Real Estate Development
The Richmond Company, Inc. (Applicant / Development Manager)
On Behalf of Richmond Great Point Development LLC (Owner)

Cc: Philip Pastan, TRC
Kathryn Fossa, TRC
Patricia Roggeveen, RGPDLLC
Shane Valero, RGPDLLC
Andrew Burek, Esq., TRC
Arthur Reade, Esq.



The Richmond Company, Inc.
23 Concord Street
Wilmington, Massachusetts 01887
(979) 988-3900

August 4, 2016

TOWN OF NANTUCKET
TOWN CLERK
16 Broad Street
Nantucket, Massachusetts 02554

Attention: Catherine Flanagan Stover, MMC, CMMC

Subject: Submittal of Application for Definitive Subdivision
Richmond Great Point Development LLC (Owner / Developer)
"Sandpiper Place" Single Family (Homeownership) Project

Dear Mrs. Stover:

The purpose of this correspondence, issued in our capacity as the applicant and development manager, on behalf of the owner of the subject properties (Richmond Great Point Development LLC) is to document submittal of the completed application to petition the Town of Nantucket Planning Board to consider the above-captioned proposal which requires the approval of a definitive subdivision of land to allow for the subdivision of the subject properties into a series of one hundred and six (106) proposed lots and a +/- 4,350 linear foot (0.82 mile) long system of roadway segments, comprising a total of +/- 16.3 acres of land, located on a series of twenty-one (21) existing parcels located off Old South Road, Nancy Ann Lane, Mayflower Circle, Daffodil Lane, and Evergreen Way (including portions of two road parcels [being portions of Daffodil Lane and Mayflower Circle] and a private way located off of Old South Road

The Notice (and copy of the completed (Form B) application and accompanying plan) is being submitted to your office in accordance with and conforms to the provisions of Section 2.06 of "The Rules and Regulations Governing the Subdivision of Land, Nantucket, Massachusetts" as well as "The Subdivision Control Law of Massachusetts" (M.G.L. Chapter 41, Sections 81K-81GG, inclusive).

Upon your acknowledgment of receipt of this Notice (by way of time / date stamping the application), we intend to submit the original completed (Form B) application and accompanying plan to the Town of Nantucket Planning Board to obtain its review and subsequent approval.

Should you have any questions with respect to the application and submittal, please feel free to contact me at 978-988-3900, Extension # 12.

Very truly yours,

David J. Armanetti
Director of Real Estate Development
The Richmond Company, Inc.
On Behalf of Richmond Great Point Development LLC

Cc: Andrew Burek, Esq., TRC
Arthur Reade, Jr., Esq., RGH

**Richmond Great Point Inc.
20 Davkim Lane
Nantucket, MA 02554**



Drainage Calculations Narrative

PROJECT SUMMARY

Richmond Great Point Inc., Inc. (RGP) is proposing to reconfigure the existing property as shown on sheets C-1 to C-5. The project includes single family home development and rental apartment development.

The proposed development of “Sandpiper Place” workforce homeownership housing development, comprised of one hundred (100) single family housing lots on a combination of nineteen (19) existing lots totaling +/- 17.2 acres of land located along Old South Road, Daffodil Lane, Mayflower Circle, and Evergreen Way.

The proposed development of “Workforce Rental Community” includes a total of 225 apartment units in a series of approximately forty (40) low density, two story, residential structures on a combination of two (2) existing lots totaling +/- 14.5 acres of land located along Davkim Lane and Nancy Ann Lane.

EXISTING CONDITIONS

Currently, access to all parcels owned by RGP is via Nancy Ann Lane. The land located at 20 Davkim Lane contains a former asphalt gravel plant/gravel pit. A paved parking area is located in front of the plant along the corner of Nancy Ann Lane and Davkim lane. North of the plant comprises gravel areas with access driveways along Nancy Ann Lane and storage components of the former Glowacki property. A gravel travelway connects the eastern portion of the plant to Evergreen Way.

The easterly portion of the project along Evergreen Way is primarily wooded with residential properties on the corner of Evergreen Way and Daffodil Lane. A gravel pathway extends from the paved roadway between the asphalt gravel plant and Evergreen Way to the Mayflower Circle cul-de-sac.

In general, the property slopes from North to South and contains two large sand pits that are shown on sheets C-6 to C-8.

PROPOSED CONDITIONS

We have included a set of plans and related documents depicting the proposal for your review. The subdivision will require the construction of new roadways. For discussion purposes during the review process with the town review agencies, we have included conceptual building footprints. The Stormwater runoff generated from the buildings depicted on the plans will be Contain by individual leaching systems sized to retain and infiltrate the Type III 24-hour 100-year storm.

Pre and Post development stormwater analysis was completed for the Type III 24-hour 25-year storm event using Carlson Civil Suite Engineering and Surveying software and HydroCad Stormwater modeling software for the drainage areas identified on the property. These stormwater modeling packages were developed using TR-55 modeling protocol and are widely used in the stormwater modeling arena. The modeling addressed stormwater for this proposal under the following assumptions:

1. We have assumed that the roadways, driveways and sidewalks as depicted on the plans, are constructed.

The two existing Sand Pits will be re-graded. The proposed site generally slopes in a Southerly direction from Old South Road, Easterly from Nancy Ann lane, And Westerly from Evergreen Road.

It should be noted that runoff from the RGP property remains on –site and the proposed conditions will remain the same.

As such, we have not concentrated on the pre and post development conditions on the property as no stormwater leaves the property. Although the impervious area of the property will be increased, the existing fully developed nature of a major portion of the property, the fact that all stormwater stays on the site, and significant drainage system improvements are proposed, the need to concentrate on pre and post development conditions is reduced. The main effort in our drainage analysis for this project centered on the use of deep sump catch basins, grease/grit removal Water Quality Structures and underground infiltration Chambers designed to retain and infiltrate the Type III 24-hour 25-year as well as mitigate the flooding caused by the 100 year event.

Runoff from the post development conditions is subdivided into 15 watersheds. Stormwater Runoff is conveyed to nine underground retention / infiltration areas (refer to table below) containing ADS StormTech MC-4500 + Cap chambers. Under conditions related to large storm events, the system will surcharge and stormwater will spill out of the lowest grate, and overflow into two designated flood areas as shown on sheet C-19.

Underground Retention / Infiltration Areas for Watershed					
No.	Watershed	Pond	Storage Area	No. Storage Chambers	VortSentry Model
1	S1	1P	46.67'W x 27.24'L x 6.75'H	25	HS72
2	S2	2P	37.58'W x 43.34'L x 6.75'H	36	HS72
3	S3	3P	37.58'W x 51.39'L x 6.75'H	44	HS84
4	S4	4P	55.75'W x 35.29'L x 6.75'H	42	HS84
5	S5, S6	5P/6P	28.50'W x 43.34'L x 6.75'H	27	HS84
6	S7	7P	46.67'W x 47.37'L x 6.75'H	50	HS84
7	S8, S9	8P/9P	37.58'W x 63.47'L x 6.75'H	56	HS96
8	S10-S14	10P-14P	55.75'W x 51.39'L x 6.75'H	66	HS96
9	S15	15P	46.67'W x 59.44'L x 6.75'H	65	HS84

Stormwater Runoff from each building is conveyed to underground retention / infiltration areas (refer to table below) containing Cultec Recharger 330XL HD chambers.

Underground Retention / Infiltration Areas for Buildings		
Type*	Storage Area	No. Storage Chambers
Building A	11.83'W x 11.17'L x 3.88'H	2
Building B	11.17'W x 10.50'L x 3.54'H	2
Building C	11.17'W x 10.50'L x 3.54'H	2
Multifamily	17.00'W x 11.50'L x 3.54'H	3

*See sheets C-6 to C-8 for building type locations.

Stormwater Standards

Standard 1 - No New Untreated Discharges

Under the proposed improvements, there are no untreated discharges to or erosion of wetlands or waters of the Commonwealth. All of the runoff from this proposal are directed to and allowed to infiltrate in retention areas within the boundary of the project. There are no off-site discharges from this project.

Standard 2 - Peak Flow Rates

The pre and post-development peak discharge rate from this development is contained within the property. There is no runoff from this property. The stormwater modeling results are included in the Attachments (1 & 2) of this document.

Standard 3 - Recharge Rates

All of the runoff from the area of development on site will be directed into the retention areas depicted on the plans. The proposed drainage system will infiltrate 100% of the excess stormwater volume.

Standard 4 - TSS Removal Rates

The design provides more than 95% TSS removal utilizing the deep sump catch basins, oil/sediment separators, and subsurface leaching systems. See Attachment 3 for these computations.

Standard 5 - Land Use with Higher Potential Pollution Load

This standard is not applicable to the site.

Standard 6 - Wellhead Protection Area

This standard applies to this project as the site is located in a public wellhead protection area. Test pits indicate a minimum of 10 feet of undisturbed soil above groundwater will be maintained for the construction of this project. Improvements to the property include conveying stormwater runoff to nine underground retention / infiltration areas with each containing a grease/grit removal Water Quality Structure.

Standard 7 - Redevelopment

This standard applies to this project as significant improvements are proposed on the property. Improvements include the use of Deep Sump catch basins, the installation of a grease/grit removal Water Quality Structure and construction of nine retention / infiltration areas to eliminate severe ponding at the property. The stormwater modeling results are included in the Appendix A of this document.

As such, Stormwater Standards have been met to the maximum extent practicable.

Standard 8 - Construction Period Pollution Prevention

Although this proposal does not require a National Pollution Discharge Elimination System (NPDES) permit for construction, the proposal calls for the installation of silt fencing, hay bales, catchbasin filters, and the remediation of all disturbed areas. Sedimentation will be controlled by inspection of stormwater facilities before and after significant stormwater events.

Standard 9 - Operations and Maintenance

The Operation and Maintenance plan calls for maintaining the landscaped portion of the project as well as regular cleaning of catch basins, grease/grit chambers, and stormwater retention facilities. An Operations and Maintenance Plan is included in this report.

Standard 10- Illicit Discharge Statement

There are no known, illicit discharges associated with this project.
Please review the above information and contact this office with any questions or comments.



Robert L. Bersin, PE
Green Seal Environmental, Inc.

July 25, 2016
Date

GENERAL CONSTRUCTION SEQUENCE

1. Prior to the start of all work, the contractor shall have the Limits of Work flagged by Green Seal Environmental. Flagging shall be inspected by the Town of Nantucket designee, prior to the start of all work.
2. Contractor shall furnish and install construction silt fencing, hay bales, or wattles (as required on approved plans) along the Limits of Work line as depicted on the approved plans. Installation of said fencing shall be inspected by the Town of Nantucket designee.
3. Install Temporary Construction Access as depicted on the approved plans. Installation of said access shall be inspected by the Town of Nantucket designee.
4. Tree Removal along the proposed roadway shall be coordinated with the Nantucket Tree Warden and Planning Department. All debris, including stumps, shall be removed from the site and disposed in a MassDEP approved disposal site. Cut materials may be chipped, stockpiled, and used as mulch, as needed. Use 4-6 inches of topsoil and the seed mixture referenced above to revegetate disturbed areas along the roadway.
5. Install Retention / Infiltration Areas and Treatment units as shown on approved plans. Retention Areas shall be installed by removing all soil above the "C" Sand layer as depicted on the soil logs and backfilled with clean granular sand, free from organic matter, and other deleterious matter. Fill material shall meet the grading specifications in 310 CMR 15.255:3. Install roadway as depicted on the approved plans. Access to the work areas shall be via the proposed construction entrances shown on the Erosion and Dust Control Plan. All efforts shall be employed to prevent soil accumulation from construction vehicles onto the surface of Nancy Ann Lane Rd. If binder course is not installed immediately after cutting, grubbing, re-grading, and compaction, install temporary crushed stone construction entrance as depicted on the Erosion and Dust Control Plan. Final paving shall be after the installation of drainage components and utilities is complete.
6. In general, revegetate disturbed areas as soon as practicable.
7. After the roadway construction, start the installation of landscaping per approved plans. Coordinate installation with the Town of Nantucket designee. All attempts shall be made to avoid planting during summer droughty season, or arrangements shall be made for proper watering required to ensure proper plant growth.
8. Upon completion of the work, inspect all areas of installation. All disturbed areas shall be revegetated as described above.

STORMWATER SYSTEM MAINTENANCE CONSTRUCTION PHASE

Best management practices (BMP) for erosion and sedimentation control are staked straw bales, filter fences, wattles, hydro seeding, and phased development. Although not all of these methods are utilized for this project, it should be noted that these are not designed to handle high concentrations of sediments typically found in construction runoff. High sediment losses are not anticipated on this project, but it is imperative that the BMP's on this site be maintained.

Pre-Construction

- A. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to straw bales, silt fence, wattles, and crushed stone.
- B. The site contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

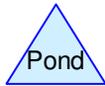
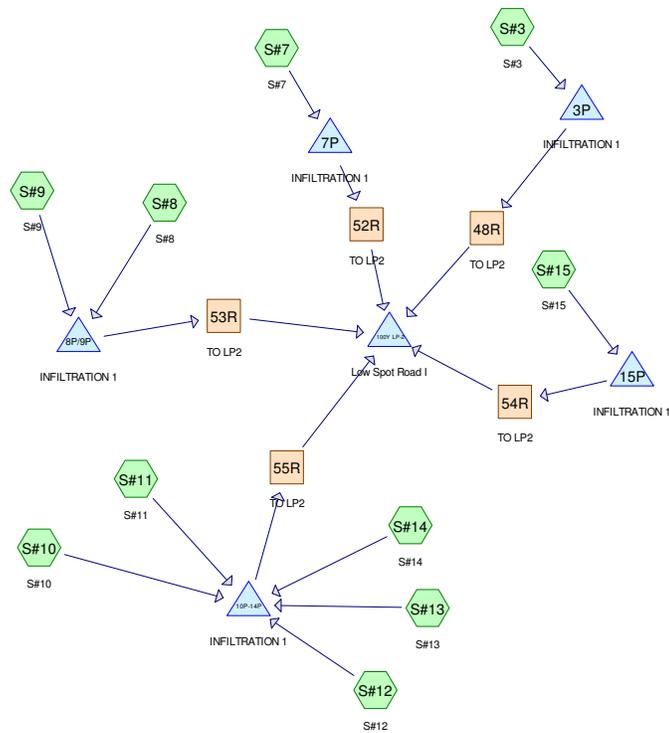
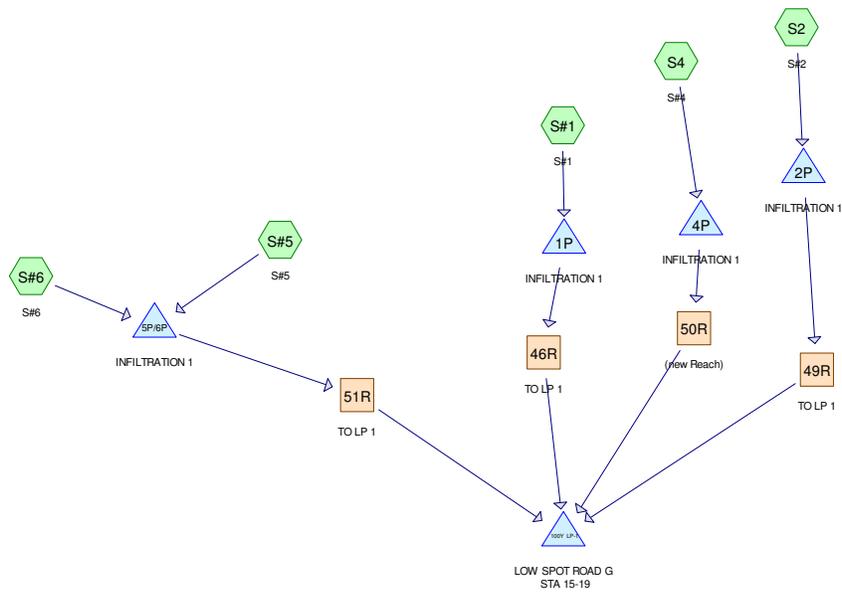
Construction Phase

- A. All excavated materials should be stockpiled, separating topsoil from other materials. The topsoil shall be kept for future use on the site. Erosion control shall be utilized along the down slope side of the stockpiles and side slopes shall not exceed 2:1.
- B. If intense rainfall is anticipated, the installation of supplemental straw bale dikes, silt fences, or wattles shall be considered.
- C. Unsuitable excavated material shall be removed from the site as soon as practicable.
- D. Construction entrance shall be installed as shown on the approved plans as outlined above.

Ongoing Site Work

- 1. Site work will be completed utilizing proper construction techniques. All efforts are to be employed to minimize the deposition of soil from Construction vehicles on Nancy Ann Lane Road.
- 2. Inspect all sediment and erosion control measures on a weekly basis, prior to, and after significant storm events (0.25 inches or greater), or as otherwise required by the Town of Nantucket designee.

3. Sediment shall be removed from sediment barriers if buildup exceeds ½ of the height of the barrier.
4. Damaged or deteriorated barriers shall be repaired immediately after the defect is identified.
5. The underside of hay bales and wattles shall be kept in close contact with exposed earth. Reset as necessary.
6. Remove vegetative and non-vegetative debris from the retention areas.
7. In general, the area shall be kept neat and litter free, to the maximum extent practicable. Trash, shipping materials, and other disposable materials shall be contained and prevented from becoming windblown litter. The site supervisor shall ensure all debris is either removed or properly contained prior to leaving the site on a daily basis.
8. Erosion control elements shall remain in place until all disturbed areas are stabilized. After removal of erosion control elements, regrade, and stabilize disturbed areas under barriers, as necessary.
9. No pesticides or herbicides are to be used on the site and only organic fertilizers shall be used.



Routing Diagram for ALTERNATIVE WATER SHEDS
 Prepared by {enter your company name here}, Printed 7/26/2016
 HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}
HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Printed 7/26/2016

Page 2

Project Notes

CarlsonStageIncrement|1.0000|

ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}
HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Printed 7/26/2016
Page 3

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.321	39	Open Space-Good (>75% grass) HSG A (S#1, S#10, S#11, S#12, S#13, S#14, S#15, S#3, S#5, S#6, S#7, S#8, S#9, S2, S4)
0.765	61	Open Space-Good (>75% grass) HSG B (S#1, S2)
0.469	98	Paved Lots Roofs & Driveways HSG A (S#11)
0.239	98	Paved Lots Roofs & Driveways HSG B (S2)
7.875	98	Paved Streets w/Curbs & Sewers HSG A (S#1, S#10, S#12, S#13, S#14, S#15, S#3, S#5, S#6, S#7, S#8, S#9, S4)
0.239	98	Paved Streets w/Curbs & Sewers HSG B (S2)
25.907	60	TOTAL AREA

ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}
HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Printed 7/26/2016
Page 4

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
24.664	HSG A	S#1, S#10, S#11, S#12, S#13, S#14, S#15, S#3, S#5, S#6, S#7, S#8, S#9, S2, S4
1.243	HSG B	S#1, S2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
25.907		TOTAL AREA

ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 5

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
16.321	0.765	0.000	0.000	0.000	17.086	Open Space-Good (>75% grass)	S#1, S#10, S#11, S#12, S#13, S#14, S#15, S#3, S#5, S#6, S#7, S#8, S#9, S2, S4
0.469	0.239	0.000	0.000	0.000	0.708	Paved Lots Roofs & Driveways	S#11, S2
7.875	0.239	0.000	0.000	0.000	8.114	Paved Streets w/Curbs & Sewers	S#1, S#10, S#12, S#13, S#14, S#15, S#3, S#5, S#6, S#7, S#8, S#9, S2, S4
24.664	1.243	0.000	0.000	0.000	25.907	TOTAL AREA	

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 6

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment S#1: S#1	Runoff Area=74,645 sf 34.86% Impervious Runoff Depth=1.79" Flow Length=173' Slope=0.0515 '/ Tc=6.0 min CN=60 Runoff=3.33 cfs 0.256 af
Subcatchment S#10: S#10	Runoff Area=36,853 sf 28.96% Impervious Runoff Depth=1.48" Flow Length=225' Slope=0.0140 '/ Tc=15.6 min CN=56 Runoff=0.96 cfs 0.104 af
Subcatchment S#11: S#11	Runoff Area=45,317 sf 45.07% Impervious Runoff Depth=2.29" Flow Length=405' Slope=0.0234 '/ Tc=14.9 min CN=66 Runoff=2.06 cfs 0.199 af
Subcatchment S#12: S#12	Runoff Area=35,592 sf 41.55% Impervious Runoff Depth=2.12" Flow Length=235' Slope=0.0333 '/ Tc=8.5 min CN=64 Runoff=1.76 cfs 0.144 af
Subcatchment S#13: S#13	Runoff Area=23,644 sf 43.86% Impervious Runoff Depth=2.21" Flow Length=117' Slope=0.0184 '/ Tc=6.4 min CN=65 Runoff=1.33 cfs 0.100 af
Subcatchment S#14: S#14	Runoff Area=32,589 sf 22.11% Impervious Runoff Depth=1.19" Flow Length=319' Slope=0.0132 '/ Tc=23.5 min CN=52 Runoff=0.53 cfs 0.074 af
Subcatchment S#15: S#15	Runoff Area=219,043 sf 28.62% Impervious Runoff Depth=1.48" Flow Length=1,119' Slope=0.0258 '/ Tc=41.5 min CN=56 Runoff=3.75 cfs 0.620 af
Subcatchment S#3: S#3	Runoff Area=180,213 sf 23.77% Impervious Runoff Depth=1.26" Flow Length=300' Slope=0.0252 '/ Tc=15.8 min CN=53 Runoff=3.73 cfs 0.433 af
Subcatchment S#5: S#5	Runoff Area=31,300 sf 60.32% Impervious Runoff Depth=3.11" Flow Length=121' Slope=0.0265 '/ Tc=5.0 min CN=75 Runoff=2.62 cfs 0.186 af
Subcatchment S#6: S#6	Runoff Area=10,705 sf 75.27% Impervious Runoff Depth=3.91" Flow Length=121' Slope=0.0370 '/ Tc=5.0 min CN=83 Runoff=1.12 cfs 0.080 af
Subcatchment S#7: S#7	Runoff Area=75,917 sf 62.25% Impervious Runoff Depth=3.21" Flow Length=405' Slope=0.0259 '/ Tc=10.8 min CN=76 Runoff=5.54 cfs 0.466 af
Subcatchment S#8: S#8	Runoff Area=46,691 sf 52.51% Impervious Runoff Depth=2.65" Flow Length=269' Slope=0.0219 '/ Tc=10.0 min CN=70 Runoff=2.85 cfs 0.236 af
Subcatchment S#9: S#9	Runoff Area=48,922 sf 54.31% Impervious Runoff Depth=2.74" Flow Length=214' Slope=0.0177 '/ Tc=9.1 min CN=71 Runoff=3.17 cfs 0.256 af
Subcatchment S2: S#2	Runoff Area=115,715 sf 17.98% Impervious Runoff Depth=1.48" Flow Length=300' Slope=0.0283 '/ Tc=13.8 min CN=56 Runoff=3.16 cfs 0.328 af
Subcatchment S4: S#4	Runoff Area=151,367 sf 28.50% Impervious Runoff Depth=1.48" Flow Length=300' Slope=0.0338 '/ Tc=12.6 min CN=56 Runoff=4.26 cfs 0.428 af
Reach 46R: TO LP 1	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=467.7' S=0.0082 '/ Capacity=9.55 cfs Outflow=0.00 cfs 0.000 af

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 7

Reach 48R: TO LP2	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=370.0' S=0.0053 '/' Capacity=7.64 cfs Outflow=0.00 cfs 0.000 af
Reach 49R: TO LP 1	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=190.0' S=0.0149 '/' Capacity=12.84 cfs Outflow=0.00 cfs 0.000 af
Reach 50R: (new Reach)	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach 51R: TO LP 1	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=431.0' S=0.0094 '/' Capacity=10.20 cfs Outflow=0.00 cfs 0.000 af
Reach 52R: TO LP2	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=592.0' S=0.0066 '/' Capacity=8.53 cfs Outflow=0.00 cfs 0.000 af
Reach 53R: TO LP2	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=184.0' S=0.0024 '/' Capacity=5.20 cfs Outflow=0.00 cfs 0.000 af
Reach 54R: TO LP2	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=372.0' S=0.0006 '/' Capacity=2.62 cfs Outflow=0.00 cfs 0.000 af
Reach 55R: TO LP2	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.013 L=1.0' S=0.0100 '/' Capacity=10.52 cfs Outflow=0.00 cfs 0.000 af
Pond 1P: INFILTRATION 1	Peak Elev=38.12' Storage=0.110 af Inflow=3.33 cfs 0.256 af Discarded=0.24 cfs 0.256 af Primary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.256 af
Pond 2P: INFILTRATION 1	Peak Elev=33.61' Storage=0.136 af Inflow=3.16 cfs 0.328 af Discarded=0.31 cfs 0.328 af Primary=0.00 cfs 0.000 af Outflow=0.31 cfs 0.328 af
Pond 3P: INFILTRATION 1	Peak Elev=27.81' Storage=0.187 af Inflow=3.73 cfs 0.433 af Discarded=0.37 cfs 0.433 af Primary=0.00 cfs 0.000 af Outflow=0.37 cfs 0.433 af
Pond 4P: INFILTRATION 1	Peak Elev=34.53' Storage=0.187 af Inflow=4.26 cfs 0.428 af Discarded=0.38 cfs 0.428 af Primary=0.00 cfs 0.000 af Outflow=0.38 cfs 0.428 af
Pond 5P/6P: INFILTRATION 1	Peak Elev=34.25' Storage=0.119 af Inflow=3.74 cfs 0.266 af Discarded=0.24 cfs 0.266 af Primary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.266 af
Pond 7P: INFILTRATION 1	Peak Elev=31.24' Storage=0.207 af Inflow=5.54 cfs 0.466 af Discarded=0.42 cfs 0.466 af Primary=0.00 cfs 0.000 af Outflow=0.42 cfs 0.466 af
Pond 8P/9P: INFILTRATION 1	Peak Elev=28.39' Storage=0.218 af Inflow=6.01 cfs 0.493 af Discarded=0.46 cfs 0.493 af Primary=0.00 cfs 0.000 af Outflow=0.46 cfs 0.493 af
Pond 10P-14P: INFILTRATION 1	Peak Elev=26.71' Storage=0.273 af Inflow=5.78 cfs 0.621 af Discarded=0.55 cfs 0.621 af Primary=0.00 cfs 0.000 af Outflow=0.55 cfs 0.621 af
Pond 15P: INFILTRATION 1	Peak Elev=26.97' Storage=0.267 af Inflow=3.75 cfs 0.620 af Discarded=0.53 cfs 0.620 af Primary=0.00 cfs 0.000 af Outflow=0.53 cfs 0.620 af

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 8

Pond 100Y LP-1: LOW SPOT ROAD G STA 15-19

Peak Elev=36.50' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 100Y LP-2: Low Spot Road I

Peak Elev=31.50' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 25.907 ac Runoff Volume = 3.912 af Average Runoff Depth = 1.81"
65.95% Pervious = 17.086 ac 34.05% Impervious = 8.821 ac

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 9

Summary for Subcatchment S#1: S#1

CarlsonPlanXYPos|1757228.0858|95778.6699|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 3.33 cfs @ 12.10 hrs, Volume= 0.256 af, Depth= 1.79"

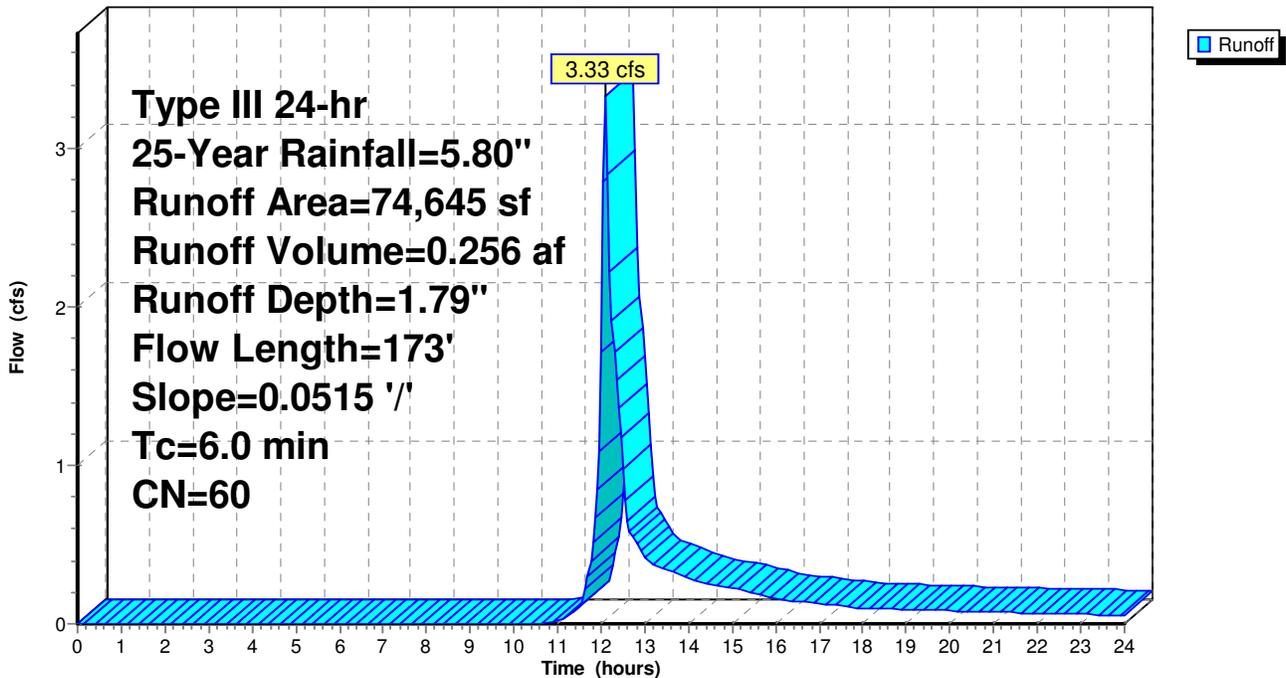
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	26,022	98	Paved Streets w/Curbs & Sewers HSG A
*	48,593	39	Open Space-Good (>75% grass) HSG A
*	30	61	Open Space-Good (>75% grass) HSG B
	74,645	60	Weighted Average
	48,623		65.14% Pervious Area
	26,022		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	173	0.0515	0.48		Lag/CN Method,

Subcatchment S#1: S#1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 10

Summary for Subcatchment S#10: S#10

CarlsonPlanXYPos|1756723.7933|94206.6253|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 0.96 cfs @ 12.25 hrs, Volume= 0.104 af, Depth= 1.48"

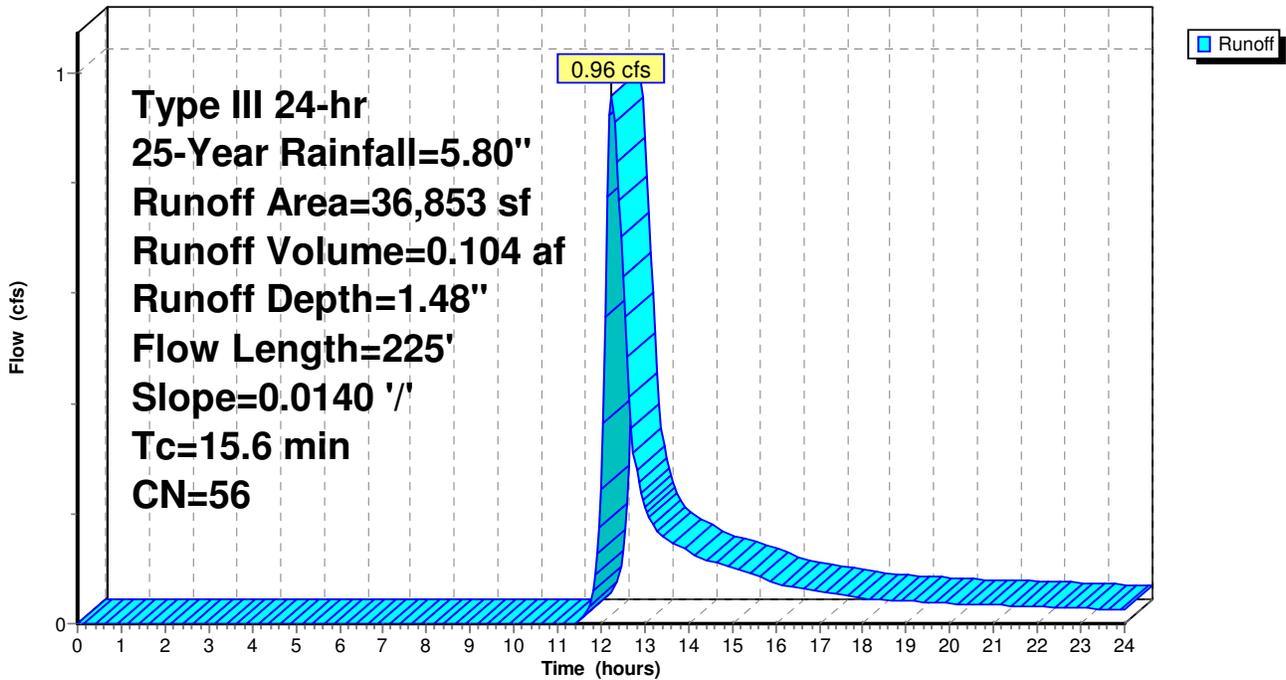
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	10,673	98	Paved Streets w/Curbs & Sewers HSG A
*	26,180	39	Open Space-Good (>75% grass) HSG A
	36,853	56	Weighted Average
	26,180		71.04% Pervious Area
	10,673		28.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	225	0.0140	0.24		Lag/CN Method,

Subcatchment S#10: S#10

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 11

Summary for Subcatchment S#11: S#11

CarlsonPlanXYPos|1756919.3220|94148.5061|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 2.06 cfs @ 12.22 hrs, Volume= 0.199 af, Depth= 2.29"

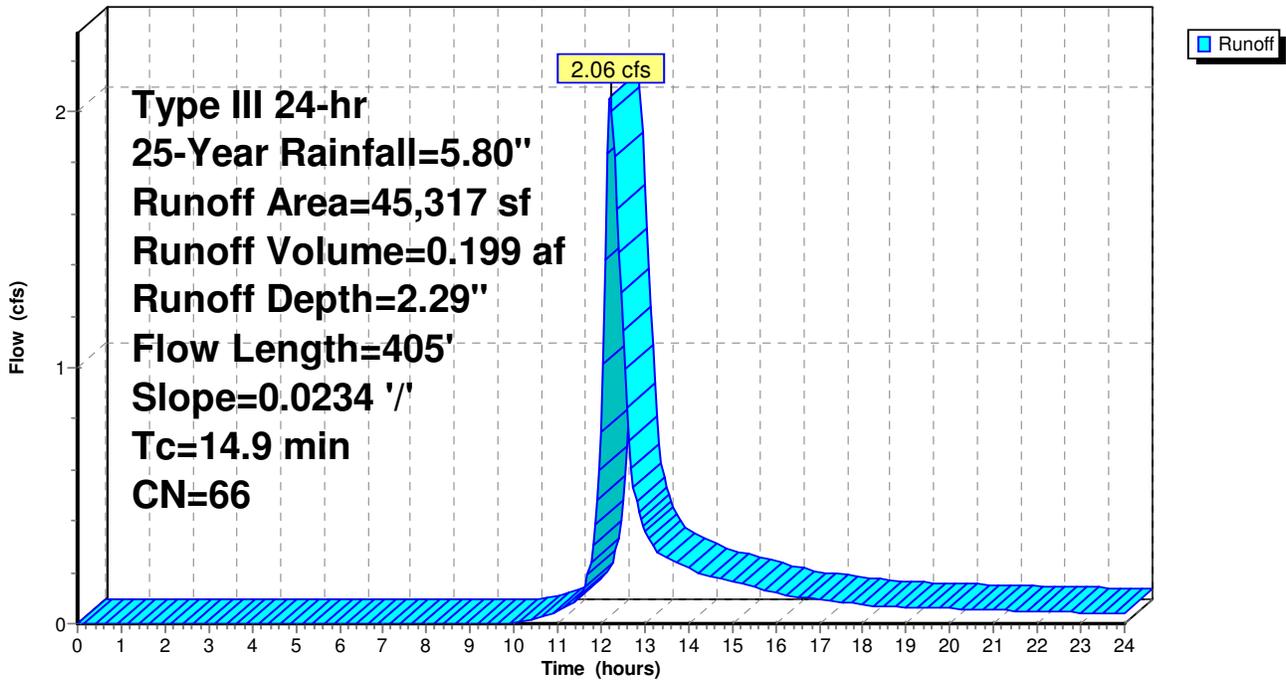
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	20,423	98	Paved Lots Roofs & Driveways HSG A
*	24,894	39	Open Space-Good (>75% grass) HSG A
	45,317	66	Weighted Average
	24,894		54.93% Pervious Area
	20,423		45.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	405	0.0234	0.45		Lag/CN Method,

Subcatchment S#11: S#11

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 12

Summary for Subcatchment S#12: S#12

CarlsonPlanXYPos|1757076.0153|93970.5069|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 1.76 cfs @ 12.13 hrs, Volume= 0.144 af, Depth= 2.12"

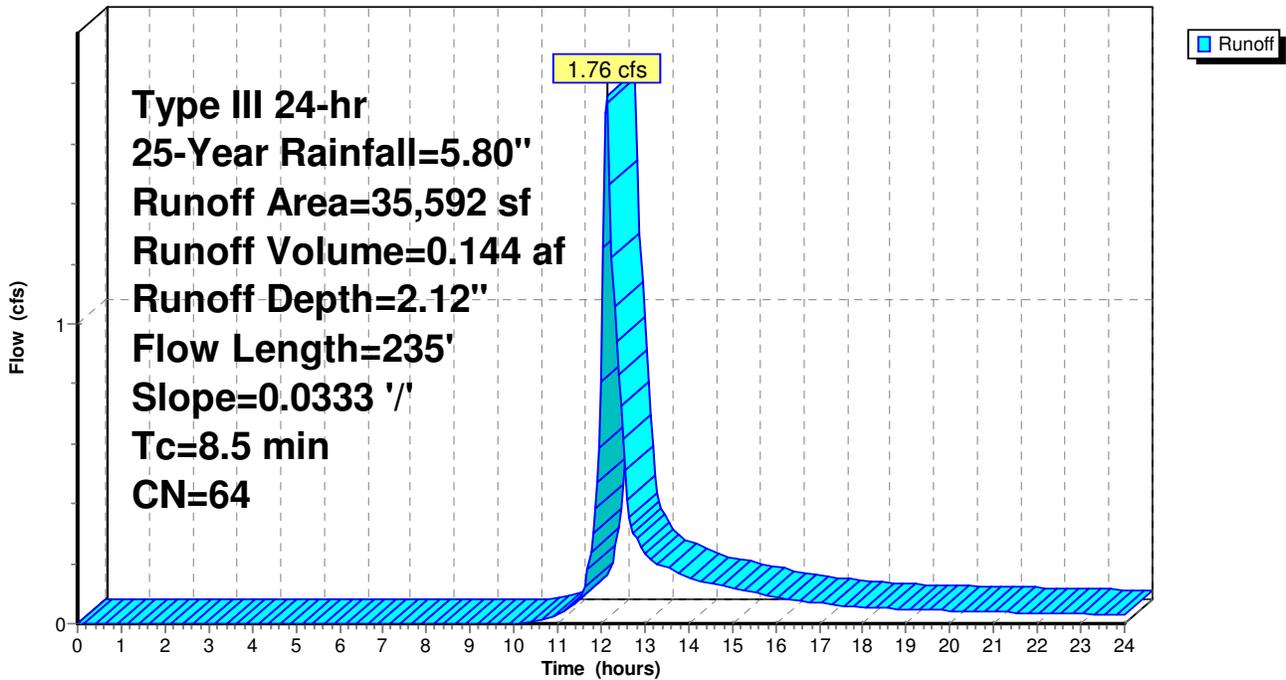
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	14,787	98	Paved Streets w/Curbs & Sewers HSG A
*	20,805	39	Open Space-Good (>75% grass) HSG A
	35,592	64	Weighted Average
	20,805		58.45% Pervious Area
	14,787		41.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	235	0.0333	0.46		Lag/CN Method,

Subcatchment S#12: S#12

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 13

Summary for Subcatchment S#13: S#13

CarlsonPlanXYPos|1757188.0982|94129.7444|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 1.33 cfs @ 12.10 hrs, Volume= 0.100 af, Depth= 2.21"

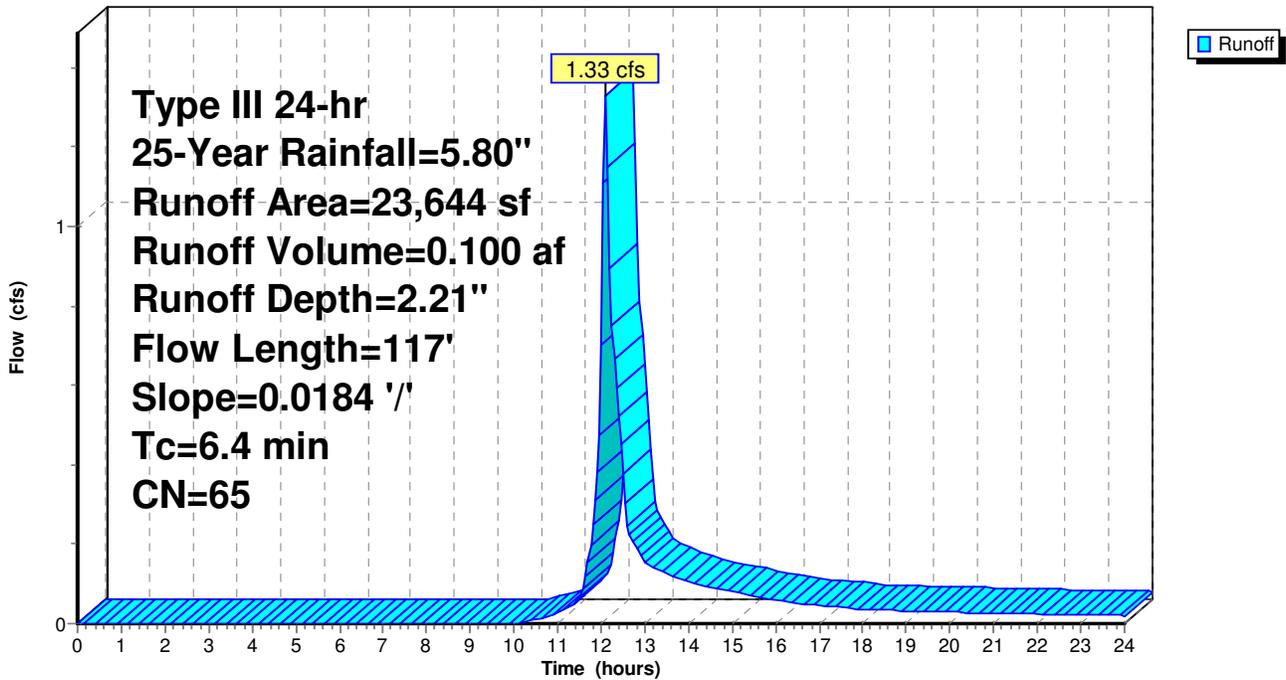
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	10,371	98	Paved Streets w/Curbs & Sewers HSG A
*	13,273	39	Open Space-Good (>75% grass) HSG A
	23,644	65	Weighted Average
	13,273		56.14% Pervious Area
	10,371		43.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	117	0.0184	0.30		Lag/CN Method,

Subcatchment S#13: S#13

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 14

Summary for Subcatchment S#14: S#14

CarlsonPlanXYPos|1757004.6545|94296.5616|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 0.53 cfs @ 12.40 hrs, Volume= 0.074 af, Depth= 1.19"

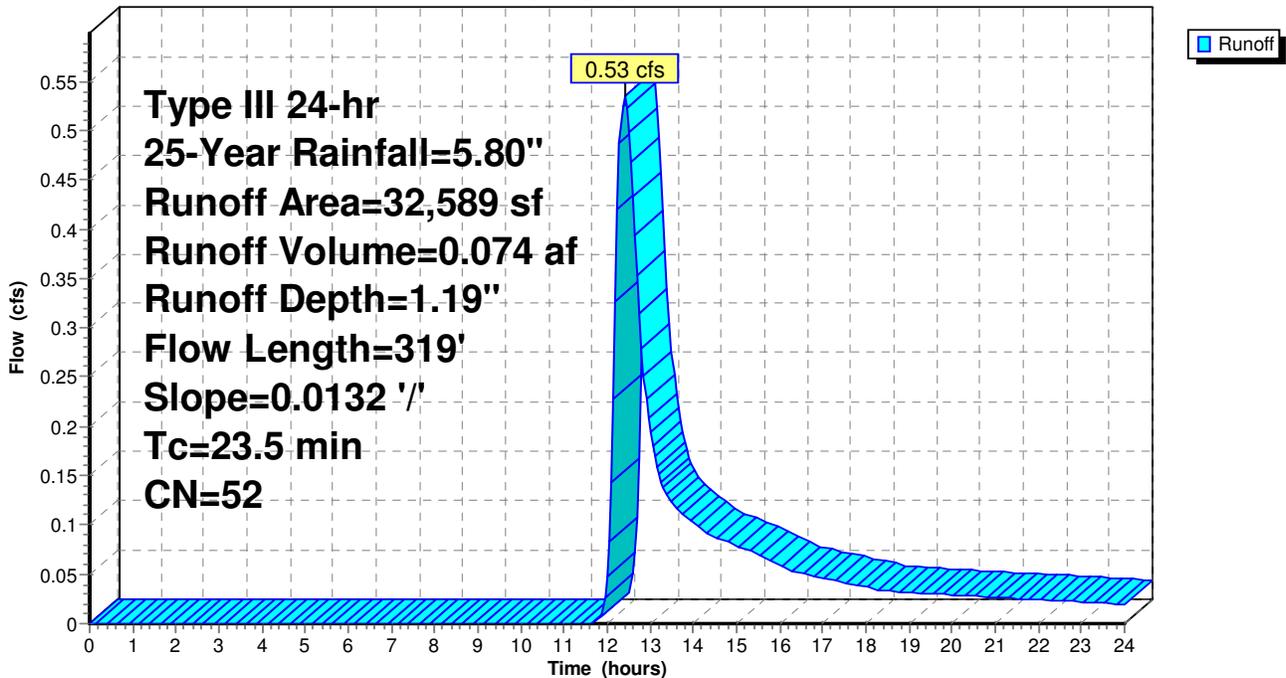
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	7,204	98	Paved Streets w/Curbs & Sewers HSG A
*	25,385	39	Open Space-Good (>75% grass) HSG A
	32,589	52	Weighted Average
	25,385		77.89% Pervious Area
	7,204		22.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	319	0.0132	0.23		Lag/CN Method,

Subcatchment S#14: S#14

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 15

Summary for Subcatchment S#15: S#15

CarlsonPlanXYPos|1757436.5135|94414.7306|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 3.75 cfs @ 12.64 hrs, Volume= 0.620 af, Depth= 1.48"

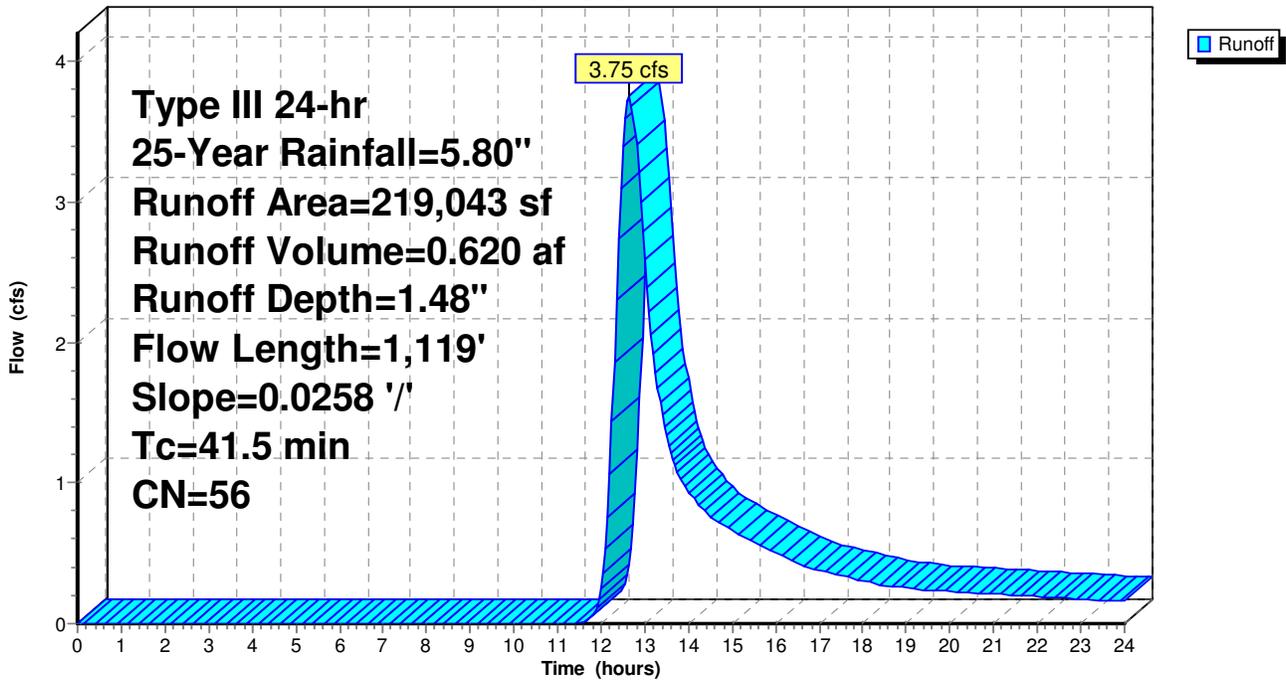
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	62,691	98	Paved Streets w/Curbs & Sewers HSG A
*	156,352	39	Open Space-Good (>75% grass) HSG A
	219,043	56	Weighted Average
	156,352		71.38% Pervious Area
	62,691		28.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.5	1,119	0.0258	0.45		Lag/CN Method,

Subcatchment S#15: S#15

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 16

Summary for Subcatchment S#3: S#3

CarlsonPlanXYPos|1757249.7579|94888.4224|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 3.73 cfs @ 12.26 hrs, Volume= 0.433 af, Depth= 1.26"

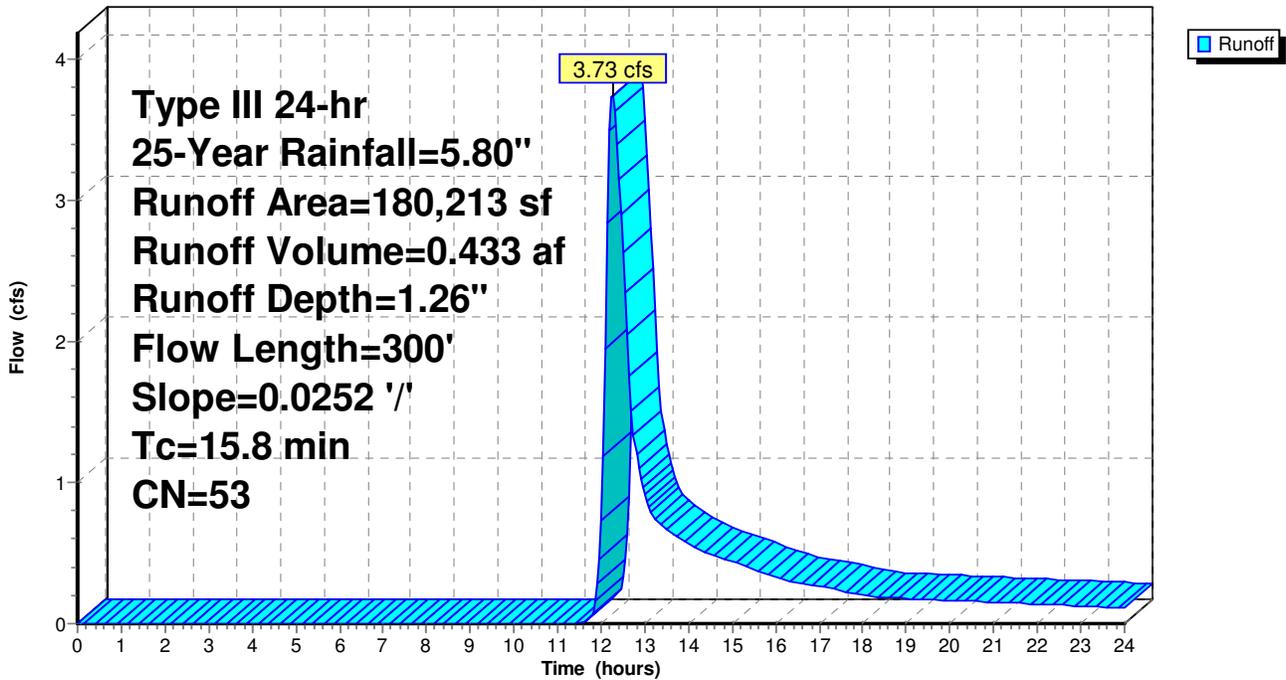
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	42,844	98	Paved Streets w/Curbs & Sewers HSG A
*	137,369	39	Open Space-Good (>75% grass) HSG A
	180,213	53	Weighted Average
	137,369		76.23% Pervious Area
	42,844		23.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	300	0.0252	0.32		Lag/CN Method,

Subcatchment S#3: S#3

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 17

Summary for Subcatchment S#5: S#5

CarlsonPlanXYPos|1757027.2221|95347.9200|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

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

Runoff = 2.62 cfs @ 12.08 hrs, Volume= 0.186 af, Depth= 3.11"

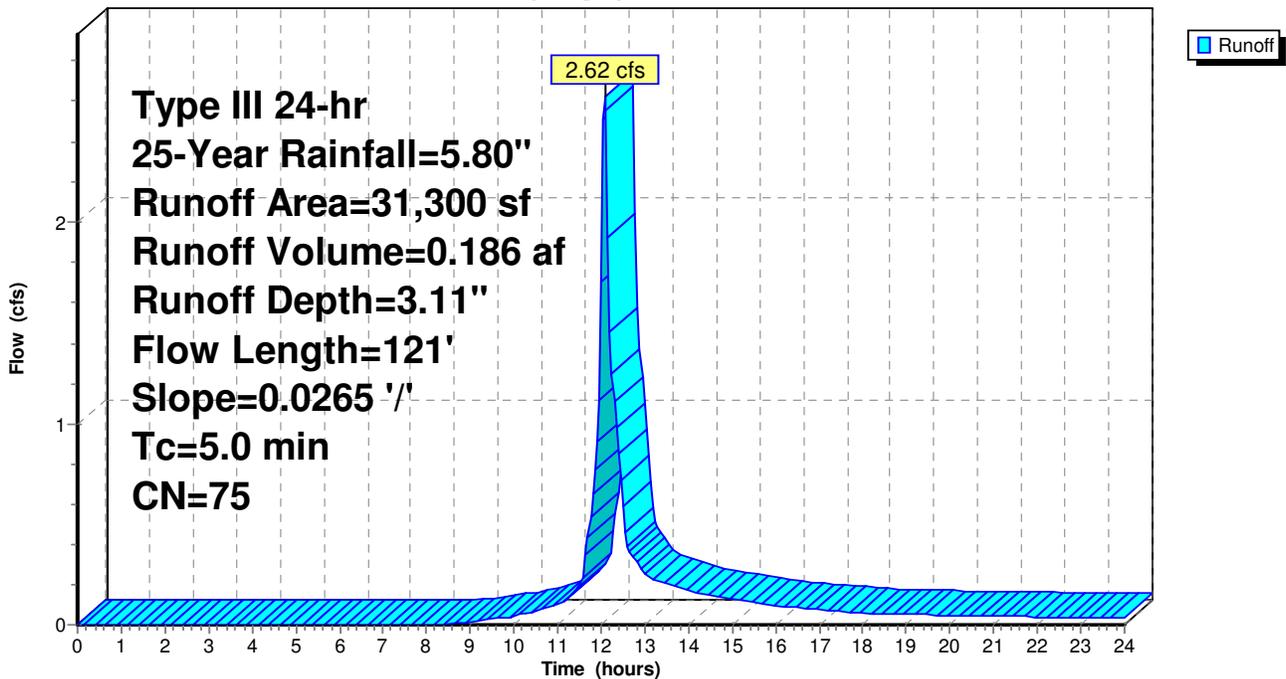
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	18,880	98	Paved Streets w/Curbs & Sewers HSG A
*	12,420	39	Open Space-Good (>75% grass) HSG A
	31,300	75	Weighted Average
	12,420		39.68% Pervious Area
	18,880		60.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	121	0.0265	0.48		Lag/CN Method,
4.2	121	Total, Increased to minimum Tc = 5.0 min			

Subcatchment S#5: S#5

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 18

Summary for Subcatchment S#6: S#6

CarlsonPlanXYPos|1757027.2221|95347.9200|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

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

Runoff = 1.12 cfs @ 12.07 hrs, Volume= 0.080 af, Depth= 3.91"

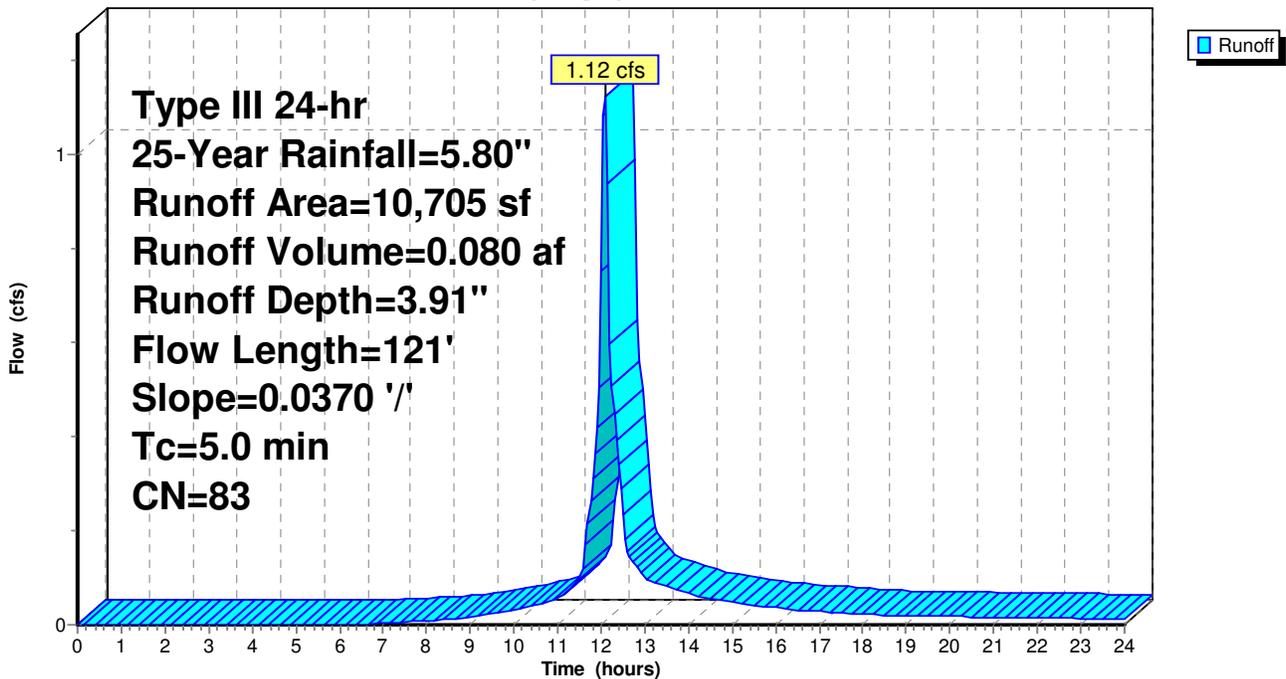
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 8,058	98	Paved Streets w/Curbs & Sewers HSG A
* 2,647	39	Open Space-Good (>75% grass) HSG A
10,705	83	Weighted Average
2,647		24.73% Pervious Area
8,058		75.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	121	0.0370	0.73		Lag/CN Method,
2.8	121	Total, Increased to minimum Tc = 5.0 min			

Subcatchment S#6: S#6

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 19

Summary for Subcatchment S#7: S#7

CarlsonPlanXYPos|1756915.6351|94896.6148|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 5.54 cfs @ 12.15 hrs, Volume= 0.466 af, Depth= 3.21"

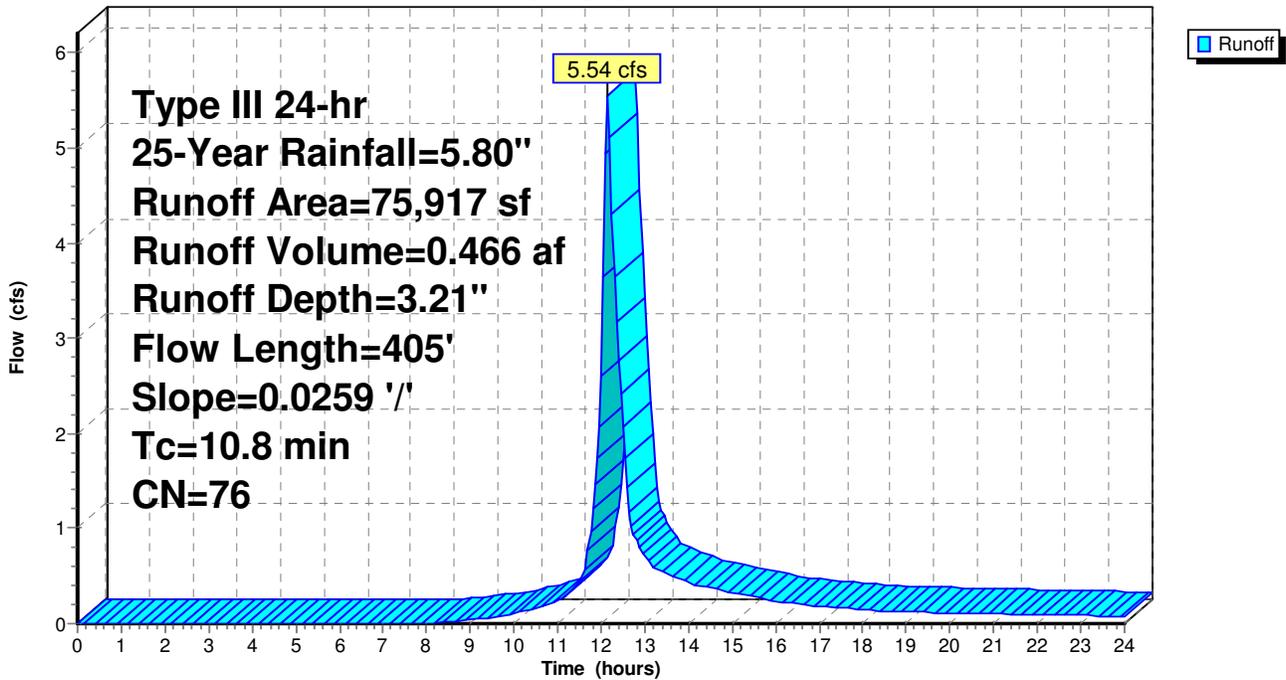
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	47,260	98	Paved Streets w/Curbs & Sewers HSG A
*	28,657	39	Open Space-Good (>75% grass) HSG A
	75,917	76	Weighted Average
	28,657		37.75% Pervious Area
	47,260		62.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	405	0.0259	0.62		Lag/CN Method,

Subcatchment S#7: S#7

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 20

Summary for Subcatchment S#8: S#8

CarlsonPlanXYPos|1756872.7656|94629.7133|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 2.85 cfs @ 12.15 hrs, Volume= 0.236 af, Depth= 2.65"

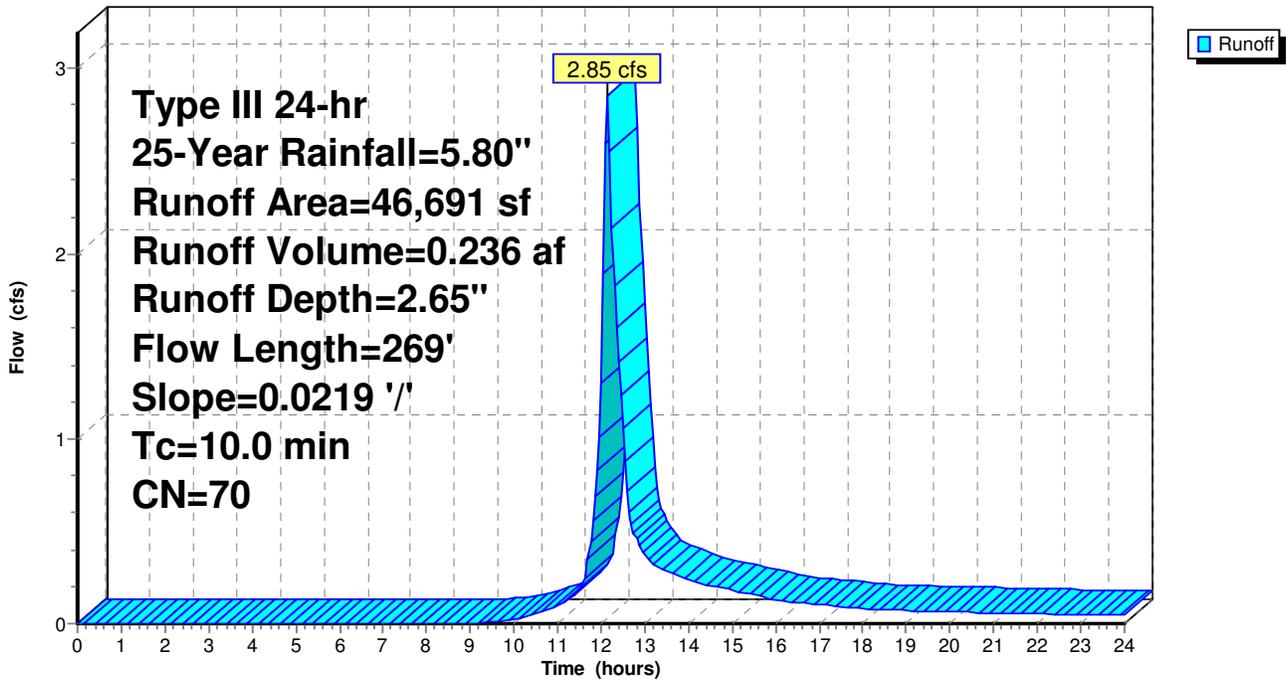
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	24,519	98	Paved Streets w/Curbs & Sewers HSG A
*	22,172	39	Open Space-Good (>75% grass) HSG A
	46,691	70	Weighted Average
	22,172		47.49% Pervious Area
	24,519		52.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	269	0.0219	0.45		Lag/CN Method,

Subcatchment S#8: S#8

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 21

Summary for Subcatchment S#9: S#9

CarlsonPlanXYPos|1756830.1751|94474.8951|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 3.17 cfs @ 12.14 hrs, Volume= 0.256 af, Depth= 2.74"

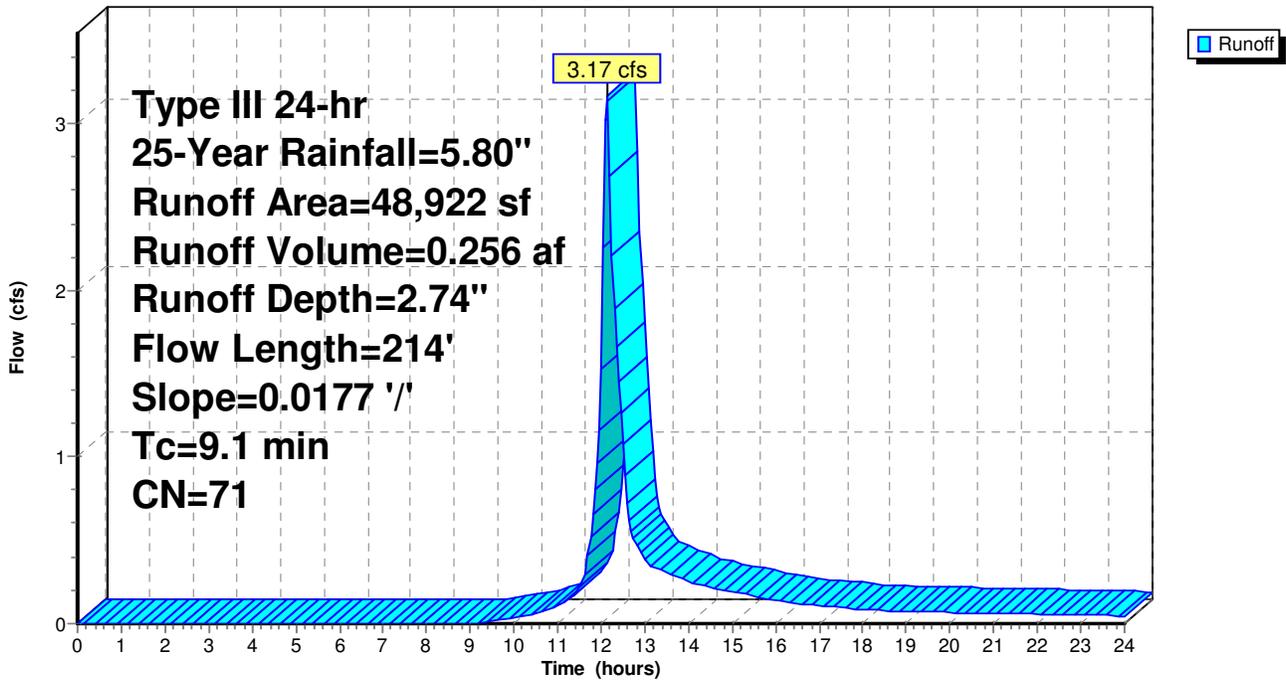
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	26,570	98	Paved Streets w/Curbs & Sewers HSG A
*	22,352	39	Open Space-Good (>75% grass) HSG A
	48,922	71	Weighted Average
	22,352		45.69% Pervious Area
	26,570		54.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	214	0.0177	0.39		Lag/CN Method,

Subcatchment S#9: S#9

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 22

Summary for Subcatchment S2: S#2

CarlsonPlanXYPos|1757390.6874|95401.9110|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 3.16 cfs @ 12.22 hrs, Volume= 0.328 af, Depth= 1.48"

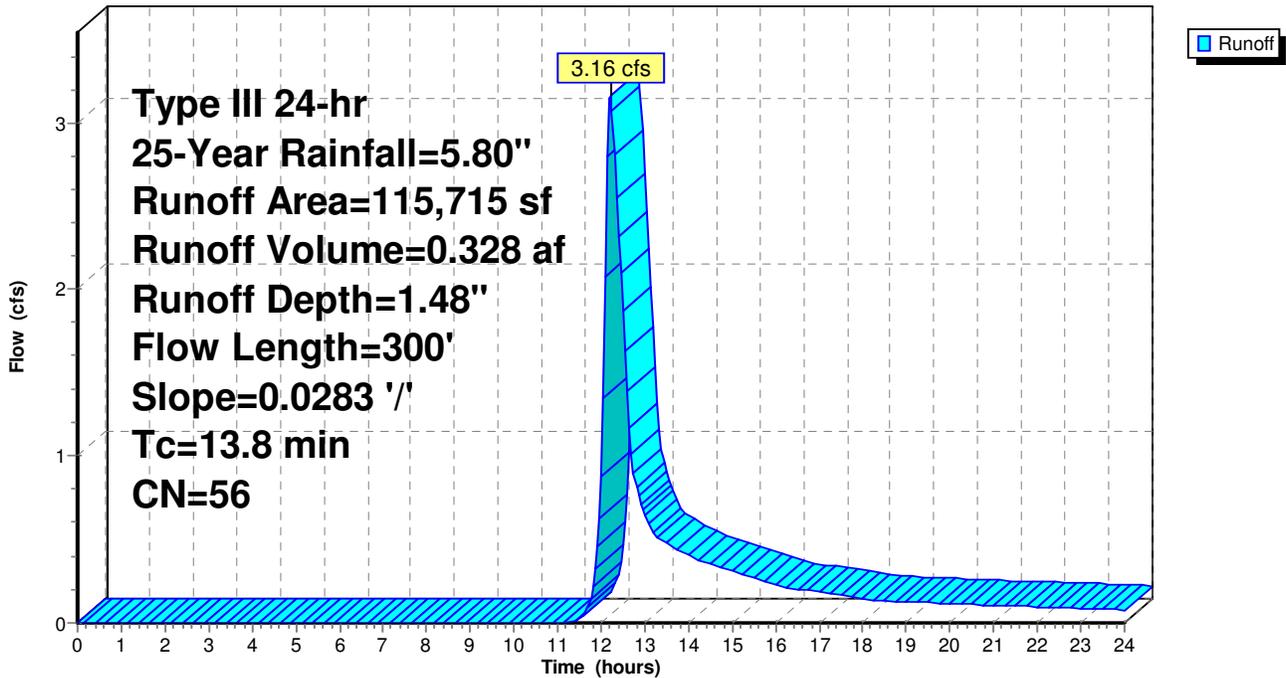
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	10,405	98	Paved Streets w/Curbs & Sewers HSG B
*	10,400	98	Paved Lots Roofs & Driveways HSG B
*	61,613	39	Open Space-Good (>75% grass) HSG A
*	33,297	61	Open Space-Good (>75% grass) HSG B
	115,715	56	Weighted Average
	94,910		82.02% Pervious Area
	20,805		17.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	300	0.0283	0.36		Lag/CN Method,

Subcatchment S2: S#2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 23

Summary for Subcatchment S4: S#4

CarlsonPlanXYPos|1757146.2718|95239.2477|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 4.26 cfs @ 12.20 hrs, Volume= 0.428 af, Depth= 1.48"

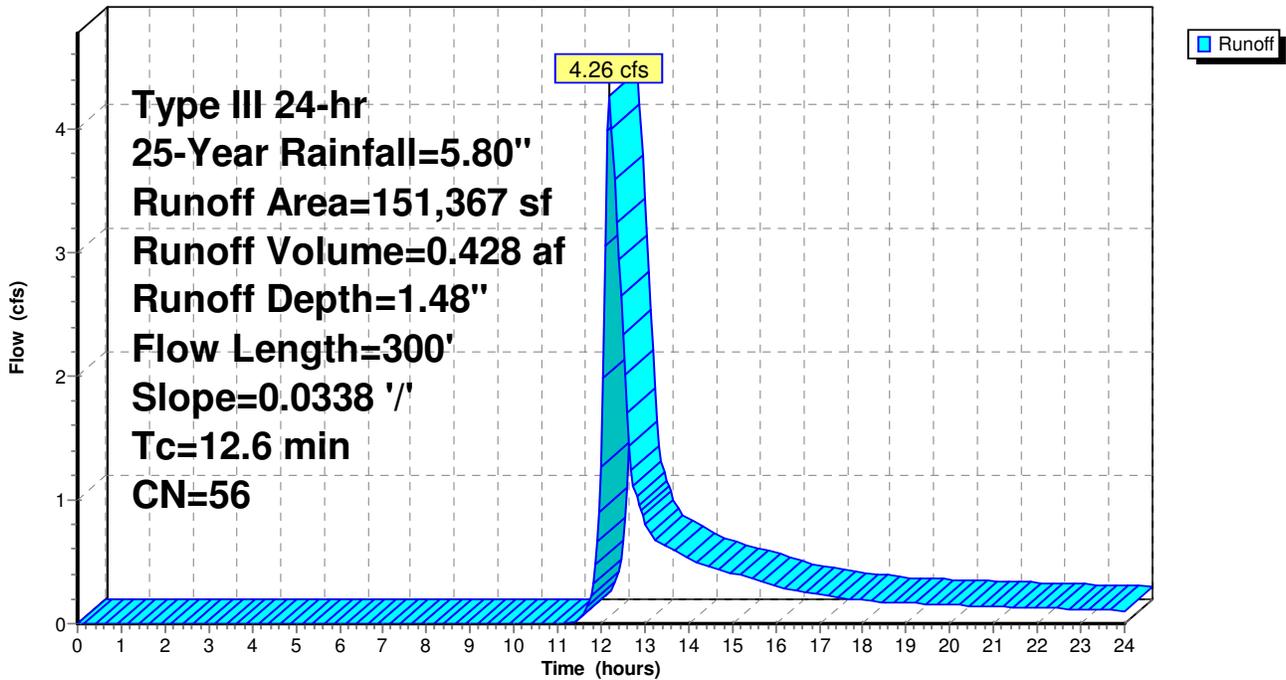
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	43,145	98	Paved Streets w/Curbs & Sewers HSG A
*	108,222	39	Open Space-Good (>75% grass) HSG A
	151,367	56	Weighted Average
	108,222		71.50% Pervious Area
	43,145		28.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	300	0.0338	0.40		Lag/CN Method,

Subcatchment S4: S#4

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 24

Summary for Reach 46R: TO LP 1

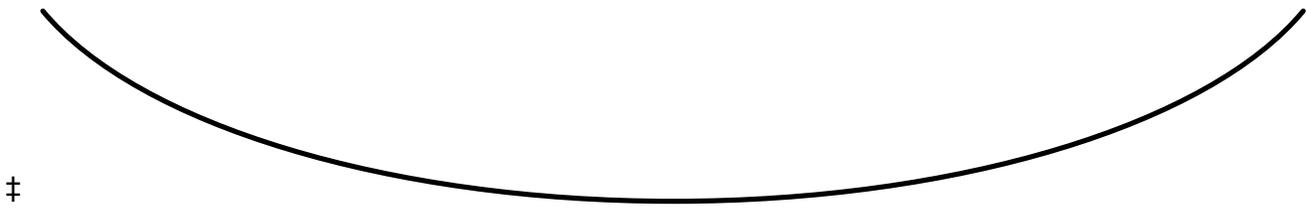
[81] Warning: Exceeded Pond 1P by 7.77' @ 0.00 hrs

Inflow Area = 1.714 ac, 34.86% Impervious, Inflow Depth = 0.00" for 25-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

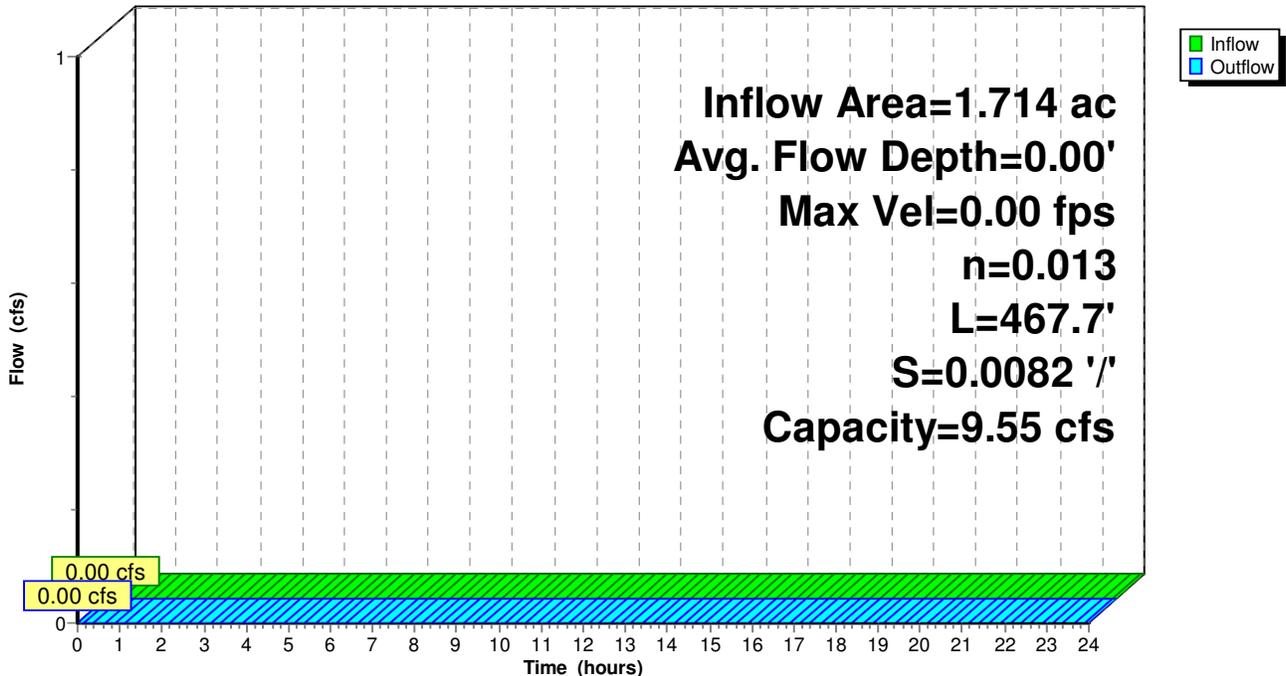
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 9.55 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
 Length= 467.7' Slope= 0.0082 '/'
 Inlet Invert= 40.02', Outlet Invert= 36.17'



Reach 46R: TO LP 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 25

Summary for Reach 48R: TO LP2

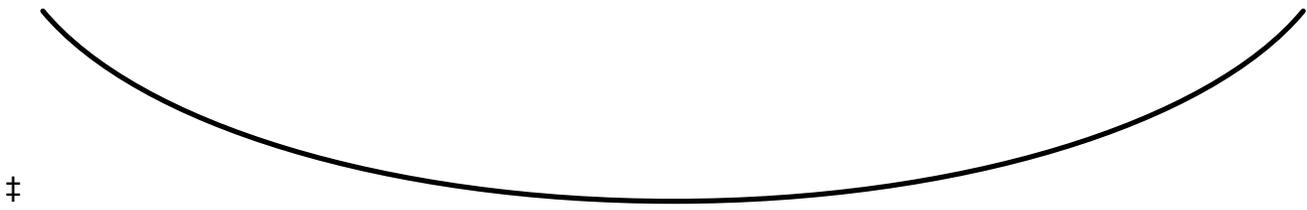
[81] Warning: Exceeded Pond 3P by 12.15' @ 0.00 hrs

Inflow Area = 4.137 ac, 23.77% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

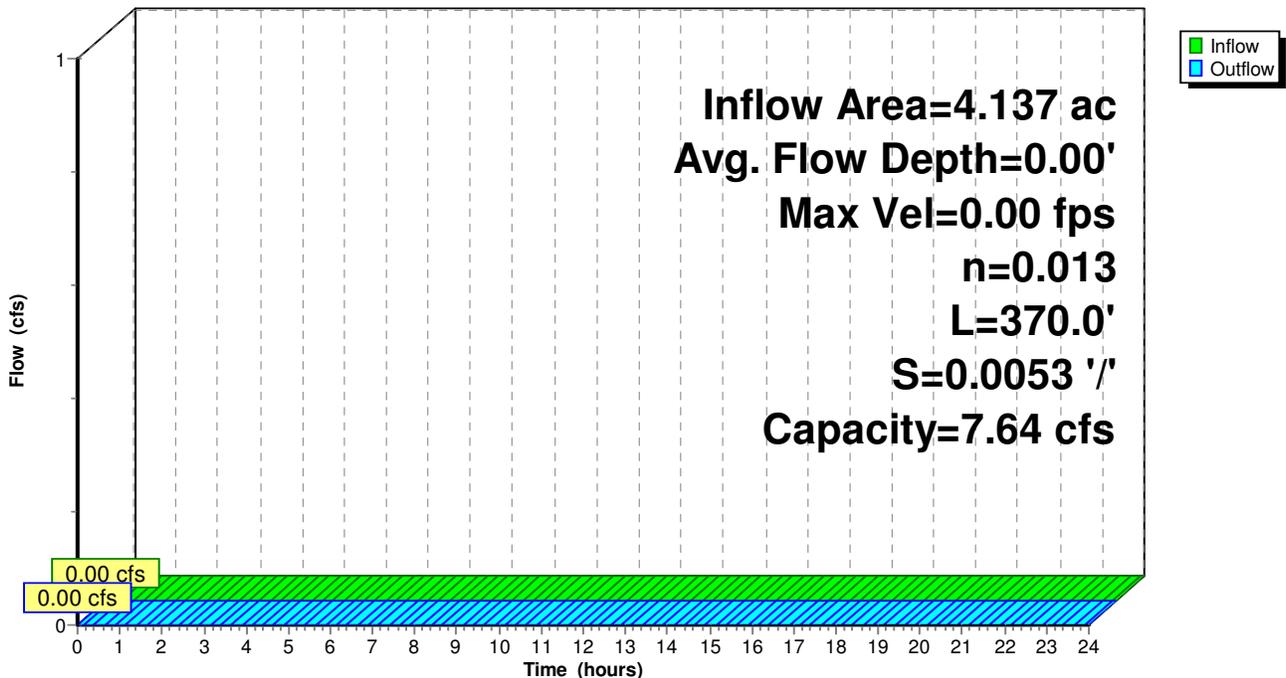
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 7.64 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 370.0' Slope= 0.0053 '/'
Inlet Invert= 33.25', Outlet Invert= 31.30'



Reach 48R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 26

Summary for Reach 49R: TO LP 1

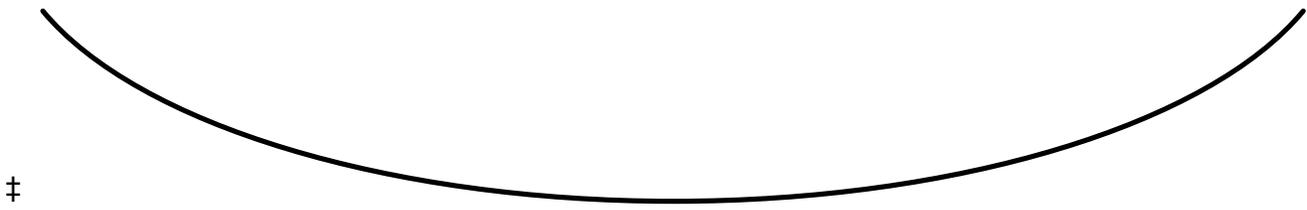
[81] Warning: Exceeded Pond 2P by 10.75' @ 0.00 hrs

Inflow Area = 2.656 ac, 17.98% Impervious, Inflow Depth = 0.00" for 25-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

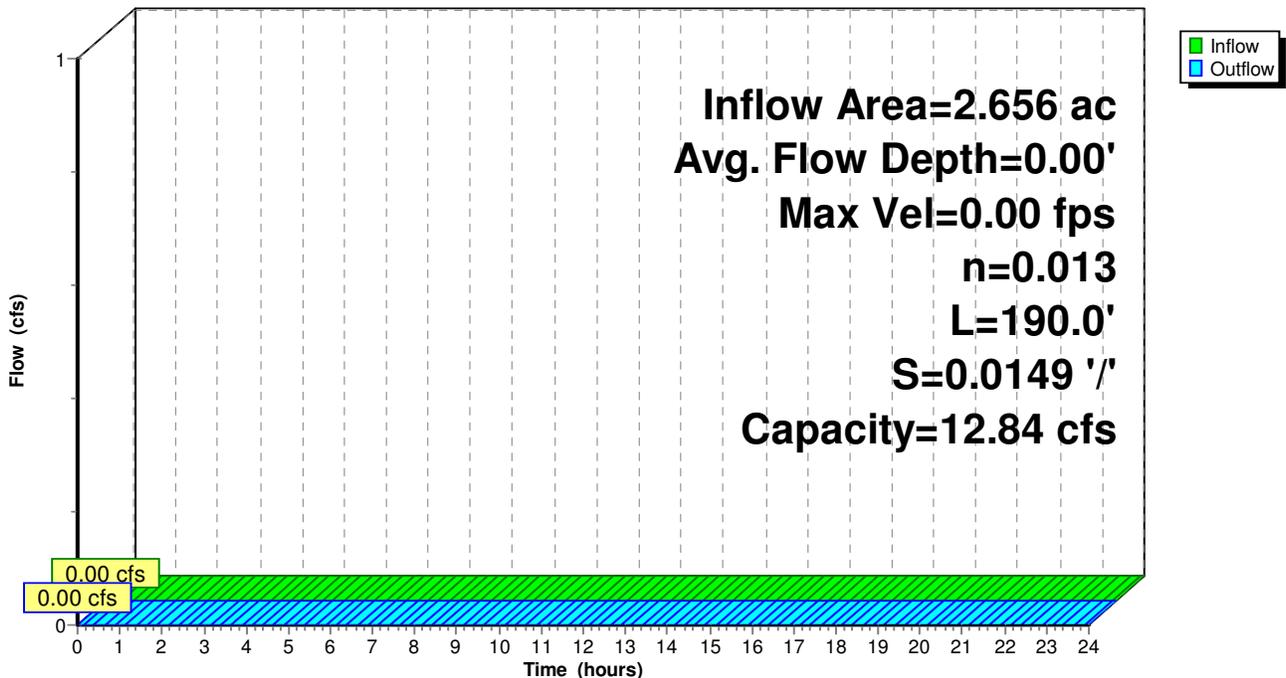
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 12.84 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
 Length= 190.0' Slope= 0.0149 '/'
 Inlet Invert= 39.00', Outlet Invert= 36.17'



Reach 49R: TO LP 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 27

Summary for Reach 50R: (new Reach)

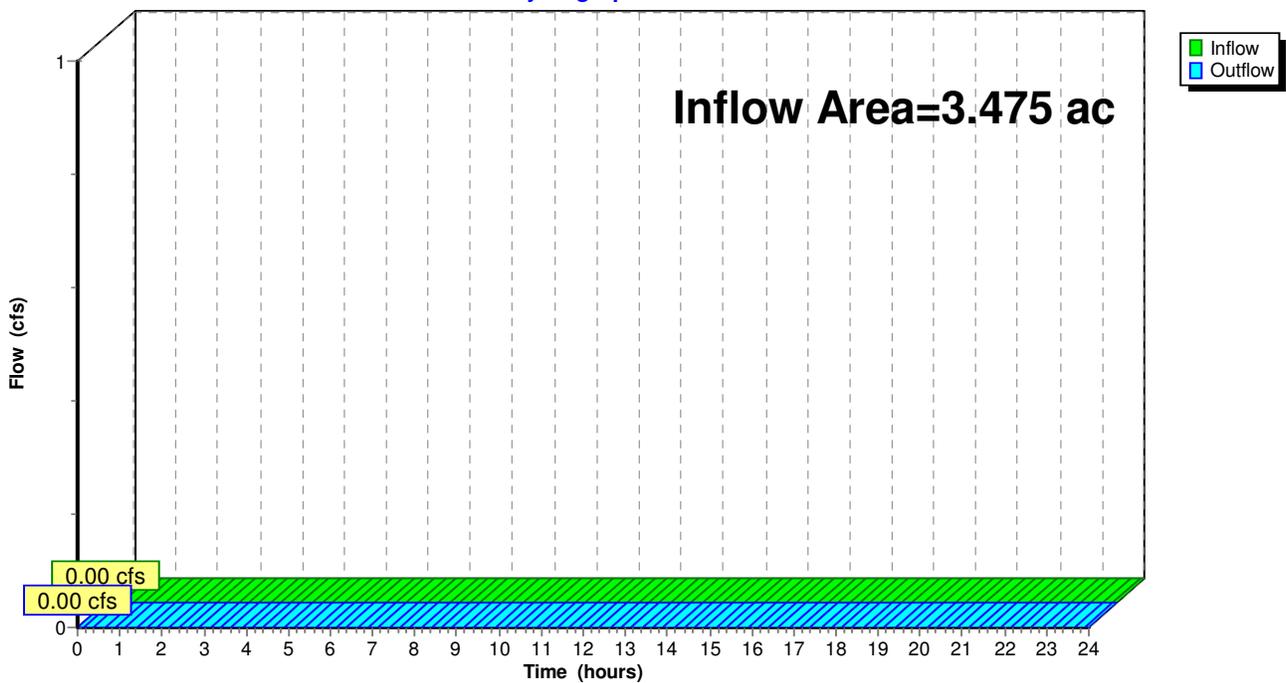
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.475 ac, 28.50% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 50R: (new Reach)

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 28

Summary for Reach 51R: TO LP 1

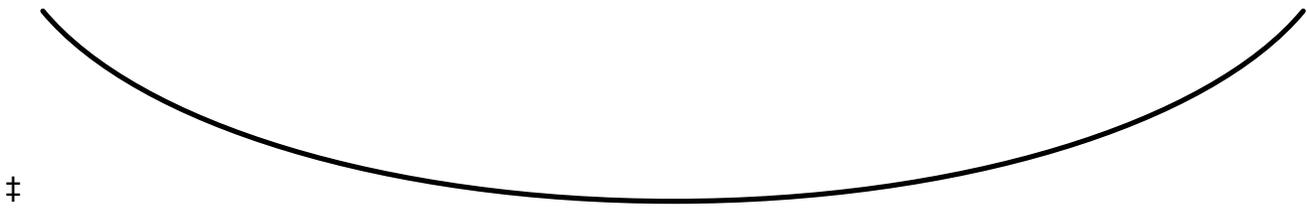
[81] Warning: Exceeded Pond 5P/6P by 12.69' @ 0.00 hrs

Inflow Area = 0.964 ac, 64.13% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

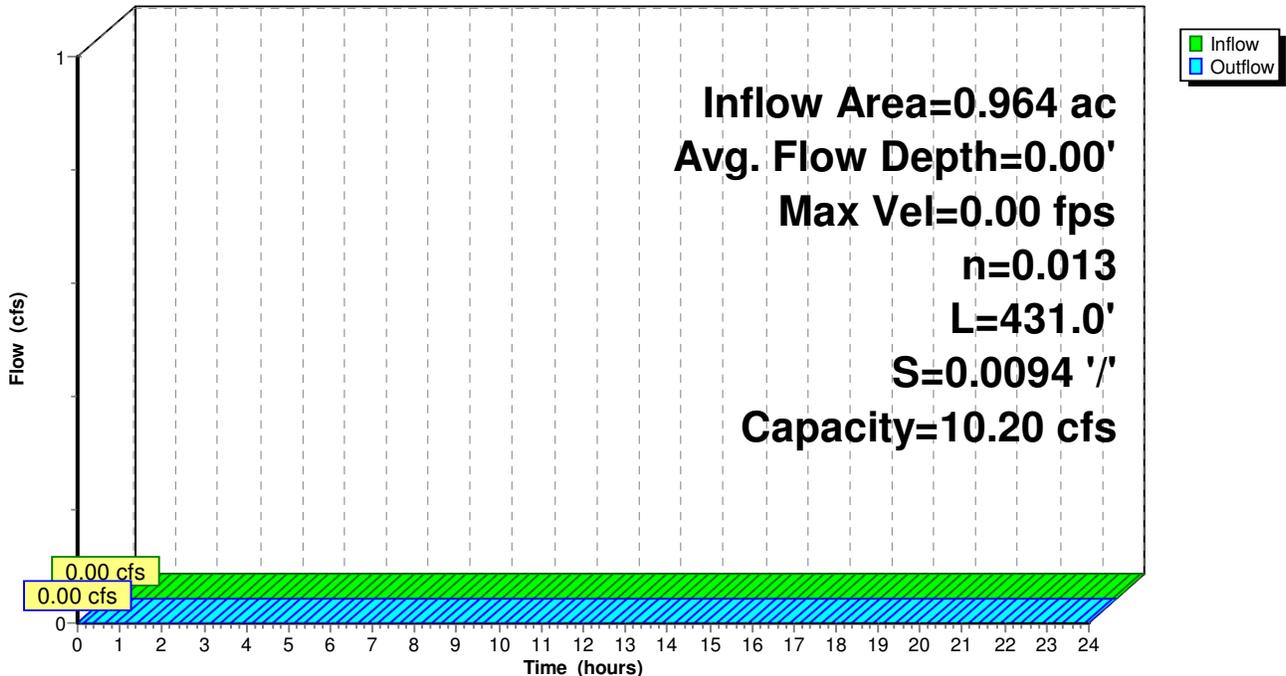
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 10.20 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 431.0' Slope= 0.0094 '/'
Inlet Invert= 40.22', Outlet Invert= 36.17'



Reach 51R: TO LP 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 29

Summary for Reach 52R: TO LP2

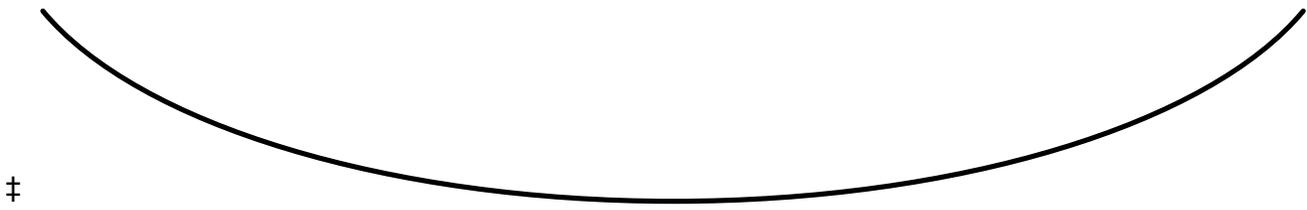
[81] Warning: Exceeded Pond 7P by 10.28' @ 0.00 hrs

Inflow Area = 1.743 ac, 62.25% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

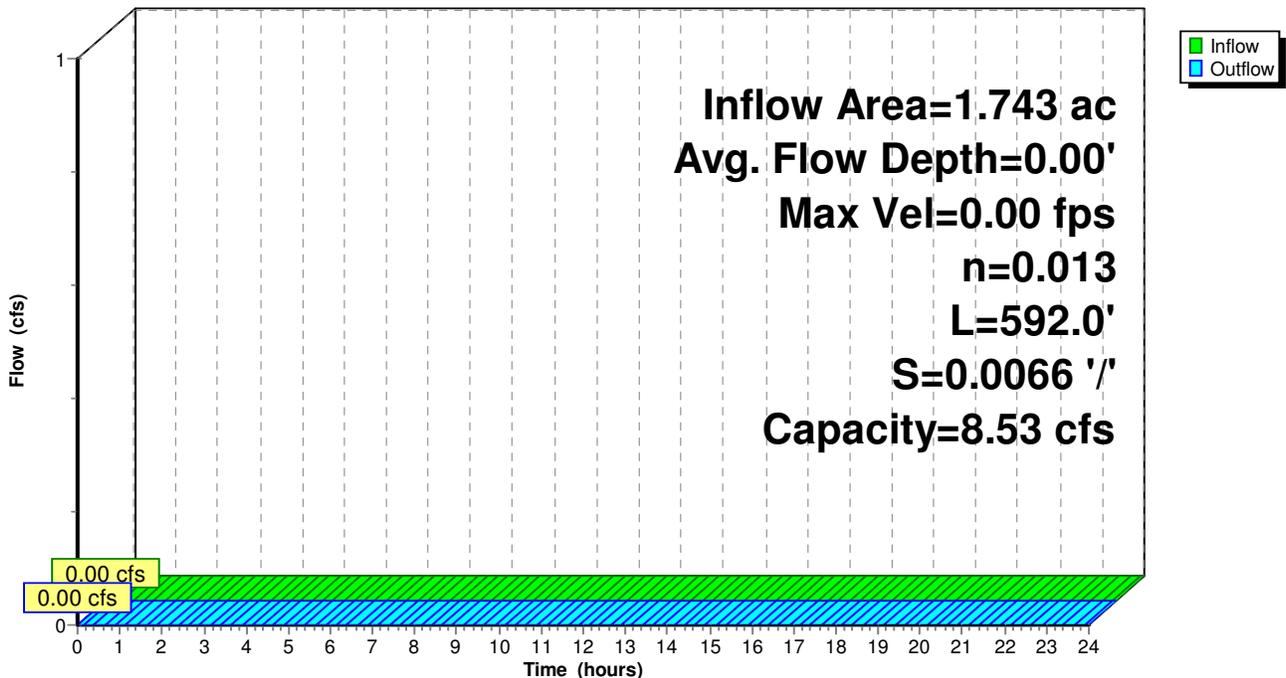
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 8.53 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 592.0' Slope= 0.0066 '/'
Inlet Invert= 35.19', Outlet Invert= 31.30'



Reach 52R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 30

Summary for Reach 53R: TO LP2

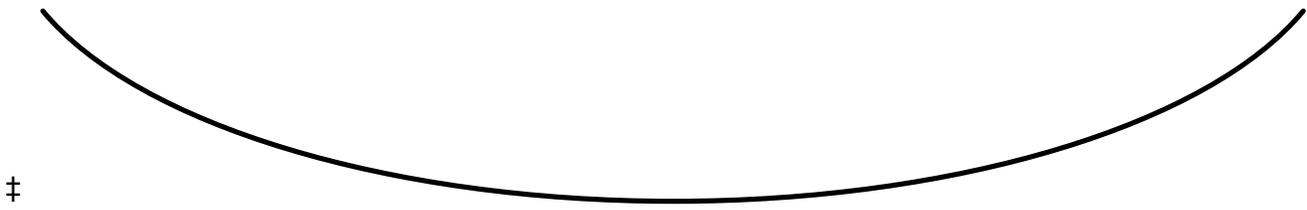
[81] Warning: Exceeded Pond 8P/9P by 9.39' @ 0.00 hrs

Inflow Area = 2.195 ac, 53.43% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

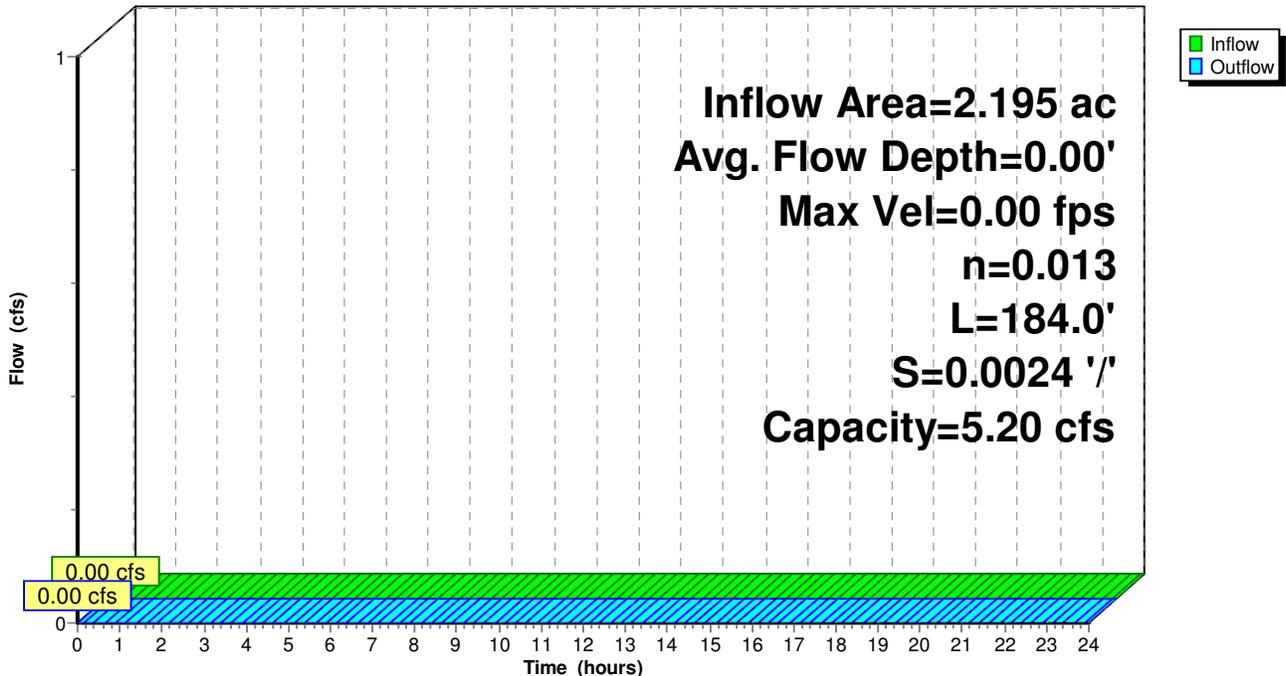
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 5.20 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 184.0' Slope= 0.0024 '/'
Inlet Invert= 31.75', Outlet Invert= 31.30'



Reach 53R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 31

Summary for Reach 54R: TO LP2

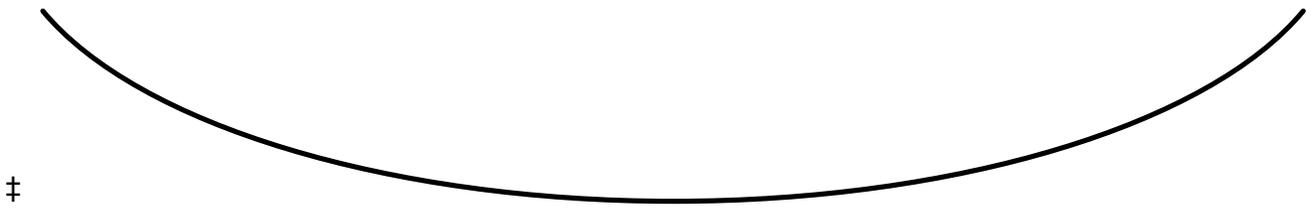
[81] Warning: Exceeded Pond 15P by 11.11' @ 0.00 hrs

Inflow Area = 5.029 ac, 28.62% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

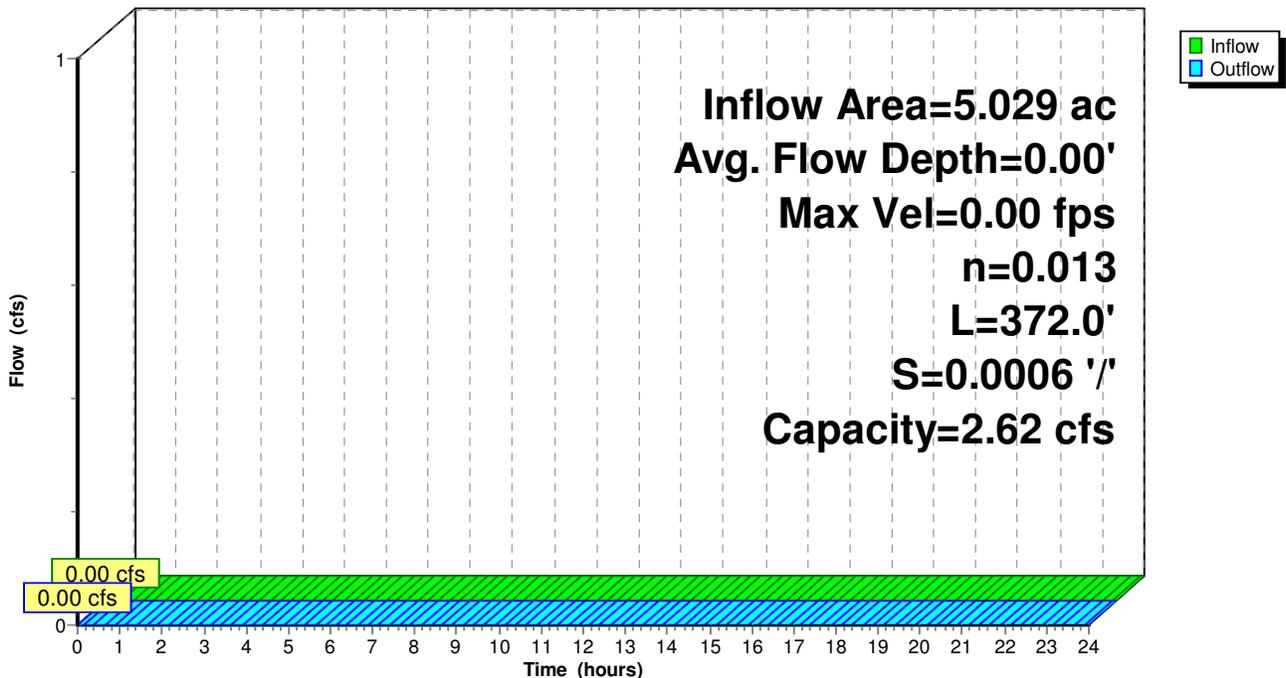
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 2.62 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 372.0' Slope= 0.0006 '/'
Inlet Invert= 31.53', Outlet Invert= 31.30'



Reach 54R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 32

Summary for Reach 55R: TO LP2

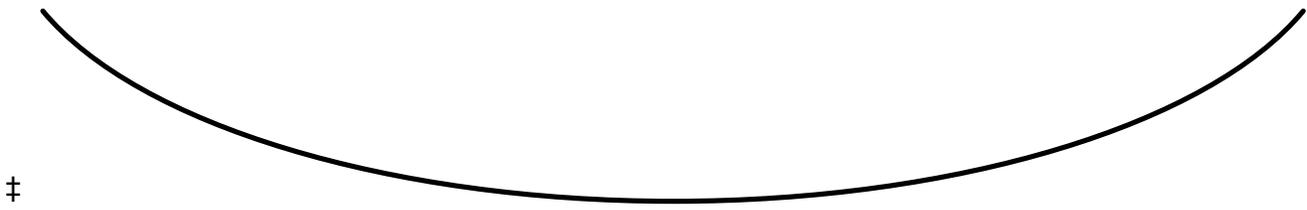
[81] Warning: Exceeded Pond 10P-14P by 11.07' @ 0.00 hrs

Inflow Area = 3.994 ac, 36.47% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

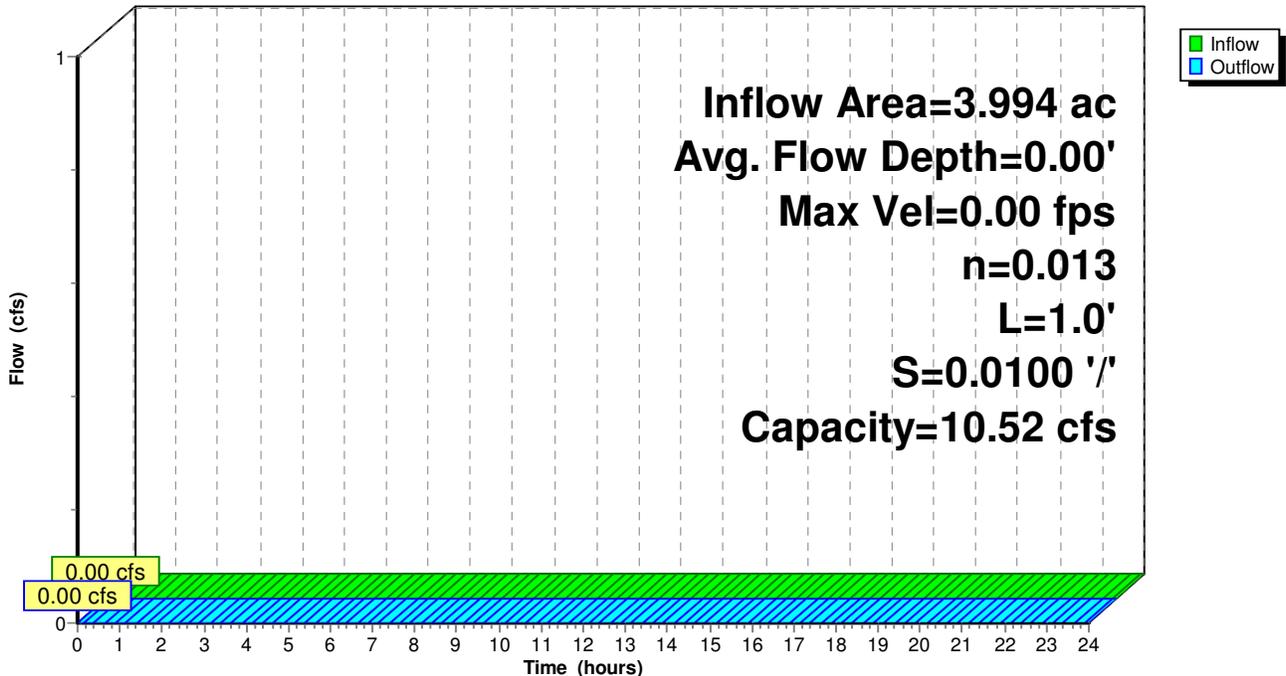
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 10.52 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 1.0' Slope= 0.0100 '/'
Inlet Invert= 31.30', Outlet Invert= 31.29'



Reach 55R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 33

Summary for Pond 1P: INFILTRATION 1

Inflow Area = 1.714 ac, 34.86% Impervious, Inflow Depth = 1.79" for 25-Year event
 Inflow = 3.33 cfs @ 12.10 hrs, Volume= 0.256 af
 Outflow = 0.24 cfs @ 11.75 hrs, Volume= 0.256 af, Atten= 93%, Lag= 0.0 min
 Discarded = 0.24 cfs @ 11.75 hrs, Volume= 0.256 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 38.12' @ 14.66 hrs Surf.Area= 0.029 ac Storage= 0.110 af
 Flood Elev= 42.00' Surf.Area= 0.029 ac Storage= 0.120 af

Plug-Flow detention time= 206.5 min calculated for 0.256 af (100% of inflow)
 Center-of-Mass det. time= 206.4 min (1,071.5 - 865.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	32.25'	0.051 af	46.67'W x 27.24'L x 6.75'H Field A 0.197 af Overall - 0.069 af Embedded = 0.128 af x 40.0% Voids
#2A	33.00'	0.069 af	ADS_StormTech MC-4500 +Cap x 25 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		0.120 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	32.25'	8.270 in/hr Exfiltration over Surface area
#2	Primary	39.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.24 cfs @ 11.75 hrs HW=32.38' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=32.25' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 34

Pond 1P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

5 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 25.24' Row Length +12.0" End Stone x 2 = 27.24' Base Length

5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

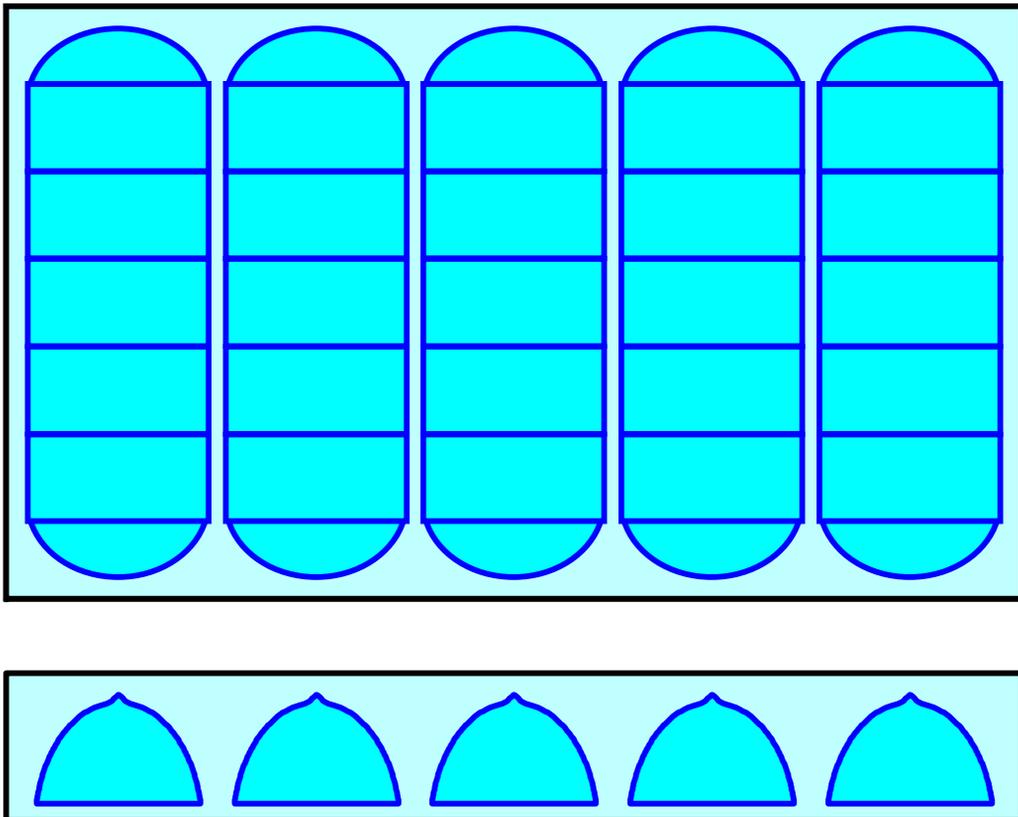
25 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 3,019.3 cf Chamber Storage

8,581.1 cf Field - 3,019.3 cf Chambers = 5,561.9 cf Stone x 40.0% Voids = 2,224.7 cf Stone Storage

Chamber Storage + Stone Storage = 5,244.0 cf = 0.120 af

Overall Storage Efficiency = 61.1%

25 Chambers
317.8 cy Field
206.0 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

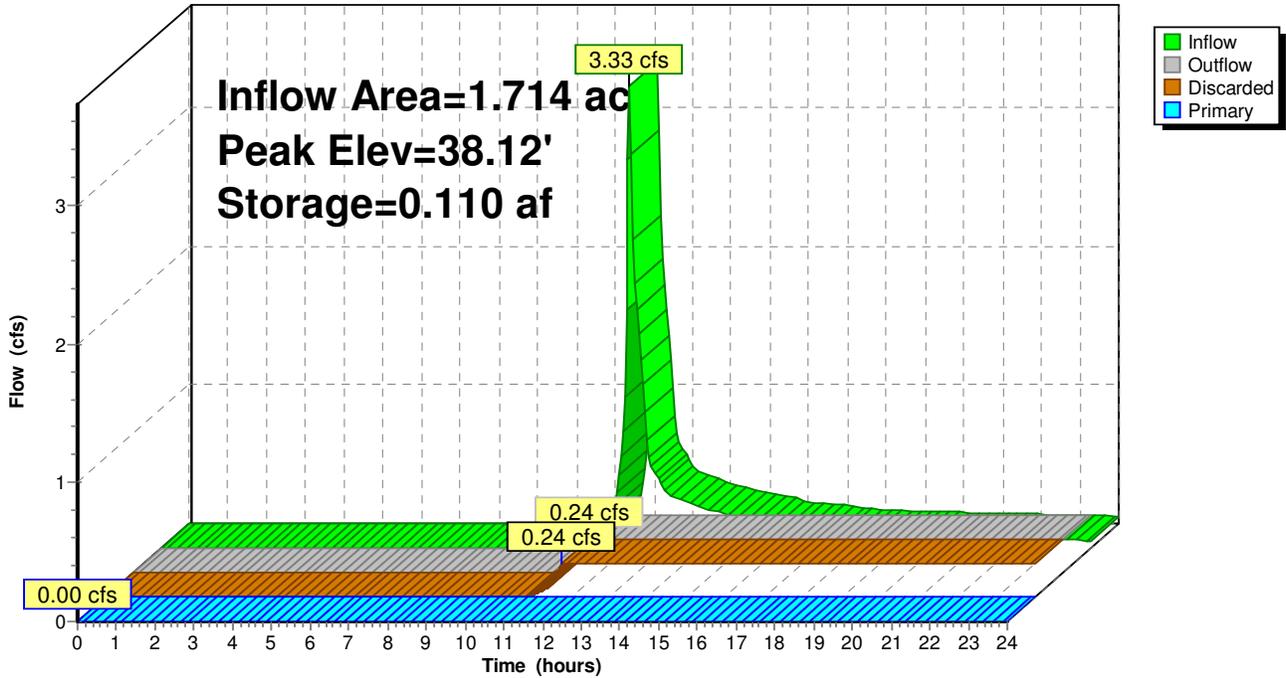
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 35

Pond 1P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 36

Summary for Pond 2P: INFILTRATION 1

Inflow Area = 2.656 ac, 17.98% Impervious, Inflow Depth = 1.48" for 25-Year event
 Inflow = 3.16 cfs @ 12.22 hrs, Volume= 0.328 af
 Outflow = 0.31 cfs @ 11.90 hrs, Volume= 0.328 af, Atten= 90%, Lag= 0.0 min
 Discarded = 0.31 cfs @ 11.90 hrs, Volume= 0.328 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 33.61' @ 15.04 hrs Surf.Area= 0.037 ac Storage= 0.136 af
 Flood Elev= 35.00' Surf.Area= 0.037 ac Storage= 0.158 af

Plug-Flow detention time= 203.0 min calculated for 0.328 af (100% of inflow)
 Center-of-Mass det. time= 203.0 min (1,086.8 - 883.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	28.25'	0.063 af	37.58'W x 43.34'L x 6.75'H Field A 0.252 af Overall - 0.095 af Embedded = 0.158 af x 40.0% Voids
#2A	29.00'	0.095 af	ADS_StormTech MC-4500 +Cap x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.158 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	28.25'	8.270 in/hr Exfiltration over Surface area
#2	Primary	35.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.31 cfs @ 11.90 hrs HW=28.33' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=28.25' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 37

Pond 2P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

9 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 41.34' Row Length +12.0" End Stone x 2 = 43.34' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

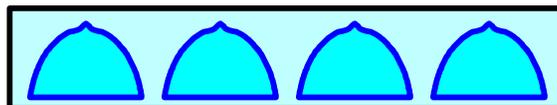
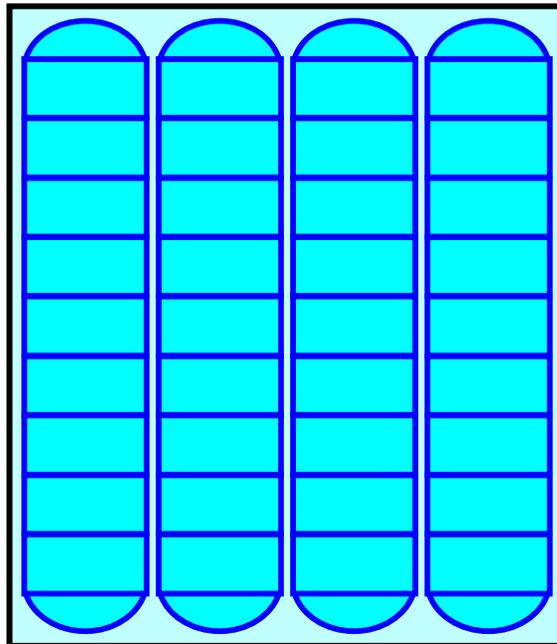
36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 4,119.3 cf Chamber Storage

10,995.2 cf Field - 4,119.3 cf Chambers = 6,876.0 cf Stone x 40.0% Voids = 2,750.4 cf Stone Storage

Chamber Storage + Stone Storage = 6,869.6 cf = 0.158 af

Overall Storage Efficiency = 62.5%

36 Chambers
407.2 cy Field
254.7 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

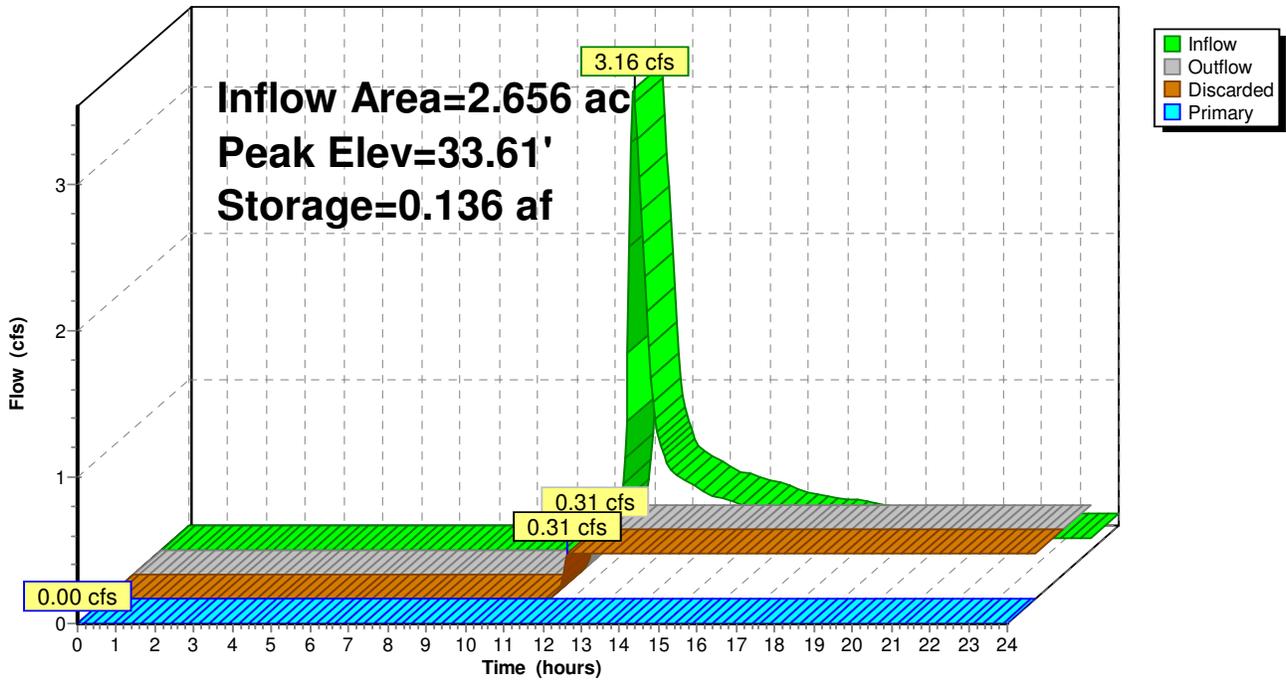
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 38

Pond 2P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 39

Summary for Pond 3P: INFILTRATION 1

Inflow Area = 4.137 ac, 23.77% Impervious, Inflow Depth = 1.26" for 25-Year event
 Inflow = 3.73 cfs @ 12.26 hrs, Volume= 0.433 af
 Outflow = 0.37 cfs @ 12.00 hrs, Volume= 0.433 af, Atten= 90%, Lag= 0.0 min
 Discarded = 0.37 cfs @ 12.00 hrs, Volume= 0.433 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.81' @ 15.65 hrs Surf.Area= 0.044 ac Storage= 0.187 af
 Flood Elev= 27.85' Surf.Area= 0.044 ac Storage= 0.188 af

Plug-Flow detention time= 242.9 min calculated for 0.433 af (100% of inflow)
 Center-of-Mass det. time= 242.8 min (1,138.3 - 895.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	21.10'	0.074 af	37.58'W x 51.39'L x 6.75'H Field A 0.299 af Overall - 0.114 af Embedded = 0.185 af x 40.0% Voids
#2A	21.85'	0.114 af	ADS_StormTech MC-4500 +Cap x 44 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.188 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	21.10'	8.270 in/hr Exfiltration over Surface area
#2	Primary	27.85'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.37 cfs @ 12.00 hrs HW=21.22' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=21.10' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 40

Pond 3P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

44 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 4,971.2 cf Chamber Storage

13,037.4 cf Field - 4,971.2 cf Chambers = 8,066.2 cf Stone x 40.0% Voids = 3,226.5 cf Stone Storage

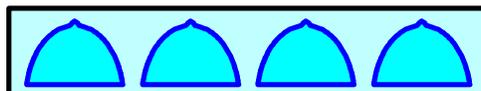
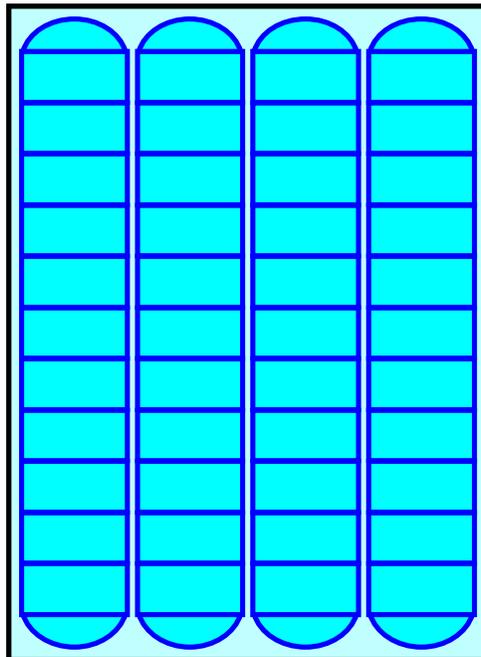
Chamber Storage + Stone Storage = 8,197.7 cf = 0.188 af

Overall Storage Efficiency = 62.9%

44 Chambers

482.9 cy Field

298.7 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

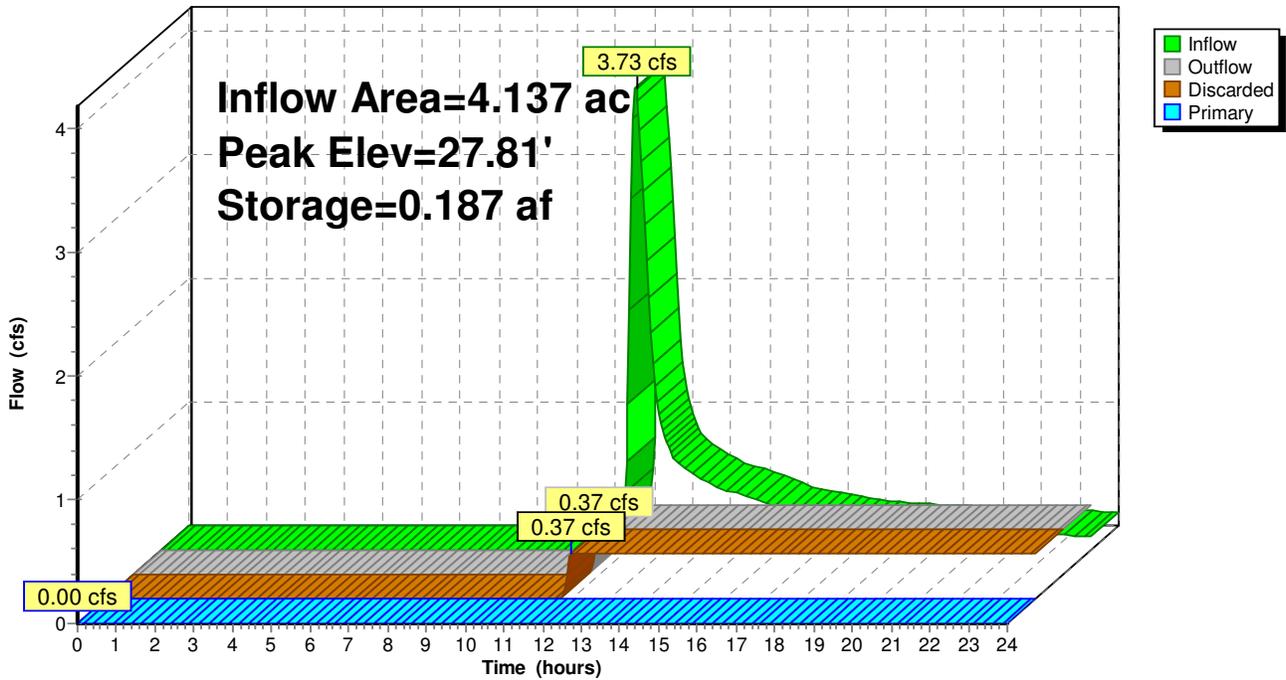
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 41

Pond 3P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 42

Summary for Pond 4P: INFILTRATION 1

Inflow Area = 3.475 ac, 28.50% Impervious, Inflow Depth = 1.48" for 25-Year event
 Inflow = 4.26 cfs @ 12.20 hrs, Volume= 0.428 af
 Outflow = 0.38 cfs @ 11.90 hrs, Volume= 0.428 af, Atten= 91%, Lag= 0.0 min
 Discarded = 0.38 cfs @ 11.90 hrs, Volume= 0.428 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.53' @ 15.32 hrs Surf.Area= 0.045 ac Storage= 0.187 af
 Flood Elev= 34.65' Surf.Area= 0.045 ac Storage= 0.189 af

Plug-Flow detention time= 234.3 min calculated for 0.428 af (100% of inflow)
 Center-of-Mass det. time= 234.3 min (1,117.0 - 882.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	27.90'	0.077 af	55.75'W x 35.29'L x 6.75'H Field A 0.305 af Overall - 0.113 af Embedded = 0.192 af x 40.0% Voids
#2A	28.65'	0.113 af	ADS_StormTech MC-4500 +Cap x 42 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf
		0.189 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.90'	8.270 in/hr Exfiltration over Surface area
#2	Primary	34.65'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.38 cfs @ 11.90 hrs HW=28.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.38 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=27.90' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 43

Pond 4P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

7 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 33.29' Row Length +12.0" End Stone x 2 = 35.29' Base Length

6 Rows x 100.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 55.75' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

42 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 6 Rows = 4,901.0 cf Chamber Storage

13,280.7 cf Field - 4,901.0 cf Chambers = 8,379.7 cf Stone x 40.0% Voids = 3,351.9 cf Stone Storage

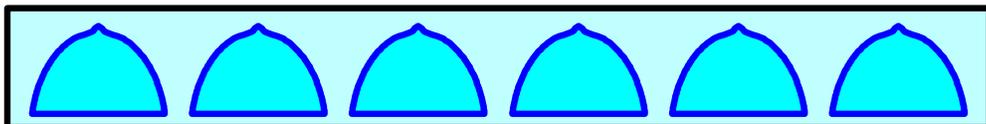
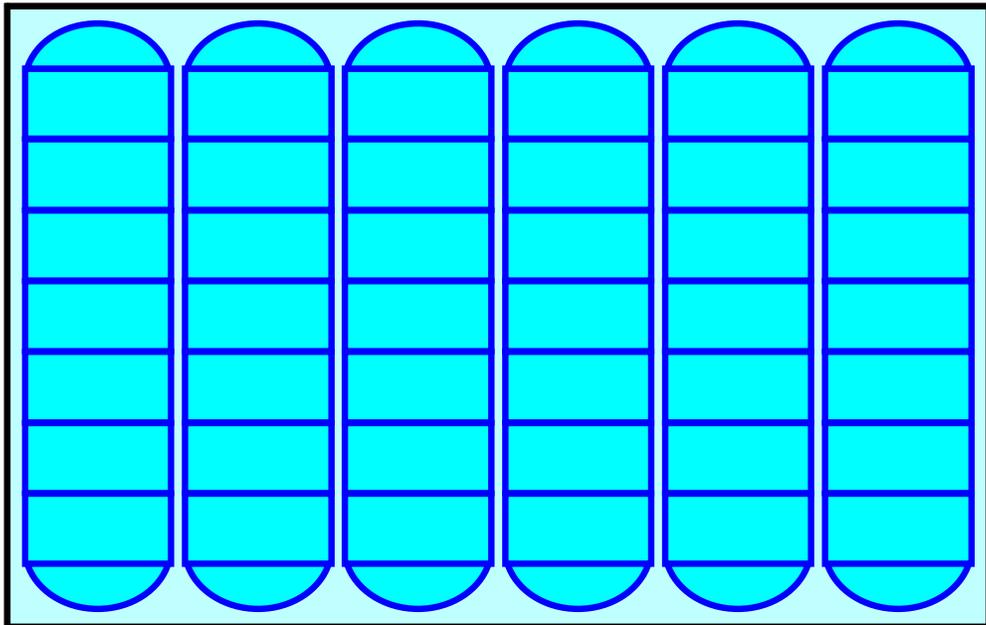
Chamber Storage + Stone Storage = 8,252.9 cf = 0.189 af

Overall Storage Efficiency = 62.1%

42 Chambers

491.9 cy Field

310.4 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

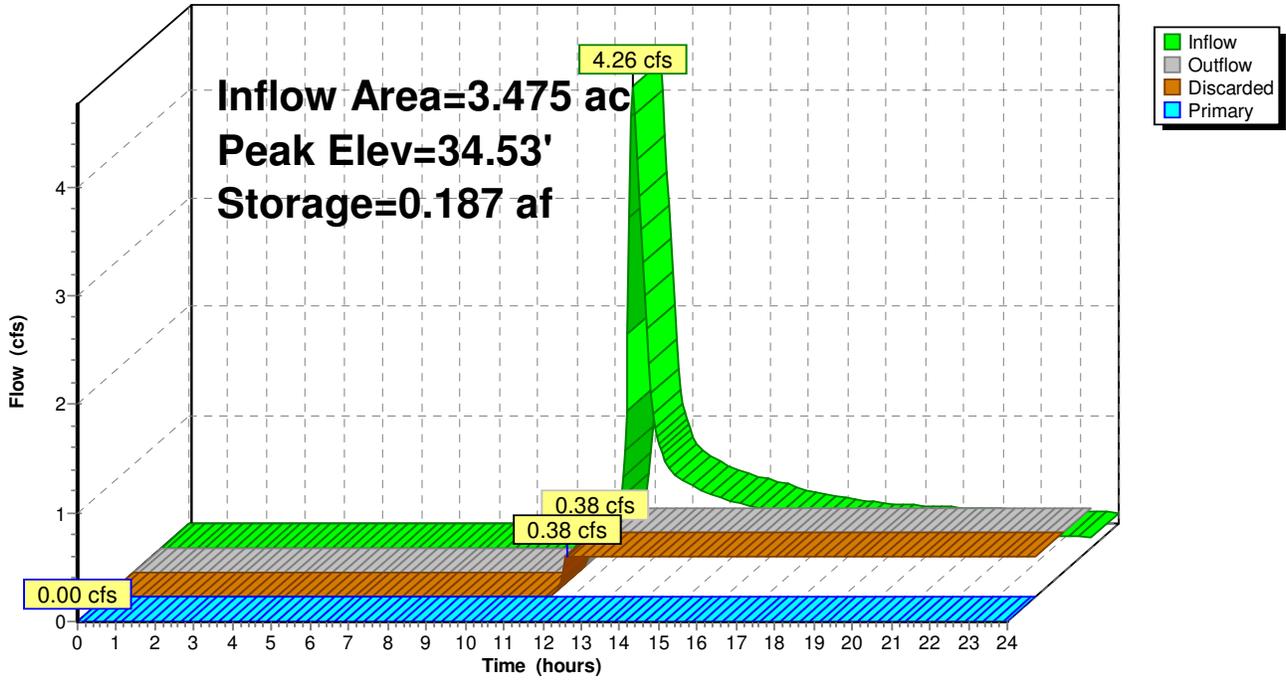
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 44

Pond 4P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 45

Summary for Pond 5P/6P: INFILTRATION 1

Inflow Area = 0.964 ac, 64.13% Impervious, Inflow Depth = 3.31" for 25-Year event
 Inflow = 3.74 cfs @ 12.08 hrs, Volume= 0.266 af
 Outflow = 0.24 cfs @ 11.40 hrs, Volume= 0.266 af, Atten= 94%, Lag= 0.0 min
 Discarded = 0.24 cfs @ 11.40 hrs, Volume= 0.266 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.25' @ 13.99 hrs Surf.Area= 0.028 ac Storage= 0.119 af
 Flood Elev= 34.28' Surf.Area= 0.028 ac Storage= 0.119 af

Plug-Flow detention time= 205.7 min calculated for 0.266 af (100% of inflow)
 Center-of-Mass det. time= 205.5 min (1,026.4 - 820.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	27.53'	0.048 af	28.50'W x 43.34'L x 6.75'H Field A 0.191 af Overall - 0.071 af Embedded = 0.120 af x 40.0% Voids
#2A	28.28'	0.071 af	ADS_StormTech MC-4500 +Cap x 27 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		0.119 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.53'	8.270 in/hr Exfiltration over Surface area
#2	Primary	34.28'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.24 cfs @ 11.40 hrs HW=27.60' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=27.53' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 46

Pond 5P/6P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

9 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 41.34' Row Length +12.0" End Stone x 2 = 43.34' Base Length

3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

27 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 3,089.4 cf Chamber Storage

8,337.9 cf Field - 3,089.4 cf Chambers = 5,248.4 cf Stone x 40.0% Voids = 2,099.4 cf Stone Storage

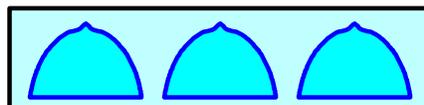
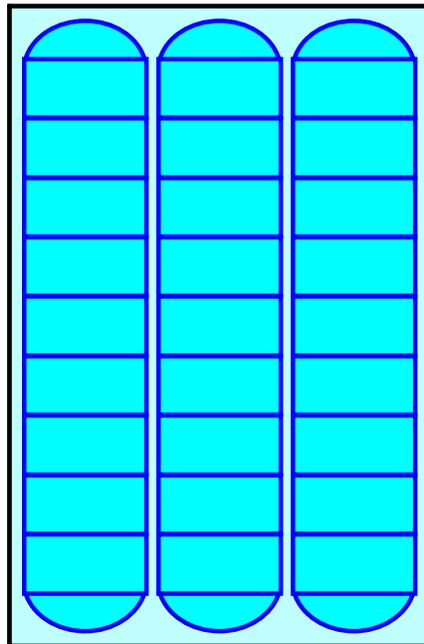
Chamber Storage + Stone Storage = 5,188.8 cf = 0.119 af

Overall Storage Efficiency = 62.2%

27 Chambers

308.8 cy Field

194.4 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

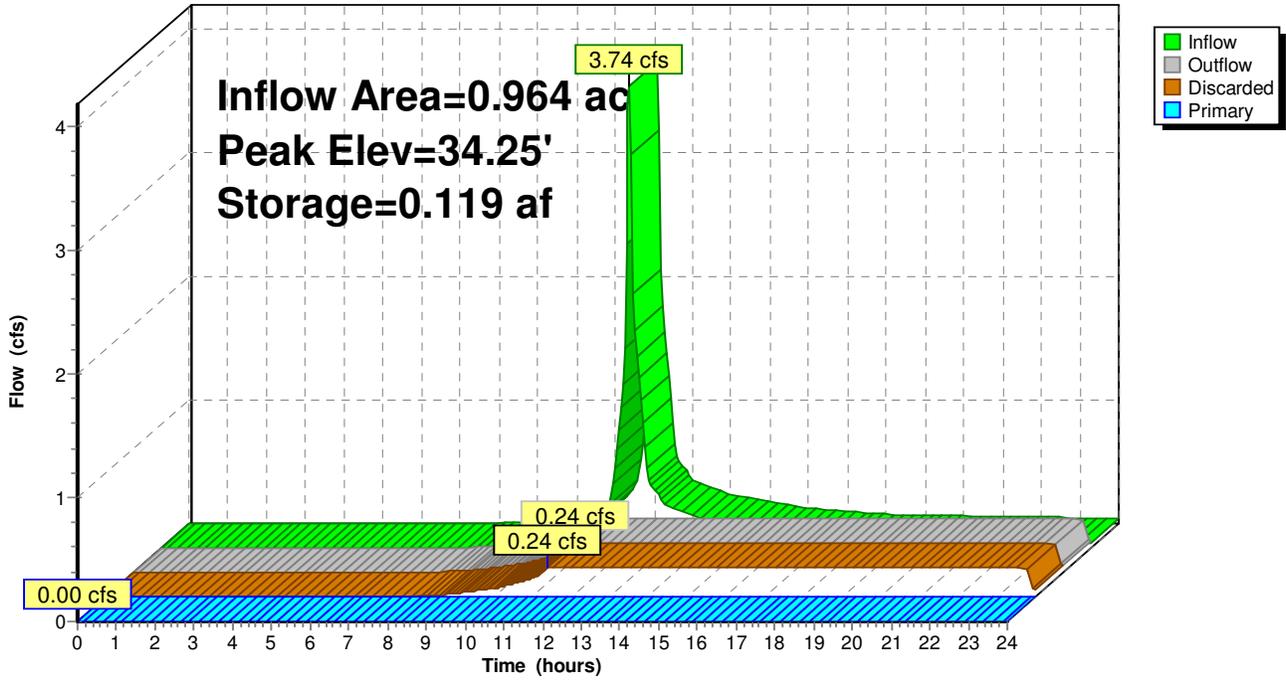
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 47

Pond 5P/6P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 48

Summary for Pond 7P: INFILTRATION 1

Inflow Area = 1.743 ac, 62.25% Impervious, Inflow Depth = 3.21" for 25-Year event
 Inflow = 5.54 cfs @ 12.15 hrs, Volume= 0.466 af
 Outflow = 0.42 cfs @ 11.50 hrs, Volume= 0.466 af, Atten= 92%, Lag= 0.0 min
 Discarded = 0.42 cfs @ 11.50 hrs, Volume= 0.466 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 31.24' @ 14.07 hrs Surf.Area= 0.051 ac Storage= 0.207 af
 Flood Elev= 31.66' Surf.Area= 0.051 ac Storage= 0.215 af

Plug-Flow detention time= 201.5 min calculated for 0.465 af (100% of inflow)
 Center-of-Mass det. time= 201.3 min (1,031.3 - 830.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.91'	0.085 af	46.67'W x 47.37'L x 6.75'H Field A 0.343 af Overall - 0.130 af Embedded = 0.212 af x 40.0% Voids
#2A	25.66'	0.130 af	ADS_StormTech MC-4500 +Cap x 50 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		0.215 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.91'	8.270 in/hr Exfiltration over Surface area
#2	Primary	31.66'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.42 cfs @ 11.50 hrs HW=24.98' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.91' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 49

Pond 7P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

10 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 45.37' Row Length +12.0" End Stone x 2 = 47.37' Base Length

5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

50 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 5,681.5 cf Chamber Storage

14,920.5 cf Field - 5,681.5 cf Chambers = 9,239.0 cf Stone x 40.0% Voids = 3,695.6 cf Stone Storage

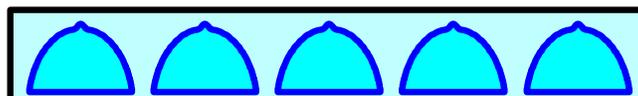
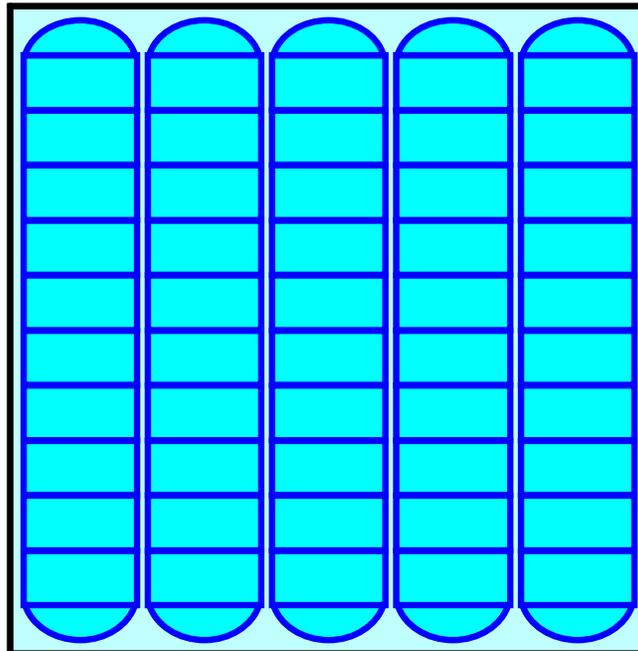
Chamber Storage + Stone Storage = 9,377.1 cf = 0.215 af

Overall Storage Efficiency = 62.8%

50 Chambers

552.6 cy Field

342.2 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

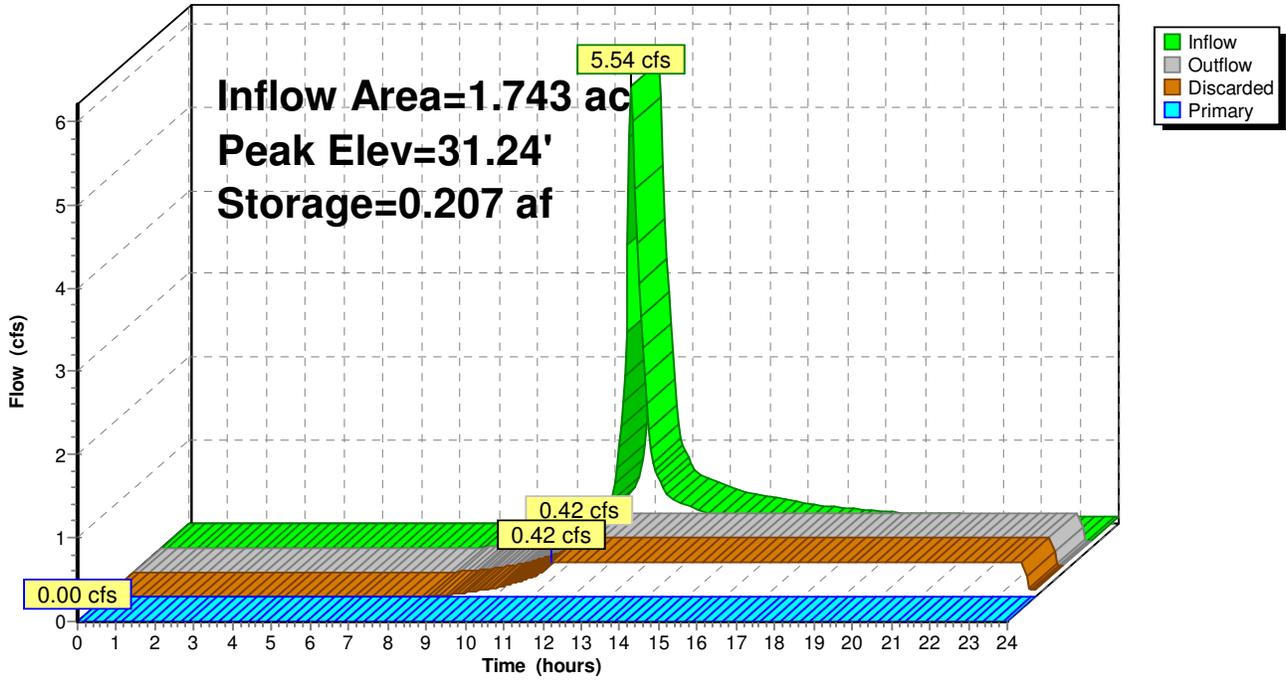
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 50

Pond 7P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 51

Summary for Pond 8P/9P: INFILTRATION 1

Inflow Area = 2.195 ac, 53.43% Impervious, Inflow Depth = 2.69" for 25-Year event
 Inflow = 6.01 cfs @ 12.14 hrs, Volume= 0.493 af
 Outflow = 0.46 cfs @ 11.65 hrs, Volume= 0.493 af, Atten= 92%, Lag= 0.0 min
 Discarded = 0.46 cfs @ 11.65 hrs, Volume= 0.493 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 28.39' @ 14.19 hrs Surf.Area= 0.055 ac Storage= 0.218 af
 Flood Elev= 29.11' Surf.Area= 0.055 ac Storage= 0.234 af

Plug-Flow detention time= 204.3 min calculated for 0.492 af (100% of inflow)
 Center-of-Mass det. time= 204.1 min (1,046.1 - 842.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	22.36'	0.090 af	37.58'W x 63.47'L x 6.75'H Field A 0.370 af Overall - 0.143 af Embedded = 0.226 af x 40.0% Voids
#2A	23.11'	0.143 af	ADS_StormTech MC-4500 +Cap x 56 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.234 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.36'	8.270 in/hr Exfiltration over Surface area
#2	Primary	29.11'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.46 cfs @ 11.65 hrs HW=22.44' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.46 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.36' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 52

Pond 8P/9P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

14 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 61.47' Row Length +12.0" End Stone x 2 = 63.47' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

56 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 6,249.1 cf Chamber Storage

16,100.7 cf Field - 6,249.1 cf Chambers = 9,851.6 cf Stone x 40.0% Voids = 3,940.7 cf Stone Storage

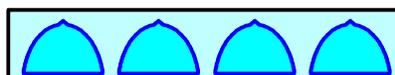
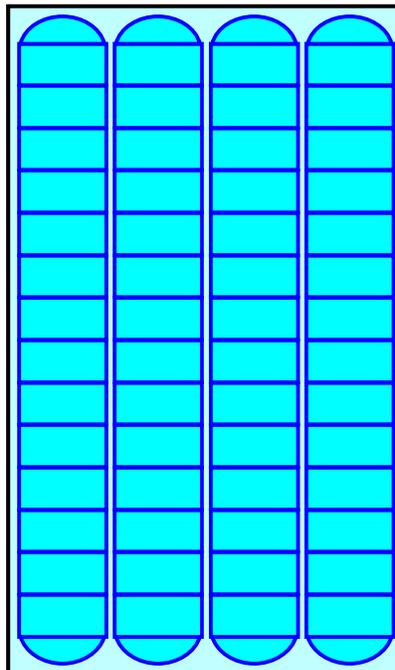
Chamber Storage + Stone Storage = 10,189.7 cf = 0.234 af

Overall Storage Efficiency = 63.3%

56 Chambers

596.3 cy Field

364.9 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

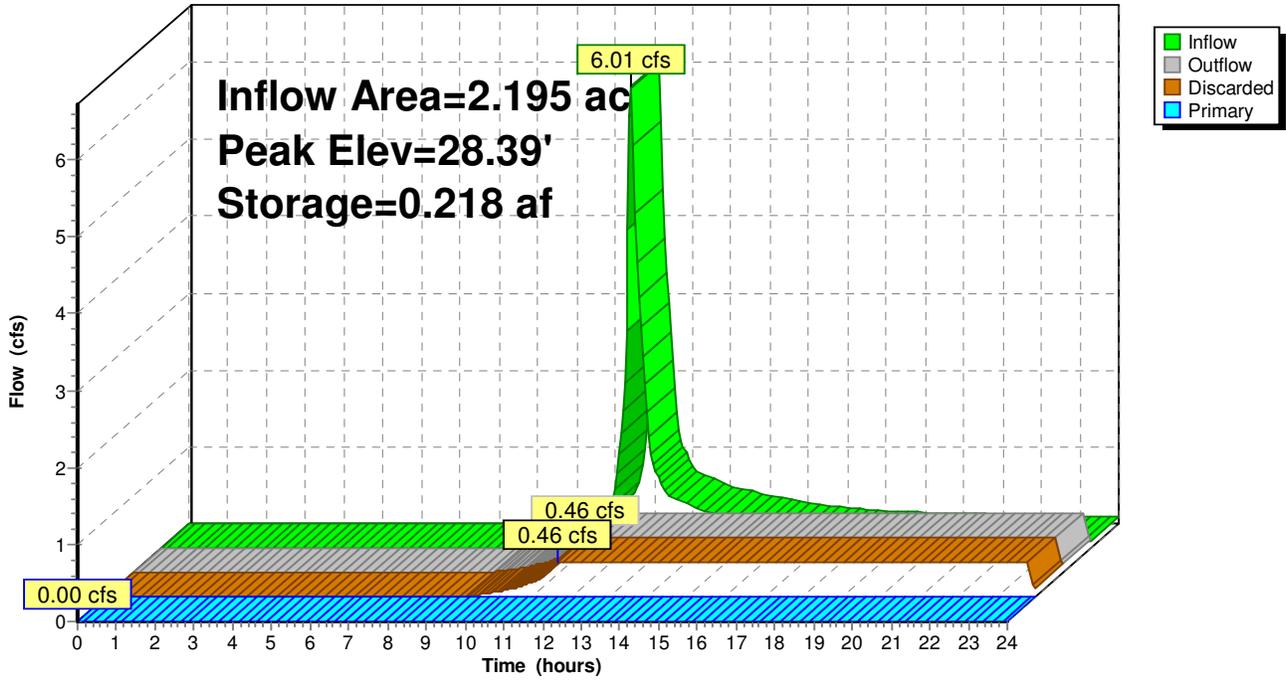
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 53

Pond 8P/9P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 54

Summary for Pond 10P-14P: INFILTRATION 1

Inflow Area = 3.994 ac, 36.47% Impervious, Inflow Depth = 1.87" for 25-Year event
 Inflow = 5.78 cfs @ 12.17 hrs, Volume= 0.621 af
 Outflow = 0.55 cfs @ 11.75 hrs, Volume= 0.621 af, Atten= 91%, Lag= 0.0 min
 Discarded = 0.55 cfs @ 11.75 hrs, Volume= 0.621 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 26.71' @ 14.98 hrs Surf.Area= 0.066 ac Storage= 0.273 af
 Flood Elev= 26.98' Surf.Area= 0.066 ac Storage= 0.280 af

Plug-Flow detention time= 226.3 min calculated for 0.621 af (100% of inflow)
 Center-of-Mass det. time= 226.2 min (1,093.3 - 867.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.23'	0.109 af	55.75'W x 51.39'L x 6.75'H Field A 0.444 af Overall - 0.171 af Embedded = 0.273 af x 40.0% Voids
#2A	20.98'	0.171 af	ADS_StormTech MC-4500 +Cap x 66 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf
		0.280 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.23'	8.270 in/hr Exfiltration over Surface area
#2	Primary	26.98'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.55 cfs @ 11.75 hrs HW=20.31' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.55 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.23' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 55

Pond 10P-14P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length

6 Rows x 100.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 55.75' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

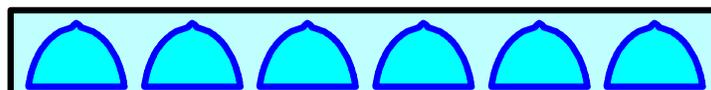
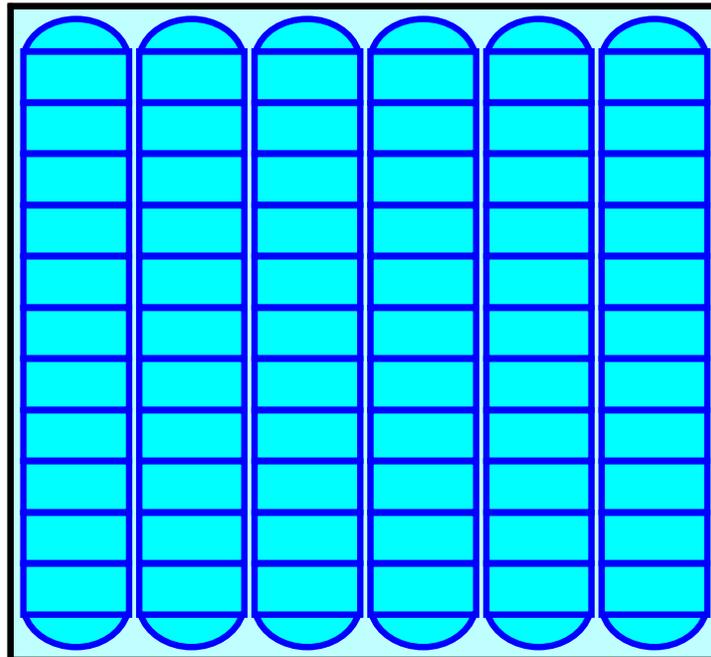
66 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 6 Rows = 7,456.8 cf Chamber Storage

19,339.3 cf Field - 7,456.8 cf Chambers = 11,882.6 cf Stone x 40.0% Voids = 4,753.0 cf Stone Storage

Chamber Storage + Stone Storage = 12,209.8 cf = 0.280 af

Overall Storage Efficiency = 63.1%

66 Chambers
716.3 cy Field
440.1 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

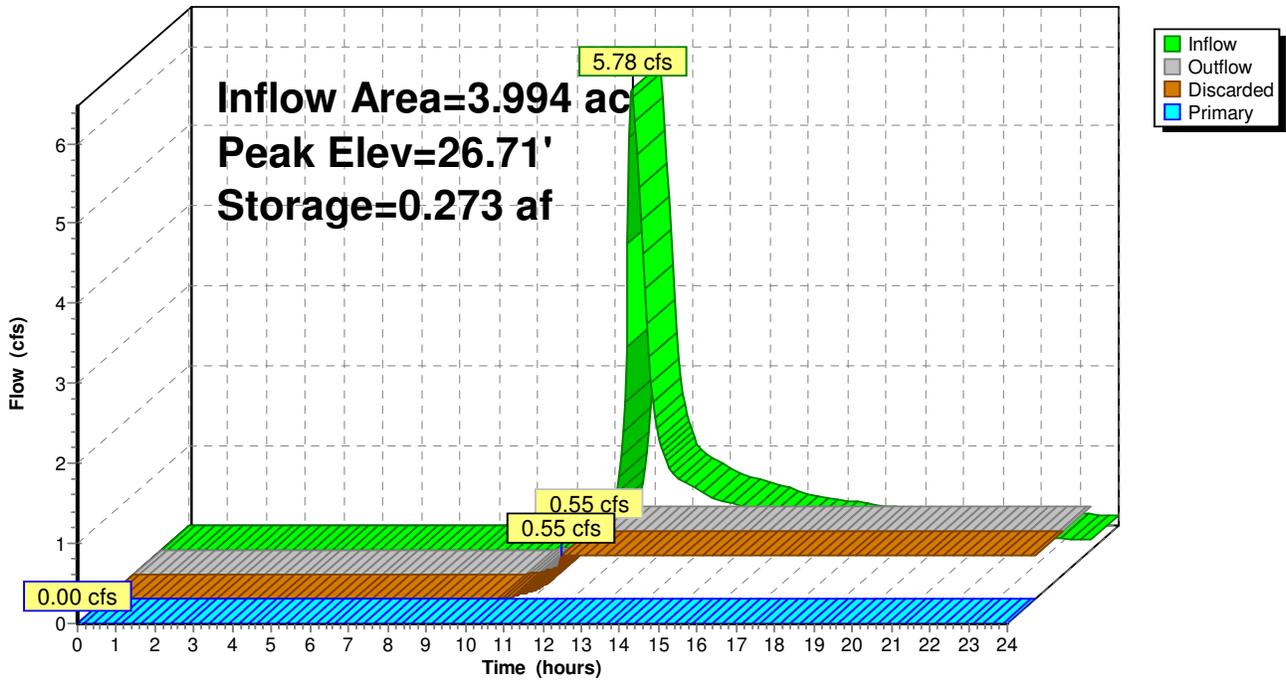
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 56

Pond 10P-14P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 57

Summary for Pond 15P: INFILTRATION 1

Inflow Area = 5.029 ac, 28.62% Impervious, Inflow Depth = 1.48" for 25-Year event
 Inflow = 3.75 cfs @ 12.64 hrs, Volume= 0.620 af
 Outflow = 0.53 cfs @ 12.15 hrs, Volume= 0.620 af, Atten= 86%, Lag= 0.0 min
 Discarded = 0.53 cfs @ 12.15 hrs, Volume= 0.620 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 26.97' @ 15.85 hrs Surf.Area= 0.064 ac Storage= 0.267 af
 Flood Elev= 27.17' Surf.Area= 0.064 ac Storage= 0.272 af

Plug-Flow detention time= 235.0 min calculated for 0.619 af (100% of inflow)
 Center-of-Mass det. time= 234.8 min (1,144.3 - 909.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.42'	0.105 af	46.67'W x 59.44'L x 6.75'H Field A 0.430 af Overall - 0.167 af Embedded = 0.263 af x 40.0% Voids
#2A	21.17'	0.167 af	ADS_StormTech MC-4500 +Cap x 65 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		0.272 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.42'	8.270 in/hr Exfiltration over Surface area
#2	Primary	27.17'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.53 cfs @ 12.15 hrs HW=20.50' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.42' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 58

Pond 15P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

13 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 57.44' Row Length +12.0" End Stone x 2 = 59.44' Base Length

5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

65 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 7,278.9 cf Chamber Storage

18,724.1 cf Field - 7,278.9 cf Chambers = 11,445.2 cf Stone x 40.0% Voids = 4,578.1 cf Stone Storage

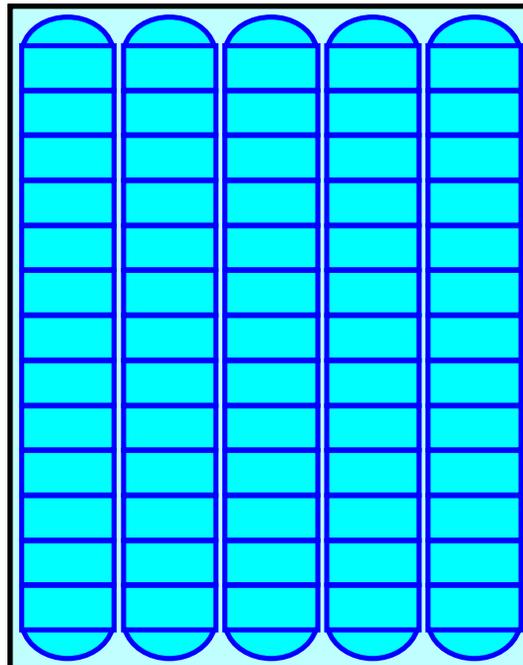
Chamber Storage + Stone Storage = 11,857.0 cf = 0.272 af

Overall Storage Efficiency = 63.3%

65 Chambers

693.5 cy Field

423.9 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

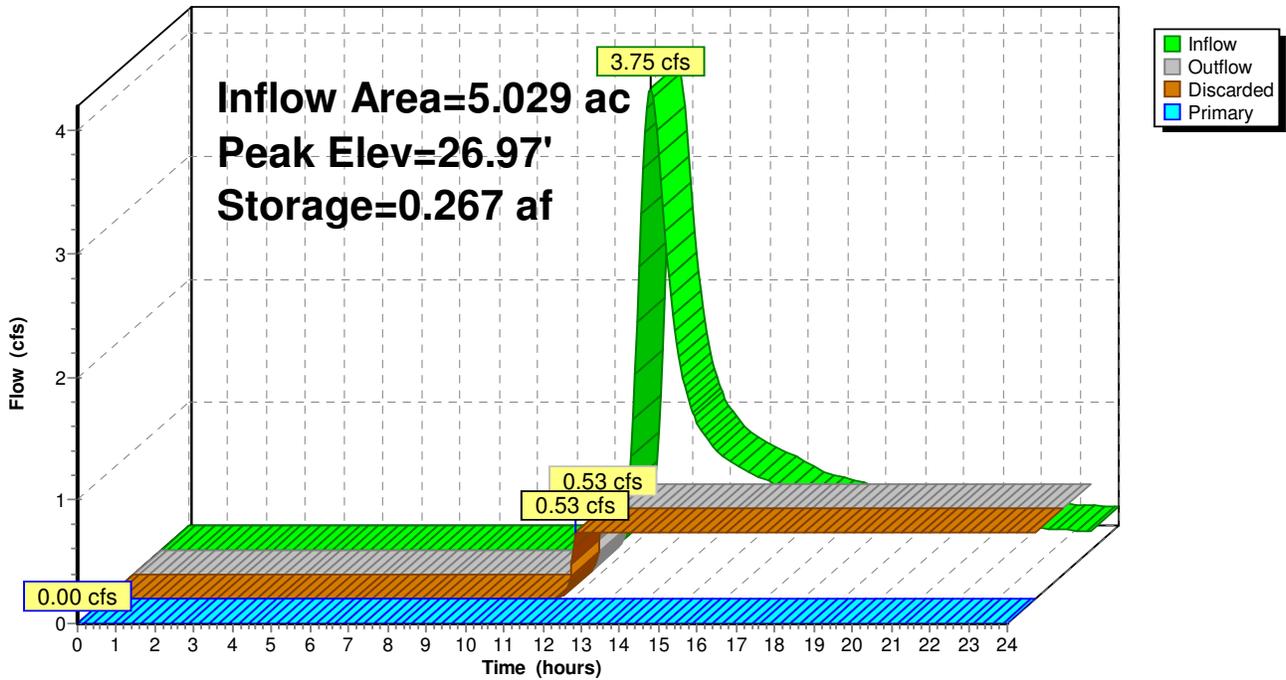
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 59

Pond 15P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 60

Summary for Pond 100Y LP-1: LOW SPOT ROAD G STA 15-19

[62] Hint: Exceeded Reach 46R OUTLET depth by 0.33' @ 0.00 hrs

[62] Hint: Exceeded Reach 49R OUTLET depth by 0.33' @ 0.00 hrs

[62] Hint: Exceeded Reach 51R OUTLET depth by 0.33' @ 0.00 hrs

Inflow Area = 8.809 ac, 30.47% Impervious, Inflow Depth = 0.00" for 25-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 36.50' @ 0.00 hrs Surf.Area= 5,746 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description			
#1	36.50'	27,083 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
36.50	5,746	507.0	0	0	5,746	
36.75	11,030	581.3	2,061	2,061	12,182	
37.00	17,237	676.0	3,505	5,566	21,658	
37.25	24,463	759.5	5,186	10,752	31,199	
37.50	32,551	841.3	7,103	17,855	41,621	
37.75	41,455	951.0	9,228	27,083	57,269	

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.50'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.50' (Free Discharge)

↑ **1=Exfiltration** (Passes 0.00 cfs of 1.10 cfs potential flow)

ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

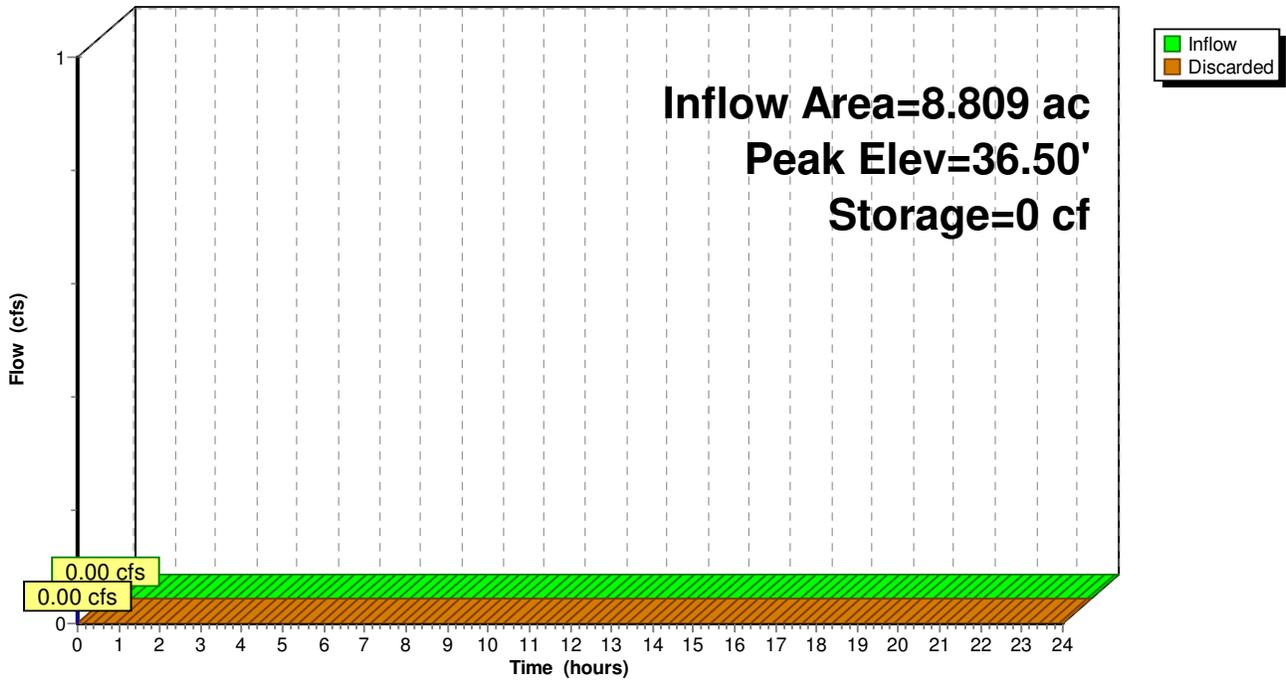
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 61

Pond 100Y LP-1: LOW SPOT ROAD G STA 15-19

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 62

Summary for Pond 100Y LP-2: Low Spot Road I

- [62] Hint: Exceeded Reach 48R OUTLET depth by 0.20' @ 0.00 hrs
- [62] Hint: Exceeded Reach 52R OUTLET depth by 0.20' @ 0.00 hrs
- [62] Hint: Exceeded Reach 53R OUTLET depth by 0.20' @ 0.00 hrs
- [62] Hint: Exceeded Reach 54R OUTLET depth by 0.20' @ 0.00 hrs
- [63] Warning: Exceeded Reach 55R INLET depth by 0.20' @ 0.00 hrs

Inflow Area = 17.098 ac, 35.90% Impervious, Inflow Depth = 0.00" for 25-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 31.50' @ 0.00 hrs Surf.Area= 3,929 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description			
#1	31.50'	70,244 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
31.50	3,929	567.0	0	0	3,929	
31.75	12,215	727.0	1,923	1,923	20,406	
32.00	24,089	969.0	4,455	6,377	53,067	
32.25	43,398	1,543.0	8,318	14,696	167,810	
32.50	63,912	1,964.0	13,331	28,027	285,302	
32.75	85,235	2,322.0	18,580	46,607	407,406	
33.00	104,183	2,279.9	23,638	70,244	422,834	

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.50'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=31.50' (Free Discharge)

↑**1=Exfiltration** (Passes 0.00 cfs of 0.75 cfs potential flow)

ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

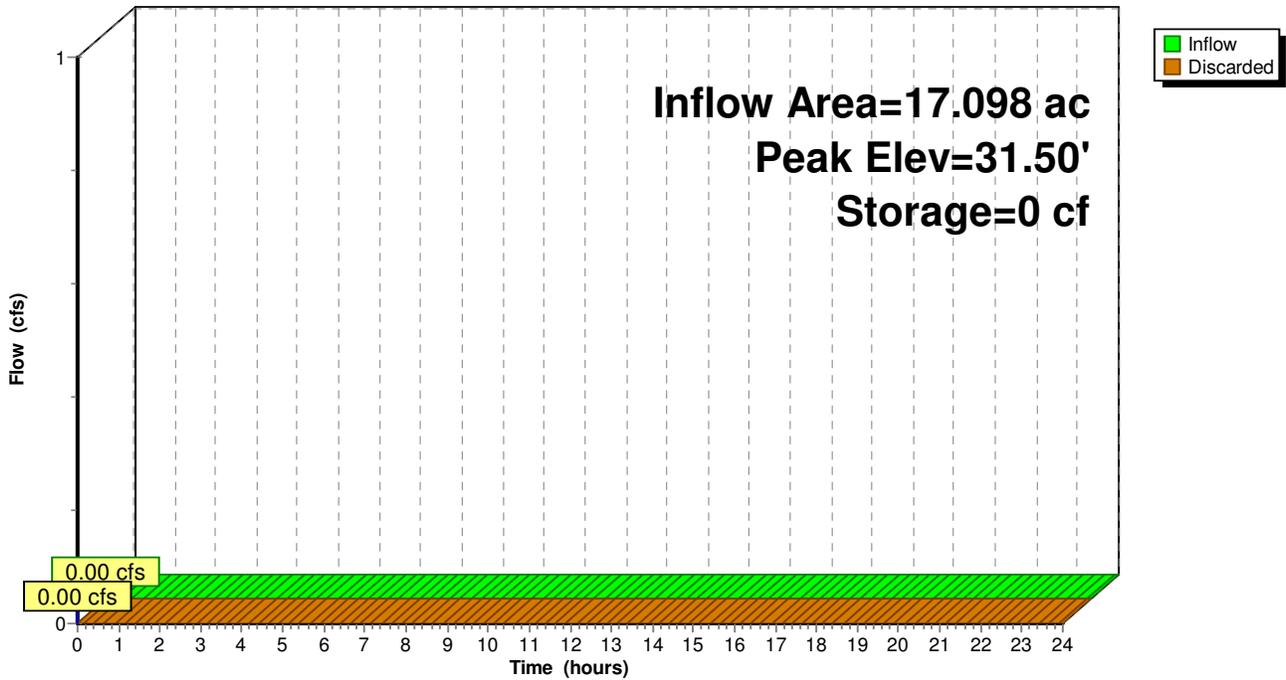
Type III 24-hr 25-Year Rainfall=5.80"

Printed 7/26/2016

Page 63

Pond 100Y LP-2: Low Spot Road I

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 64

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment S#1: S#1	Runoff Area=74,645 sf 34.86% Impervious Runoff Depth=2.75" Flow Length=173' Slope=0.0515 '/' Tc=6.0 min CN=60 Runoff=5.28 cfs 0.392 af
Subcatchment S#10: S#10	Runoff Area=36,853 sf 28.96% Impervious Runoff Depth=2.35" Flow Length=225' Slope=0.0140 '/' Tc=15.6 min CN=56 Runoff=1.62 cfs 0.166 af
Subcatchment S#11: S#11	Runoff Area=45,317 sf 45.07% Impervious Runoff Depth=3.36" Flow Length=405' Slope=0.0234 '/' Tc=14.9 min CN=66 Runoff=3.07 cfs 0.291 af
Subcatchment S#12: S#12	Runoff Area=35,592 sf 41.55% Impervious Runoff Depth=3.15" Flow Length=235' Slope=0.0333 '/' Tc=8.5 min CN=64 Runoff=2.68 cfs 0.215 af
Subcatchment S#13: S#13	Runoff Area=23,644 sf 43.86% Impervious Runoff Depth=3.26" Flow Length=117' Slope=0.0184 '/' Tc=6.4 min CN=65 Runoff=2.00 cfs 0.147 af
Subcatchment S#14: S#14	Runoff Area=32,589 sf 22.11% Impervious Runoff Depth=1.97" Flow Length=319' Slope=0.0132 '/' Tc=23.5 min CN=52 Runoff=0.98 cfs 0.123 af
Subcatchment S#15: S#15	Runoff Area=219,043 sf 28.62% Impervious Runoff Depth=2.35" Flow Length=1,119' Slope=0.0258 '/' Tc=41.5 min CN=56 Runoff=6.33 cfs 0.984 af
Subcatchment S#3: S#3	Runoff Area=180,213 sf 23.77% Impervious Runoff Depth=2.06" Flow Length=300' Slope=0.0252 '/' Tc=15.8 min CN=53 Runoff=6.71 cfs 0.710 af
Subcatchment S#5: S#5	Runoff Area=31,300 sf 60.32% Impervious Runoff Depth=4.33" Flow Length=121' Slope=0.0265 '/' Tc=5.0 min CN=75 Runoff=3.64 cfs 0.259 af
Subcatchment S#6: S#6	Runoff Area=10,705 sf 75.27% Impervious Runoff Depth=5.22" Flow Length=121' Slope=0.0370 '/' Tc=5.0 min CN=83 Runoff=1.48 cfs 0.107 af
Subcatchment S#7: S#7	Runoff Area=75,917 sf 62.25% Impervious Runoff Depth=4.44" Flow Length=405' Slope=0.0259 '/' Tc=10.8 min CN=76 Runoff=7.65 cfs 0.644 af
Subcatchment S#8: S#8	Runoff Area=46,691 sf 52.51% Impervious Runoff Depth=3.79" Flow Length=269' Slope=0.0219 '/' Tc=10.0 min CN=70 Runoff=4.10 cfs 0.338 af
Subcatchment S#9: S#9	Runoff Area=48,922 sf 54.31% Impervious Runoff Depth=3.89" Flow Length=214' Slope=0.0177 '/' Tc=9.1 min CN=71 Runoff=4.52 cfs 0.364 af
Subcatchment S2: S#2	Runoff Area=115,715 sf 17.98% Impervious Runoff Depth=2.35" Flow Length=300' Slope=0.0283 '/' Tc=13.8 min CN=56 Runoff=5.36 cfs 0.520 af
Subcatchment S4: S#4	Runoff Area=151,367 sf 28.50% Impervious Runoff Depth=2.35" Flow Length=300' Slope=0.0338 '/' Tc=12.6 min CN=56 Runoff=7.21 cfs 0.680 af
Reach 46R: TO LP 1	Avg. Flow Depth=0.15' Max Vel=2.26 fps Inflow=3.59 cfs 0.089 af n=0.013 L=467.7' S=0.0082 '/' Capacity=9.55 cfs Outflow=1.81 cfs 0.089 af

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 65

Reach 48R: TO LP2	Avg. Flow Depth=0.24' Max Vel=2.41 fps Inflow=6.39 cfs 0.215 af n=0.013 L=370.0' S=0.0053 '/' Capacity=7.64 cfs Outflow=3.68 cfs 0.215 af
Reach 49R: TO LP 1	Avg. Flow Depth=0.19' Max Vel=3.27 fps Inflow=5.05 cfs 0.122 af n=0.013 L=190.0' S=0.0149 '/' Capacity=12.84 cfs Outflow=3.24 cfs 0.122 af
Reach 50R: (new Reach)	Inflow=4.47 cfs 0.189 af Outflow=4.47 cfs 0.189 af
Reach 51R: TO LP 1	Avg. Flow Depth=0.14' Max Vel=2.32 fps Inflow=2.12 cfs 0.066 af n=0.013 L=431.0' S=0.0094 '/' Capacity=10.20 cfs Outflow=1.69 cfs 0.066 af
Reach 52R: TO LP2	Avg. Flow Depth=0.20' Max Vel=2.43 fps Inflow=7.12 cfs 0.110 af n=0.013 L=592.0' S=0.0066 '/' Capacity=8.53 cfs Outflow=2.96 cfs 0.110 af
Reach 53R: TO LP2	Avg. Flow Depth=0.31' Max Vel=1.87 fps Inflow=6.87 cfs 0.128 af n=0.013 L=184.0' S=0.0024 '/' Capacity=5.20 cfs Outflow=4.11 cfs 0.128 af
Reach 54R: TO LP2	Avg. Flow Depth=0.37' Max Vel=1.10 fps Inflow=6.20 cfs 0.276 af n=0.013 L=372.0' S=0.0006 '/' Capacity=2.62 cfs Outflow=3.30 cfs 0.276 af
Reach 55R: TO LP2	Avg. Flow Depth=0.33' Max Vel=4.17 fps Inflow=10.66 cfs 0.228 af n=0.013 L=1.0' S=0.0100 '/' Capacity=10.52 cfs Outflow=10.64 cfs 0.228 af
Pond 1P: INFILTRATION 1	Peak Elev=39.27' Storage=0.120 af Inflow=5.28 cfs 0.392 af Discarded=0.24 cfs 0.304 af Primary=3.59 cfs 0.089 af Outflow=3.84 cfs 0.392 af
Pond 2P: INFILTRATION 1	Peak Elev=35.33' Storage=0.158 af Inflow=5.36 cfs 0.520 af Discarded=0.31 cfs 0.398 af Primary=5.05 cfs 0.122 af Outflow=5.36 cfs 0.520 af
Pond 3P: INFILTRATION 1	Peak Elev=28.24' Storage=0.188 af Inflow=6.71 cfs 0.710 af Discarded=0.37 cfs 0.495 af Primary=6.39 cfs 0.215 af Outflow=6.76 cfs 0.710 af
Pond 4P: INFILTRATION 1	Peak Elev=34.96' Storage=0.189 af Inflow=7.21 cfs 0.680 af Discarded=0.38 cfs 0.491 af Primary=4.47 cfs 0.189 af Outflow=4.85 cfs 0.680 af
Pond 5P/6P: INFILTRATION 1	Peak Elev=34.46' Storage=0.119 af Inflow=5.11 cfs 0.366 af Discarded=0.24 cfs 0.300 af Primary=2.12 cfs 0.066 af Outflow=2.35 cfs 0.366 af
Pond 7P: INFILTRATION 1	Peak Elev=32.08' Storage=0.215 af Inflow=7.65 cfs 0.644 af Discarded=0.42 cfs 0.534 af Primary=7.12 cfs 0.110 af Outflow=7.55 cfs 0.644 af
Pond 8P/9P: INFILTRATION 1	Peak Elev=29.52' Storage=0.234 af Inflow=8.62 cfs 0.702 af Discarded=0.46 cfs 0.575 af Primary=6.87 cfs 0.128 af Outflow=7.33 cfs 0.702 af
Pond 10P-14P: INFILTRATION 1	Peak Elev=27.53' Storage=0.280 af Inflow=9.07 cfs 0.942 af Discarded=0.55 cfs 0.714 af Primary=10.66 cfs 0.228 af Outflow=11.21 cfs 0.942 af
Pond 15P: INFILTRATION 1	Peak Elev=27.55' Storage=0.272 af Inflow=6.33 cfs 0.984 af Discarded=0.53 cfs 0.709 af Primary=6.20 cfs 0.276 af Outflow=6.73 cfs 0.984 af

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 66

Pond 100Y LP-1: LOW SPOT ROAD G STA 15-19 Peak Elev=36.98' Storage=5,172 cf Inflow=8.27 cfs 0.465 af
Outflow=3.18 cfs 0.465 af

Pond 100Y LP-2: Low Spot Road I Peak Elev=32.08' Storage=8,404 cf Inflow=17.48 cfs 0.957 af
Outflow=5.62 cfs 0.957 af

Total Runoff Area = 25.907 ac Runoff Volume = 5.941 af Average Runoff Depth = 2.75"
65.95% Pervious = 17.086 ac 34.05% Impervious = 8.821 ac

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 67

Summary for Subcatchment S#1: S#1

CarlsonPlanXYPos|1757228.0858|95778.6699|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 5.28 cfs @ 12.10 hrs, Volume= 0.392 af, Depth= 2.75"

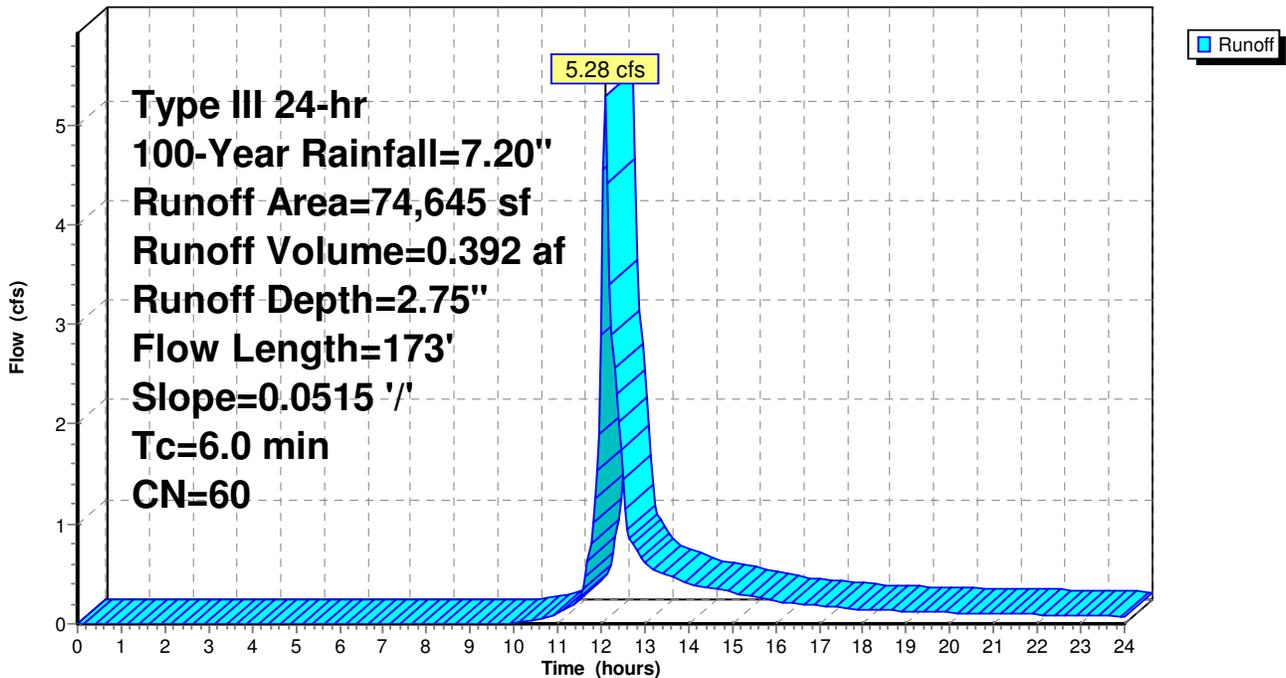
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	26,022	98	Paved Streets w/Curbs & Sewers HSG A
*	48,593	39	Open Space-Good (>75% grass) HSG A
*	30	61	Open Space-Good (>75% grass) HSG B
	74,645	60	Weighted Average
	48,623		65.14% Pervious Area
	26,022		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	173	0.0515	0.48		Lag/CN Method,

Subcatchment S#1: S#1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 68

Summary for Subcatchment S#10: S#10

CarlsonPlanXYPos|1756723.7933|94206.6253|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 1.62 cfs @ 12.23 hrs, Volume= 0.166 af, Depth= 2.35"

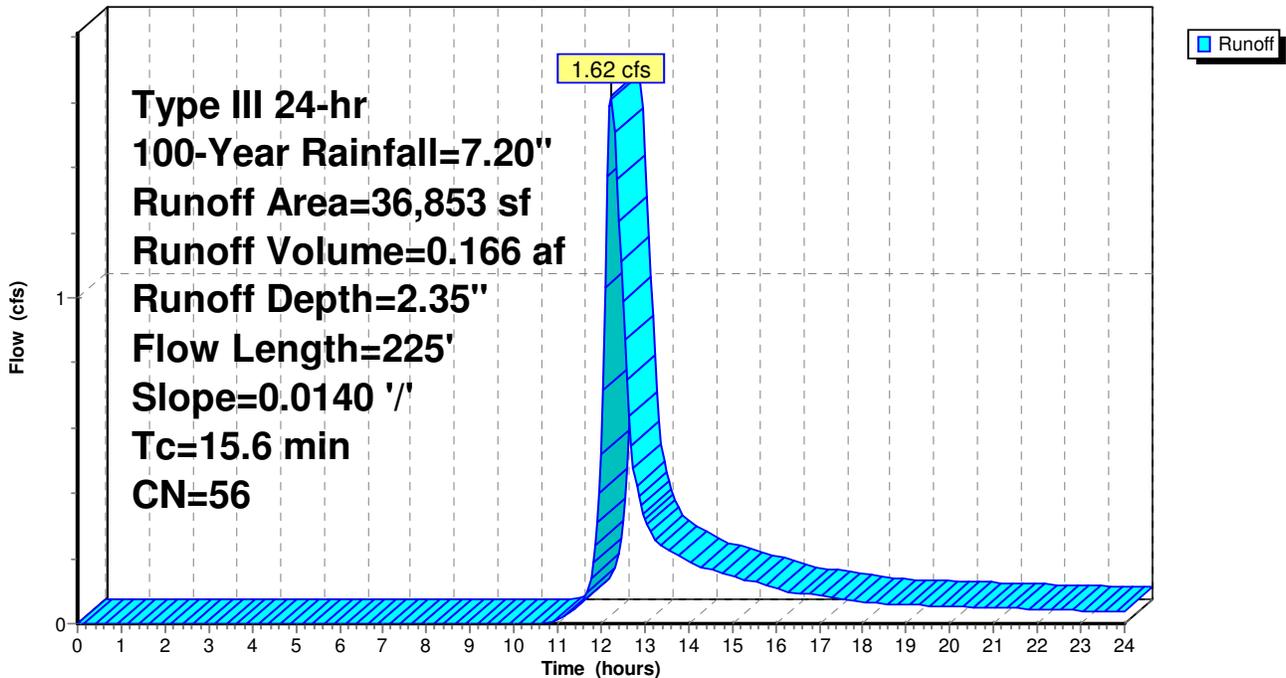
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	10,673	98	Paved Streets w/Curbs & Sewers HSG A
*	26,180	39	Open Space-Good (>75% grass) HSG A
	36,853	56	Weighted Average
	26,180		71.04% Pervious Area
	10,673		28.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	225	0.0140	0.24		Lag/CN Method,

Subcatchment S#10: S#10

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 69

Summary for Subcatchment S#11: S#11

CarlsonPlanXYPos|1756919.3220|94148.5061|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 3.07 cfs @ 12.21 hrs, Volume= 0.291 af, Depth= 3.36"

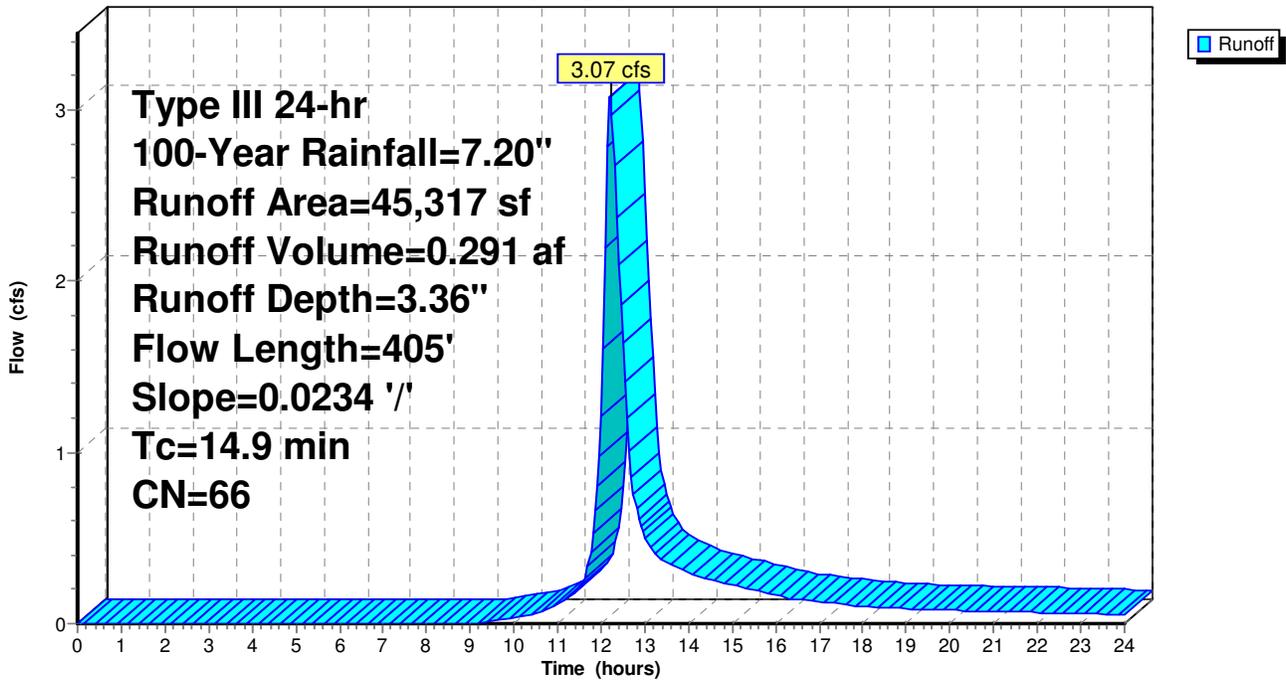
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	20,423	98	Paved Lots Roofs & Driveways HSG A
*	24,894	39	Open Space-Good (>75% grass) HSG A
	45,317	66	Weighted Average
	24,894		54.93% Pervious Area
	20,423		45.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	405	0.0234	0.45		Lag/CN Method,

Subcatchment S#11: S#11

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 70

Summary for Subcatchment S#12: S#12

CarlsonPlanXYPos|1757076.0153|93970.5069|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 2.68 cfs @ 12.13 hrs, Volume= 0.215 af, Depth= 3.15"

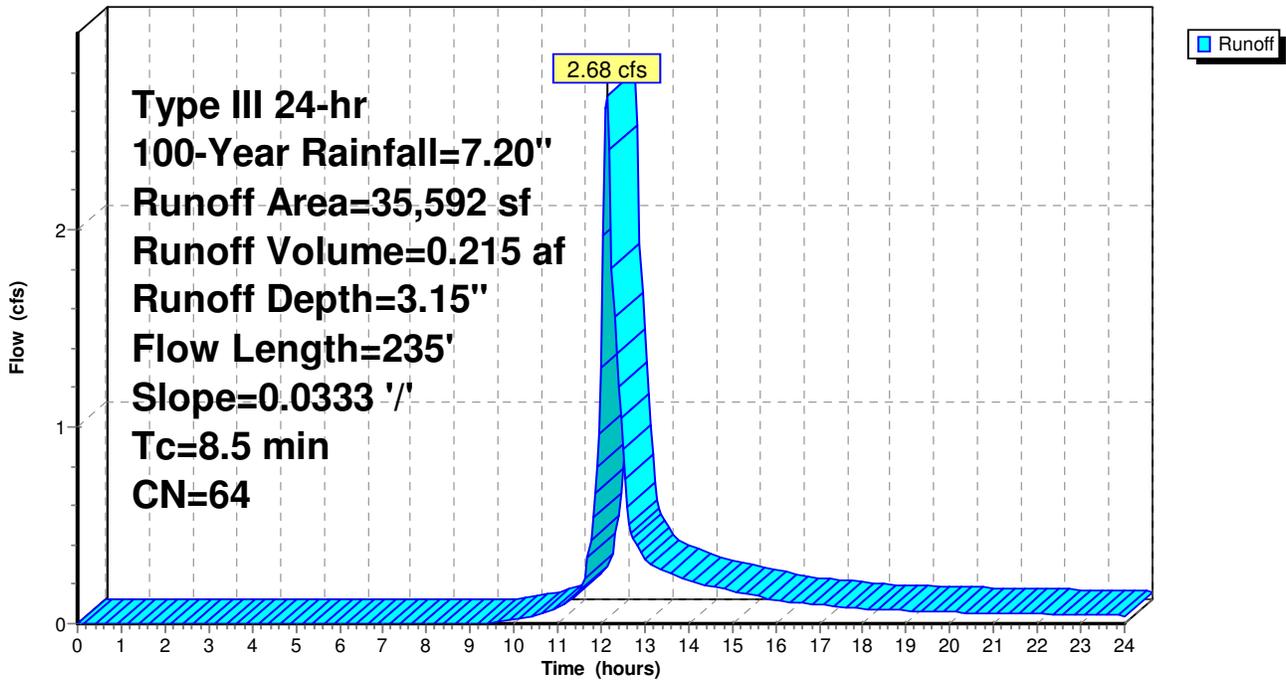
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	14,787	98	Paved Streets w/Curbs & Sewers HSG A
*	20,805	39	Open Space-Good (>75% grass) HSG A
	35,592	64	Weighted Average
	20,805		58.45% Pervious Area
	14,787		41.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	235	0.0333	0.46		Lag/CN Method,

Subcatchment S#12: S#12

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 71

Summary for Subcatchment S#13: S#13

CarlsonPlanXYPos|1757188.0982|94129.7444|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 2.00 cfs @ 12.10 hrs, Volume= 0.147 af, Depth= 3.26"

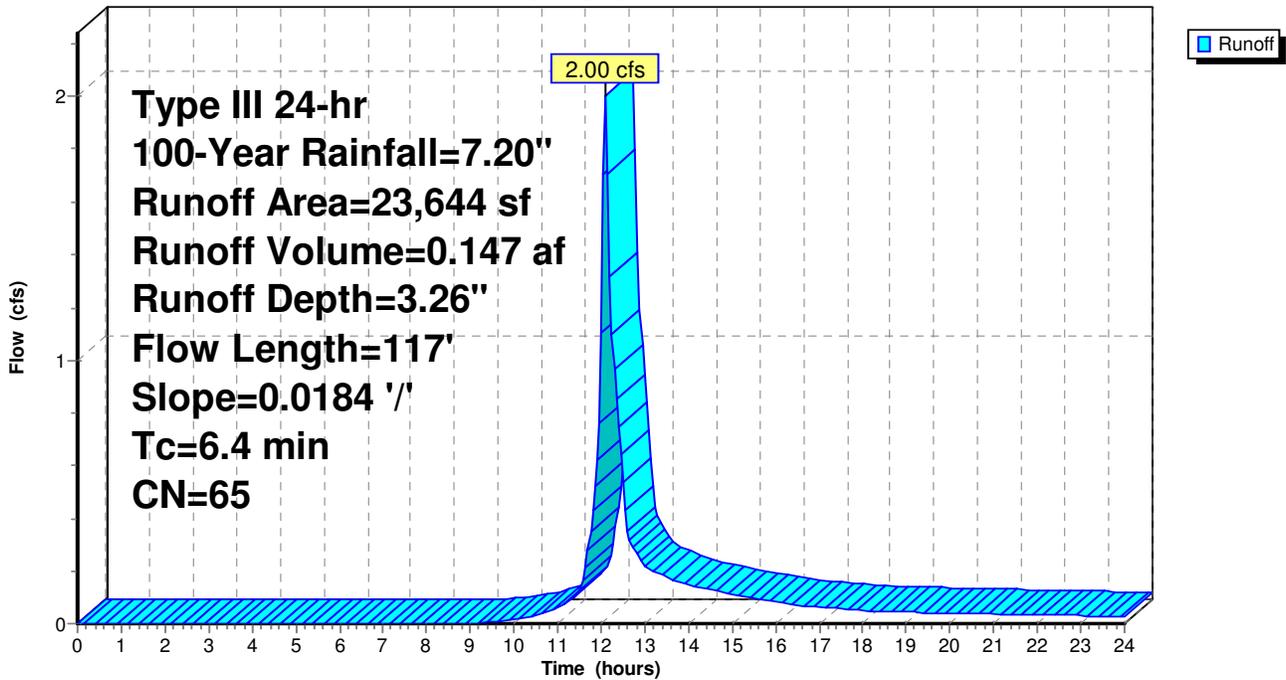
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	10,371	98	Paved Streets w/Curbs & Sewers HSG A
*	13,273	39	Open Space-Good (>75% grass) HSG A
	23,644	65	Weighted Average
	13,273		56.14% Pervious Area
	10,371		43.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	117	0.0184	0.30		Lag/CN Method,

Subcatchment S#13: S#13

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 72

Summary for Subcatchment S#14: S#14

CarlsonPlanXYPos|1757004.6545|94296.5616|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 0.98 cfs @ 12.37 hrs, Volume= 0.123 af, Depth= 1.97"

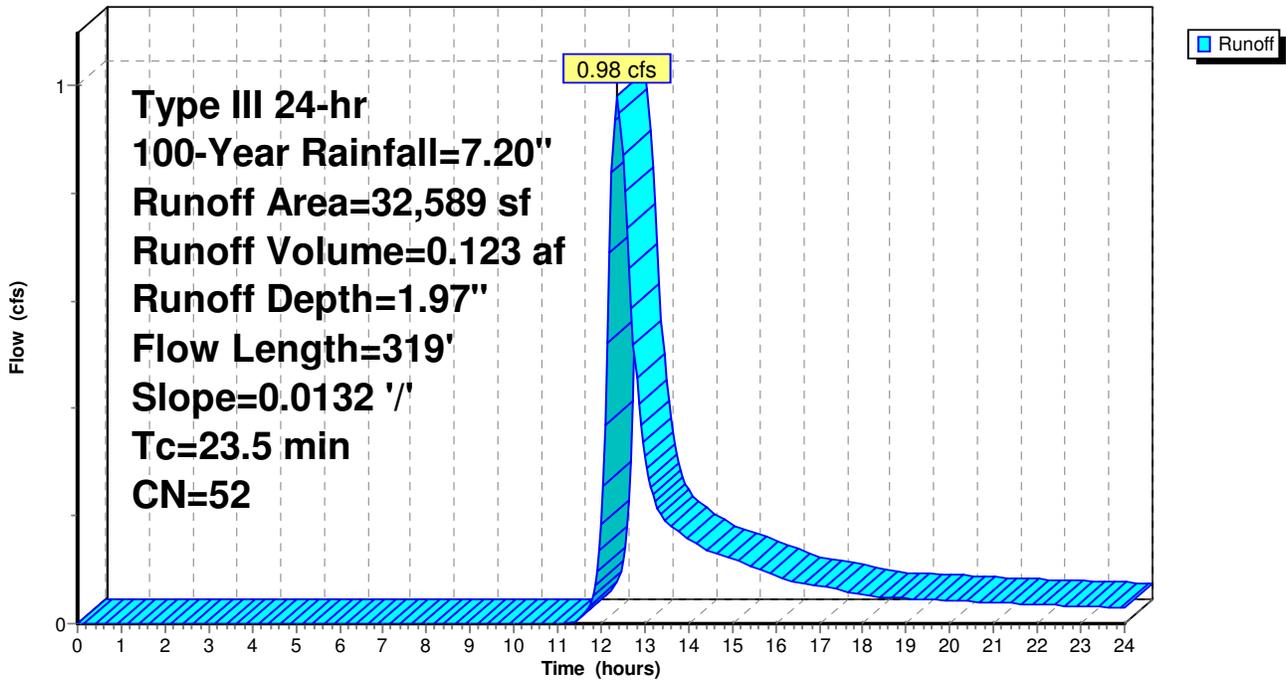
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Description
* 7,204	98	Paved Streets w/Curbs & Sewers HSG A
* 25,385	39	Open Space-Good (>75% grass) HSG A
32,589	52	Weighted Average
25,385		77.89% Pervious Area
7,204		22.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	319	0.0132	0.23		Lag/CN Method,

Subcatchment S#14: S#14

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 73

Summary for Subcatchment S#15: S#15

CarlsonPlanXYPos|1757436.5135|94414.7306|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 6.33 cfs @ 12.62 hrs, Volume= 0.984 af, Depth= 2.35"

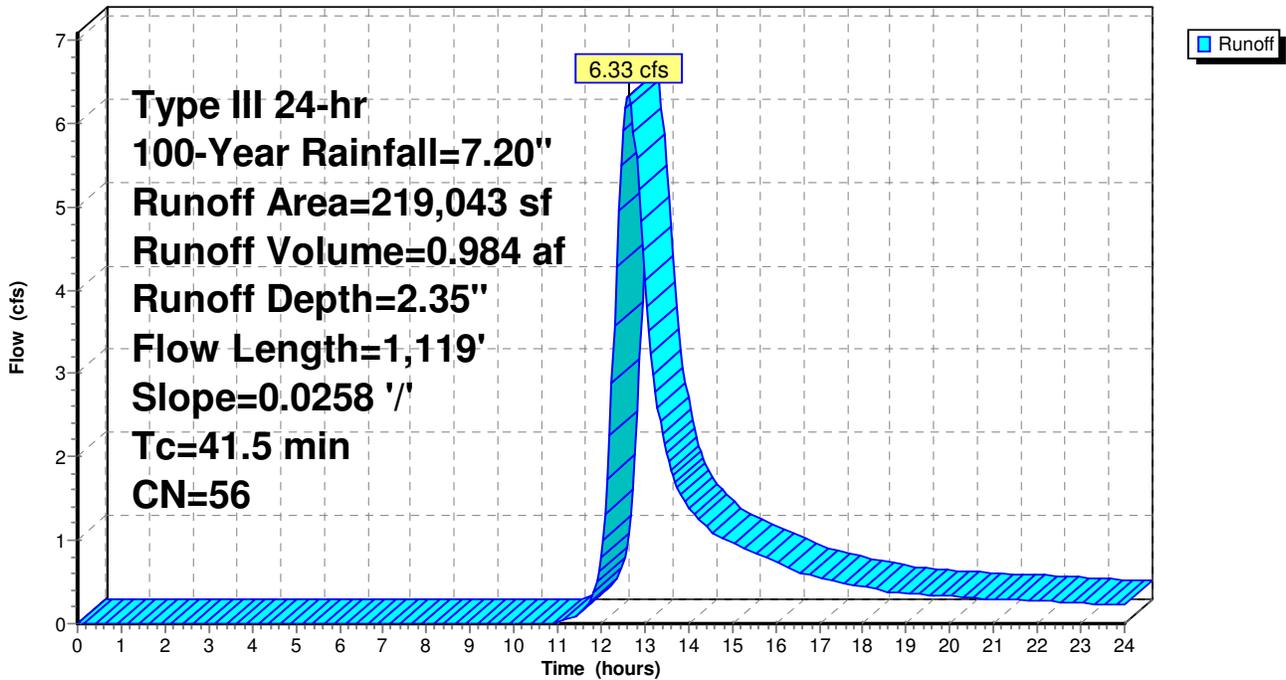
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	62,691	98	Paved Streets w/Curbs & Sewers HSG A
*	156,352	39	Open Space-Good (>75% grass) HSG A
	219,043	56	Weighted Average
	156,352		71.38% Pervious Area
	62,691		28.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.5	1,119	0.0258	0.45		Lag/CN Method,

Subcatchment S#15: S#15

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 74

Summary for Subcatchment S#3: S#3

CarlsonPlanXYPos|1757249.7579|94888.4224|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 6.71 cfs @ 12.24 hrs, Volume= 0.710 af, Depth= 2.06"

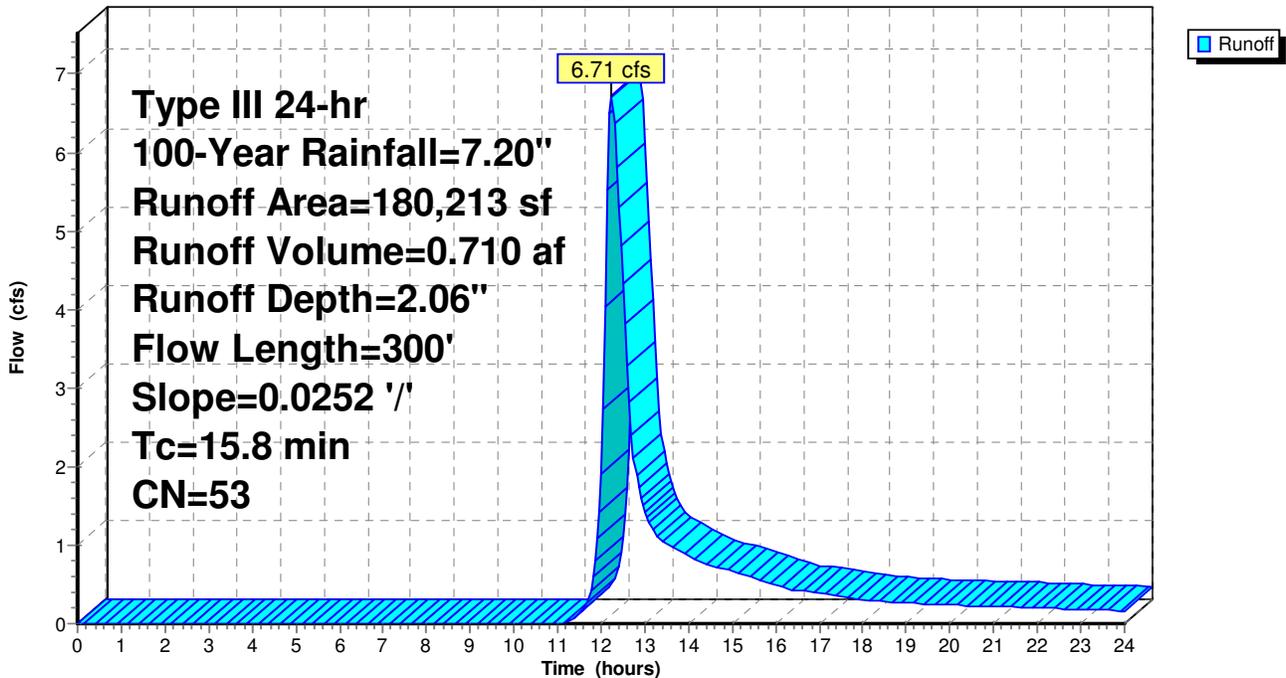
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	42,844	98	Paved Streets w/Curbs & Sewers HSG A
*	137,369	39	Open Space-Good (>75% grass) HSG A
	180,213	53	Weighted Average
	137,369		76.23% Pervious Area
	42,844		23.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	300	0.0252	0.32		Lag/CN Method,

Subcatchment S#3: S#3

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 75

Summary for Subcatchment S#5: S#5

CarlsonPlanXYPos|1757027.2221|95347.9200|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

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

Runoff = 3.64 cfs @ 12.08 hrs, Volume= 0.259 af, Depth= 4.33"

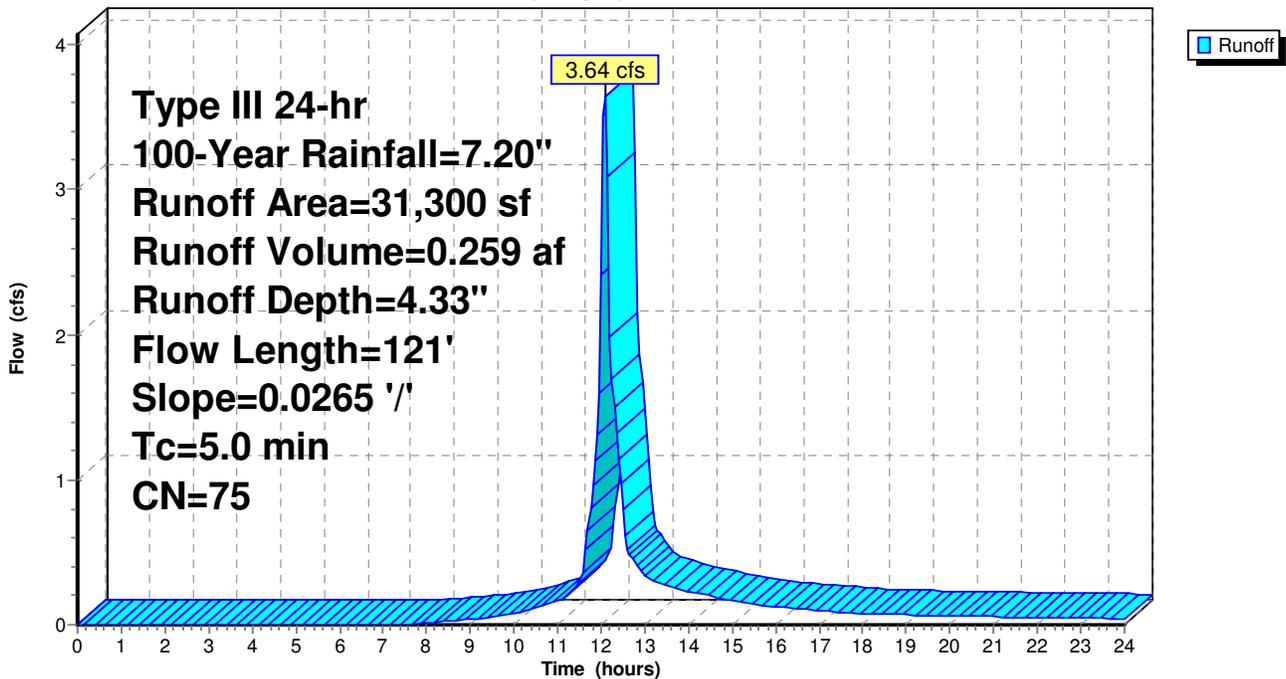
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	18,880	98	Paved Streets w/Curbs & Sewers HSG A
*	12,420	39	Open Space-Good (>75% grass) HSG A
	31,300	75	Weighted Average
	12,420		39.68% Pervious Area
	18,880		60.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	121	0.0265	0.48		Lag/CN Method,
4.2	121	Total, Increased to minimum Tc = 5.0 min			

Subcatchment S#5: S#5

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 76

Summary for Subcatchment S#6: S#6

CarlsonPlanXYPos|1757027.2221|95347.9200|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

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

Runoff = 1.48 cfs @ 12.07 hrs, Volume= 0.107 af, Depth= 5.22"

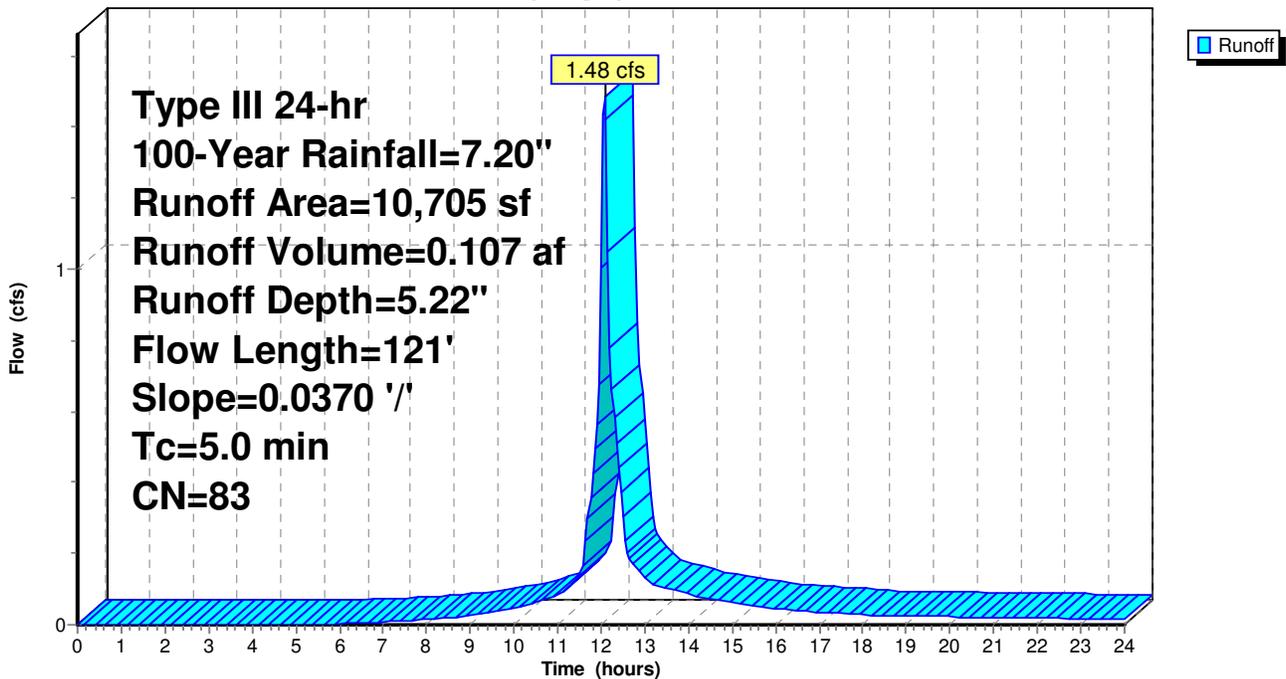
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Description
* 8,058	98	Paved Streets w/Curbs & Sewers HSG A
* 2,647	39	Open Space-Good (>75% grass) HSG A
10,705	83	Weighted Average
2,647		24.73% Pervious Area
8,058		75.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	121	0.0370	0.73		Lag/CN Method,
2.8	121	Total, Increased to minimum Tc = 5.0 min			

Subcatchment S#6: S#6

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 77

Summary for Subcatchment S#7: S#7

CarlsonPlanXYPos|1756915.6351|94896.6148|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 7.65 cfs @ 12.15 hrs, Volume= 0.644 af, Depth= 4.44"

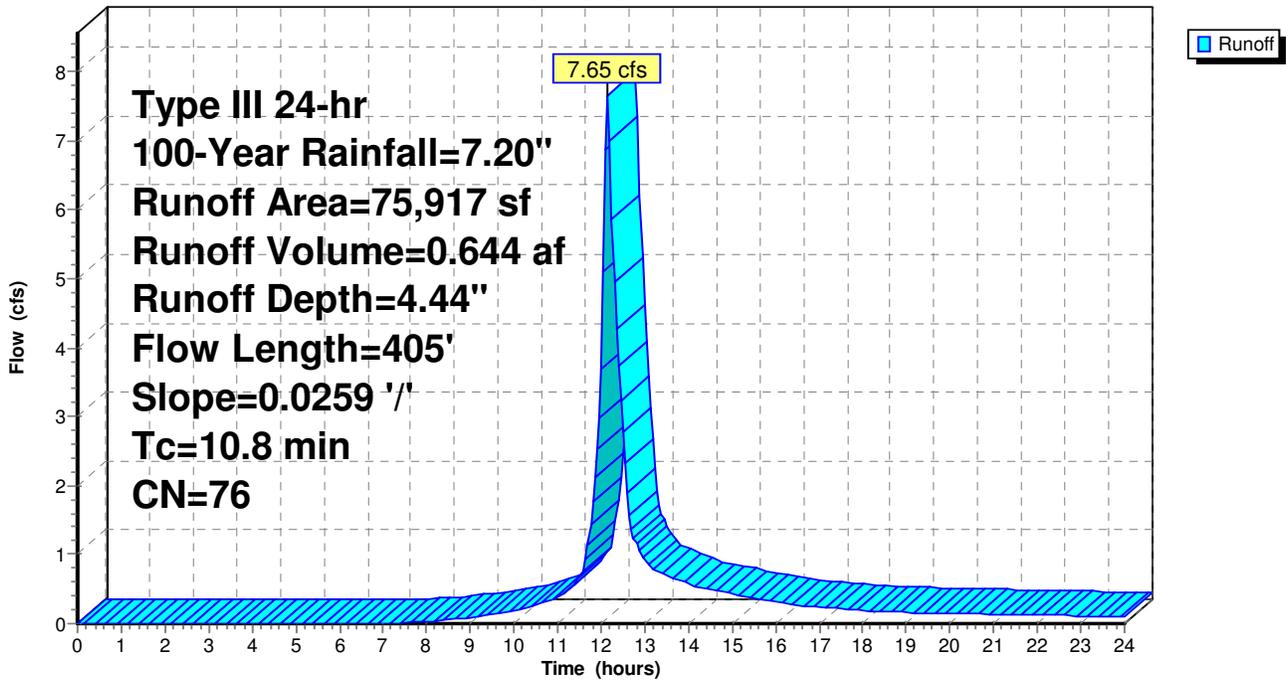
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	47,260	98	Paved Streets w/Curbs & Sewers HSG A
*	28,657	39	Open Space-Good (>75% grass) HSG A
	75,917	76	Weighted Average
	28,657		37.75% Pervious Area
	47,260		62.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	405	0.0259	0.62		Lag/CN Method,

Subcatchment S#7: S#7

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 78

Summary for Subcatchment S#8: S#8

CarlsonPlanXYPos|1756872.7656|94629.7133|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15

RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 4.10 cfs @ 12.15 hrs, Volume= 0.338 af, Depth= 3.79"

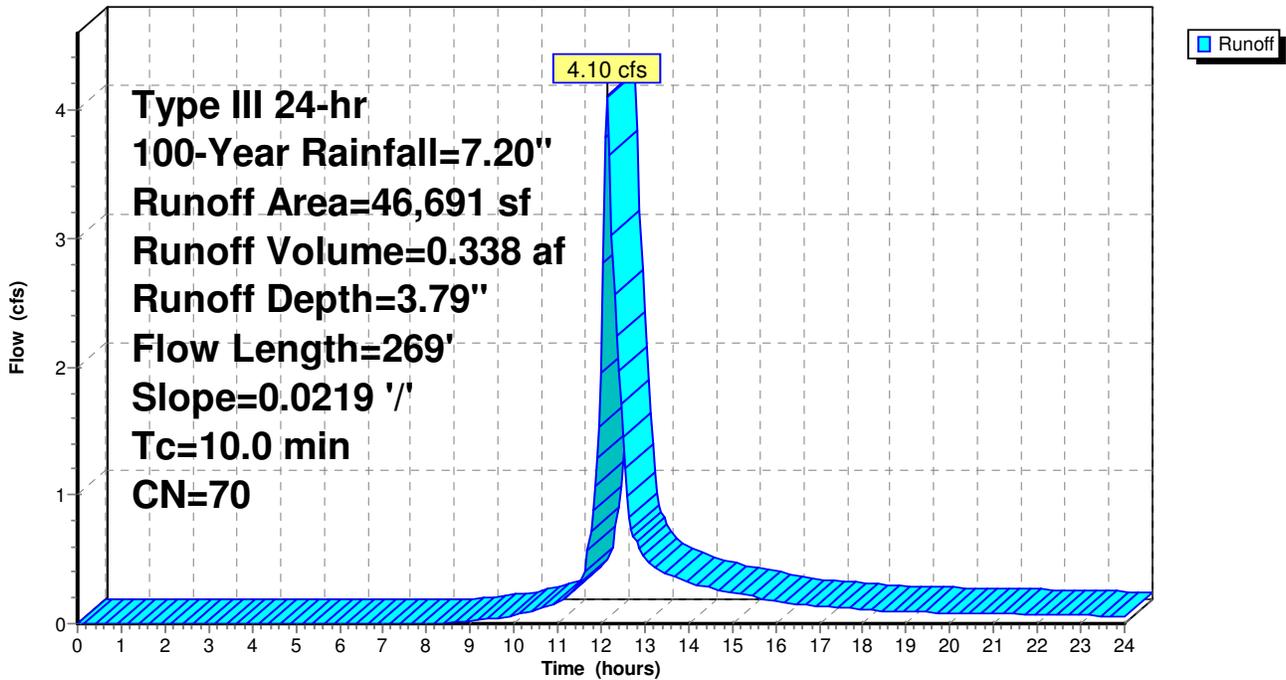
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	24,519	98	Paved Streets w/Curbs & Sewers HSG A
*	22,172	39	Open Space-Good (>75% grass) HSG A
	46,691	70	Weighted Average
	22,172		47.49% Pervious Area
	24,519		52.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	269	0.0219	0.45		Lag/CN Method,

Subcatchment S#8: S#8

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 79

Summary for Subcatchment S#9: S#9

CarlsonPlanXYPos|1756830.1751|94474.8951|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 4.52 cfs @ 12.13 hrs, Volume= 0.364 af, Depth= 3.89"

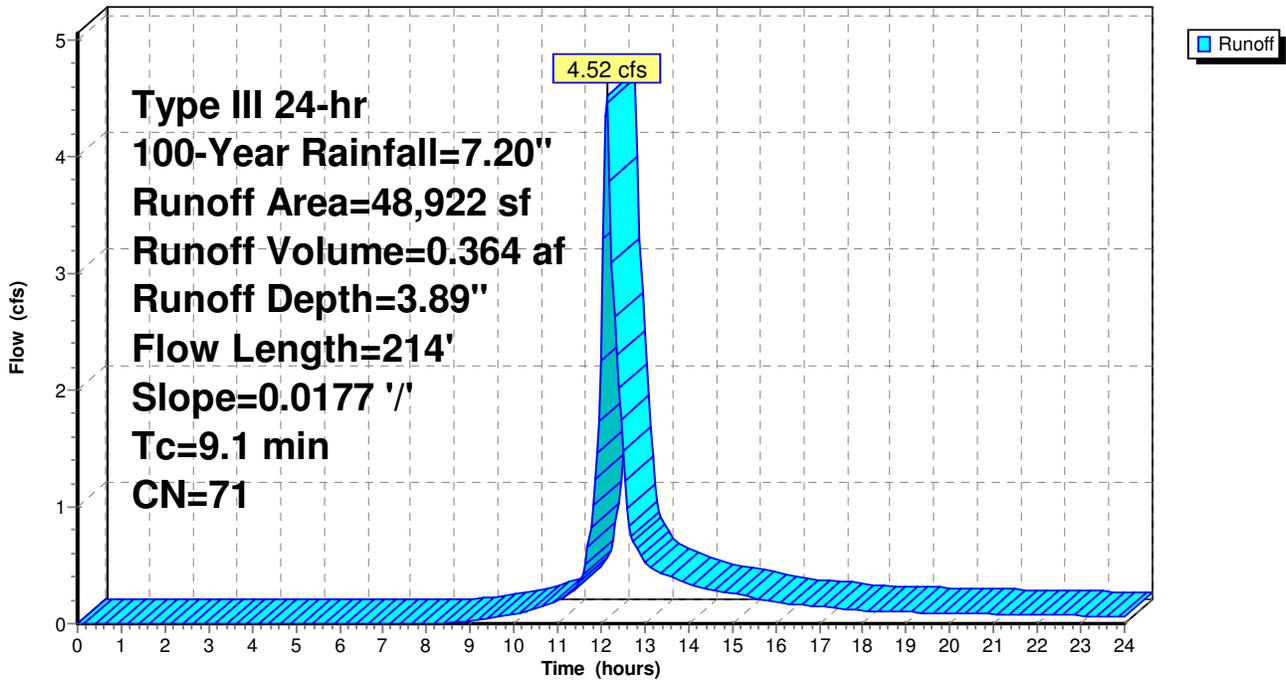
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	26,570	98	Paved Streets w/Curbs & Sewers HSG A
*	22,352	39	Open Space-Good (>75% grass) HSG A
	48,922	71	Weighted Average
	22,352		45.69% Pervious Area
	26,570		54.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	214	0.0177	0.39		Lag/CN Method,

Subcatchment S#9: S#9

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 80

Summary for Subcatchment S2: S#2

CarlsonPlanXYPos|1757390.6874|95401.9110|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 5.36 cfs @ 12.21 hrs, Volume= 0.520 af, Depth= 2.35"

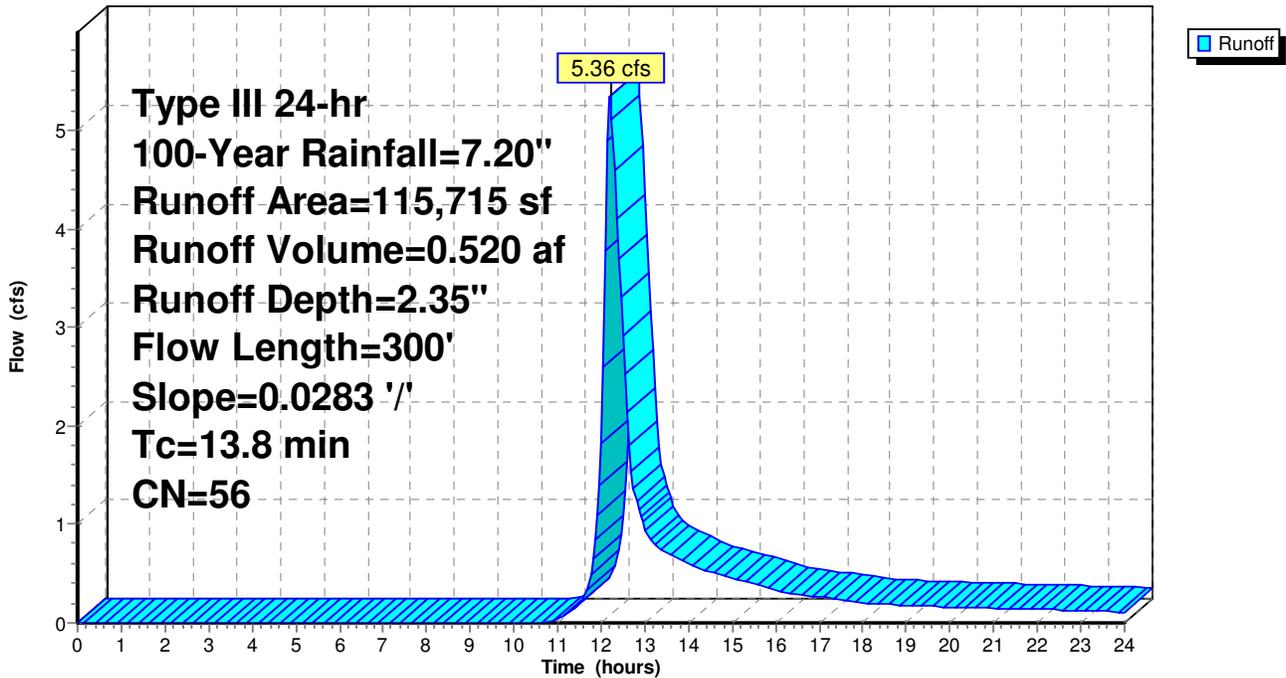
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	10,405	98	Paved Streets w/Curbs & Sewers HSG B
*	10,400	98	Paved Lots Roofs & Driveways HSG B
*	61,613	39	Open Space-Good (>75% grass) HSG A
*	33,297	61	Open Space-Good (>75% grass) HSG B
	115,715	56	Weighted Average
	94,910		82.02% Pervious Area
	20,805		17.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	300	0.0283	0.36		Lag/CN Method,

Subcatchment S2: S#2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 81

Summary for Subcatchment S4: S#4

CarlsonPlanXYPos|1757146.2718|95239.2477|

CarlsonSurface|S:\Clients\Richmond Greatpoint Development\CAD\Carlson Files\2016-06-15
RE-GRADE\2FTCONT daylight-marged-2.tin|

Runoff = 7.21 cfs @ 12.19 hrs, Volume= 0.680 af, Depth= 2.35"

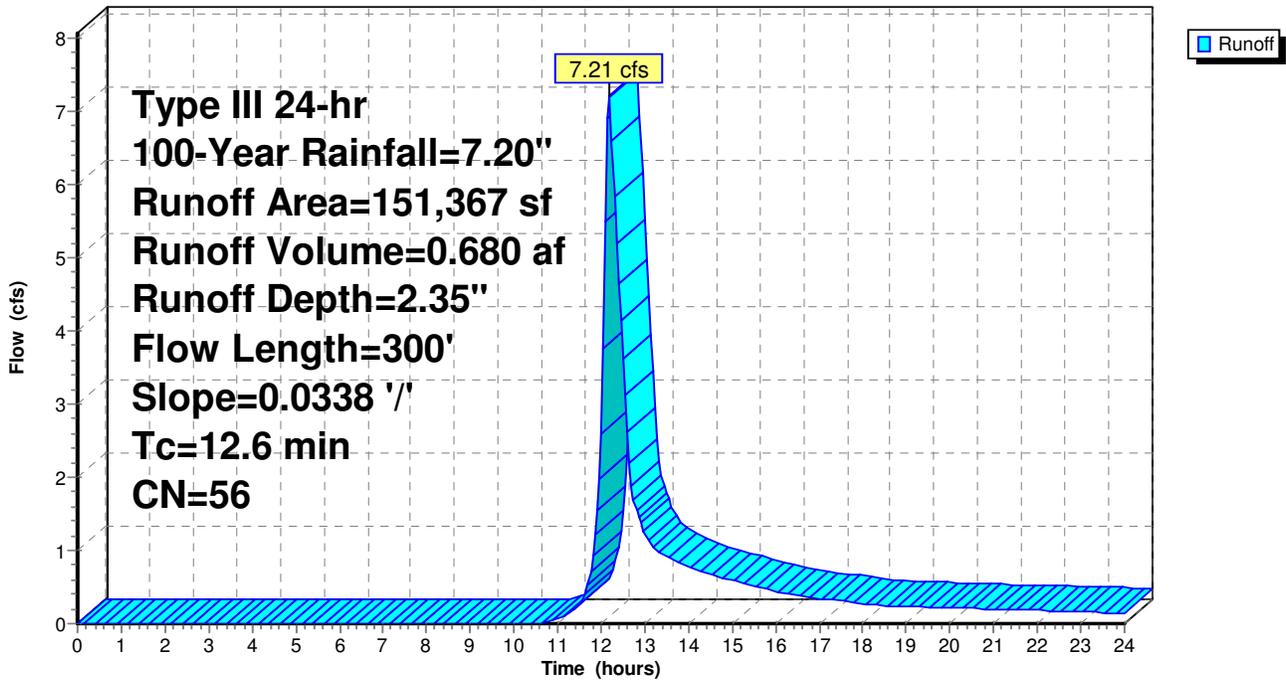
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

	Area (sf)	CN	Description
*	43,145	98	Paved Streets w/Curbs & Sewers HSG A
*	108,222	39	Open Space-Good (>75% grass) HSG A
	151,367	56	Weighted Average
	108,222		71.50% Pervious Area
	43,145		28.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	300	0.0338	0.40		Lag/CN Method,

Subcatchment S4: S#4

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 82

Summary for Reach 46R: TO LP 1

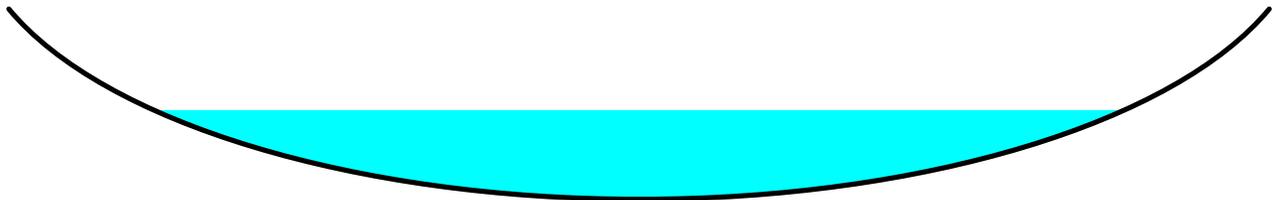
[81] Warning: Exceeded Pond 1P by 7.77' @ 27.15 hrs

Inflow Area =	1.714 ac, 34.86% Impervious,	Inflow Depth =	0.62"	for 100-Year event
Inflow =	3.59 cfs @ 12.35 hrs,	Volume=	0.089 af	
Outflow =	1.81 cfs @ 12.41 hrs,	Volume=	0.089 af,	Atten= 50%, Lag= 3.9 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.26 fps, Min. Travel Time= 3.5 min
 Avg. Velocity = 0.69 fps, Avg. Travel Time= 11.3 min

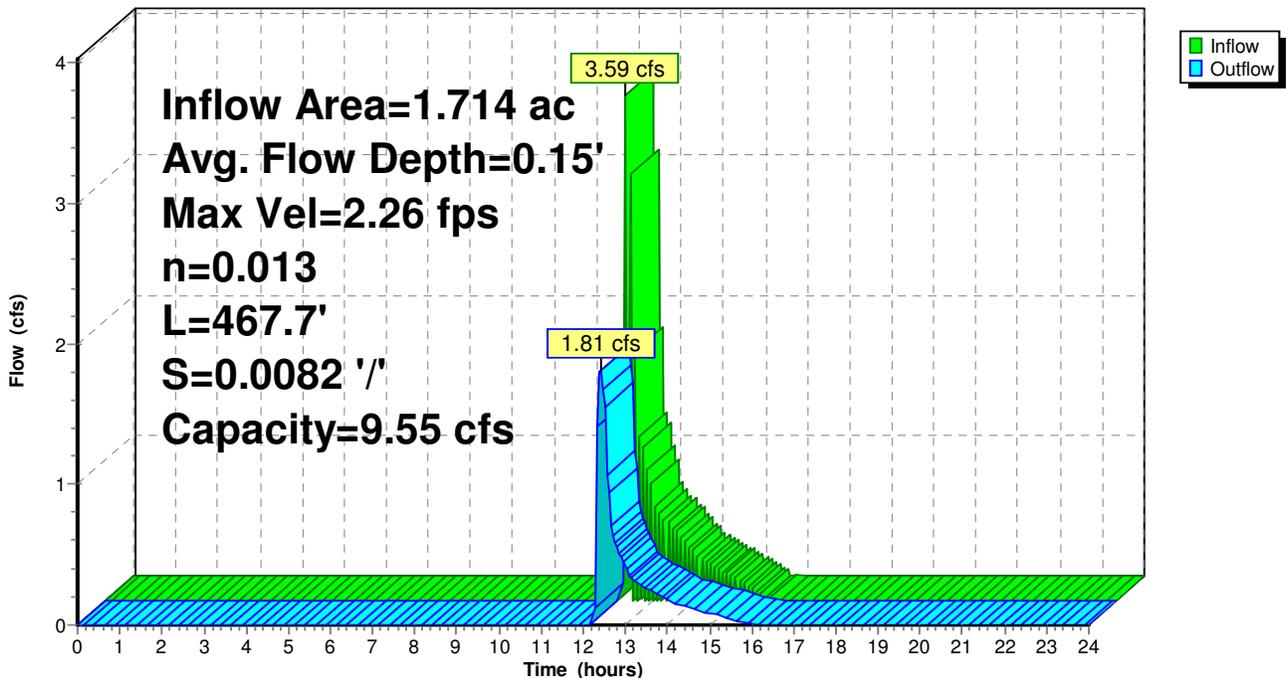
Peak Storage= 374 cf @ 12.41 hrs
 Average Depth at Peak Storage= 0.15'
 Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 9.55 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
 Length= 467.7' Slope= 0.0082 '/'
 Inlet Invert= 40.02', Outlet Invert= 36.17'



Reach 46R: TO LP 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 83

Summary for Reach 48R: TO LP2

[81] Warning: Exceeded Pond 3P by 12.15' @ 28.40 hrs

Inflow Area =	4.137 ac, 23.77% Impervious,	Inflow Depth = 0.62"	for 100-Year event
Inflow =	6.39 cfs @ 12.50 hrs,	Volume=	0.215 af
Outflow =	3.68 cfs @ 12.54 hrs,	Volume=	0.215 af, Atten= 42%, Lag= 2.7 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.41 fps, Min. Travel Time= 2.6 min
 Avg. Velocity = 0.75 fps, Avg. Travel Time= 8.2 min

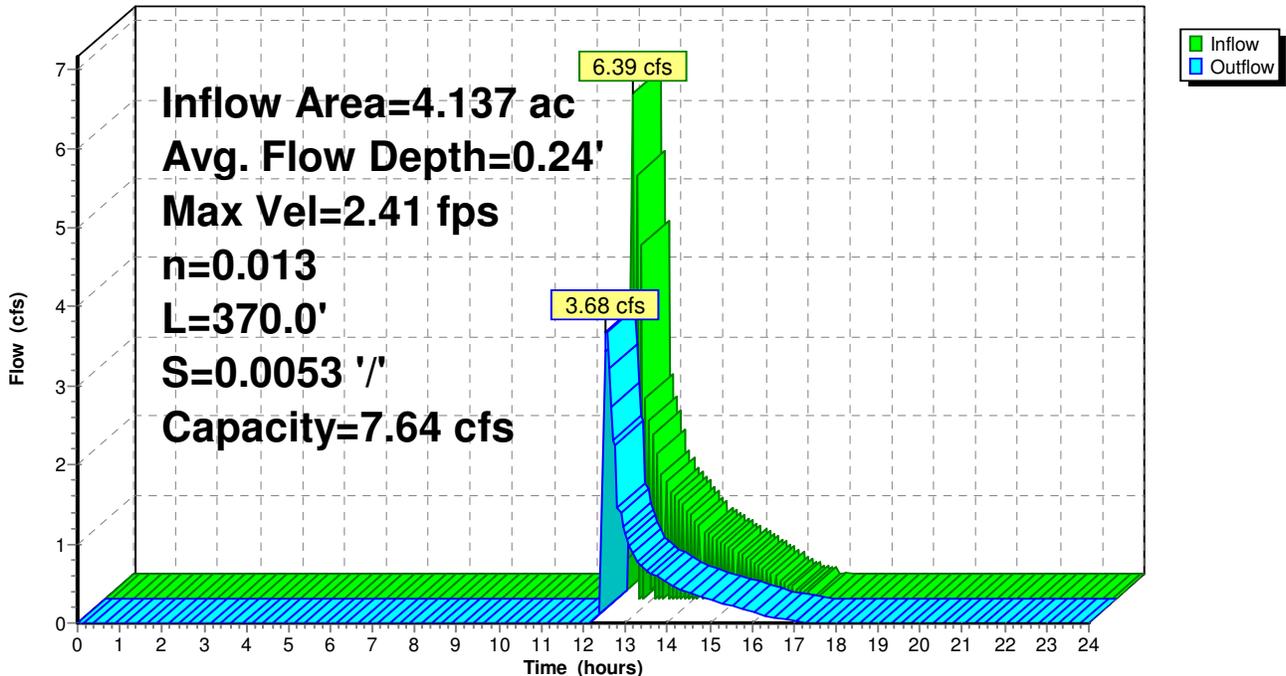
Peak Storage= 564 cf @ 12.54 hrs
 Average Depth at Peak Storage= 0.24'
 Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 7.64 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
 Length= 370.0' Slope= 0.0053 '/'
 Inlet Invert= 33.25', Outlet Invert= 31.30'



Reach 48R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 84

Summary for Reach 49R: TO LP 1

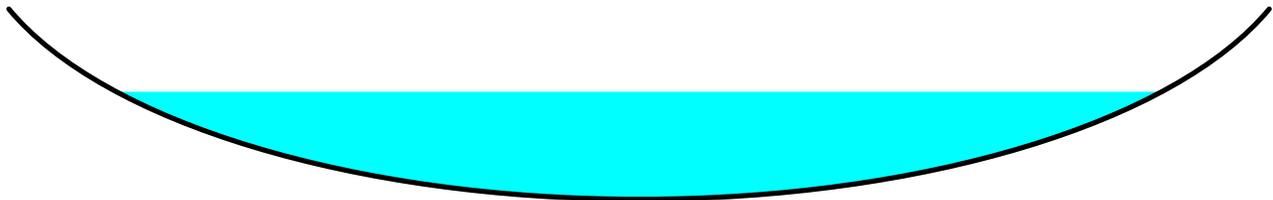
[81] Warning: Exceeded Pond 2P by 10.75' @ 0.00 hrs

Inflow Area = 2.656 ac, 17.98% Impervious, Inflow Depth = 0.55" for 100-Year event
 Inflow = 5.05 cfs @ 12.50 hrs, Volume= 0.122 af
 Outflow = 3.24 cfs @ 12.52 hrs, Volume= 0.122 af, Atten= 36%, Lag= 0.9 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.27 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 1.28 fps, Avg. Travel Time= 2.5 min

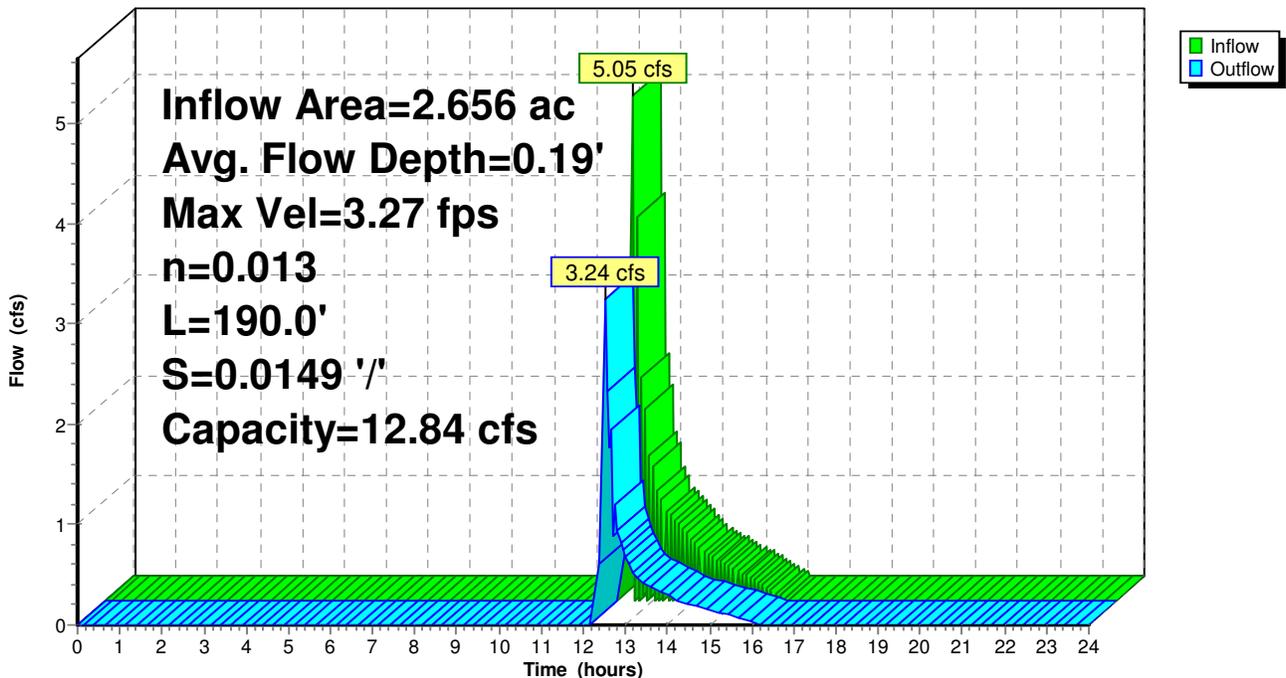
Peak Storage= 191 cf @ 12.52 hrs
 Average Depth at Peak Storage= 0.19'
 Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 12.84 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
 Length= 190.0' Slope= 0.0149 '/'
 Inlet Invert= 39.00', Outlet Invert= 36.17'



Reach 49R: TO LP 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 85

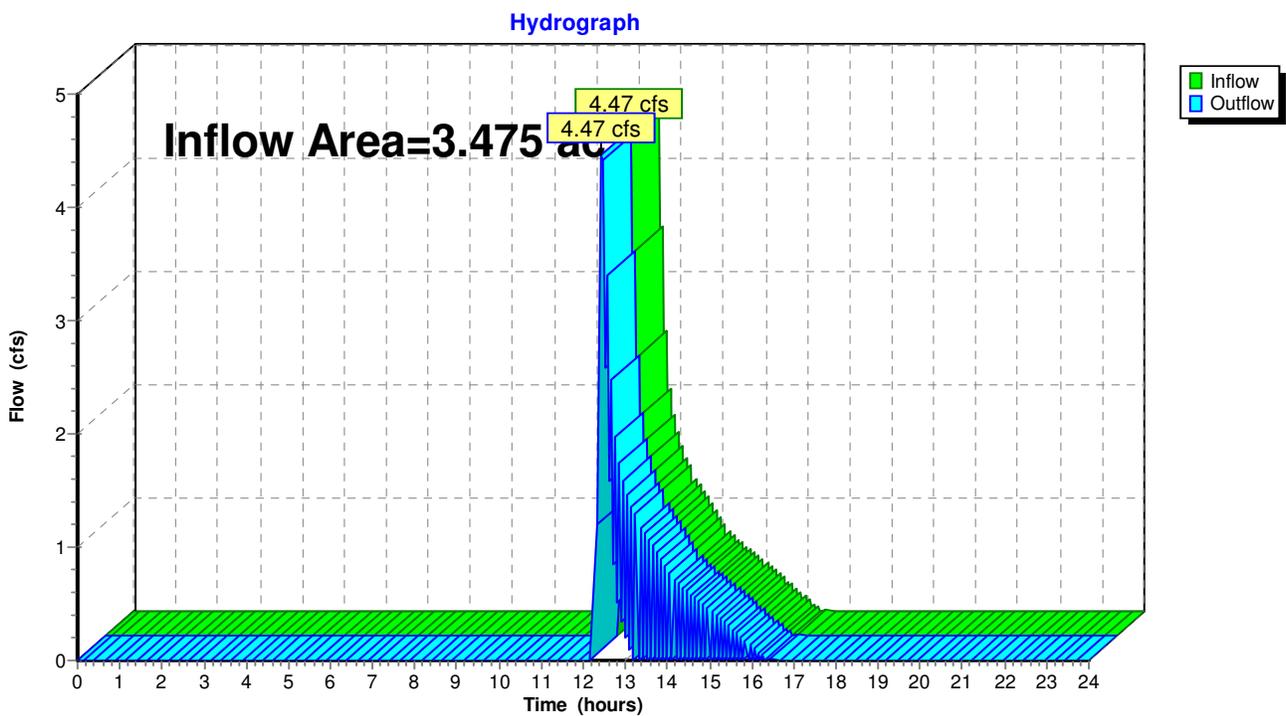
Summary for Reach 50R: (new Reach)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.475 ac, 28.50% Impervious, Inflow Depth = 0.65" for 100-Year event
Inflow = 4.47 cfs @ 12.44 hrs, Volume= 0.189 af
Outflow = 4.47 cfs @ 12.44 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 50R: (new Reach)



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 86

Summary for Reach 51R: TO LP 1

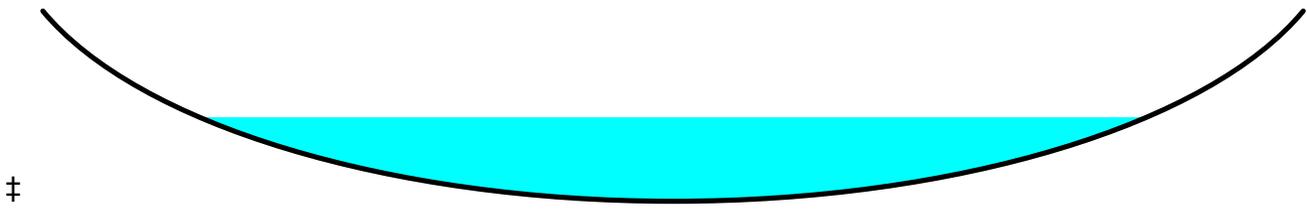
[81] Warning: Exceeded Pond 5P/6P by 12.69' @ 25.70 hrs

Inflow Area = 0.964 ac, 64.13% Impervious, Inflow Depth = 0.82" for 100-Year event
Inflow = 2.12 cfs @ 12.29 hrs, Volume= 0.066 af
Outflow = 1.69 cfs @ 12.34 hrs, Volume= 0.066 af, Atten= 20%, Lag= 3.5 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.32 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 10.7 min

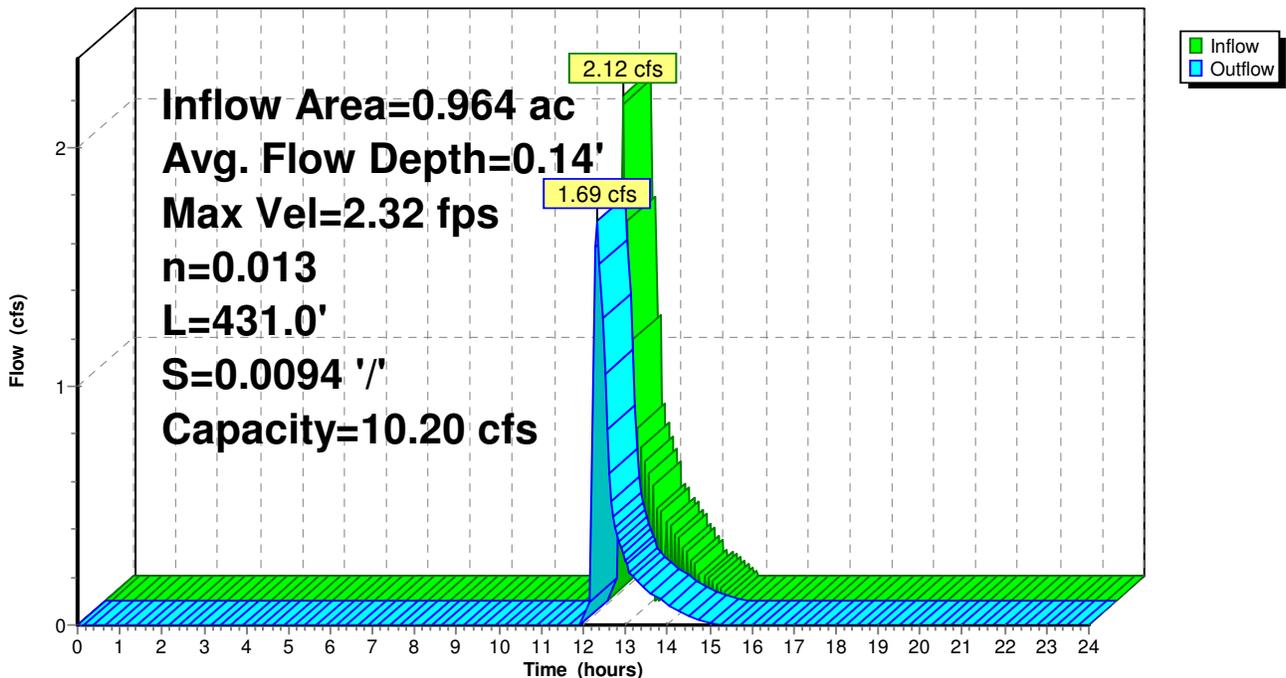
Peak Storage= 315 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 10.20 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 431.0' Slope= 0.0094 '/'
Inlet Invert= 40.22', Outlet Invert= 36.17'



Reach 51R: TO LP 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 87

Summary for Reach 52R: TO LP2

[81] Warning: Exceeded Pond 7P by 10.28' @ 25.65 hrs

Inflow Area = 1.743 ac, 62.25% Impervious, Inflow Depth = 0.76" for 100-Year event
Inflow = 7.12 cfs @ 12.40 hrs, Volume= 0.110 af
Outflow = 2.96 cfs @ 12.46 hrs, Volume= 0.110 af, Atten= 58%, Lag= 3.5 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.43 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 17.9 min

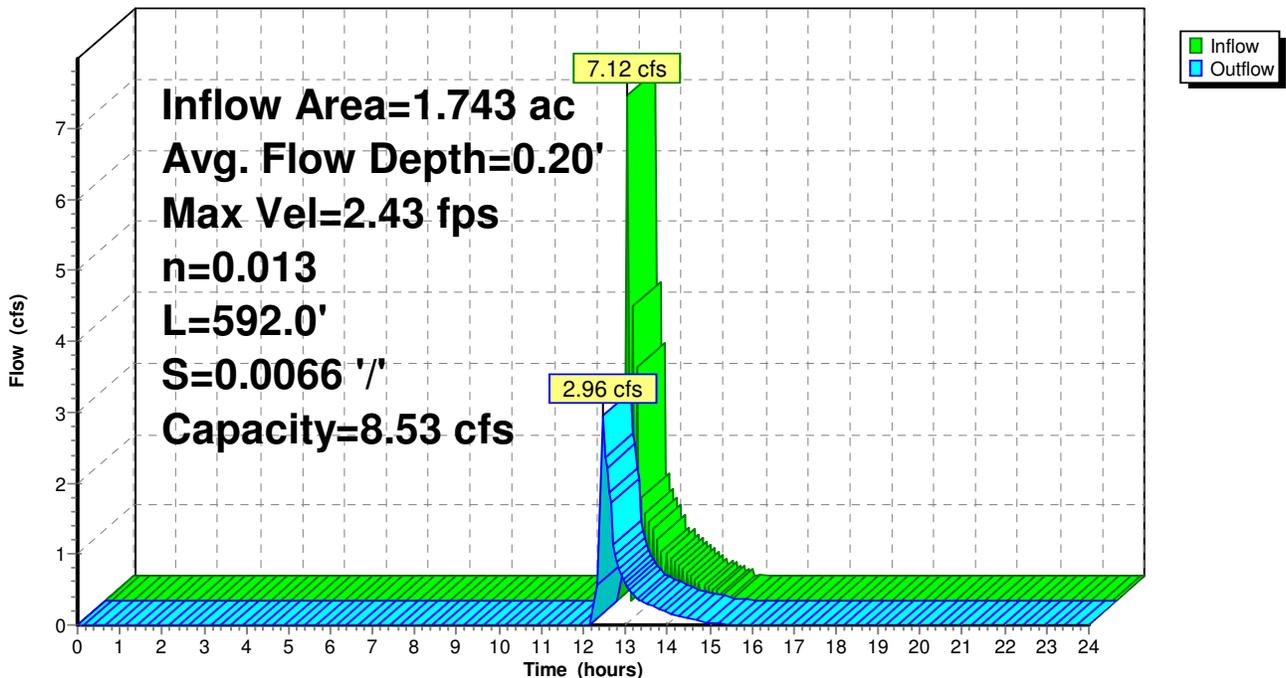
Peak Storage= 720 cf @ 12.46 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 8.53 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 592.0' Slope= 0.0066 '/'
Inlet Invert= 35.19', Outlet Invert= 31.30'



Reach 52R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 88

Summary for Reach 53R: TO LP2

[55] Hint: Peak inflow is 132% of Manning's capacity

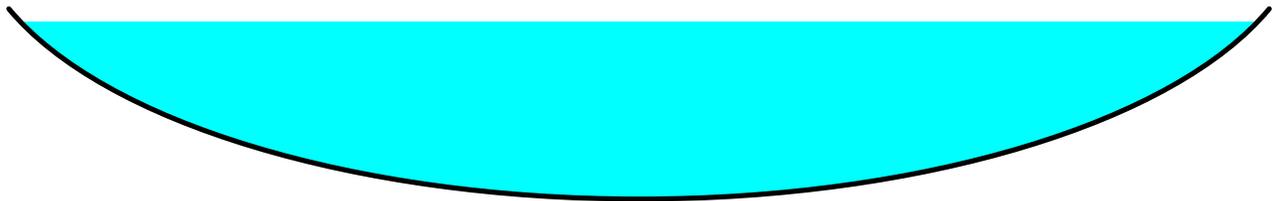
[81] Warning: Exceeded Pond 8P/9P by 9.39' @ 26.35 hrs

Inflow Area =	2.195 ac, 53.43% Impervious, Inflow Depth = 0.70"	for 100-Year event
Inflow =	6.87 cfs @ 12.40 hrs, Volume=	0.128 af
Outflow =	4.11 cfs @ 12.42 hrs, Volume=	0.128 af, Atten= 40%, Lag= 1.3 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 1.87 fps, Min. Travel Time= 1.6 min
 Avg. Velocity = 0.52 fps, Avg. Travel Time= 5.9 min

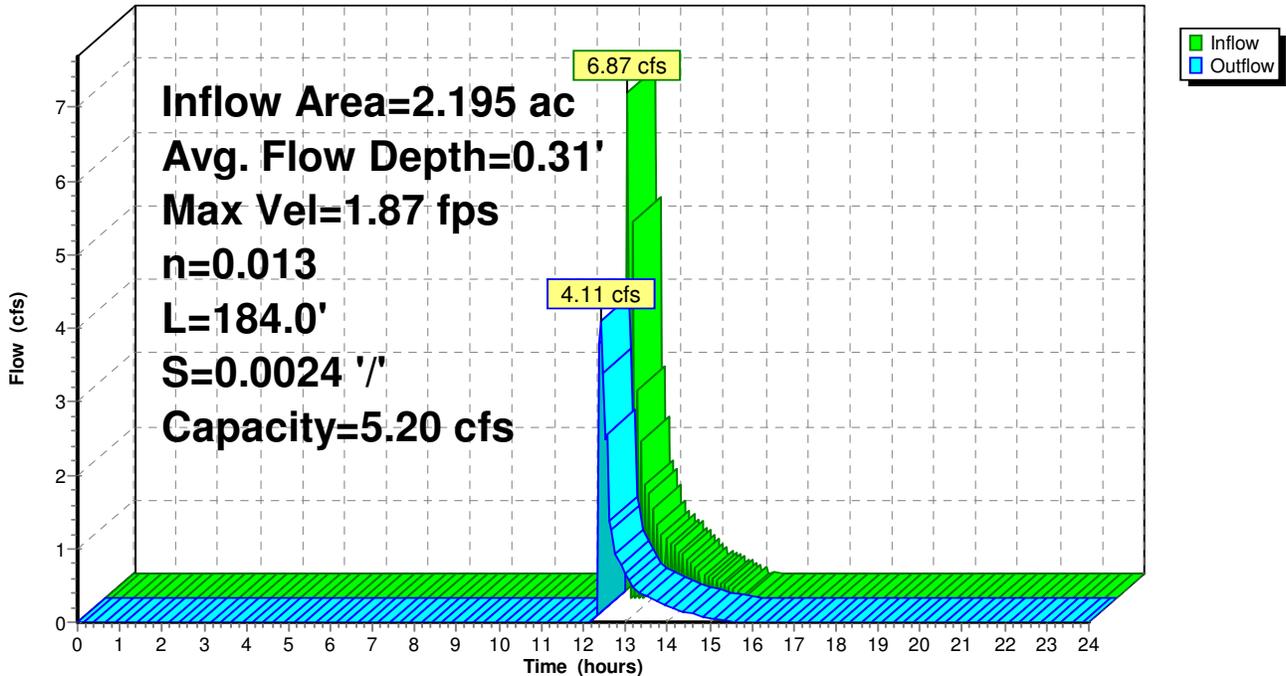
Peak Storage= 405 cf @ 12.42 hrs
 Average Depth at Peak Storage= 0.31'
 Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 5.20 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
 Length= 184.0' Slope= 0.0024 '/'
 Inlet Invert= 31.75', Outlet Invert= 31.30'



Reach 53R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 89

Summary for Reach 54R: TO LP2

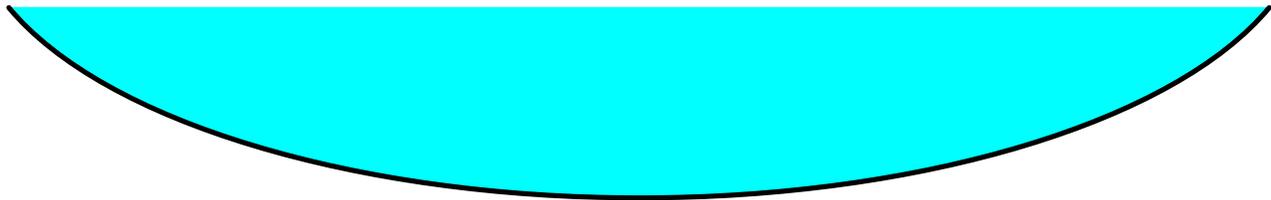
[91] Warning: Storage range exceeded by 0.04'
[55] Hint: Peak inflow is 237% of Manning's capacity
[81] Warning: Exceeded Pond 15P by 11.11' @ 28.15 hrs

Inflow Area = 5.029 ac, 28.62% Impervious, Inflow Depth = 0.66" for 100-Year event
Inflow = 6.20 cfs @ 12.91 hrs, Volume= 0.276 af
Outflow = 3.30 cfs @ 13.06 hrs, Volume= 0.276 af, Atten= 47%, Lag= 9.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.10 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 27.0 min

Peak Storage= 1,112 cf @ 13.06 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 2.62 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 372.0' Slope= 0.0006 '/'
Inlet Invert= 31.53', Outlet Invert= 31.30'



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

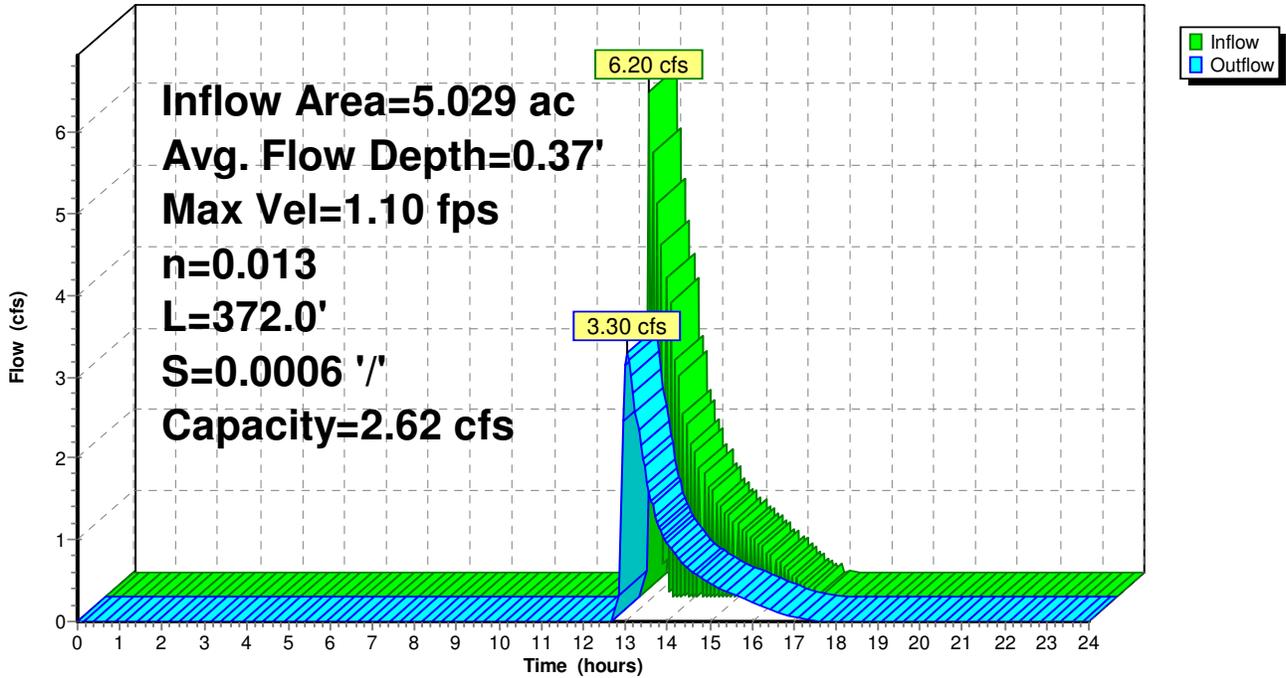
Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 90

Reach 54R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 91

Summary for Reach 55R: TO LP2

[55] Hint: Peak inflow is 101% of Manning's capacity

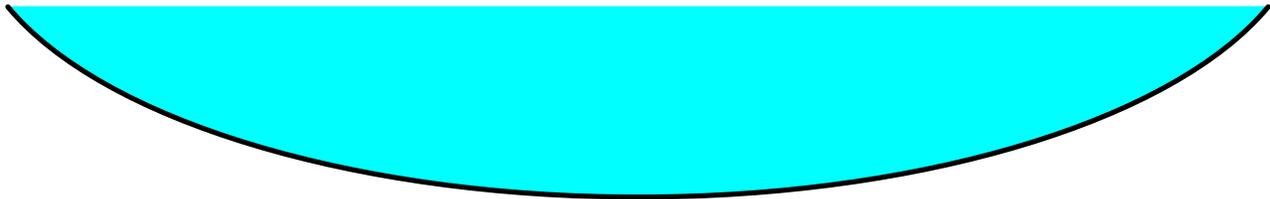
[81] Warning: Exceeded Pond 10P-14P by 11.07' @ 0.00 hrs

Inflow Area = 3.994 ac, 36.47% Impervious, Inflow Depth = 0.68" for 100-Year event
 Inflow = 10.66 cfs @ 12.45 hrs, Volume= 0.228 af
 Outflow = 10.64 cfs @ 12.45 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.17 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.57 fps, Avg. Travel Time= 0.0 min

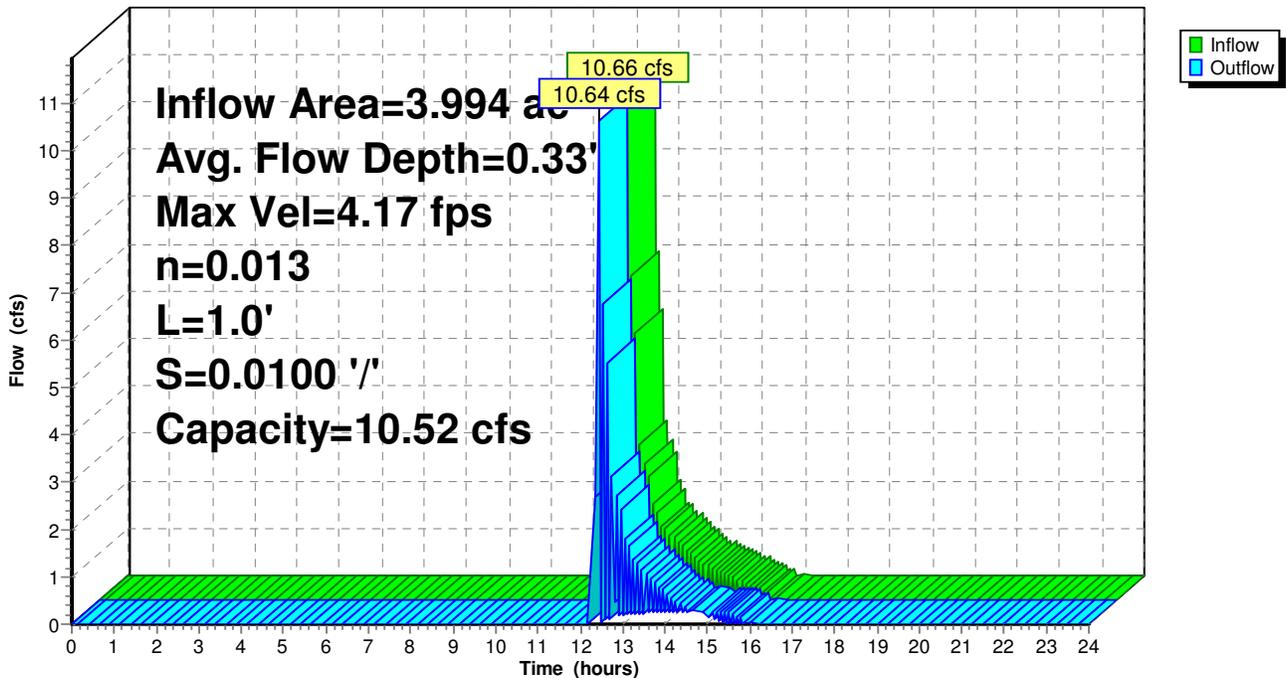
Peak Storage= 3 cf @ 12.45 hrs
 Average Depth at Peak Storage= 0.33'
 Bank-Full Depth= 0.33' Flow Area= 2.5 sf, Capacity= 10.52 cfs

11.50' x 0.33' deep Parabolic Channel, n= 0.013 Asphalt, smooth
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 31.30', Outlet Invert= 31.29'



Reach 55R: TO LP2

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 92

Summary for Pond 1P: INFILTRATION 1

[93] Warning: Storage range exceeded by 0.27'

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=31)

Inflow Area = 1.714 ac, 34.86% Impervious, Inflow Depth = 2.75" for 100-Year event
 Inflow = 5.28 cfs @ 12.10 hrs, Volume= 0.392 af
 Outflow = 3.84 cfs @ 12.35 hrs, Volume= 0.392 af, Atten= 27%, Lag= 15.0 min
 Discarded = 0.24 cfs @ 11.55 hrs, Volume= 0.304 af
 Primary = 3.59 cfs @ 12.35 hrs, Volume= 0.089 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 39.27' @ 12.35 hrs Surf.Area= 0.029 ac Storage= 0.120 af
 Flood Elev= 42.00' Surf.Area= 0.029 ac Storage= 0.120 af

Plug-Flow detention time= 187.5 min calculated for 0.392 af (100% of inflow)
 Center-of-Mass det. time= 187.5 min (1,039.4 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	32.25'	0.051 af	46.67'W x 27.24'L x 6.75'H Field A 0.197 af Overall - 0.069 af Embedded = 0.128 af x 40.0% Voids
#2A	33.00'	0.069 af	ADS_StormTech MC-4500 +Cap x 25 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		0.120 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	32.25'	8.270 in/hr Exfiltration over Surface area
#2	Primary	39.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.24 cfs @ 11.55 hrs HW=32.36' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=3.42 cfs @ 12.35 hrs HW=39.26' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 3.42 cfs @ 1.66 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 93

Pond 1P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

5 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 25.24' Row Length +12.0" End Stone x 2 = 27.24' Base Length

5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

25 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 3,019.3 cf Chamber Storage

8,581.1 cf Field - 3,019.3 cf Chambers = 5,561.9 cf Stone x 40.0% Voids = 2,224.7 cf Stone Storage

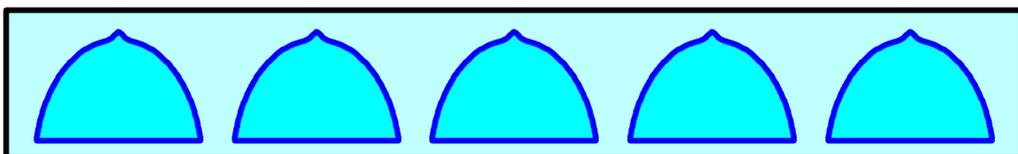
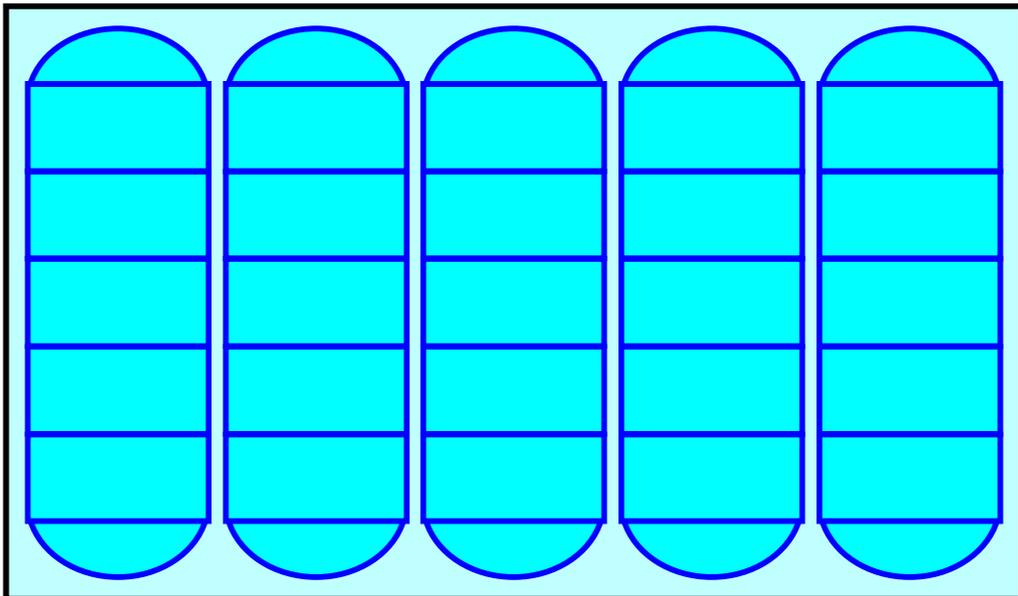
Chamber Storage + Stone Storage = 5,244.0 cf = 0.120 af

Overall Storage Efficiency = 61.1%

25 Chambers

317.8 cy Field

206.0 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

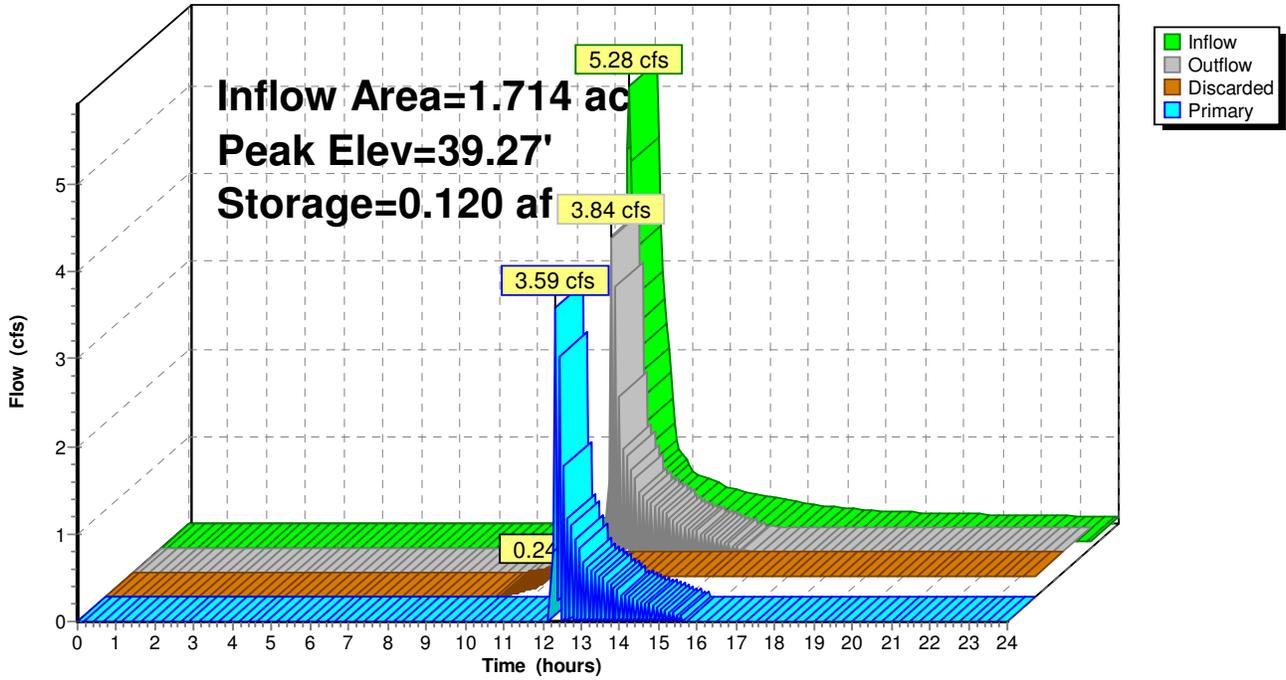
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 94

Pond 1P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 95

Summary for Pond 2P: INFILTRATION 1

[93] Warning: Storage range exceeded by 0.33'

[58] Hint: Peaked 0.33' above defined flood level

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=33)

Inflow Area = 2.656 ac, 17.98% Impervious, Inflow Depth = 2.35" for 100-Year event
 Inflow = 5.36 cfs @ 12.21 hrs, Volume= 0.520 af
 Outflow = 5.36 cfs @ 12.50 hrs, Volume= 0.520 af, Atten= 0%, Lag= 17.5 min
 Discarded = 0.31 cfs @ 11.70 hrs, Volume= 0.398 af
 Primary = 5.05 cfs @ 12.50 hrs, Volume= 0.122 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 35.33' @ 12.50 hrs Surf.Area= 0.037 ac Storage= 0.158 af
 Flood Elev= 35.00' Surf.Area= 0.037 ac Storage= 0.158 af

Plug-Flow detention time= 196.0 min calculated for 0.520 af (100% of inflow)
 Center-of-Mass det. time= 195.9 min (1,064.8 - 868.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	28.25'	0.063 af	37.58'W x 43.34'L x 6.75'H Field A 0.252 af Overall - 0.095 af Embedded = 0.158 af x 40.0% Voids
#2A	29.00'	0.095 af	ADS_StormTech MC-4500 +Cap x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.158 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	28.25'	8.270 in/hr Exfiltration over Surface area
#2	Primary	35.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.31 cfs @ 11.70 hrs HW=28.32' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=5.04 cfs @ 12.50 hrs HW=35.33' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 5.04 cfs @ 1.89 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 96

Pond 2P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

9 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 41.34' Row Length +12.0" End Stone x 2 = 43.34' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

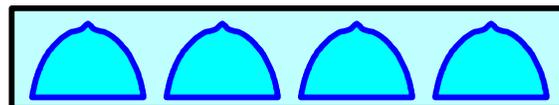
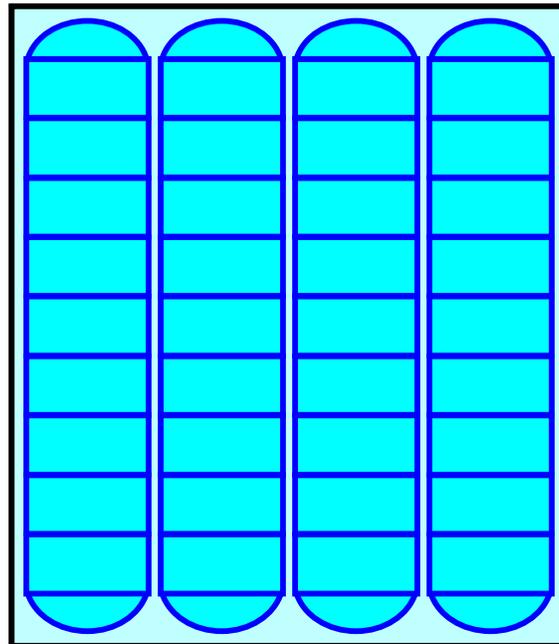
36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 4,119.3 cf Chamber Storage

10,995.2 cf Field - 4,119.3 cf Chambers = 6,876.0 cf Stone x 40.0% Voids = 2,750.4 cf Stone Storage

Chamber Storage + Stone Storage = 6,869.6 cf = 0.158 af

Overall Storage Efficiency = 62.5%

36 Chambers
407.2 cy Field
254.7 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

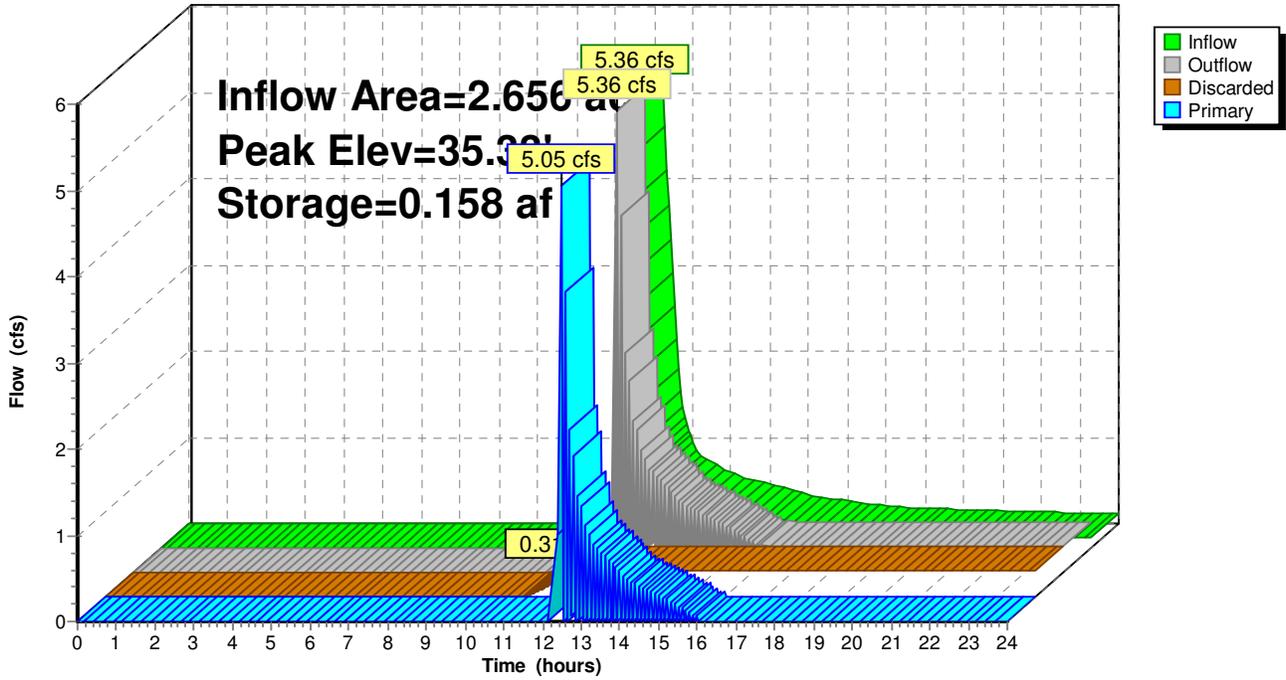
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 97

Pond 2P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 98

Summary for Pond 3P: INFILTRATION 1

[93] Warning: Storage range exceeded by 0.39'

[58] Hint: Peaked 0.39' above defined flood level

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=42)

Inflow Area = 4.137 ac, 23.77% Impervious, Inflow Depth = 2.06" for 100-Year event
 Inflow = 6.71 cfs @ 12.24 hrs, Volume= 0.710 af
 Outflow = 6.76 cfs @ 12.50 hrs, Volume= 0.710 af, Atten= 0%, Lag= 15.2 min
 Discarded = 0.37 cfs @ 11.80 hrs, Volume= 0.495 af
 Primary = 6.39 cfs @ 12.50 hrs, Volume= 0.215 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 28.24' @ 12.50 hrs Surf.Area= 0.044 ac Storage= 0.188 af
 Flood Elev= 27.85' Surf.Area= 0.044 ac Storage= 0.188 af

Plug-Flow detention time= 188.6 min calculated for 0.709 af (100% of inflow)
 Center-of-Mass det. time= 188.7 min (1,067.4 - 878.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	21.10'	0.074 af	37.58'W x 51.39'L x 6.75'H Field A 0.299 af Overall - 0.114 af Embedded = 0.185 af x 40.0% Voids
#2A	21.85'	0.114 af	ADS_StormTech MC-4500 +Cap x 44 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.188 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	21.10'	8.270 in/hr Exfiltration over Surface area
#2	Primary	27.85'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.37 cfs @ 11.80 hrs HW=21.20' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=6.10 cfs @ 12.50 hrs HW=28.23' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 6.10 cfs @ 2.01 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 99

Pond 3P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

44 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 4,971.2 cf Chamber Storage

13,037.4 cf Field - 4,971.2 cf Chambers = 8,066.2 cf Stone x 40.0% Voids = 3,226.5 cf Stone Storage

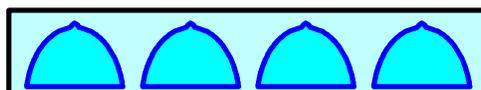
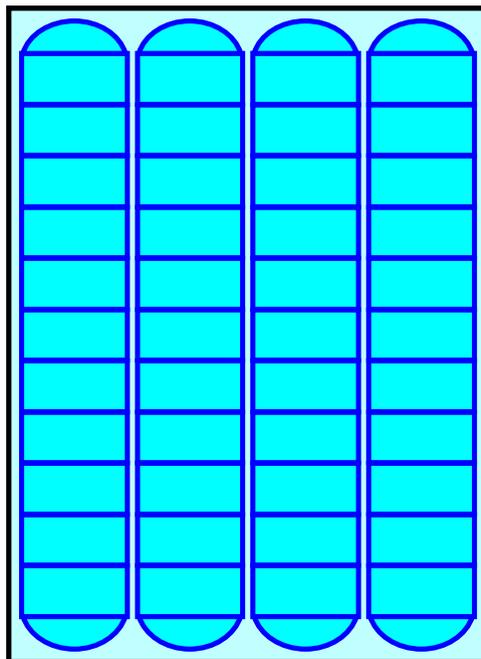
Chamber Storage + Stone Storage = 8,197.7 cf = 0.188 af

Overall Storage Efficiency = 62.9%

44 Chambers

482.9 cy Field

298.7 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

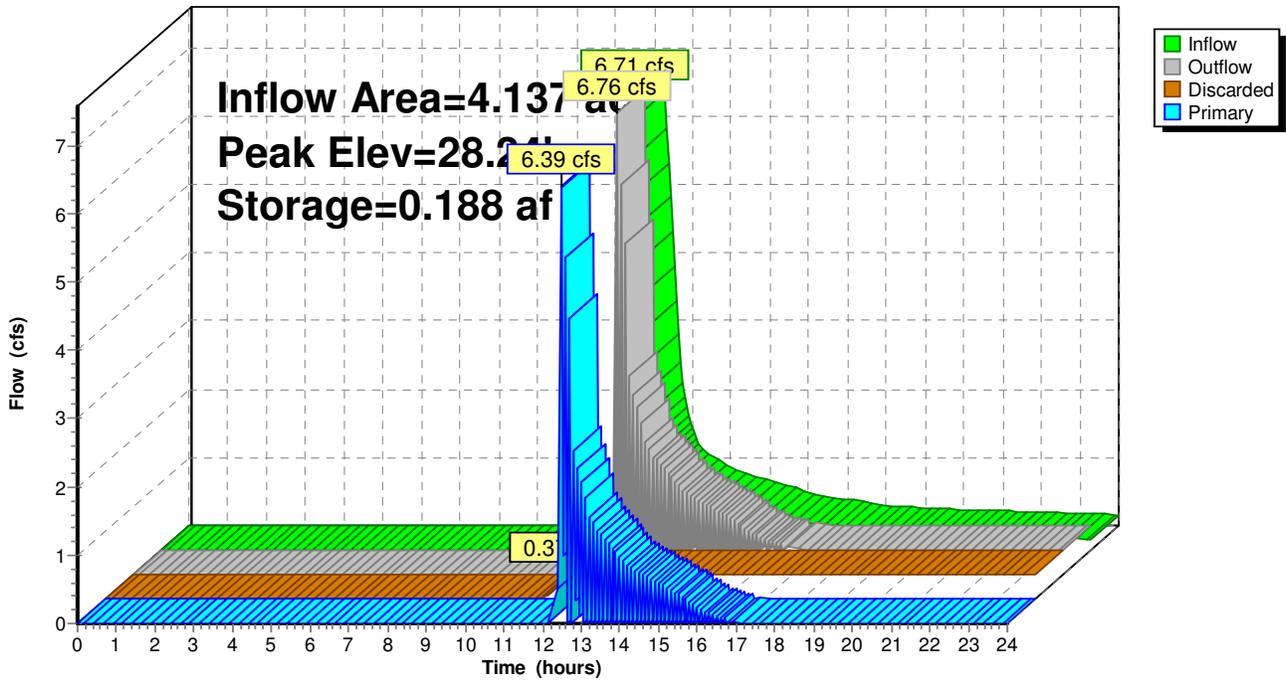
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 100

Pond 3P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 101

Summary for Pond 4P: INFILTRATION 1

[93] Warning: Storage range exceeded by 0.31'

[58] Hint: Peaked 0.31' above defined flood level

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=37)

Inflow Area = 3.475 ac, 28.50% Impervious, Inflow Depth = 2.35" for 100-Year event
 Inflow = 7.21 cfs @ 12.19 hrs, Volume= 0.680 af
 Outflow = 4.85 cfs @ 12.44 hrs, Volume= 0.680 af, Atten= 33%, Lag= 14.9 min
 Discarded = 0.38 cfs @ 11.70 hrs, Volume= 0.491 af
 Primary = 4.47 cfs @ 12.44 hrs, Volume= 0.189 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.96' @ 12.44 hrs Surf.Area= 0.045 ac Storage= 0.189 af
 Flood Elev= 34.65' Surf.Area= 0.045 ac Storage= 0.189 af

Plug-Flow detention time= 187.2 min calculated for 0.680 af (100% of inflow)
 Center-of-Mass det. time= 187.2 min (1,055.0 - 867.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	27.90'	0.077 af	55.75'W x 35.29'L x 6.75'H Field A 0.305 af Overall - 0.113 af Embedded = 0.192 af x 40.0% Voids
#2A	28.65'	0.113 af	ADS_StormTech MC-4500 +Cap x 42 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf
		0.189 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.90'	8.270 in/hr Exfiltration over Surface area
#2	Primary	34.65'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.38 cfs @ 11.70 hrs HW=27.99' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Primary OutFlow Max=4.24 cfs @ 12.44 hrs HW=34.95' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 4.24 cfs @ 1.78 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 102

Pond 4P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

7 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 33.29' Row Length +12.0" End Stone x 2 = 35.29' Base Length

6 Rows x 100.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 55.75' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

42 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 6 Rows = 4,901.0 cf Chamber Storage

13,280.7 cf Field - 4,901.0 cf Chambers = 8,379.7 cf Stone x 40.0% Voids = 3,351.9 cf Stone Storage

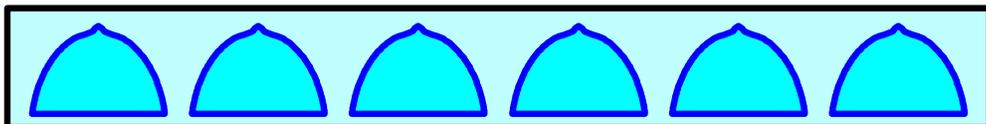
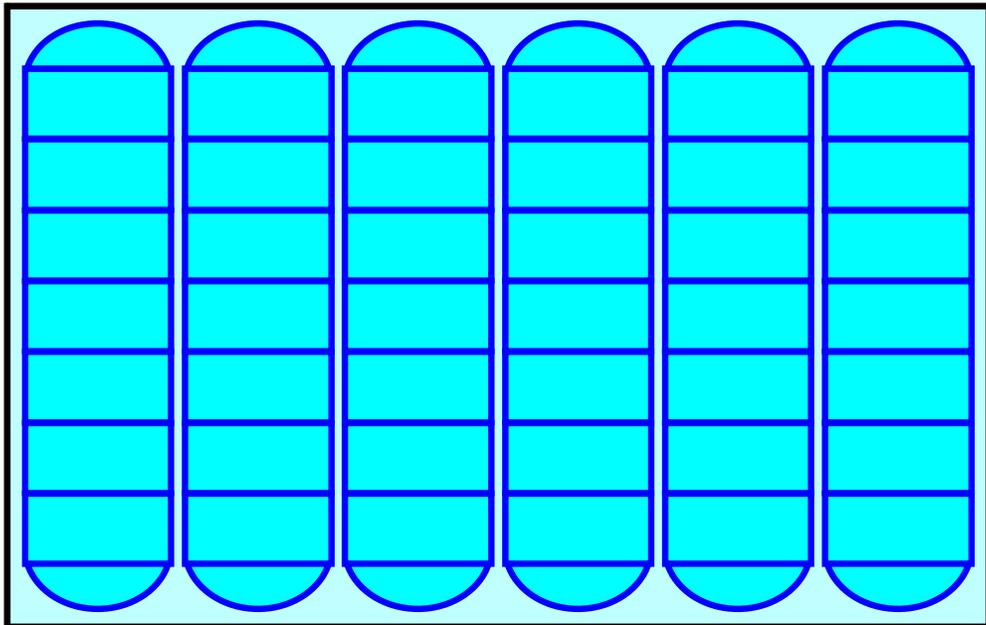
Chamber Storage + Stone Storage = 8,252.9 cf = 0.189 af

Overall Storage Efficiency = 62.1%

42 Chambers

491.9 cy Field

310.4 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

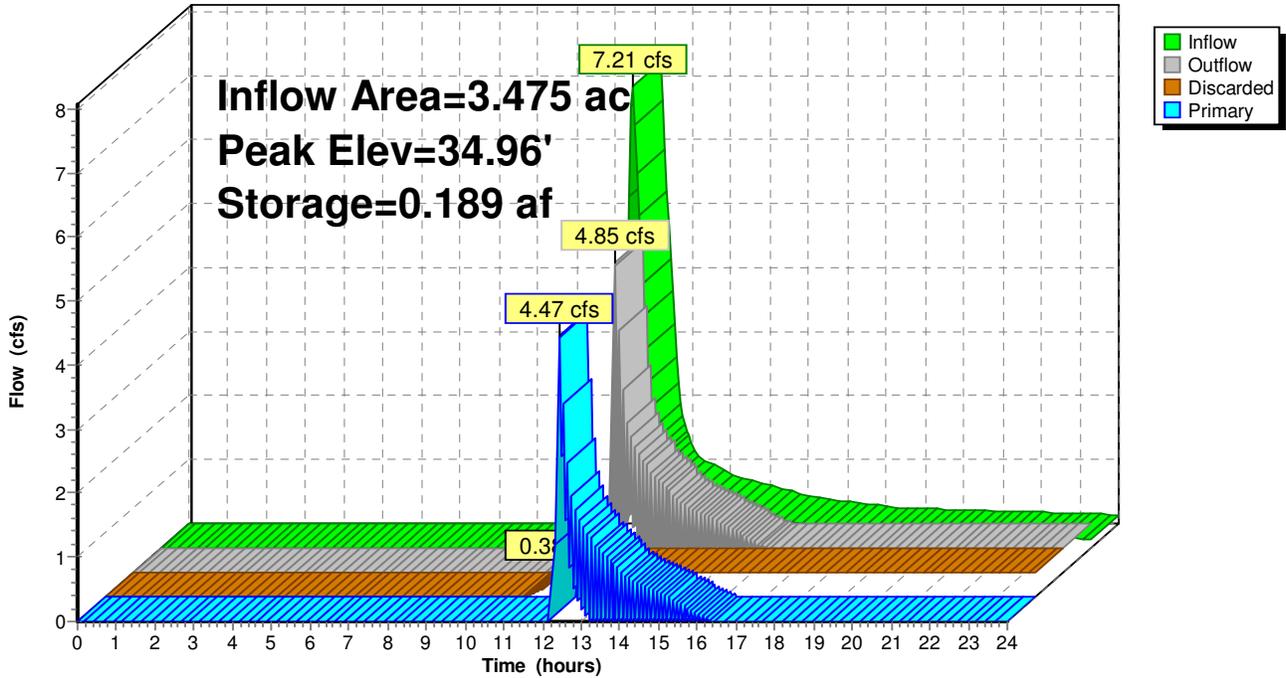
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 103

Pond 4P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 104

Summary for Pond 5P/6P: INFILTRATION 1

[93] Warning: Storage range exceeded by 0.18'

[58] Hint: Peaked 0.18' above defined flood level

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=24)

Inflow Area = 0.964 ac, 64.13% Impervious, Inflow Depth = 4.55" for 100-Year event
 Inflow = 5.11 cfs @ 12.08 hrs, Volume= 0.366 af
 Outflow = 2.35 cfs @ 12.29 hrs, Volume= 0.366 af, Atten= 54%, Lag= 12.7 min
 Discarded = 0.24 cfs @ 11.05 hrs, Volume= 0.300 af
 Primary = 2.12 cfs @ 12.29 hrs, Volume= 0.066 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.46' @ 12.30 hrs Surf.Area= 0.028 ac Storage= 0.119 af
 Flood Elev= 34.28' Surf.Area= 0.028 ac Storage= 0.119 af

Plug-Flow detention time= 175.9 min calculated for 0.366 af (100% of inflow)
 Center-of-Mass det. time= 175.8 min (987.8 - 812.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	27.53'	0.048 af	28.50'W x 43.34'L x 6.75'H Field A 0.191 af Overall - 0.071 af Embedded = 0.120 af x 40.0% Voids
#2A	28.28'	0.071 af	ADS_StormTech MC-4500 +Cap x 27 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		0.119 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.53'	8.270 in/hr Exfiltration over Surface area
#2	Primary	34.28'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.24 cfs @ 11.05 hrs HW=27.60' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=2.00 cfs @ 12.29 hrs HW=34.46' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 2.00 cfs @ 1.39 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 105

Pond 5P/6P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

9 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 41.34' Row Length +12.0" End Stone x 2 = 43.34' Base Length

3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

27 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 3,089.4 cf Chamber Storage

8,337.9 cf Field - 3,089.4 cf Chambers = 5,248.4 cf Stone x 40.0% Voids = 2,099.4 cf Stone Storage

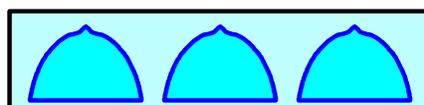
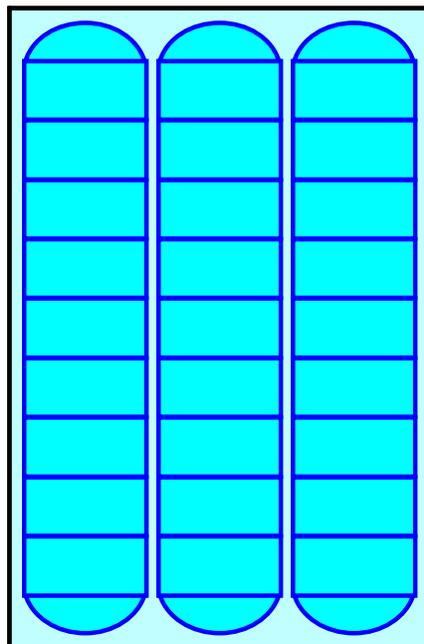
Chamber Storage + Stone Storage = 5,188.8 cf = 0.119 af

Overall Storage Efficiency = 62.2%

27 Chambers

308.8 cy Field

194.4 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

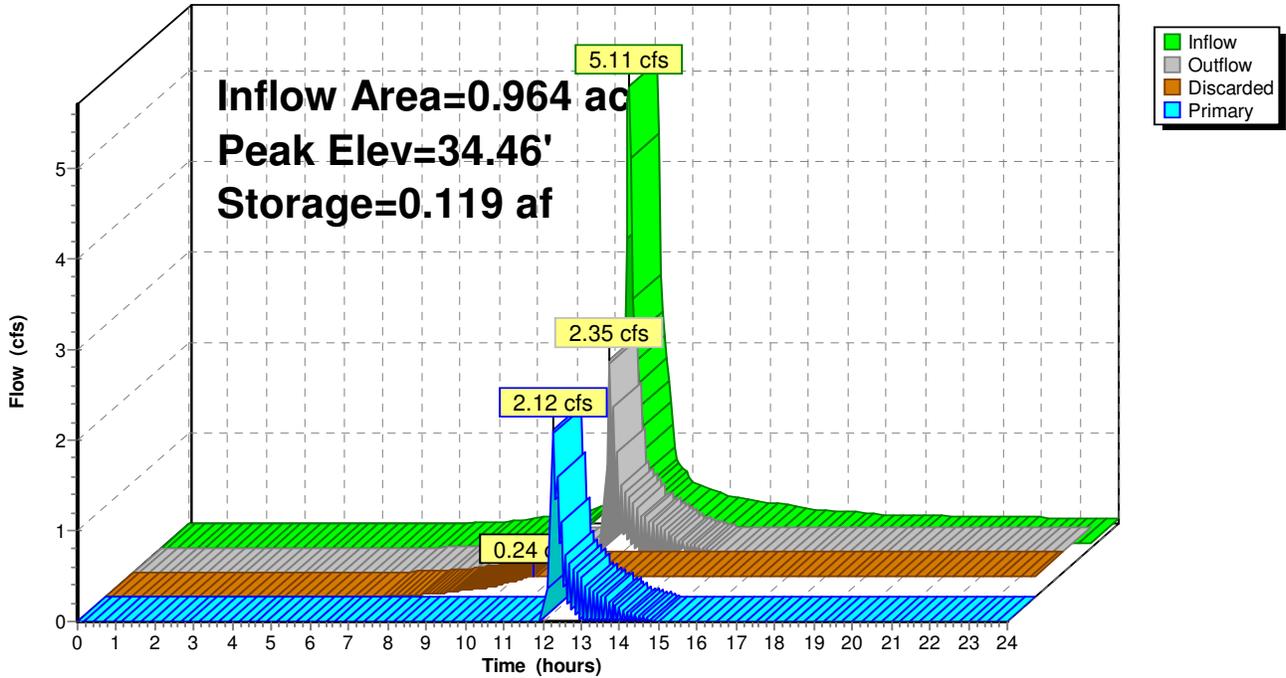
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 106

Pond 5P/6P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 107

Summary for Pond 7P: INFILTRATION 1

[93] Warning: Storage range exceeded by 0.42'

[58] Hint: Peaked 0.42' above defined flood level

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=23)

Inflow Area = 1.743 ac, 62.25% Impervious, Inflow Depth = 4.44" for 100-Year event
 Inflow = 7.65 cfs @ 12.15 hrs, Volume= 0.644 af
 Outflow = 7.55 cfs @ 12.40 hrs, Volume= 0.644 af, Atten= 1%, Lag= 14.9 min
 Discarded = 0.42 cfs @ 11.20 hrs, Volume= 0.534 af
 Primary = 7.12 cfs @ 12.40 hrs, Volume= 0.110 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 32.08' @ 12.40 hrs Surf.Area= 0.051 ac Storage= 0.215 af
 Flood Elev= 31.66' Surf.Area= 0.051 ac Storage= 0.215 af

Plug-Flow detention time= 181.2 min calculated for 0.644 af (100% of inflow)
 Center-of-Mass det. time= 181.2 min (1,001.9 - 820.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.91'	0.085 af	46.67'W x 47.37'L x 6.75'H Field A 0.343 af Overall - 0.130 af Embedded = 0.212 af x 40.0% Voids
#2A	25.66'	0.130 af	ADS_StormTech MC-4500 +Cap x 50 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		0.215 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.91'	8.270 in/hr Exfiltration over Surface area
#2	Primary	31.66'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.42 cfs @ 11.20 hrs HW=24.98' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=7.11 cfs @ 12.40 hrs HW=32.08' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 7.11 cfs @ 2.12 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 108

Pond 7P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

10 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 45.37' Row Length +12.0" End Stone x 2 = 47.37' Base Length

5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

50 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 5,681.5 cf Chamber Storage

14,920.5 cf Field - 5,681.5 cf Chambers = 9,239.0 cf Stone x 40.0% Voids = 3,695.6 cf Stone Storage

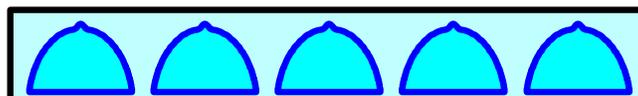
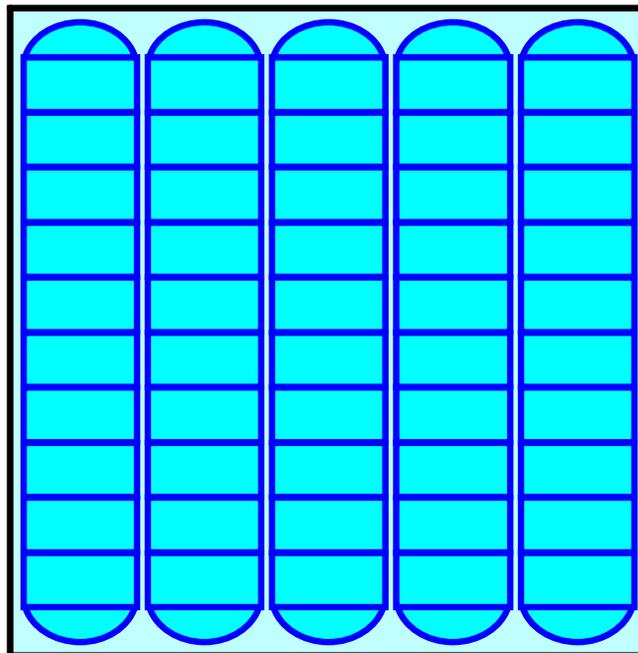
Chamber Storage + Stone Storage = 9,377.1 cf = 0.215 af

Overall Storage Efficiency = 62.8%

50 Chambers

552.6 cy Field

342.2 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

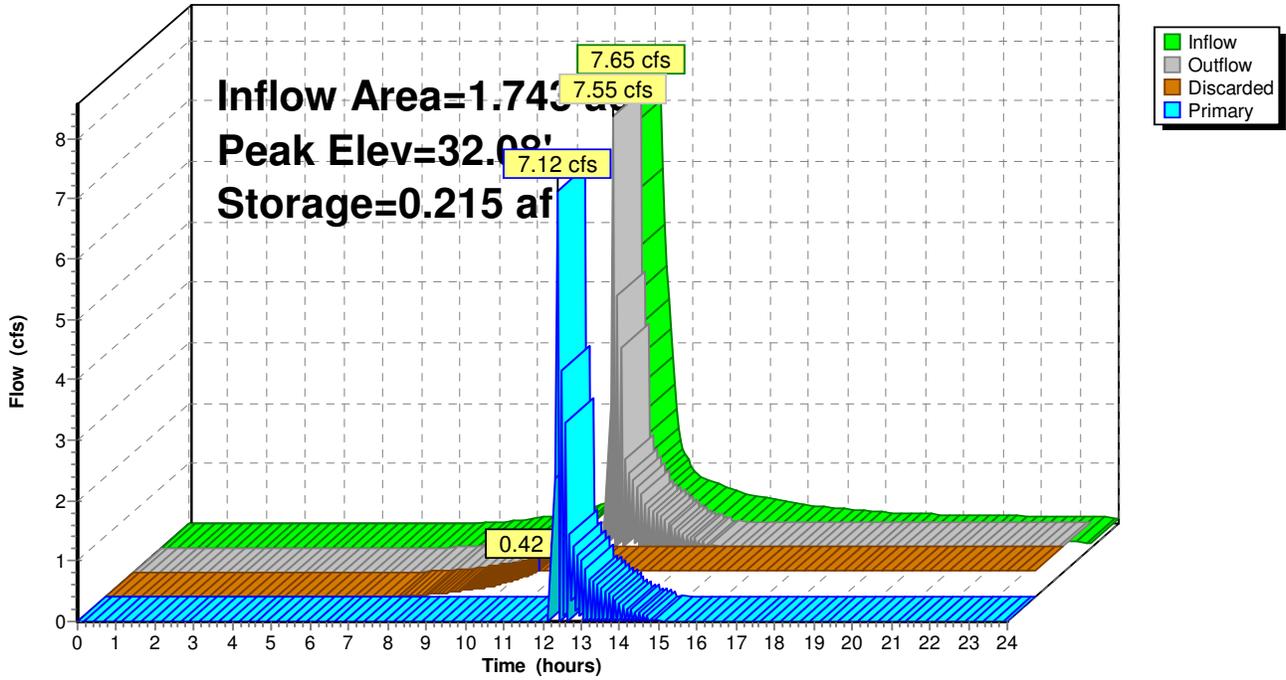
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 109

Pond 7P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 110

Summary for Pond 8P/9P: INFILTRATION 1

[93] Warning: Storage range exceeded by 0.41'

[58] Hint: Peaked 0.41' above defined flood level

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=25)

Inflow Area = 2.195 ac, 53.43% Impervious, Inflow Depth = 3.84" for 100-Year event
 Inflow = 8.62 cfs @ 12.14 hrs, Volume= 0.702 af
 Outflow = 7.33 cfs @ 12.40 hrs, Volume= 0.702 af, Atten= 15%, Lag= 15.6 min
 Discarded = 0.46 cfs @ 11.30 hrs, Volume= 0.575 af
 Primary = 6.87 cfs @ 12.40 hrs, Volume= 0.128 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 29.52' @ 12.40 hrs Surf.Area= 0.055 ac Storage= 0.234 af
 Flood Elev= 29.11' Surf.Area= 0.055 ac Storage= 0.234 af

Plug-Flow detention time= 188.2 min calculated for 0.702 af (100% of inflow)
 Center-of-Mass det. time= 188.1 min (1,019.8 - 831.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	22.36'	0.090 af	37.58'W x 63.47'L x 6.75'H Field A 0.370 af Overall - 0.143 af Embedded = 0.226 af x 40.0% Voids
#2A	23.11'	0.143 af	ADS_StormTech MC-4500 +Cap x 56 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.234 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.36'	8.270 in/hr Exfiltration over Surface area
#2	Primary	29.11'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.46 cfs @ 11.30 hrs HW=22.43' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.46 cfs)

Primary OutFlow Max=6.64 cfs @ 12.40 hrs HW=29.51' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 6.64 cfs @ 2.07 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 111

Pond 8P/9P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

14 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 61.47' Row Length +12.0" End Stone x 2 = 63.47' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

56 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 6,249.1 cf Chamber Storage

16,100.7 cf Field - 6,249.1 cf Chambers = 9,851.6 cf Stone x 40.0% Voids = 3,940.7 cf Stone Storage

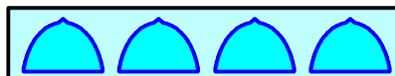
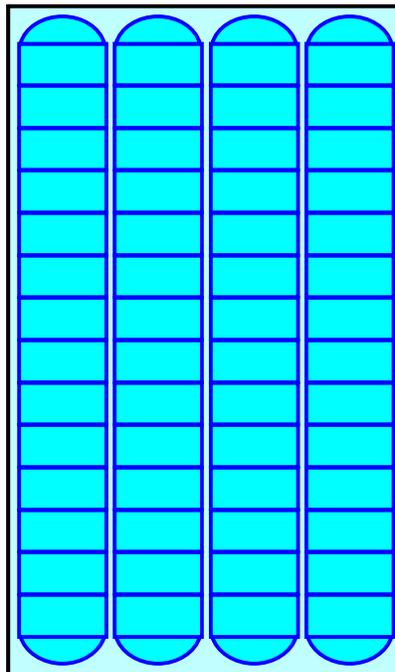
Chamber Storage + Stone Storage = 10,189.7 cf = 0.234 af

Overall Storage Efficiency = 63.3%

56 Chambers

596.3 cy Field

364.9 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

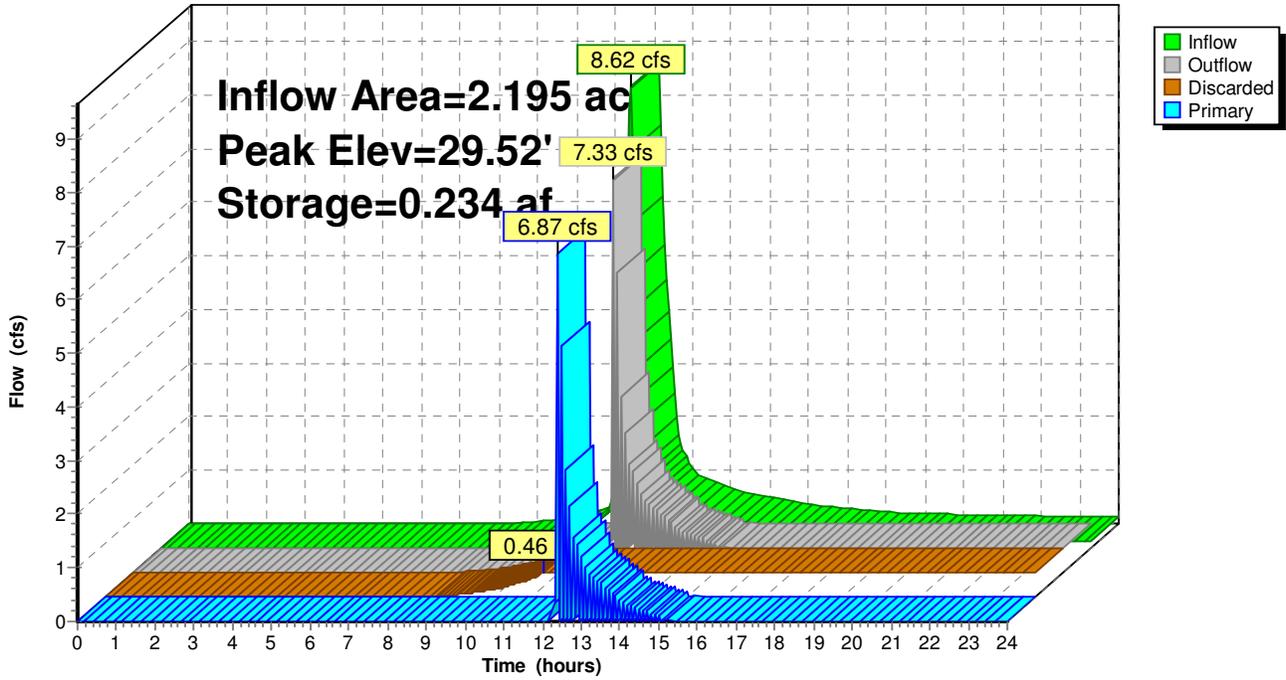
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 112

Pond 8P/9P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 113

Summary for Pond 10P-14P: INFILTRATION 1

- [93] Warning: Storage range exceeded by 0.55'
- [58] Hint: Peaked 0.55' above defined flood level
- [88] Warning: Qout>Qin may require smaller dt or Finer Routing
- [85] Warning: Oscillations may require smaller dt or Finer Routing (severity=32)

Inflow Area = 3.994 ac, 36.47% Impervious, Inflow Depth = 2.83" for 100-Year event
 Inflow = 9.07 cfs @ 12.17 hrs, Volume= 0.942 af
 Outflow = 11.21 cfs @ 12.45 hrs, Volume= 0.942 af, Atten= 0%, Lag= 17.0 min
 Discarded = 0.55 cfs @ 11.55 hrs, Volume= 0.714 af
 Primary = 10.66 cfs @ 12.45 hrs, Volume= 0.228 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.53' @ 12.45 hrs Surf.Area= 0.066 ac Storage= 0.280 af
 Flood Elev= 26.98' Surf.Area= 0.066 ac Storage= 0.280 af

Plug-Flow detention time= 188.6 min calculated for 0.941 af (100% of inflow)
 Center-of-Mass det. time= 188.5 min (1,043.6 - 855.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.23'	0.109 af	55.75'W x 51.39'L x 6.75'H Field A 0.444 af Overall - 0.171 af Embedded = 0.273 af x 40.0% Voids
#2A	20.98'	0.171 af	ADS_StormTech MC-4500 +Cap x 66 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf
		0.280 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.23'	8.270 in/hr Exfiltration over Surface area
#2	Primary	26.98'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.55 cfs @ 11.55 hrs HW=20.30' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.55 cfs)

Primary OutFlow Max=10.62 cfs @ 12.45 hrs HW=27.53' (Free Discharge)
 ↑2=Orifice/Grate (Weir Controls 10.62 cfs @ 2.42 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 114

Pond 10P-14P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 6 rows = 428.4 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length

6 Rows x 100.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 55.75' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

66 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 6 Rows = 7,456.8 cf Chamber Storage

19,339.3 cf Field - 7,456.8 cf Chambers = 11,882.6 cf Stone x 40.0% Voids = 4,753.0 cf Stone Storage

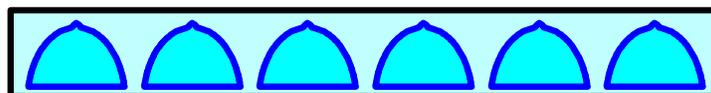
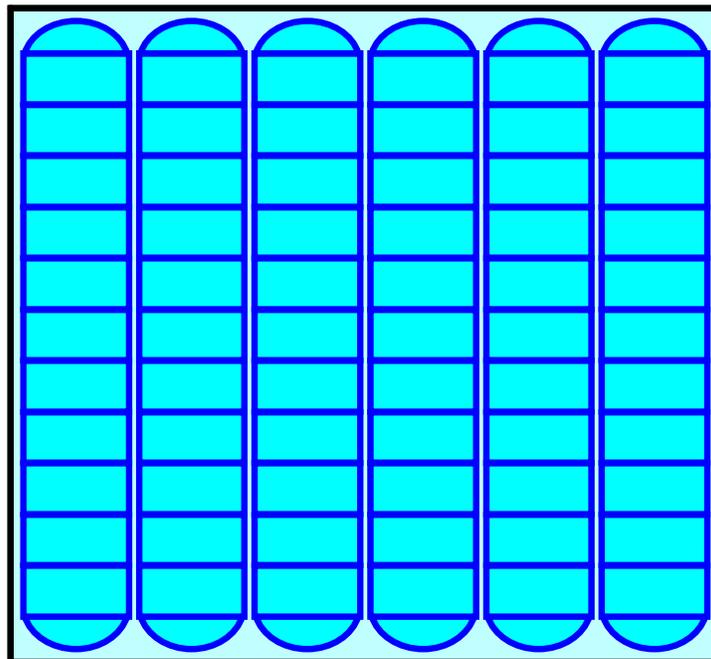
Chamber Storage + Stone Storage = 12,209.8 cf = 0.280 af

Overall Storage Efficiency = 63.1%

66 Chambers

716.3 cy Field

440.1 cy Stone



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

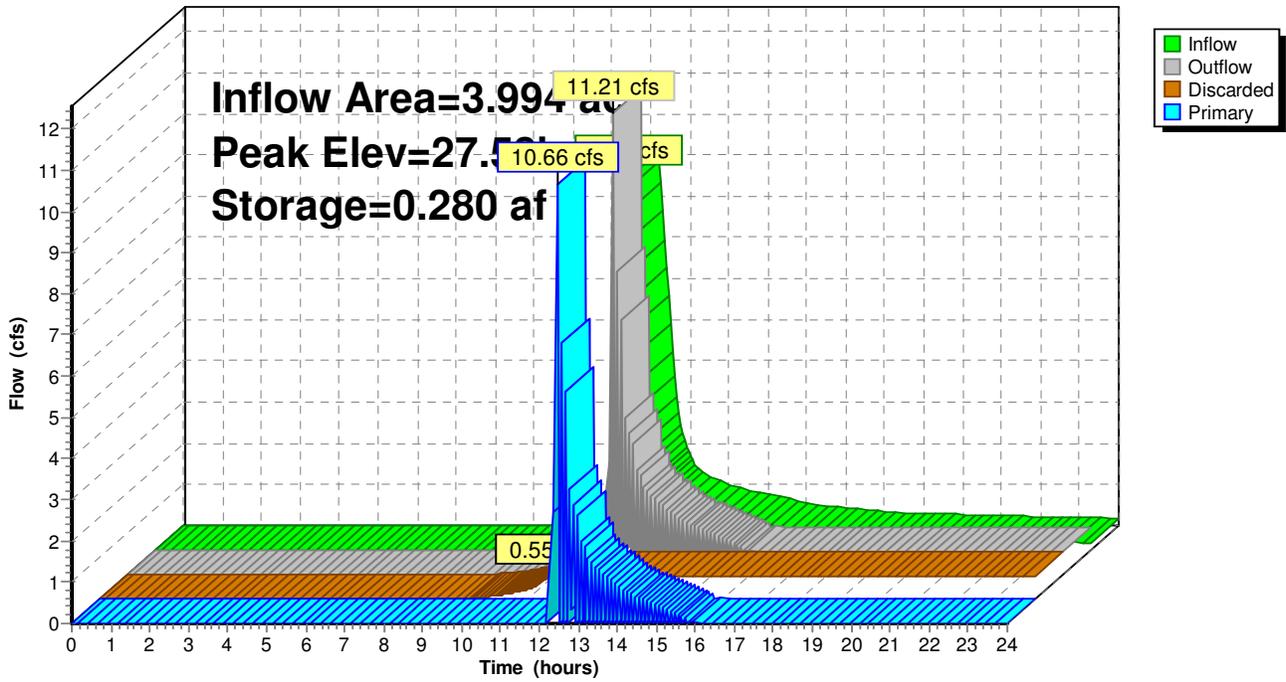
Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 115

Pond 10P-14P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 116

Summary for Pond 15P: INFILTRATION 1

- [93] Warning: Storage range exceeded by 0.38'
- [58] Hint: Peaked 0.38' above defined flood level
- [88] Warning: Qout>Qin may require smaller dt or Finer Routing
- [85] Warning: Oscillations may require smaller dt or Finer Routing (severity=39)

Inflow Area = 5.029 ac, 28.62% Impervious, Inflow Depth = 2.35" for 100-Year event
 Inflow = 6.33 cfs @ 12.62 hrs, Volume= 0.984 af
 Outflow = 6.73 cfs @ 12.91 hrs, Volume= 0.984 af, Atten= 0%, Lag= 17.3 min
 Discarded = 0.53 cfs @ 12.00 hrs, Volume= 0.709 af
 Primary = 6.20 cfs @ 12.91 hrs, Volume= 0.276 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.55' @ 12.90 hrs Surf.Area= 0.064 ac Storage= 0.272 af
 Flood Elev= 27.17' Surf.Area= 0.064 ac Storage= 0.272 af

Plug-Flow detention time= 190.6 min calculated for 0.983 af (100% of inflow)
 Center-of-Mass det. time= 190.6 min (1,085.2 - 894.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.42'	0.105 af	46.67'W x 59.44'L x 6.75'H Field A 0.430 af Overall - 0.167 af Embedded = 0.263 af x 40.0% Voids
#2A	21.17'	0.167 af	ADS_StormTech MC-4500 +Cap x 65 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		0.272 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.42'	8.270 in/hr Exfiltration over Surface area
#2	Primary	27.17'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.53 cfs @ 12.00 hrs HW=20.52' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.53 cfs)

Primary OutFlow Max=5.65 cfs @ 12.91 hrs HW=27.53' (Free Discharge)
 ↑2=Orifice/Grate (Weir Controls 5.65 cfs @ 1.96 fps)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 117

Pond 15P: INFILTRATION 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with end caps)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

13 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 57.44' Row Length +12.0" End Stone x 2 = 59.44' Base Length

5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width

9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

65 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 7,278.9 cf Chamber Storage

18,724.1 cf Field - 7,278.9 cf Chambers = 11,445.2 cf Stone x 40.0% Voids = 4,578.1 cf Stone Storage

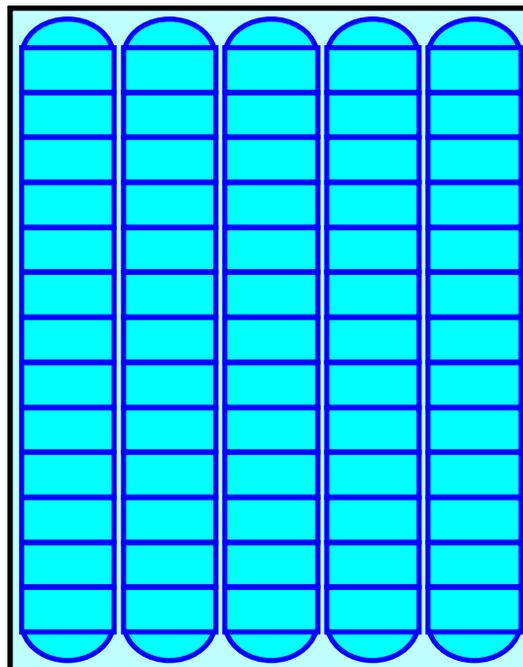
Chamber Storage + Stone Storage = 11,857.0 cf = 0.272 af

Overall Storage Efficiency = 63.3%

65 Chambers

693.5 cy Field

423.9 cy Stone



ALTERNATIVE WATER SHEDS

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

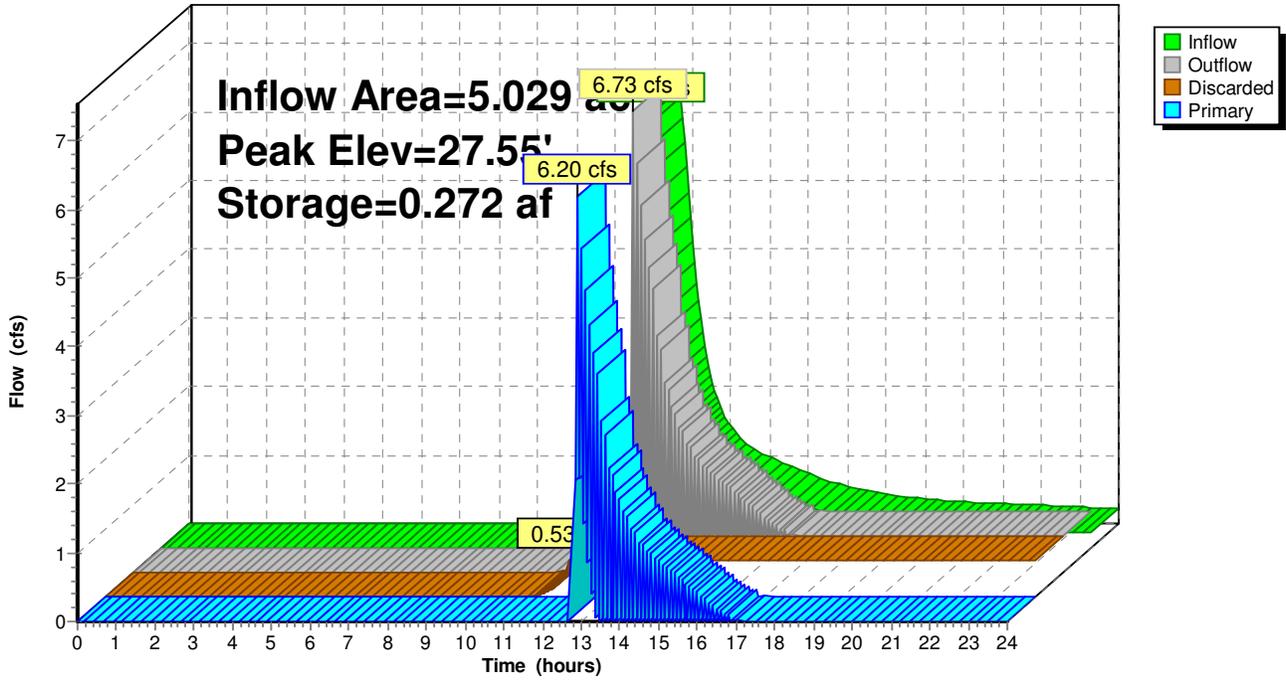
Type III 24-hr 100-Year Rainfall=7.20"

Printed 7/26/2016

Page 118

Pond 15P: INFILTRATION 1

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 119

Summary for Pond 100Y LP-1: LOW SPOT ROAD G STA 15-19

[62] Hint: Exceeded Reach 46R OUTLET depth by 0.72' @ 12.85 hrs

[62] Hint: Exceeded Reach 49R OUTLET depth by 0.71' @ 12.90 hrs

[62] Hint: Exceeded Reach 51R OUTLET depth by 0.73' @ 12.85 hrs

Inflow Area = 8.809 ac, 30.47% Impervious, Inflow Depth = 0.63" for 100-Year event
 Inflow = 8.27 cfs @ 12.50 hrs, Volume= 0.465 af
 Outflow = 3.18 cfs @ 12.79 hrs, Volume= 0.465 af, Atten= 62%, Lag= 17.3 min
 Discarded = 3.18 cfs @ 12.79 hrs, Volume= 0.465 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 36.98' @ 12.79 hrs Surf.Area= 16,600 sf Storage= 5,172 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 17.4 min (808.1 - 790.7)

Volume	Invert	Avail.Storage	Storage Description			
#1	36.50'	27,083 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
36.50	5,746	507.0	0	0	5,746	
36.75	11,030	581.3	2,061	2,061	12,182	
37.00	17,237	676.0	3,505	5,566	21,658	
37.25	24,463	759.5	5,186	10,752	31,199	
37.50	32,551	841.3	7,103	17,855	41,621	
37.75	41,455	951.0	9,228	27,083	57,269	

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.50'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=3.18 cfs @ 12.79 hrs HW=36.98' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 3.18 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

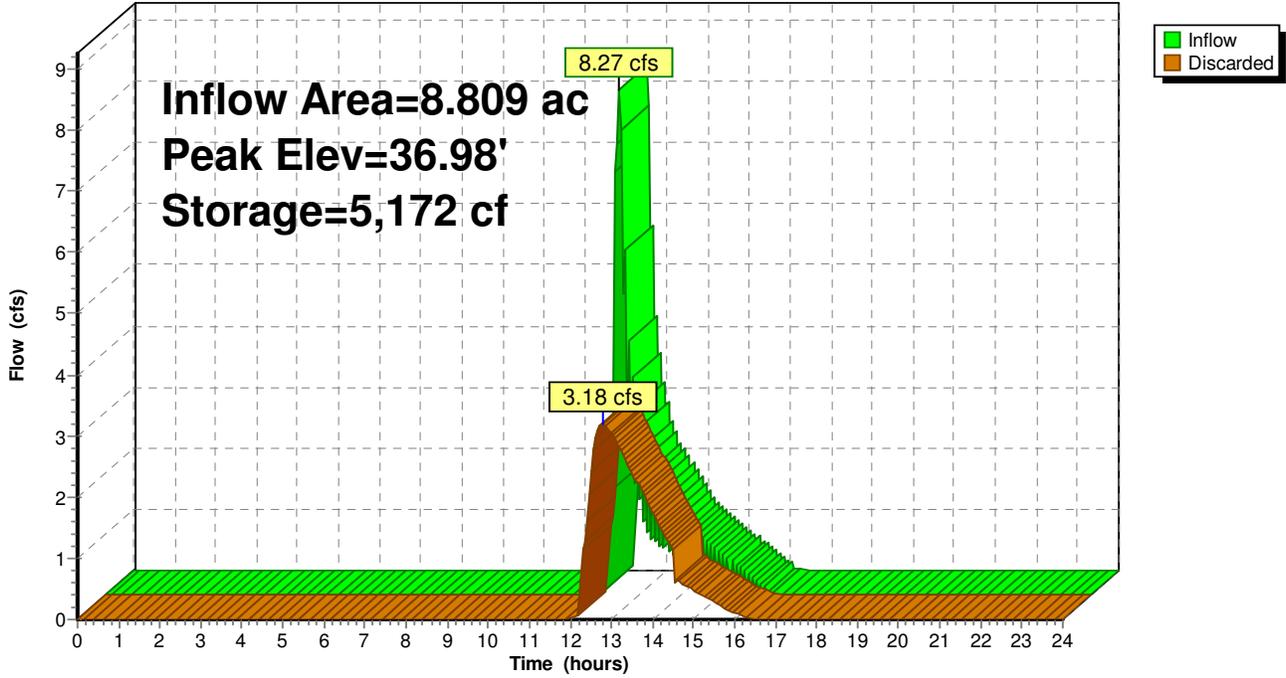
Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 120

Pond 100Y LP-1: LOW SPOT ROAD G STA 15-19

Hydrograph



ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 121

Summary for Pond 100Y LP-2: Low Spot Road I

- [62] Hint: Exceeded Reach 48R OUTLET depth by 0.66' @ 13.20 hrs
- [62] Hint: Exceeded Reach 52R OUTLET depth by 0.69' @ 13.20 hrs
- [63] Warning: Exceeded Reach 53R INLET depth by 0.22' @ 13.20 hrs
- [63] Warning: Exceeded Reach 54R INLET depth by 0.53' @ 12.80 hrs
- [63] Warning: Exceeded Reach 55R INLET depth by 0.72' @ 13.20 hrs

Inflow Area = 17.098 ac, 35.90% Impervious, Inflow Depth = 0.67" for 100-Year event
 Inflow = 17.48 cfs @ 12.45 hrs, Volume= 0.957 af
 Outflow = 5.62 cfs @ 13.18 hrs, Volume= 0.957 af, Atten= 68%, Lag= 43.3 min
 Discarded = 5.62 cfs @ 13.18 hrs, Volume= 0.957 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 32.08' @ 13.18 hrs Surf.Area= 29,360 sf Storage= 8,404 cf

Plug-Flow detention time= 19.7 min calculated for 0.957 af (100% of inflow)
 Center-of-Mass det. time= 19.7 min (823.9 - 804.2)

Volume	Invert	Avail.Storage	Storage Description			
#1	31.50'	70,244 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
31.50	3,929	567.0	0	0	3,929	
31.75	12,215	727.0	1,923	1,923	20,406	
32.00	24,089	969.0	4,455	6,377	53,067	
32.25	43,398	1,543.0	8,318	14,696	167,810	
32.50	63,912	1,964.0	13,331	28,027	285,302	
32.75	85,235	2,322.0	18,580	46,607	407,406	
33.00	104,183	2,279.9	23,638	70,244	422,834	

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.50'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=5.62 cfs @ 13.18 hrs HW=32.08' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 5.62 cfs)

ALTERNATIVE WATER SHEDS

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

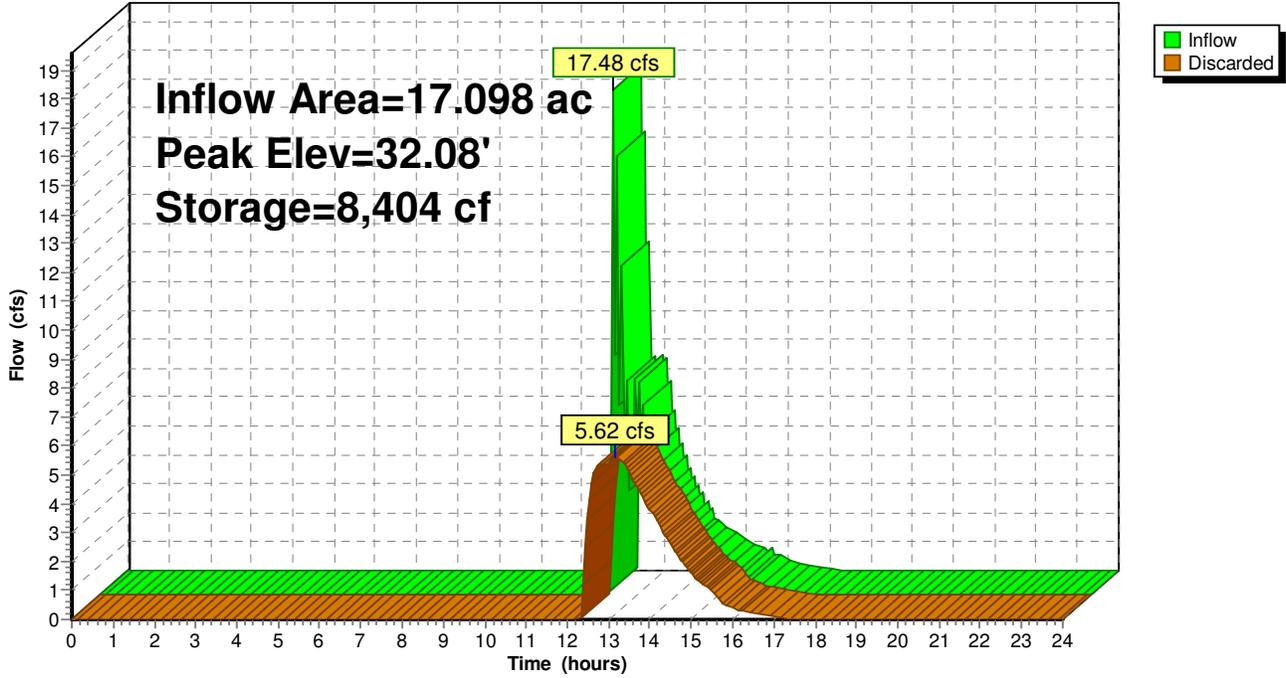
Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 122

Pond 100Y LP-2: Low Spot Road I

Hydrograph





building c



building c



building b



building b



building A



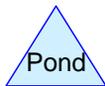
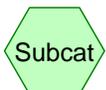
building a



multifamily(per module)



multifamily (per module)



Routing Diagram for ALTERNATIVE WATER SHEDS-buildings
Prepared by {enter your company name here}, Printed 7/26/2016
HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

ALTERNATIVE WATER SHEDS-buildings

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Printed 7/26/2016

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.134	98	(25S, 27S, 29S, 35S)
0.134	98	TOTAL AREA

ALTERNATIVE WATER SHEDS-buildings

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Printed 7/26/2016

Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.134	Other	25S, 27S, 29S, 35S
0.134		TOTAL AREA

ALTERNATIVE WATER SHEDS-buildings

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Printed 7/26/2016

Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.134	0.134		25S, 27S, 29S, 35S
0.000	0.000	0.000	0.000	0.134	0.134	TOTAL AREA	

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 5

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 25S: building c	Runoff Area=1,154 sf 100.00% Impervious Runoff Depth>5.15" Tc=5.0 min CN=98 Runoff=0.15 cfs 0.011 af
Subcatchment 27S: building b	Runoff Area=1,104 sf 100.00% Impervious Runoff Depth>5.15" Tc=5.0 min CN=98 Runoff=0.14 cfs 0.011 af
Subcatchment 29S: building A	Runoff Area=1,464 sf 100.00% Impervious Runoff Depth>5.15" Tc=5.0 min CN=98 Runoff=0.19 cfs 0.014 af
Subcatchment 35S: multifamily(per	Runoff Area=2,120 sf 100.00% Impervious Runoff Depth>5.15" Tc=5.0 min CN=98 Runoff=0.28 cfs 0.021 af
Pond 32P: building b	Peak Elev=26.66' Storage=0.003 af Inflow=0.14 cfs 0.011 af Outflow=0.02 cfs 0.011 af
Pond 33P: building c	Peak Elev=26.78' Storage=0.003 af Inflow=0.15 cfs 0.011 af Outflow=0.02 cfs 0.011 af
Pond 34P: building a	Peak Elev=27.31' Storage=0.004 af Inflow=0.19 cfs 0.014 af Outflow=0.03 cfs 0.014 af
Pond 36P: multifamily (per module)	Peak Elev=27.16' Storage=0.006 af Inflow=0.28 cfs 0.021 af Outflow=0.04 cfs 0.021 af

Total Runoff Area = 0.134 ac Runoff Volume = 0.058 af Average Runoff Depth = 5.15"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.134 ac

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 6

Summary for Subcatchment 25S: building c

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af, Depth> 5.15"

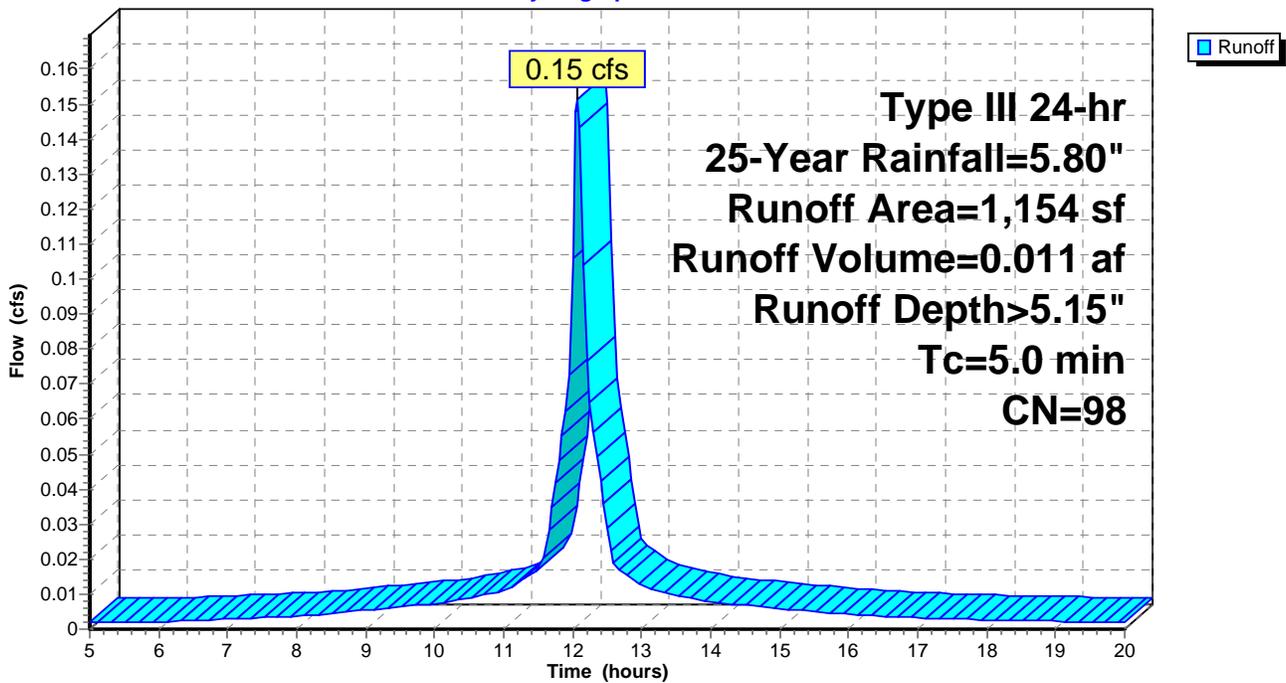
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 1,154	98	
1,154		100.00% Impervious Area

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

Subcatchment 25S: building c

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 7

Summary for Subcatchment 27S: building b

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

Runoff = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af, Depth> 5.15"

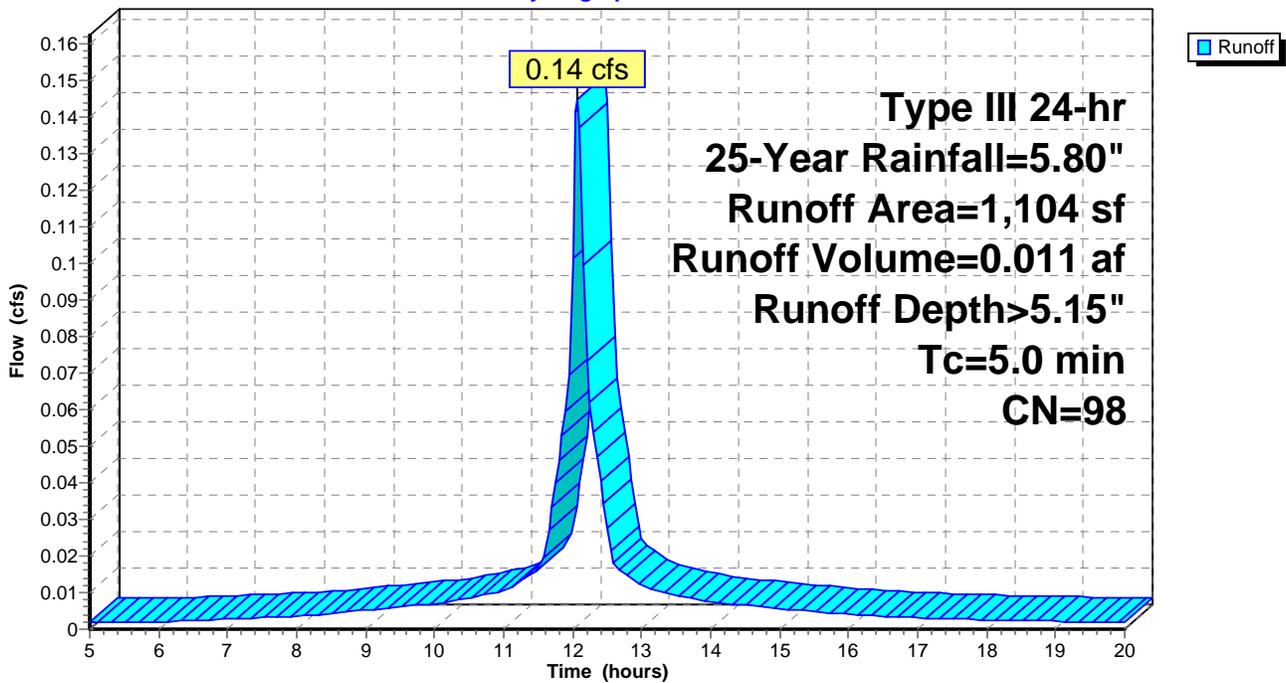
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 1,104	98	
1,104		100.00% Impervious Area

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

Subcatchment 27S: building b

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 8

Summary for Subcatchment 29S: building A

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

Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.014 af, Depth> 5.15"

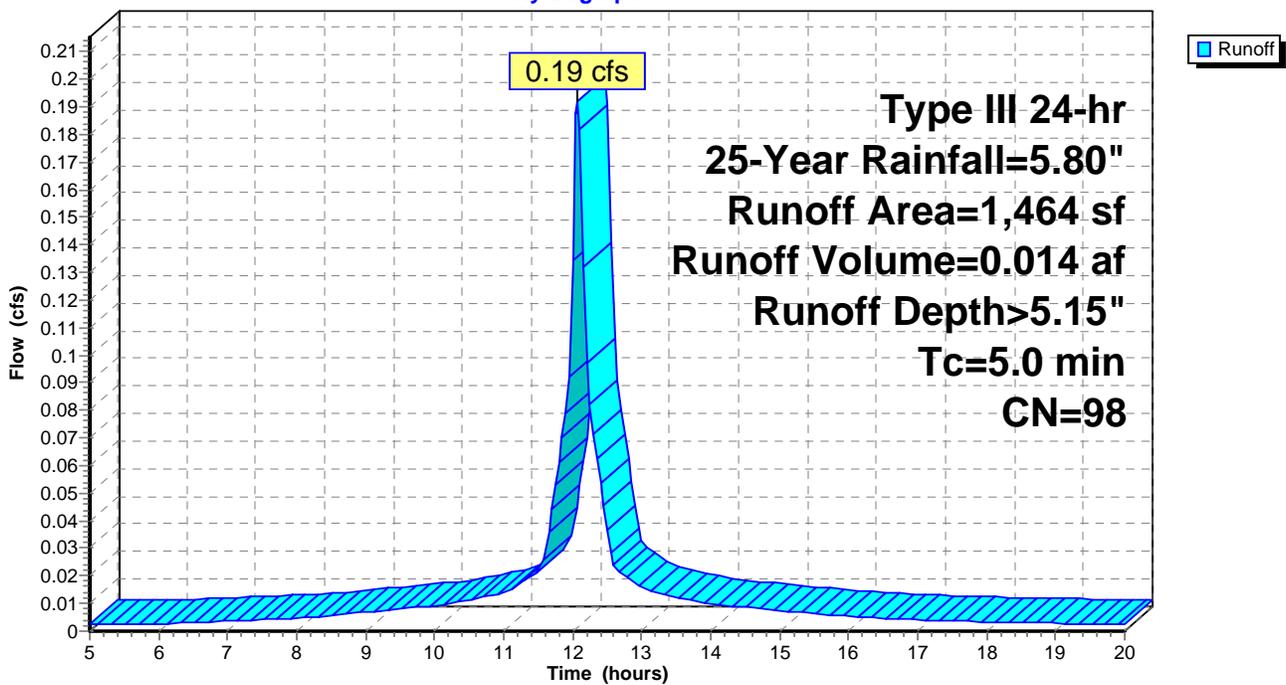
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 1,464	98	
1,464		100.00% Impervious Area

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

Subcatchment 29S: building A

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 9

Summary for Subcatchment 35S: multifamily(per module)

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.28 cfs @ 12.07 hrs, Volume= 0.021 af, Depth> 5.15"

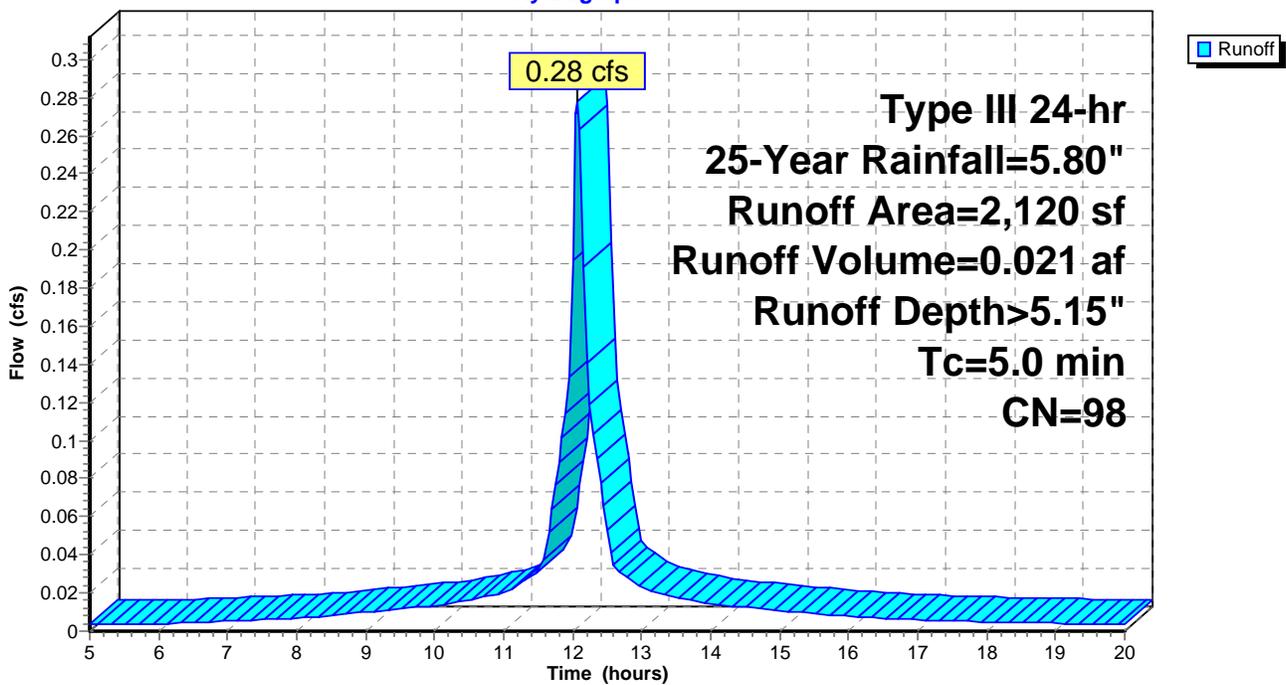
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 2,120	98	
2,120		100.00% Impervious Area

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

Subcatchment 35S: multifamily(per module)

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 10

Summary for Pond 32P: building b

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.025 ac, 100.00% Impervious, Inflow Depth > 5.15" for 25-Year event
 Inflow = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af
 Outflow = 0.02 cfs @ 11.65 hrs, Volume= 0.011 af, Atten= 85%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.65 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 26.66' @ 12.55 hrs Surf.Area= 0.003 ac Storage= 0.003 af
 Flood Elev= 28.40' Surf.Area= 0.003 ac Storage= 0.006 af

Plug-Flow detention time= 35.5 min calculated for 0.011 af (100% of inflow)
 Center-of-Mass det. time= 35.2 min (768.8 - 733.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.003 af	11.17'W x 10.50'L x 3.54'H Field A 0.010 af Overall - 0.003 af Embedded = 0.007 af x 40.0% Voids
#2A	25.35'	0.003 af	Cultec R-330XLHD x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 11.65 hrs HW=24.89' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 11

Pond 32P: building b - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length

2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

2 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 126.7 cf Chamber Storage

415.3 cf Field - 126.7 cf Chambers = 288.6 cf Stone x 40.0% Voids = 115.4 cf Stone Storage

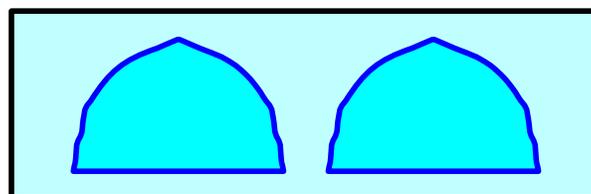
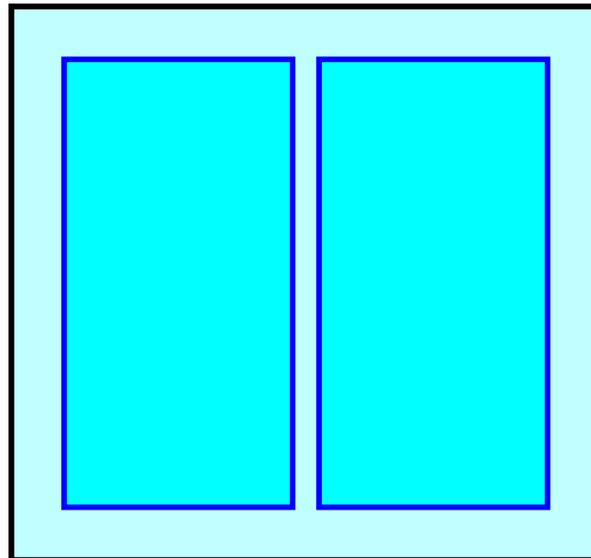
Chamber Storage + Stone Storage = 242.1 cf = 0.006 af

Overall Storage Efficiency = 58.3%

2 Chambers

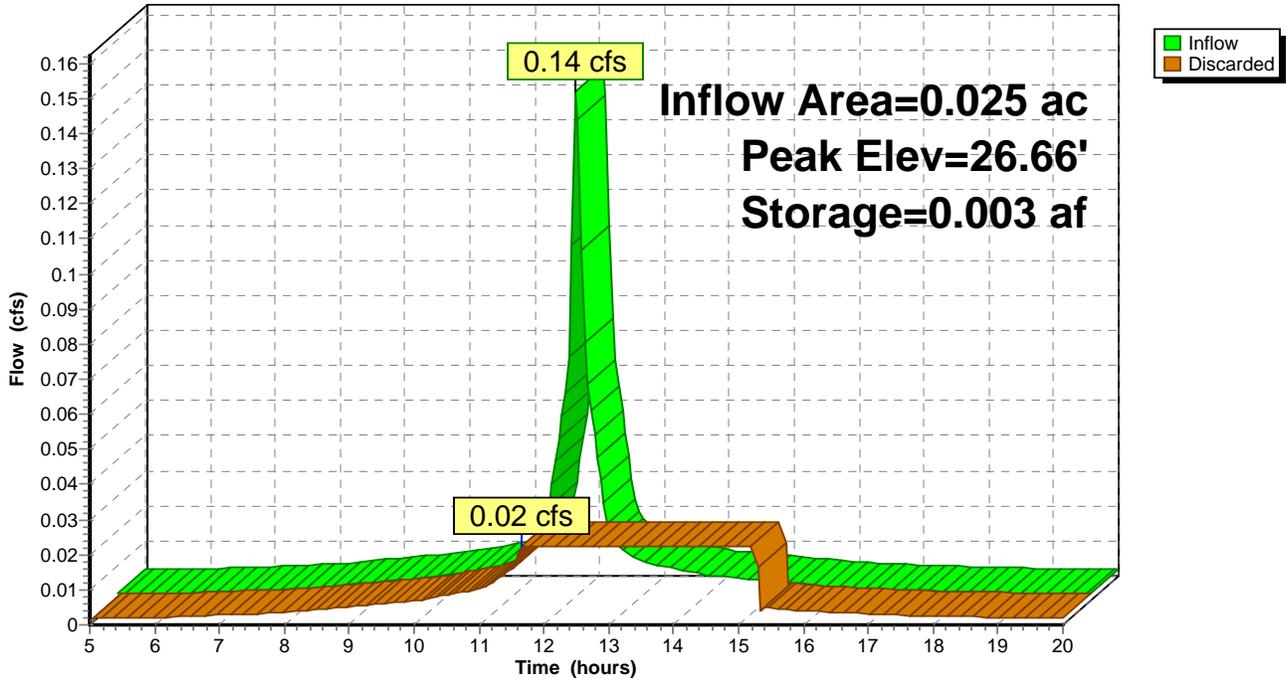
15.4 cy Field

10.7 cy Stone



Pond 32P: building b

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 13

Summary for Pond 33P: building c

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.026 ac, 100.00% Impervious, Inflow Depth > 5.15" for 25-Year event
 Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af
 Outflow = 0.02 cfs @ 11.65 hrs, Volume= 0.011 af, Atten= 85%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.65 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 26.78' @ 12.56 hrs Surf.Area= 0.003 ac Storage= 0.003 af
 Flood Elev= 28.39' Surf.Area= 0.003 ac Storage= 0.006 af

Plug-Flow detention time= 38.7 min calculated for 0.011 af (100% of inflow)
 Center-of-Mass det. time= 38.4 min (772.0 - 733.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.003 af	11.17'W x 10.50'L x 3.54'H Field A 0.010 af Overall - 0.003 af Embedded = 0.007 af x 40.0% Voids
#2A	25.35'	0.003 af	Cultec R-330XLHD x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 11.65 hrs HW=24.90' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 14

Pond 33P: building c - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length

2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

2 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 126.7 cf Chamber Storage

415.3 cf Field - 126.7 cf Chambers = 288.6 cf Stone x 40.0% Voids = 115.4 cf Stone Storage

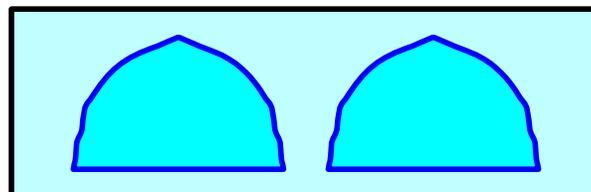
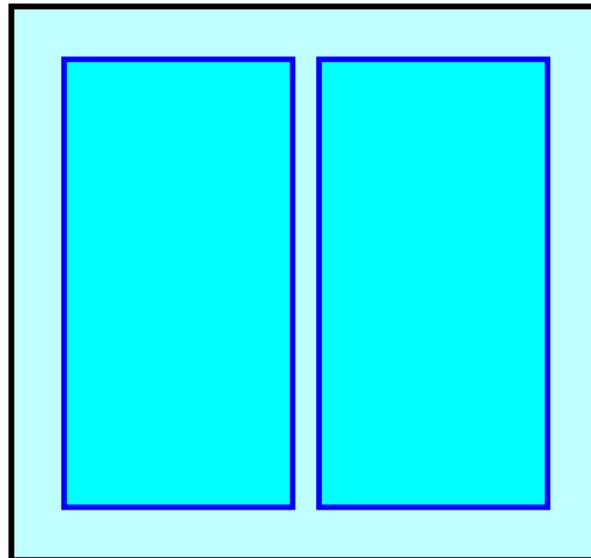
Chamber Storage + Stone Storage = 242.1 cf = 0.006 af

Overall Storage Efficiency = 58.3%

2 Chambers

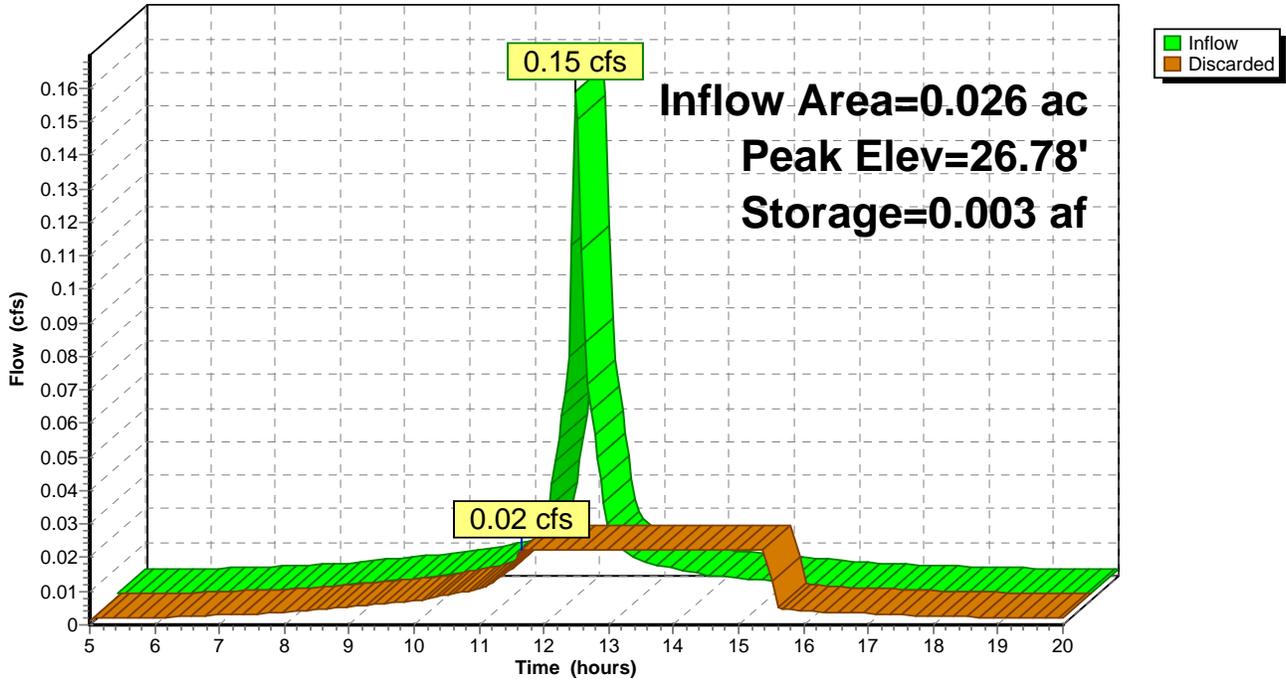
15.4 cy Field

10.7 cy Stone



Pond 33P: building c

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 16

Summary for Pond 34P: building a

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.034 ac, 100.00% Impervious, Inflow Depth > 5.15" for 25-Year event
 Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.014 af
 Outflow = 0.03 cfs @ 11.60 hrs, Volume= 0.014 af, Atten= 87%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 11.60 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.31' @ 12.59 hrs Surf.Area= 0.003 ac Storage= 0.004 af
 Flood Elev= 28.73' Surf.Area= 0.003 ac Storage= 0.006 af

Plug-Flow detention time= 48.5 min calculated for 0.014 af (100% of inflow)
 Center-of-Mass det. time= 48.2 min (781.8 - 733.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.004 af	11.83'W x 11.17'L x 3.88'H Field A 0.012 af Overall - 0.003 af Embedded = 0.009 af x 40.0% Voids
#2A	25.52'	0.003 af	Cultec R-330XLHD x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 11.60 hrs HW=24.89' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 17

Pond 34P: building a - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +16.0" End Stone x 2 = 11.17' Base Length

2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 16.0" Side Stone x 2 = 11.83' Base Width

8.0" Base + 30.5" Chamber Height + 8.0" Cover = 3.88' Field Height

2 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 126.7 cf Chamber Storage

512.0 cf Field - 126.7 cf Chambers = 385.4 cf Stone x 40.0% Voids = 154.1 cf Stone Storage

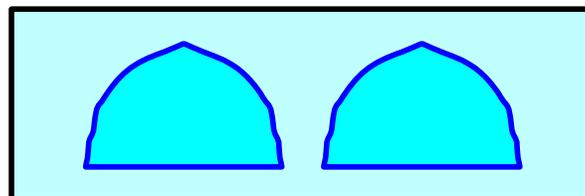
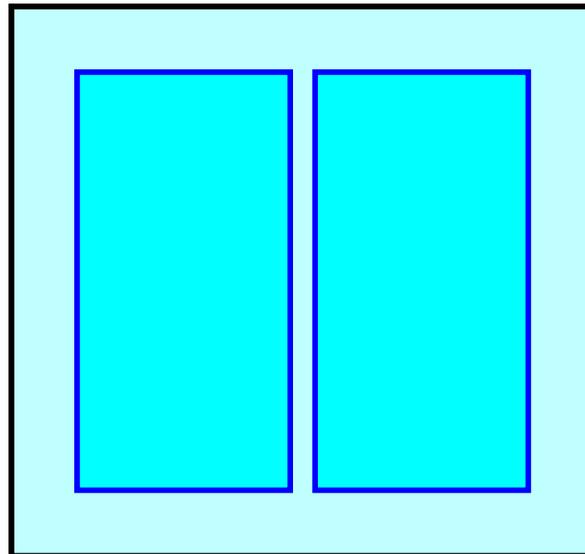
Chamber Storage + Stone Storage = 280.8 cf = 0.006 af

Overall Storage Efficiency = 54.8%

2 Chambers

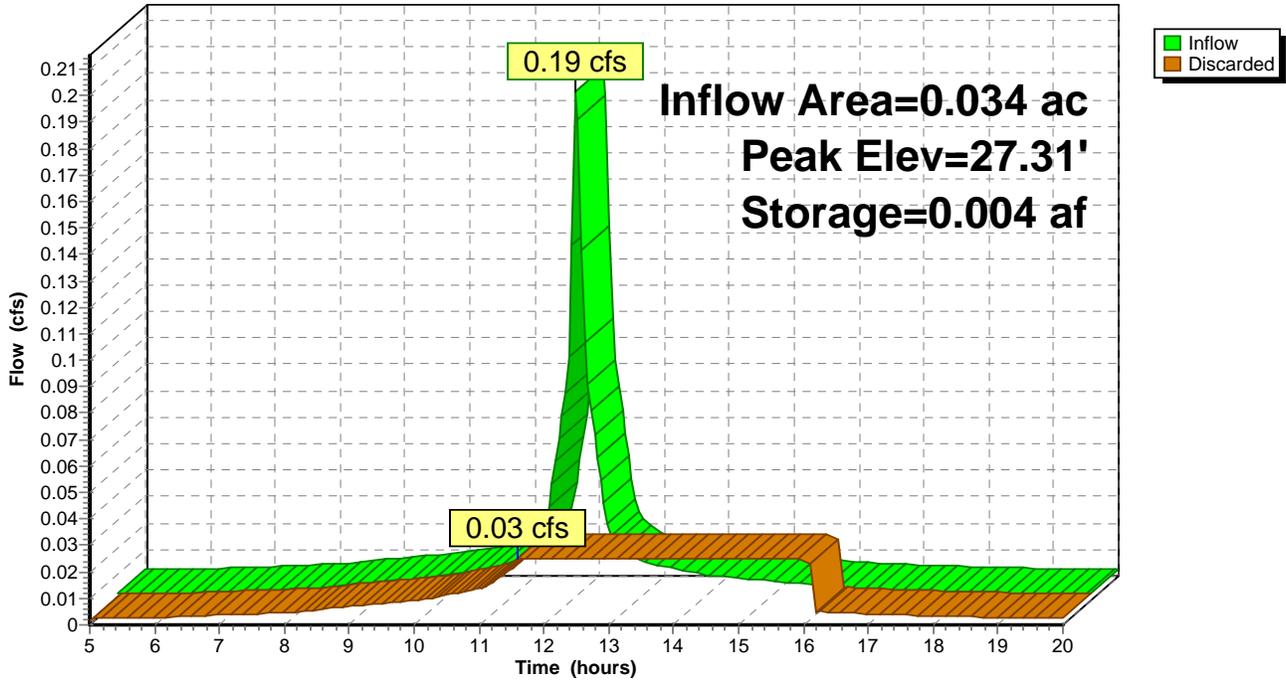
19.0 cy Field

14.3 cy Stone



Pond 34P: building a

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 19

Summary for Pond 36P: multifamily (per module)

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.049 ac, 100.00% Impervious, Inflow Depth > 5.15" for 25-Year event
 Inflow = 0.28 cfs @ 12.07 hrs, Volume= 0.021 af
 Outflow = 0.04 cfs @ 11.60 hrs, Volume= 0.021 af, Atten= 87%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 11.60 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.16' @ 12.58 hrs Surf.Area= 0.004 ac Storage= 0.006 af
 Flood Elev= 28.40' Surf.Area= 0.004 ac Storage= 0.009 af

Plug-Flow detention time= 46.5 min calculated for 0.021 af (100% of inflow)
 Center-of-Mass det. time= 46.2 min (779.8 - 733.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.005 af	17.00'W x 11.50'L x 3.54'H Field A 0.016 af Overall - 0.004 af Embedded = 0.012 af x 40.0% Voids
#2A	25.35'	0.004 af	Cultec R-330XLHD x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.009 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 11.60 hrs HW=24.89' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 20

Pond 36P: multifamily (per module) - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +18.0" End Stone x 2 = 11.50' Base Length

3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 18.0" Side Stone x 2 = 17.00' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

3 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 190.0 cf Chamber Storage

692.4 cf Field - 190.0 cf Chambers = 502.4 cf Stone x 40.0% Voids = 201.0 cf Stone Storage

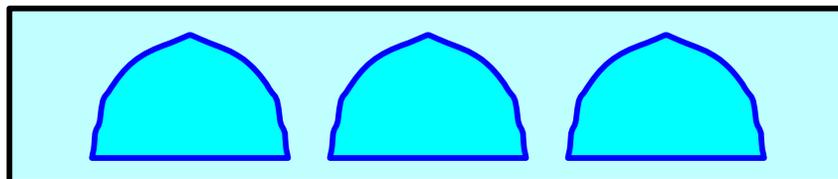
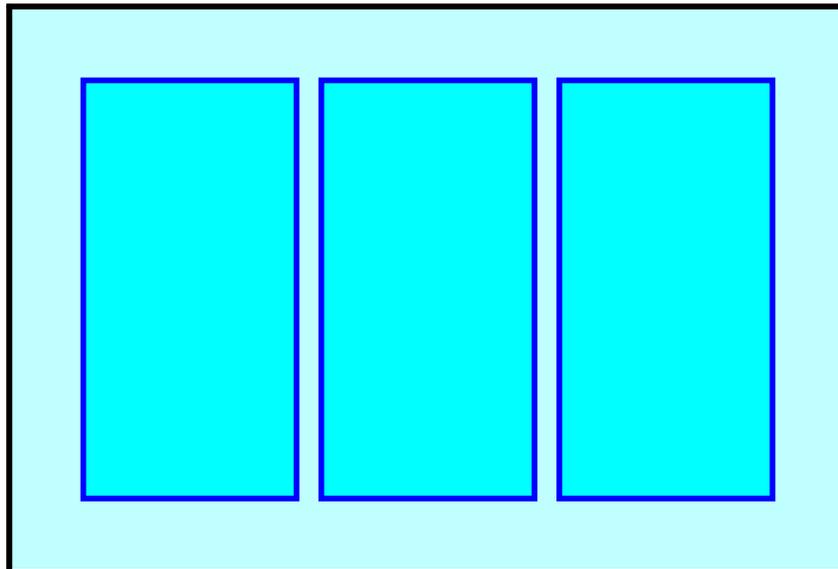
Chamber Storage + Stone Storage = 391.0 cf = 0.009 af

Overall Storage Efficiency = 56.5%

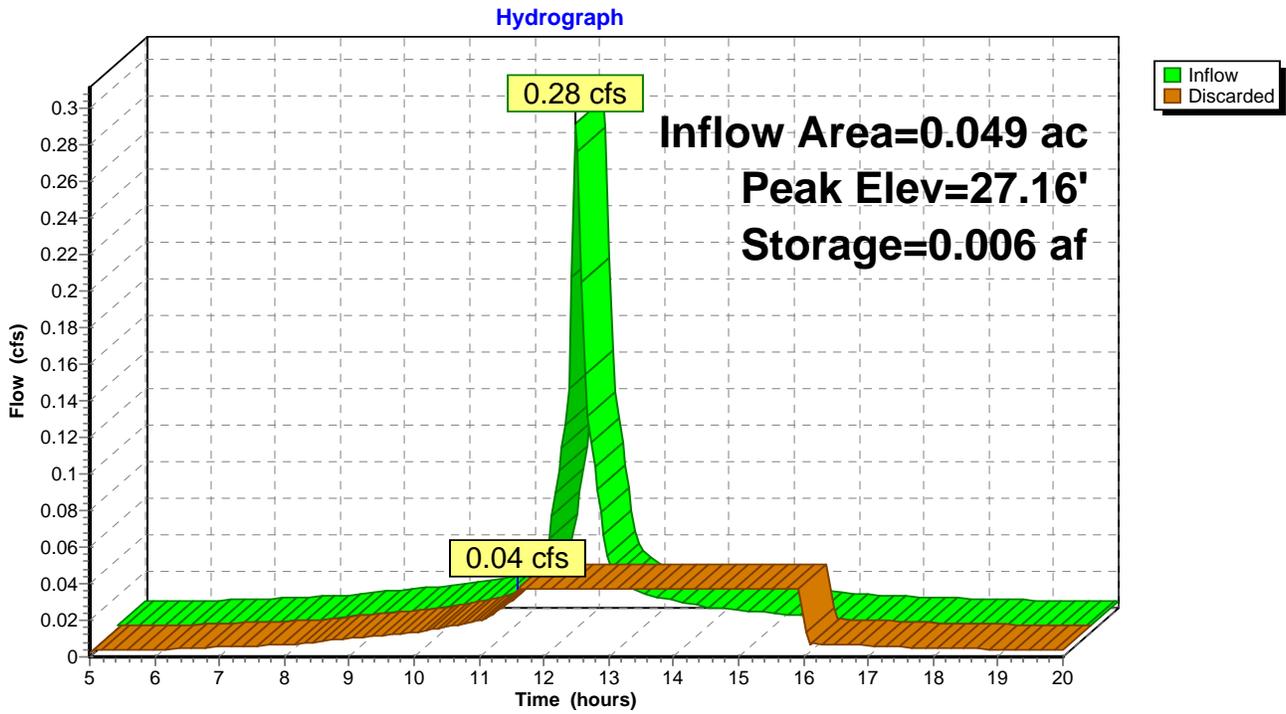
3 Chambers

25.6 cy Field

18.6 cy Stone



Pond 36P: multifamily (per module)



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 22

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 25S: building c	Runoff Area=1,154 sf 100.00% Impervious Runoff Depth>6.42" Tc=5.0 min CN=98 Runoff=0.19 cfs 0.014 af
Subcatchment 27S: building b	Runoff Area=1,104 sf 100.00% Impervious Runoff Depth>6.42" Tc=5.0 min CN=98 Runoff=0.18 cfs 0.014 af
Subcatchment 29S: building A	Runoff Area=1,464 sf 100.00% Impervious Runoff Depth>6.42" Tc=5.0 min CN=98 Runoff=0.24 cfs 0.018 af
Subcatchment 35S: multifamily(per	Runoff Area=2,120 sf 100.00% Impervious Runoff Depth>6.42" Tc=5.0 min CN=98 Runoff=0.35 cfs 0.026 af
Pond 32P: building b	Peak Elev=27.35' Storage=0.004 af Inflow=0.18 cfs 0.014 af Outflow=0.02 cfs 0.014 af
Pond 33P: building c	Peak Elev=27.53' Storage=0.005 af Inflow=0.19 cfs 0.014 af Outflow=0.02 cfs 0.014 af
Pond 34P: building a	Peak Elev=28.46' Storage=0.006 af Inflow=0.24 cfs 0.018 af Outflow=0.03 cfs 0.018 af
Pond 36P: multifamily (per module)	Peak Elev=28.28' Storage=0.009 af Inflow=0.35 cfs 0.026 af Outflow=0.04 cfs 0.026 af

Total Runoff Area = 0.134 ac Runoff Volume = 0.072 af Average Runoff Depth = 6.42"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.134 ac

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 23

Summary for Subcatchment 25S: building c

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.014 af, Depth> 6.42"

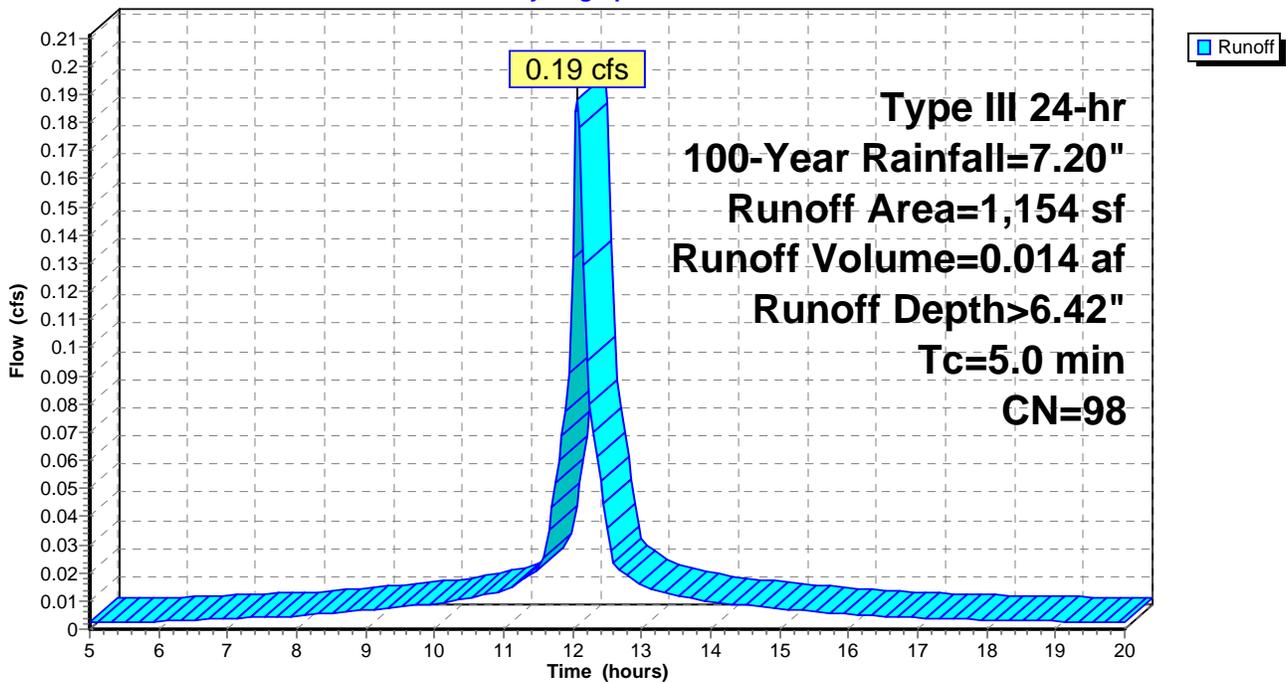
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Description
* 1,154	98	
1,154		100.00% Impervious Area

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

Subcatchment 25S: building c

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 24

Summary for Subcatchment 27S: building b

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

Runoff = 0.18 cfs @ 12.07 hrs, Volume= 0.014 af, Depth> 6.42"

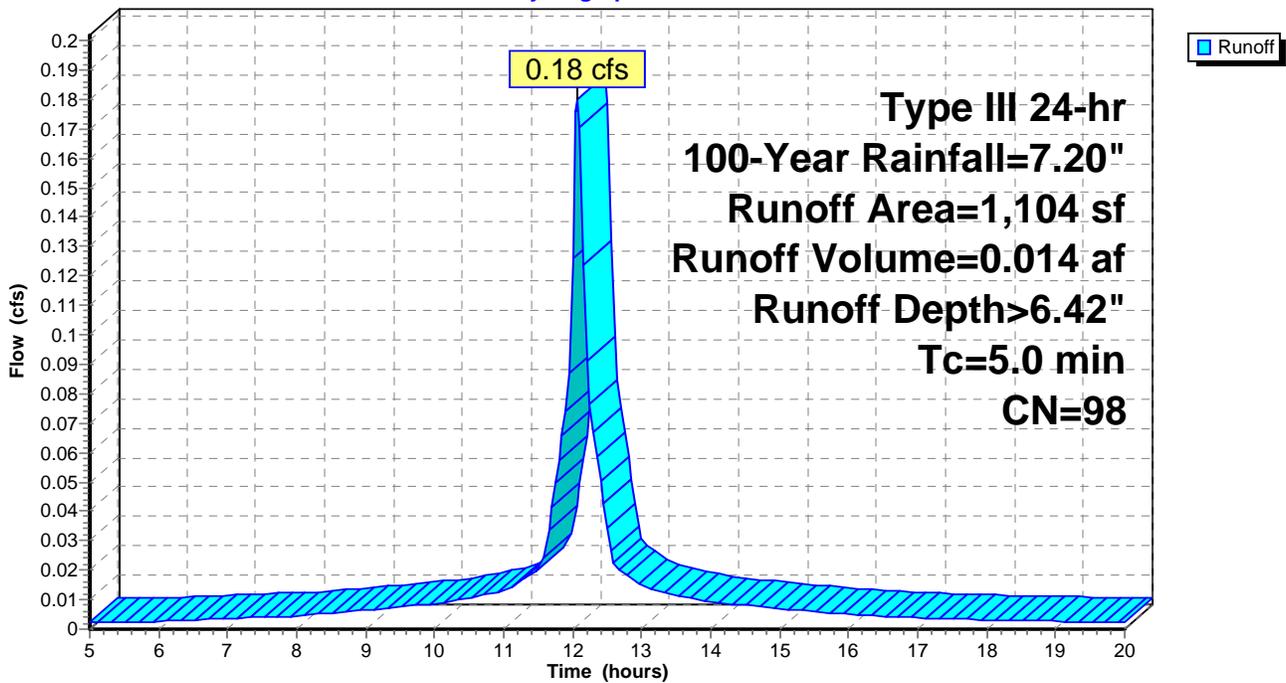
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Description
* 1,104	98	
1,104		100.00% Impervious Area

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

Subcatchment 27S: building b

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 25

Summary for Subcatchment 29S: building A

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.018 af, Depth> 6.42"

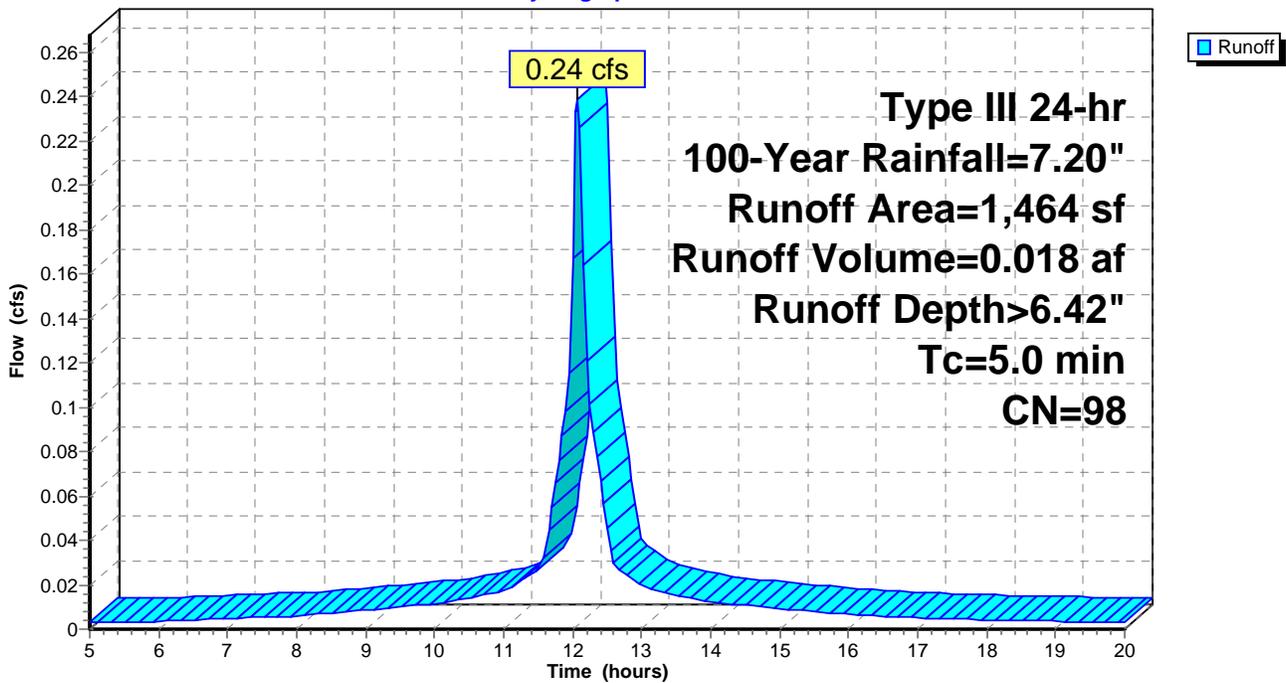
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Description
* 1,464	98	
1,464		100.00% Impervious Area

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

Subcatchment 29S: building A

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 26

Summary for Subcatchment 35S: multifamily(per module)

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

Runoff = 0.35 cfs @ 12.07 hrs, Volume= 0.026 af, Depth> 6.42"

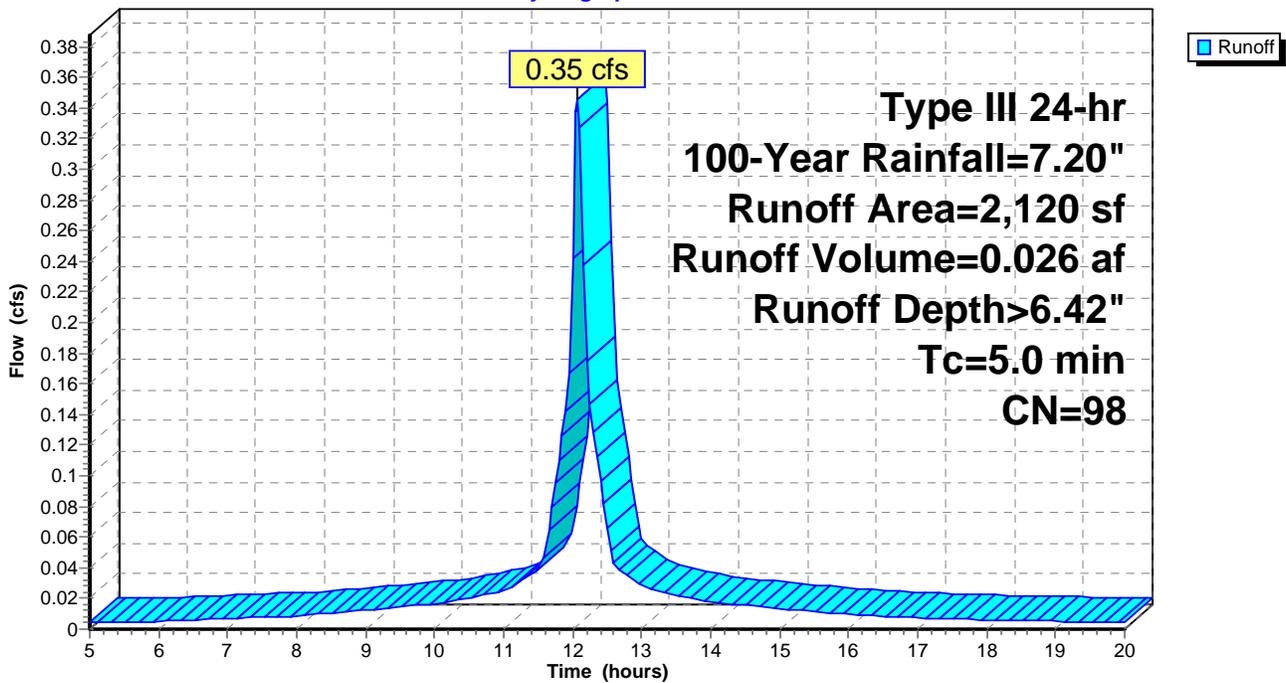
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Description
* 2,120	98	
2,120		100.00% Impervious Area

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

Subcatchment 35S: multifamily(per module)

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 27

Summary for Pond 32P: building b

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.025 ac, 100.00% Impervious, Inflow Depth > 6.42" for 100-Year event
 Inflow = 0.18 cfs @ 12.07 hrs, Volume= 0.014 af
 Outflow = 0.02 cfs @ 11.60 hrs, Volume= 0.014 af, Atten= 88%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.60 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.35' @ 12.61 hrs Surf.Area= 0.003 ac Storage= 0.004 af
 Flood Elev= 28.40' Surf.Area= 0.003 ac Storage= 0.006 af

Plug-Flow detention time= 53.7 min calculated for 0.014 af (100% of inflow)
 Center-of-Mass det. time= 53.2 min (785.9 - 732.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.003 af	11.17'W x 10.50'L x 3.54'H Field A 0.010 af Overall - 0.003 af Embedded = 0.007 af x 40.0% Voids
#2A	25.35'	0.003 af	Cultec R-330XLHD x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 11.60 hrs HW=24.89' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 28

Pond 32P: building b - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger®330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length

2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

2 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 126.7 cf Chamber Storage

415.3 cf Field - 126.7 cf Chambers = 288.6 cf Stone x 40.0% Voids = 115.4 cf Stone Storage

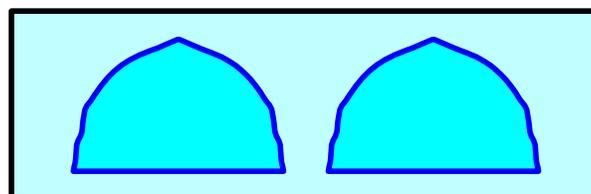
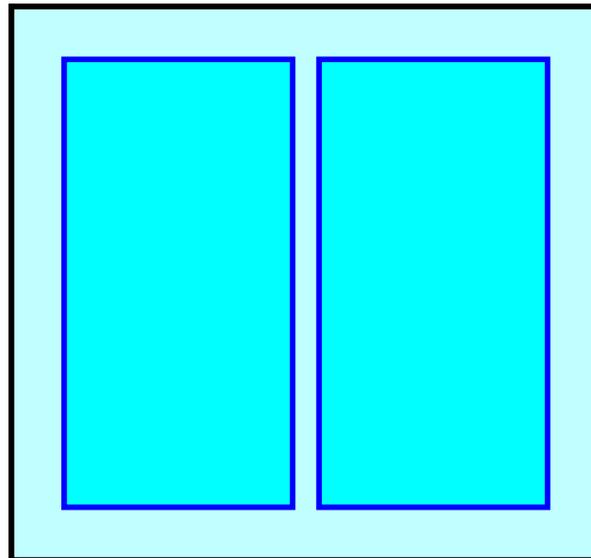
Chamber Storage + Stone Storage = 242.1 cf = 0.006 af

Overall Storage Efficiency = 58.3%

2 Chambers

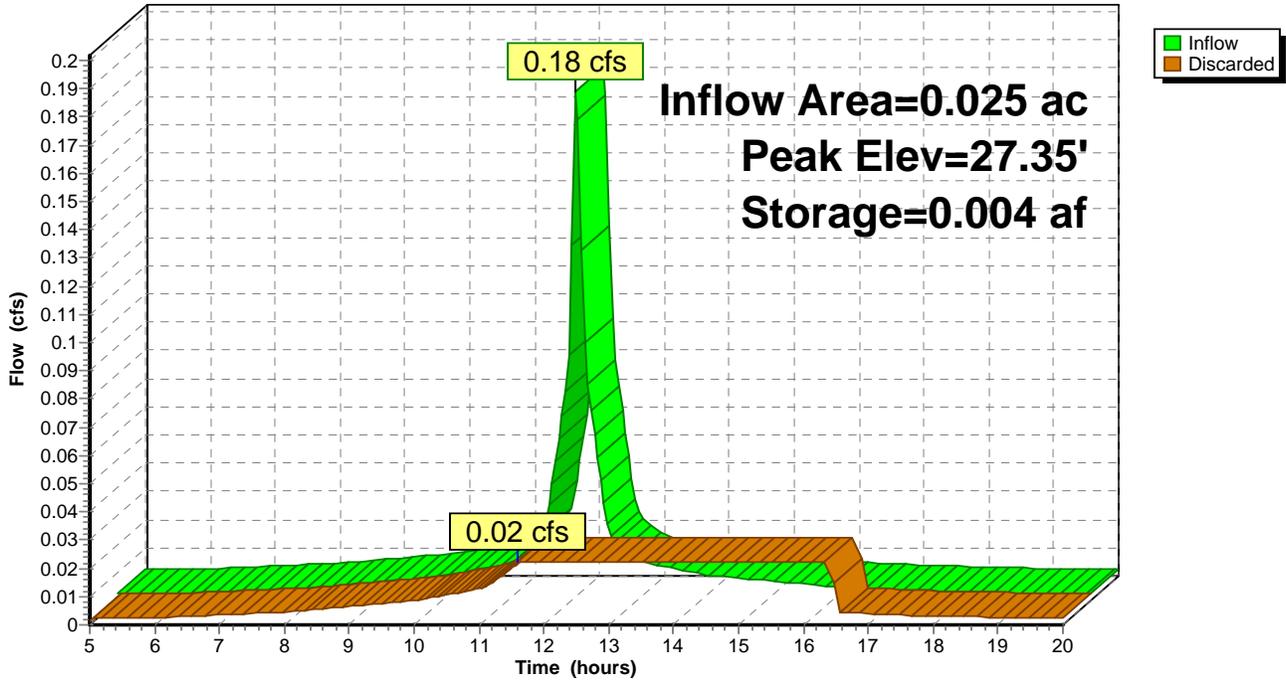
15.4 cy Field

10.7 cy Stone



Pond 32P: building b

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 30

Summary for Pond 33P: building c

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.026 ac, 100.00% Impervious, Inflow Depth > 6.42" for 100-Year event
 Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.014 af
 Outflow = 0.02 cfs @ 11.60 hrs, Volume= 0.014 af, Atten= 88%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.60 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 27.53' @ 12.63 hrs Surf.Area= 0.003 ac Storage= 0.005 af
 Flood Elev= 28.39' Surf.Area= 0.003 ac Storage= 0.006 af

Plug-Flow detention time= 58.2 min calculated for 0.014 af (100% of inflow)
 Center-of-Mass det. time= 57.8 min (790.4 - 732.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.003 af	11.17'W x 10.50'L x 3.54'H Field A 0.010 af Overall - 0.003 af Embedded = 0.007 af x 40.0% Voids
#2A	25.35'	0.003 af	Cultec R-330XLHD x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 11.60 hrs HW=24.90' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 31

Pond 33P: building c - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length

2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

2 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 126.7 cf Chamber Storage

415.3 cf Field - 126.7 cf Chambers = 288.6 cf Stone x 40.0% Voids = 115.4 cf Stone Storage

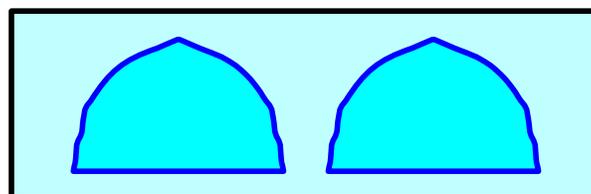
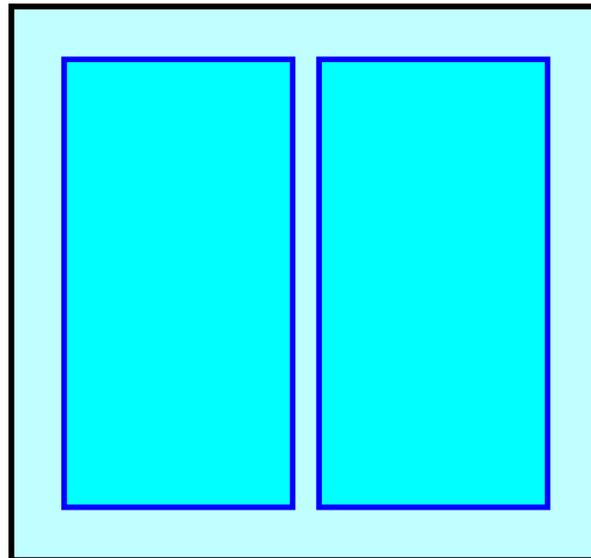
Chamber Storage + Stone Storage = 242.1 cf = 0.006 af

Overall Storage Efficiency = 58.3%

2 Chambers

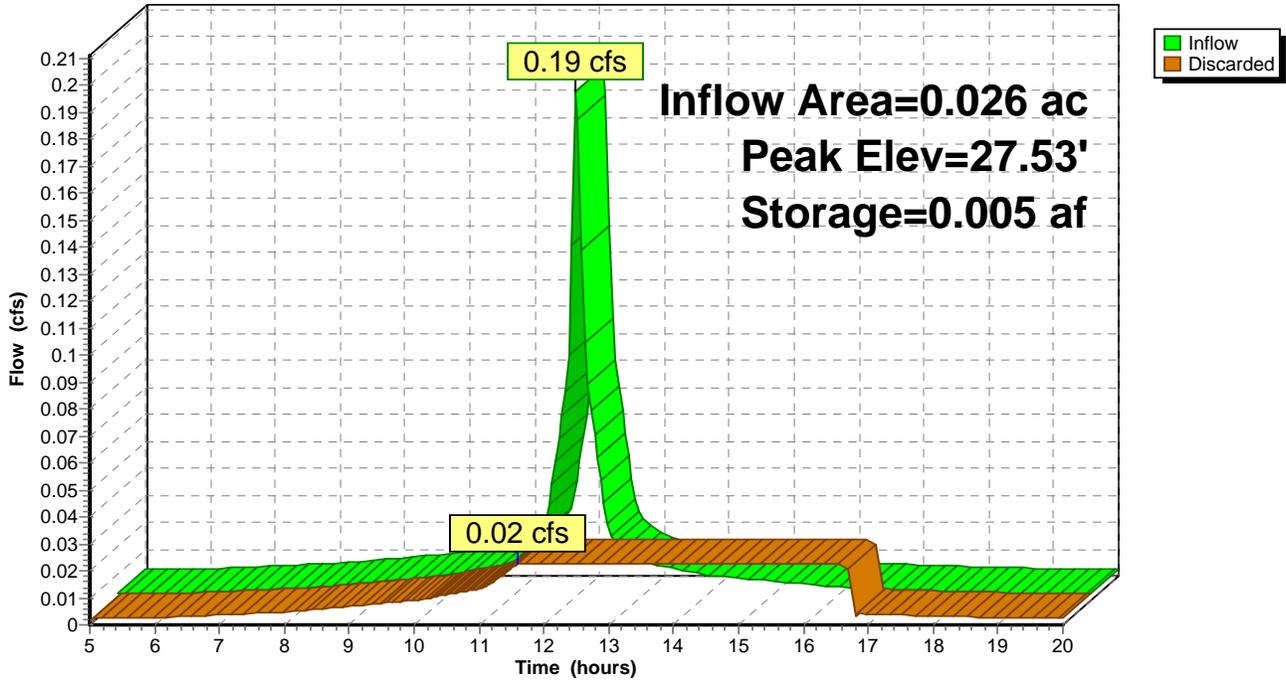
15.4 cy Field

10.7 cy Stone



Pond 33P: building c

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 33

Summary for Pond 34P: building a

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.034 ac, 100.00% Impervious, Inflow Depth > 6.42" for 100-Year event
 Inflow = 0.24 cfs @ 12.07 hrs, Volume= 0.018 af
 Outflow = 0.03 cfs @ 11.45 hrs, Volume= 0.018 af, Atten= 89%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 11.45 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 28.46' @ 12.74 hrs Surf.Area= 0.003 ac Storage= 0.006 af
 Flood Elev= 28.73' Surf.Area= 0.003 ac Storage= 0.006 af

Plug-Flow detention time= 72.4 min calculated for 0.018 af (100% of inflow)
 Center-of-Mass det. time= 71.9 min (804.6 - 732.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.004 af	11.83'W x 11.17'L x 3.88'H Field A 0.012 af Overall - 0.003 af Embedded = 0.009 af x 40.0% Voids
#2A	25.52'	0.003 af	Cultec R-330XLHD x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 11.45 hrs HW=24.89' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 34

Pond 34P: building a - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +16.0" End Stone x 2 = 11.17' Base Length

2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 16.0" Side Stone x 2 = 11.83' Base Width

8.0" Base + 30.5" Chamber Height + 8.0" Cover = 3.88' Field Height

2 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 126.7 cf Chamber Storage

512.0 cf Field - 126.7 cf Chambers = 385.4 cf Stone x 40.0% Voids = 154.1 cf Stone Storage

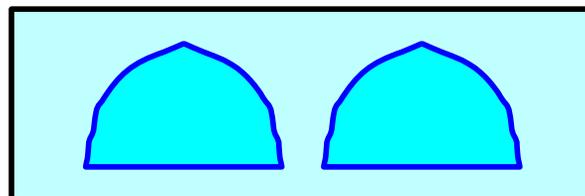
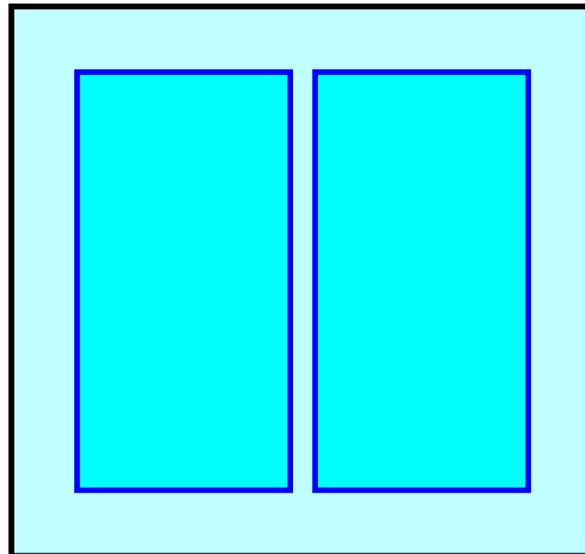
Chamber Storage + Stone Storage = 280.8 cf = 0.006 af

Overall Storage Efficiency = 54.8%

2 Chambers

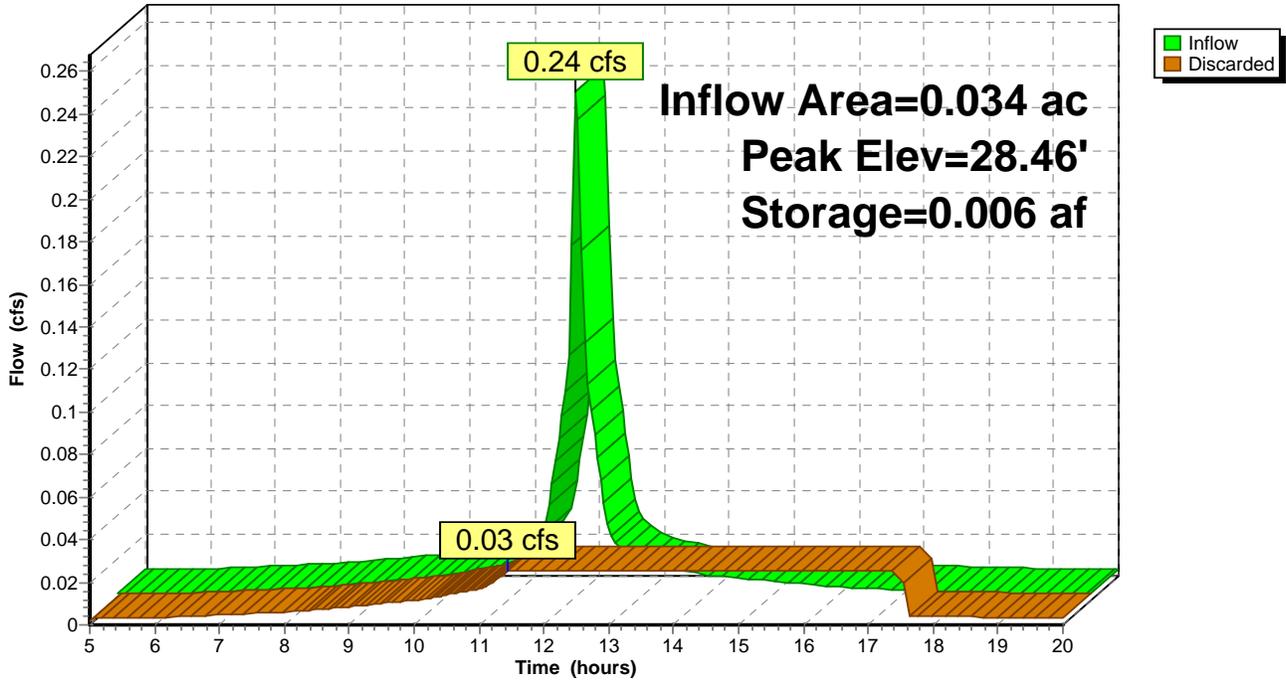
19.0 cy Field

14.3 cy Stone



Pond 34P: building a

Hydrograph



ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 36

Summary for Pond 36P: multifamily (per module)

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.049 ac, 100.00% Impervious, Inflow Depth > 6.42" for 100-Year event
 Inflow = 0.35 cfs @ 12.07 hrs, Volume= 0.026 af
 Outflow = 0.04 cfs @ 11.50 hrs, Volume= 0.026 af, Atten= 89%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 11.50 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 28.28' @ 12.72 hrs Surf.Area= 0.004 ac Storage= 0.009 af
 Flood Elev= 28.40' Surf.Area= 0.004 ac Storage= 0.009 af

Plug-Flow detention time= 69.3 min calculated for 0.026 af (100% of inflow)
 Center-of-Mass det. time= 69.0 min (801.7 - 732.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.85'	0.005 af	17.00'W x 11.50'L x 3.54'H Field A 0.016 af Overall - 0.004 af Embedded = 0.012 af x 40.0% Voids
#2A	25.35'	0.004 af	Cultec R-330XLHD x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.009 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.85'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 11.50 hrs HW=24.89' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

ALTERNATIVE WATER SHEDS-buildings

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 7/26/2016

HydroCAD® 10.00 s/n 07546 © 2013 HydroCAD Software Solutions LLC

Page 37

Pond 36P: multifamily (per module) - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +18.0" End Stone x 2 = 11.50' Base Length

3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 18.0" Side Stone x 2 = 17.00' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

3 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 190.0 cf Chamber Storage

692.4 cf Field - 190.0 cf Chambers = 502.4 cf Stone x 40.0% Voids = 201.0 cf Stone Storage

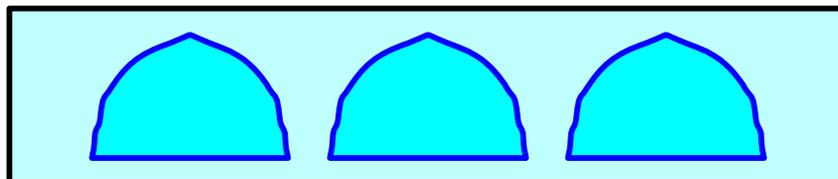
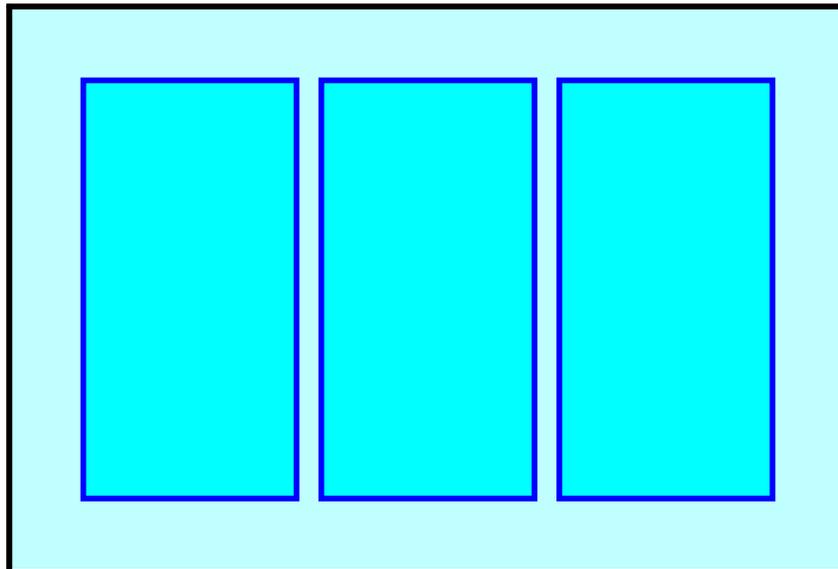
Chamber Storage + Stone Storage = 391.0 cf = 0.009 af

Overall Storage Efficiency = 56.5%

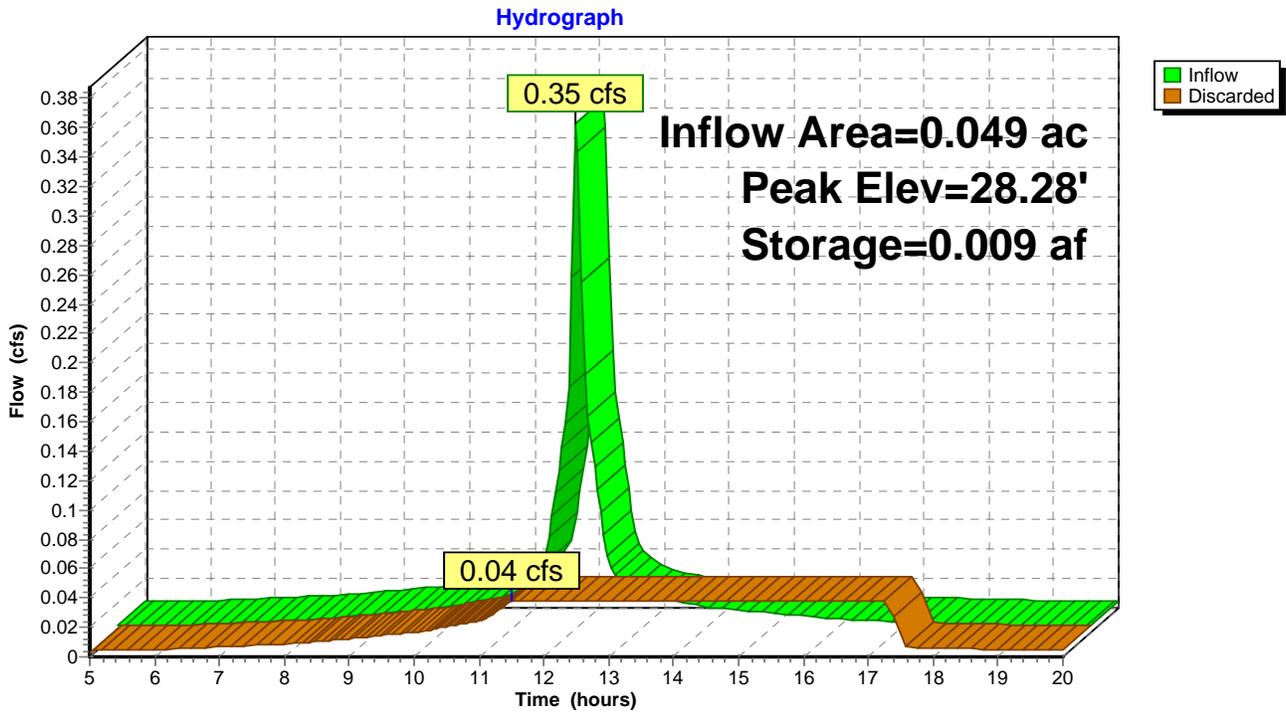
3 Chambers

25.6 cy Field

18.6 cy Stone



Pond 36P: multifamily (per module)



Length (ft)	Downstream Structure	Upstream Structure	Upstream Invert (ft)	Downstream Invert (ft)	Slope (ft/ft)
115.202	DMH1	CB4	35.500	34.924	0.00500
83.523	DMH1	CB4A	35.342	34.924	0.00500
77.316	CB4	CB3	36.467	36.080	0.00500
50.190	CB3	CB2	37.131	36.877	0.00508
35.718	CB2	CB1	37.310	37.131	0.00500
118.397	DMH3	CB9	38.650	33.184	0.04617
53.741	DMH3	DMH2	33.452	33.184	0.00500
79.640	DMH2	CB6	33.850	33.452	0.00500
22.016	CB9	CB8	39.800	39.650	0.00679
119.578	CB6	CB5	36.650	36.320	0.00276
19.655	CB6	CB7	34.833	33.850	0.05000
53.992	DMH4	CB10	34.668	32.440	0.04127
64.388	DMH4	CB12	34.498	32.440	0.03196
124.706	DMH4	CB14	33.063	32.440	0.00500
70.424	DMH4	CB15	33.255	32.440	0.01157
21.961	CB14	CB13	33.173	33.063	0.00500
20.862	CB12	CB11	34.602	34.498	0.00500

Direction (DD.MMSS)	Step Up (ft)	Drop Invert (ft)	Pipe Material	Pipe Shape	Pipe Size (in)	Pipe Width (in)	Manning's n
26.3759 SE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
51.4059 NW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
67.5524 SW	0.58	0.00	HDPE	Circular	15.00	0.00	0.012
16.0922 SW	0.41	0.00	HDPE	Circular	15.00	0.00	0.012
17.2711 SW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
65.5130 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
66.5638 NW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
89.1754 SW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
69.4149 SE	1.00	0.00	HDPE	Circular	12.00	0.00	0.012
5.5721 NE	2.47	0.00	HDPE	Circular	12.00	0.00	0.012
87.2816 NW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
55.0756 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
37.0209 SW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
0.0405 NW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
15.1328 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.013
87.4303 SW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
0.4203 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012

Known Flow (cfs)	Area (Acres)	Area (SF)	Area (SqMiles)	Curve Number	Tc (min)	Barrel Numbers	Barrel Spacing (ft)
0.000	0.002	87.120	0.000	63	17.900	1	0.00
0.000	0.000	0.000	0.000	50	5.000	1	0.00
0.000	0.772	33610.896	0.001	87	471.300	1	0.00
0.000	0.010	432.185	0.000	92	81.478	1	0.00
0.000	0.012	509.652	0.000	97	78.800	1	0.00
0.000	0.028	1224.036	0.000	50	185.200	1	0.00
0.000	0.021	919.489	0.000	50	187.360	1	0.00
0.000	0.245	10689.624	0.000	50	613.200	1	0.00
0.000	0.040	1759.824	0.000	73	119.300	1	0.00
0.000	0.178	7771.104	0.000	69	569.100	1	0.00
0.000	0.790	34404.660	0.001	56	516.553	1	0.00
0.000	0.106	4613.282	0.000	50	351.803	1	0.00
0.000	0.003	148.834	0.000	50	21.882	1	0.00
0.000	0.447	19459.907	0.001	50	376.489	1	0.00
0.000	0.812	35357.652	0.001	50	486.200	1	0.00
0.000	1.679	73155.615	0.003	50	811.331	1	0.00
0.000	0.148	6468.660	0.000	50	418.100	1	0.00

Downstream Rim Elev (ft)	Upstream Rim Elev (ft)	Total Flow (cfs)	Full Flow (cfs)	Maximum Flow (cfs)	Downstream HGL (ft)
39.862	41.145	0.385	4.962	5.337	35.160
39.862	38.441	0.000	4.962	5.337	34.924
41.145	40.021	0.382	4.962	5.337	36.315
40.021	40.374	0.042	5.000	5.378	36.955
40.374	40.310	0.024	2.737	2.944	37.231
39.760	41.597	0.045	8.316	8.946	33.236
39.760	39.109	0.203	4.962	5.337	33.356
39.109	37.840	0.198	4.962	5.337	33.697
41.597	41.651	0.039	3.188	3.429	39.728
37.840	39.650	0.047	2.032	2.186	36.409
37.840	37.833	0.126	15.691	16.878	34.074
36.971	37.670	0.016	7.862	8.457	32.473
36.971	37.577	0.022	12.544	13.493	32.479
36.971	36.173	0.197	2.737	2.944	32.622
36.971	37.505	0.097	3.843	4.134	32.550
36.173	36.173	0.134	2.737	2.944	33.301
37.577	37.600	0.020	2.736	2.944	34.596

Upstream HGL (ft)	Downstream EGL (ft)	Upstream EGL (ft)	Downstream Flow Depth (in)	Upstream Flow Depth (in)
35.736	35.249	35.825	2.829	2.829
35.342	34.924	35.342	0.000	0.000
36.701	36.404	36.790	2.817	2.817
37.210	36.981	37.236	0.942	0.942
37.373	37.236	37.394	1.192	0.756
38.703	33.359	38.826	0.634	0.634
33.625	33.417	33.686	2.069	2.069
34.022	33.718	34.081	2.943	2.061
39.877	39.757	39.907	0.926	0.926
36.808	36.439	36.814	1.062	1.899
34.970	34.085	35.016	2.687	1.638
34.702	32.533	34.761	0.400	0.400
34.537	32.538	34.595	0.473	0.473
33.245	32.685	33.309	2.179	2.179
33.365	32.617	33.432	1.318	1.318
33.323	33.315	33.374	2.851	1.792
34.659	34.600	34.678	1.184	0.684

Downstream Velocity (fps)	Upstream Velocity (fps)	System
2.400	2.400	A
0.000	0.000	A
2.391	2.391	A
1.303	1.303	A
0.597	1.169	A
2.811	2.811	B
1.982	1.982	B
1.164	1.946	B
1.379	1.379	C
1.389	0.590	B
0.842	1.730	B
1.962	1.962	E
1.936	1.936	E
2.022	2.022	E
2.078	2.078	E
0.934	1.819	F
0.493	1.108	E

Length (ft)	Downstream Structure	Upstream Structure	Upstream Invert (ft)	Downstream Invert (ft)	Slope (ft/ft)
19.542	05	CB28	26.000	25.602	0.02035
242.236	CB28	CB27	30.009	26.000	0.01655
33.338	CB27	CB26	30.639	30.009	0.01890
153.586	CB26	CB25	31.443	30.639	0.00524
21.234	CB25	CB24	31.549	31.443	0.00500
50.779	CB24	CB23	31.968	31.659	0.00609
97.335	DMH10	DMH7	25.481	21.461	0.04131
146.644	DMH10	DMH8	25.172	21.461	0.02531
165.853	DMH8	CB57	26.002	25.172	0.00500
50.641	DMH8	CB58	28.695	28.442	0.00499
112.557	DMH7	CB53	26.780	25.481	0.01154
35.319	DMH7	CB54	28.677	25.481	0.09047
32.269	DMH7	CB55	26.000	25.481	0.01608
62.956	CB57	CB56	28.079	26.002	0.03300
37.925	CB57	CB63	26.191	26.002	0.00500
63.610	CB53	CB52	27.650	27.330	0.00504
22.797	CB63	CB62	26.305	26.191	0.00500
44.192	CB62	CB61	26.526	26.305	0.00500
104.277	CB61	CB60	27.048	26.526	0.00501
21.511	CB60	CB59	27.296	27.188	0.00500
105.077	O3	CB21	37.057	36.531	0.00500
34.606	O3	DMH2	38.526	36.531	0.05763
129.017	DMH2	CB18	39.173	38.526	0.00502
139.681	DMH2	CB19	39.223	38.526	0.00499
32.071	CB21	CB20	37.217	37.057	0.00500
32.968	CB20	CB20A	37.382	37.217	0.00500
49.511	O6	CB34	26.732	24.920	0.03660
231.581	O6	CB35	29.027	24.920	0.01774
57.806	CB35	CB35A	29.420	29.127	0.00506
72.150	CB35	CB35B	29.369	29.027	0.00474
107.985	CB34	CB33	27.561	26.732	0.00768
141.431	CB33	CB31	28.891	27.561	0.00940
52.446	CB33	CB33A	27.823	27.561	0.00500
273.149	CB31	CB30	30.657	28.891	0.00646
39.922	CB31	CB32	29.176	28.891	0.00713
39.144	CB30	CB29	31.211	30.657	0.01416
178.720	CB29	CB29B	32.303	31.211	0.00611
17.342	CB29B	CB29A	32.769	32.682	0.00499
101.486	O8	CB37	29.912	29.405	0.00500
31.444	CB37	DMH4	30.070	29.912	0.00500
43.488	DMH4	CB38	31.755	30.070	0.03875
33.909	DMH4	CB39	31.655	31.490	0.00487
169.462	DMH4	DMH3	30.656	30.070	0.00346
106.055	DMH3	CB36	31.186	30.656	0.00500
56.649	DMH3	CB40	31.485	30.916	0.01005
41.853	DMH3	CB42	31.335	30.916	0.01000
53.419	DMH3	CB43	31.447	30.916	0.00993
41.017	DMH3	CB45	31.325	30.916	0.00996
16.518	CB45	CB44	31.407	31.325	0.00500
15.803	CB42	CB41	31.414	31.335	0.00500
45.852	09	DHM6	27.354	27.110	0.00530
30.281	DHM6	CB49	27.650	27.503	0.00484
78.834	DHM6	CB50	28.290	27.503	0.00997
36.525	DHM6	CB51	27.868	27.683	0.00506
212.419	DHM6	DHM5	27.595	27.354	0.00114
30.460	DHM5	CB46	27.747	27.595	0.00500
31.573	DHM5	CB47	27.775	27.615	0.00507

Direction (DD.MMSS)	Step Up (ft)	Drop Invert (ft)	Pipe Material	Pipe Shape	Pipe Size (in)	Pipe Width (in)	Manning's n
78.3308 SE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
15.2930 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
86.2106 SW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
1.4205 NW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
89.2145 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
28.5309 NE	0.11	0.00	HDPE	Circular	12.00	0.00	0.012
19.5921 NW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
55.1311 SE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
42.0011 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
67.3743 SE	3.27	0.00	HDPE	Circular	12.00	0.00	0.012
2.1850 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
70.5213 SW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
89.3913 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
53.1325 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
48.0222 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
69.1512 SE	0.55	0.00	HDPE	Circular	12.00	0.00	0.012
56.2311 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
45.0245 NW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
54.4810 NW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
32.1036 SW	0.14	0.00	HDPE	Circular	12.00	0.00	0.012
9.0131 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
77.0836 SE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
34.3944 SW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
9.1048 SW	0.00	0.00	Concrete	Circular	12.00	0.00	0.013
16.5700 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
89.4707 NE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
1.0114 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
9.3223 SE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
65.2223 SW	0.10	0.00	HDPE	Circular	12.00	0.00	0.012
63.5900 NW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
87.5632 SW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
28.0747 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
16.0759 SW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
88.0441 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
25.3548 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
50.1242 NE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
26.2646 NW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
70.5406 SW	0.38	0.00	HDPE	Circular	12.00	0.00	0.012
39.3648 SW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
29.3728 SW	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
65.2650 SW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
70.2759 SE	1.42	0.00	HDPE	Circular	12.00	0.00	0.012
2.1814 SE	0.00	0.00	HDPE	Circular	15.00	0.00	0.012
16.1951 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
57.4328 SW	0.26	0.00	HDPE	Circular	12.00	0.00	0.012
54.3843 NW	0.26	0.00	HDPE	Circular	12.00	0.00	0.012
58.5340 SE	0.26	0.00	HDPE	Circular	12.00	0.00	0.012
43.1544 NE	0.26	0.00	HDPE	Circular	12.00	0.00	0.012
74.5711 NE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
63.3701 NW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
59.5536 NW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
58.3057 NW	0.15	0.00	HDPE	Circular	12.00	0.00	0.012
60.4833 SW	0.15	0.00	HDPE	Circular	12.00	0.00	0.012
30.2432 SE	0.33	0.00	HDPE	Circular	12.00	0.00	0.012
34.5613 SW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
61.1940 SE	0.00	0.00	HDPE	Circular	12.00	0.00	0.012
74.5752 NW	0.02	0.00	HDPE	Circular	12.00	0.00	0.012

Known Flow (cfs)	Area (Acres)	Area (SF)	Area (SqMiles)	Curve Number	Tc (min)	Barrel Numbers	Barrel Spacing (ft)
0.000	0.088	3815.500	0.000	50	5.000	1	0.00
0.000	0.159	6909.300	0.000	50	5.000	1	0.00
0.000	0.397	17275.500	0.001	50	5.000	1	0.00
0.000	1.197	52132.608	0.002	50	5.000	1	0.00
0.000	0.042	1837.700	0.000	50	5.000	1	0.00
0.000	0.006	278.784	0.000	50	5.000	1	0.00
0.000	0.006	279.900	0.000	50	5.000	1	0.00
0.000	0.000	0.000	0.000	50	5.000	1	0.00
0.000	0.186	8084.736	0.000	50	5.000	1	0.00
0.000	0.098	4251.000	0.000	50	5.000	1	0.00
0.000	0.806	35119.800	0.001	50	5.000	1	0.00
0.000	0.343	14938.100	0.001	50	5.000	1	0.00
0.000	0.142	6203.800	0.000	50	5.000	1	0.00
0.000	0.313	13644.400	0.000	50	5.000	1	0.00
0.000	0.004	188.500	0.000	50	5.000	1	0.00
0.000	0.105	4563.500	0.000	50	5.000	1	0.00
0.000	0.005	198.300	0.000	50	5.000	1	0.00
0.000	0.006	241.000	0.000	50	5.000	1	0.00
0.000	0.012	532.600	0.000	50	5.000	1	0.00
0.000	0.409	17802.700	0.001	50	5.000	1	0.00
0.000	0.000	0.000	0.000	50	5.000	1	0.00
0.000	0.006	278.784	0.000	50	5.000	1	0.00
0.000	0.122	5296.896	0.000	50	5.000	1	0.00
0.000	0.102	4460.544	0.000	50	5.000	1	0.00
0.000	0.016	675.900	0.000	50	5.000	1	0.00
0.000	0.000	0.000	0.000	50	5.000	1	0.00
0.000	0.667	29066.500	0.001	50	5.000	1	0.00
0.000	0.000	0.000	0.000	50	5.000	1	0.00
0.000	0.000	0.000	0.000	50	5.000	1	0.00
0.000	0.000	0.000	0.000	50	5.000	1	0.00
0.000	0.015	652.000	0.000	50	5.000	1	0.00
0.000	1.030	44884.224	0.002	50	5.000	1	0.00
0.000	0.011	498.800	0.000	50	5.000	1	0.00
0.000	0.428	18661.400	0.001	50	5.000	1	0.00
0.000	0.342	14902.800	0.001	50	5.000	1	0.00
0.000	0.037	1633.300	0.000	50	5.000	1	0.00
0.000	0.581	25318.100	0.001	50	5.000	1	0.00
0.000	0.013	561.800	0.000	50	5.000	1	0.00
0.000	0.004	173.700	0.000	50	5.000	1	0.00
0.000	0.011	468.000	0.000	50	5.000	1	0.00
0.000	0.095	4131.100	0.000	50	5.000	1	0.00
0.000	0.586	25547.279	0.001	50	5.000	1	0.00
0.000	0.011	492.200	0.000	50	5.000	1	0.00
0.000	0.129	5601.100	0.000	50	5.000	1	0.00
0.000	0.147	6390.200	0.000	50	5.000	1	0.00
0.000	0.159	6933.200	0.000	50	5.000	1	0.00
0.000	0.016	704.200	0.000	50	5.000	1	0.00
0.000	0.039	1677.300	0.000	50	5.000	1	0.00
0.000	0.115	5012.700	0.000	50	5.000	1	0.00
0.000	0.504	21933.400	0.001	50	5.000	1	0.00
0.000	0.012	507.400	0.000	50	5.000	1	0.00
0.000	0.212	9224.800	0.000	50	5.000	1	0.00
0.000	0.408	17780.300	0.001	50	5.000	1	0.00
0.000	0.158	6897.200	0.000	50	5.000	1	0.00
0.000	0.044	1918.100	0.000	50	5.000	1	0.00
0.000	0.370	16107.300	0.001	50	5.000	1	0.00
0.000	0.645	28115.900	0.001	50	5.000	1	0.00

Downstream Rim Elev (ft)	Upstream Rim Elev (ft)	Total Flow (cfs)	Full Flow (cfs)	Maximum Flow (cfs)	Downstream HGL (ft)
33.453	33.251	1.662	10.010	10.768	25.947
33.251	34.500	1.561	9.027	9.710	26.948
34.500	34.809	1.386	5.321	5.724	30.711
34.809	35.641	0.997	2.801	3.013	31.327
35.641	35.620	0.057	2.737	2.944	31.903
35.620	36.298	0.008	3.020	3.249	31.659
33.770	33.167	1.321	14.261	15.341	21.718
33.770	33.321	1.065	11.163	12.009	21.722
33.321	32.062	0.950	4.962	5.337	25.973
33.321	33.111	0.112	2.733	2.940	28.579
33.167	31.649	0.811	7.537	8.108	26.638
33.167	32.806	0.344	11.641	12.522	26.637
33.167	32.449	0.159	4.907	5.279	26.636
32.062	32.079	0.318	7.031	7.563	26.512
32.062	32.205	0.430	4.963	5.338	26.514
31.649	31.650	0.119	2.747	2.955	27.471
32.205	31.360	0.425	4.960	5.335	26.575
31.360	31.856	0.419	4.962	5.338	26.665
31.856	31.298	0.413	4.965	5.341	26.884
31.298	31.296	0.398	2.736	2.943	27.446
41.736	40.304	0.018	4.962	5.337	36.583
41.736	42.136	0.219	16.845	18.121	36.631
42.136	41.109	0.137	2.742	2.949	39.004
42.136	41.113	0.074	2.524	2.715	39.003
40.304	40.217	0.018	4.962	5.338	37.129
40.217	40.381	0.000	2.736	2.943	37.217
34.227	33.500	2.813	13.423	14.440	25.309
34.227	32.027	0.000	9.345	10.052	24.920
32.027	33.670	0.000	2.754	2.962	29.127
32.027	33.619	0.000	2.664	2.866	29.027
33.500	32.706	2.218	6.149	6.614	28.198
32.706	33.257	2.187	6.805	7.320	28.466
32.706	32.482	0.013	4.961	5.337	28.443
33.257	35.000	1.006	5.642	6.069	29.662
33.257	33.000	0.343	5.927	6.375	29.655
35.000	35.650	0.592	8.348	8.981	31.162
35.650	36.824	0.547	5.483	5.899	31.632
36.824	36.831	0.015	2.735	2.942	32.732
38.774	38.620	1.827	4.962	5.337	29.930
38.620	38.805	1.823	4.961	5.337	30.702
38.805	38.542	0.109	7.618	8.195	30.820
38.805	38.197	0.536	2.701	2.906	31.792
38.805	36.844	1.165	4.128	4.441	30.831
36.844	35.186	0.145	2.736	2.943	31.251
36.844	35.798	0.163	3.879	4.173	31.253
36.844	36.157	0.649	3.870	4.162	31.278
36.844	36.296	0.019	3.856	4.148	31.251
36.844	36.151	0.176	3.863	4.156	31.254
36.151	36.567	0.130	2.737	2.944	31.553
36.157	35.822	0.474	2.736	2.943	31.785
34.033	34.417	2.563	2.817	3.031	27.797
34.417	33.810	0.979	2.692	2.896	28.402
34.417	32.927	0.398	3.865	4.157	28.393
34.417	33.631	0.175	2.754	2.962	28.392
34.417	32.416	0.998	1.305	1.404	28.402
32.416	31.747	0.366	2.737	2.944	28.561
32.416	31.775	0.579	2.756	2.965	28.563

Upstream HGL (ft)	Downstream EGL (ft)	Upstream EGL (ft)	Downstream Flow Depth (in)	Upstream Flow Depth (in)
26.345	26.514	26.912	4.135	4.135
30.504	26.986	30.689	11.381	5.945
31.137	30.797	31.332	8.427	5.980
31.863	31.374	32.021	8.261	5.036
31.903	31.903	31.904	5.515	4.241
31.968	31.659	31.968	0.000	0.000
25.738	22.538	26.558	3.086	3.086
25.433	22.232	25.944	3.131	3.131
26.384	25.993	26.523	9.607	4.595
28.831	28.626	28.878	1.639	1.639
27.133	26.646	27.259	13.885	4.236
28.919	26.640	29.004	12.000	2.903
26.636	26.636	26.637	12.000	7.630
28.312	26.522	28.394	6.127	2.791
26.521	26.527	26.564	6.152	3.951
27.791	27.519	27.840	1.693	1.693
26.580	26.603	26.650	4.607	3.293
26.778	26.697	26.866	4.317	3.019
27.298	26.915	27.385	4.289	2.995
27.554	27.542	27.650	3.096	3.096
37.108	36.600	37.125	0.617	0.617
38.626	36.984	38.979	1.200	1.200
39.325	39.006	39.377	5.736	1.818
39.334	39.004	39.371	5.730	1.333
37.269	37.135	37.286	0.870	0.617
37.382	37.217	37.382	0.000	0.000
27.121	26.470	28.282	4.664	4.664
29.027	24.920	29.027	0.000	0.000
29.420	29.127	29.420	0.000	0.000
29.369	29.027	29.369	0.000	0.000
28.294	28.248	28.431	15.000	8.795
29.482	28.548	29.710	10.860	7.085
28.443	28.443	28.443	10.587	7.441
31.051	29.687	31.194	9.253	4.733
29.655	29.658	29.665	9.167	5.750
31.511	31.187	31.617	6.060	3.600
32.591	31.667	32.692	5.047	3.460
32.819	32.749	32.836	0.599	0.599
30.438	30.147	30.654	6.303	6.303
30.709	30.779	30.838	9.471	7.678
31.889	30.821	31.935	9.007	1.616
31.957	31.903	32.069	3.626	3.626
31.082	30.865	31.237	9.137	5.107
31.342	31.253	31.395	7.142	1.867
31.651	31.261	31.708	4.044	1.984
31.670	31.378	31.793	4.341	4.029
31.502	31.251	31.521	4.017	0.670
31.497	31.262	31.556	4.048	2.060
31.565	31.568	31.607	2.739	1.893
31.786	31.815	31.835	5.404	4.468
28.131	28.106	28.369	8.235	9.326
28.412	28.429	28.448	10.778	9.148
28.551	28.398	28.643	10.678	3.130
28.393	28.393	28.395	8.504	6.290
28.532	28.427	28.558	12.000	11.241
28.563	28.564	28.567	11.591	9.783
28.567	28.572	28.579	11.376	9.501

Downstream Velocity (fps)	Upstream Velocity (fps)	System
6.040	6.040	G
1.563	3.448	G
2.352	3.544	G
1.730	3.189	G
0.162	0.230	G
0.805	0.805	G
7.263	7.263	L
5.731	5.731	L
1.144	2.981	M
1.736	1.736	M
0.684	2.849	L
0.438	2.346	L
0.202	0.301	L
0.790	2.297	M
0.907	1.665	M
1.766	1.766	L
1.328	2.123	M
1.435	2.378	M
1.426	2.368	M
2.483	2.483	M
1.051	1.051	E
4.765	4.765	E
0.371	1.833	E
0.201	1.558	E
0.632	1.051	F
0.000	0.000	F
8.646	8.646	H
0.000	0.000	H
0.000	0.000	I
0.000	0.000	I
1.807	2.965	G
2.298	3.834	G
0.015	0.022	G
1.266	3.029	H
0.437	0.795	H
1.273	2.612	H
1.509	2.557	H
1.036	1.036	H
3.734	3.734	J
2.232	2.880	J
0.172	1.724	J
2.679	2.679	J
1.488	3.161	J
0.297	1.856	J
0.701	1.918	J
2.533	2.805	J
0.082	1.099	J
0.754	1.957	J
0.967	1.645	J
1.380	1.775	J
4.461	3.916	K
1.317	1.523	K
0.539	2.443	K
0.294	0.419	K
1.270	1.304	K
0.472	0.534	K
0.753	0.869	K

Length (ft)	Downstream Structure	Upstream Structure	Upstream Invert (ft)	Downstream Invert (ft)	Slope (ft/ft)
22.015	CB49	CB48	27.760	27.650	0.00500

Direction (DD.MMSS)	Step Up (ft)	Drop Invert (ft)	Pipe Material	Pipe Shape	Pipe Size (in)	Pipe Width (in)	Manning's n
81.0510 NW	0.00	0.00	HDPE	Circular	12.00	0.00	0.012

Known Flow (cfs)	Area (Acres)	Area (SF)	Area (SqMiles)	Curve Number	Tc (min)	Barrel Numbers	Barrel Spacing (ft)
0.000	0.897	39072.900	0.001	50	5.000	1	0.00

Downstream Rim Elev (ft)	Upstream Rim Elev (ft)	Total Flow (cfs)	Full Flow (cfs)	Maximum Flow (cfs)	Downstream HGL (ft)
33.810	32.908	0.752	2.737	2.944	28.451

Upstream HGL (ft)	Downstream EGL (ft)	Upstream EGL (ft)	Downstream Flow Depth (in)	Upstream Flow Depth (in)
28.455	28.470	28.481	9.610	8.334

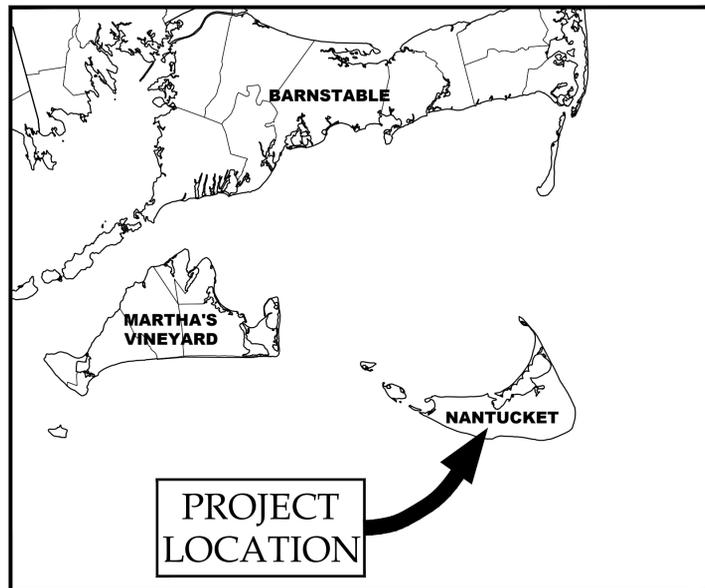
Downstream Velocity (fps)	Upstream Velocity (fps)	System
1.115	1.291	K

DEFINITIVE SUBDIVISION PLAN

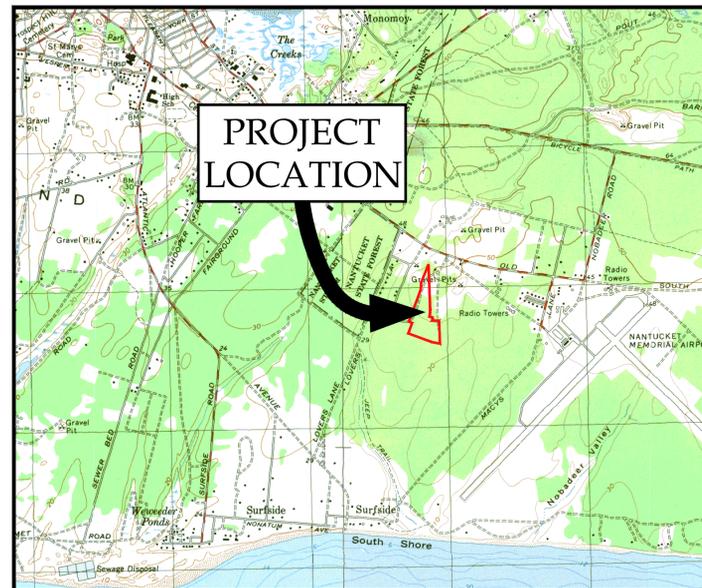
"MEADOWS II" MULTI-FAMILY (RENTAL) APARTMENT PROJECT

LOCATED AT:

20 Davkim Lane and 20(R) Davkim Lane
Town of Nantucket MA



VICINITY MAP
NOT TO SCALE



USGS TOPOGRAPHIC MAP
1"=2000'



LOCATION MAP
1"=400'

OWNER/DEVELOPER:

RICHMOND GREAT POINT DEVELOPMENT LLC
20 Davkim Lane, Nantucket MA 02554



LIST OF DRAWINGS

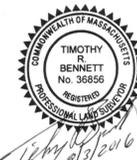
DWG	TITLE
G-1	COVER SHEET
C-1	INDEX SHEET
C-2 TO C-5	DEFINITIVE PLAN
C-6 TO C-8	TOPOGRAPHIC PLAN
C-9 TO C-12	PLANS & PROFILES
C-13	LANDSCAPE PLAN
C-14	EROSION & DUST CONTROL PLAN
C-15 TO C-22	DETAILS
C-23	TEST PIT LOCATION
C-24	SOIL LOGS
C-25	GENERAL NOTES

PREPARED BY:

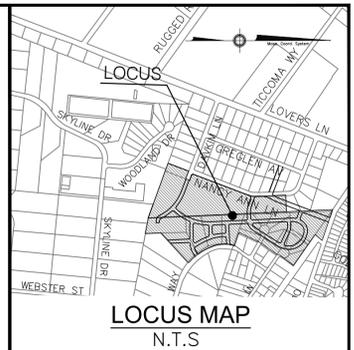
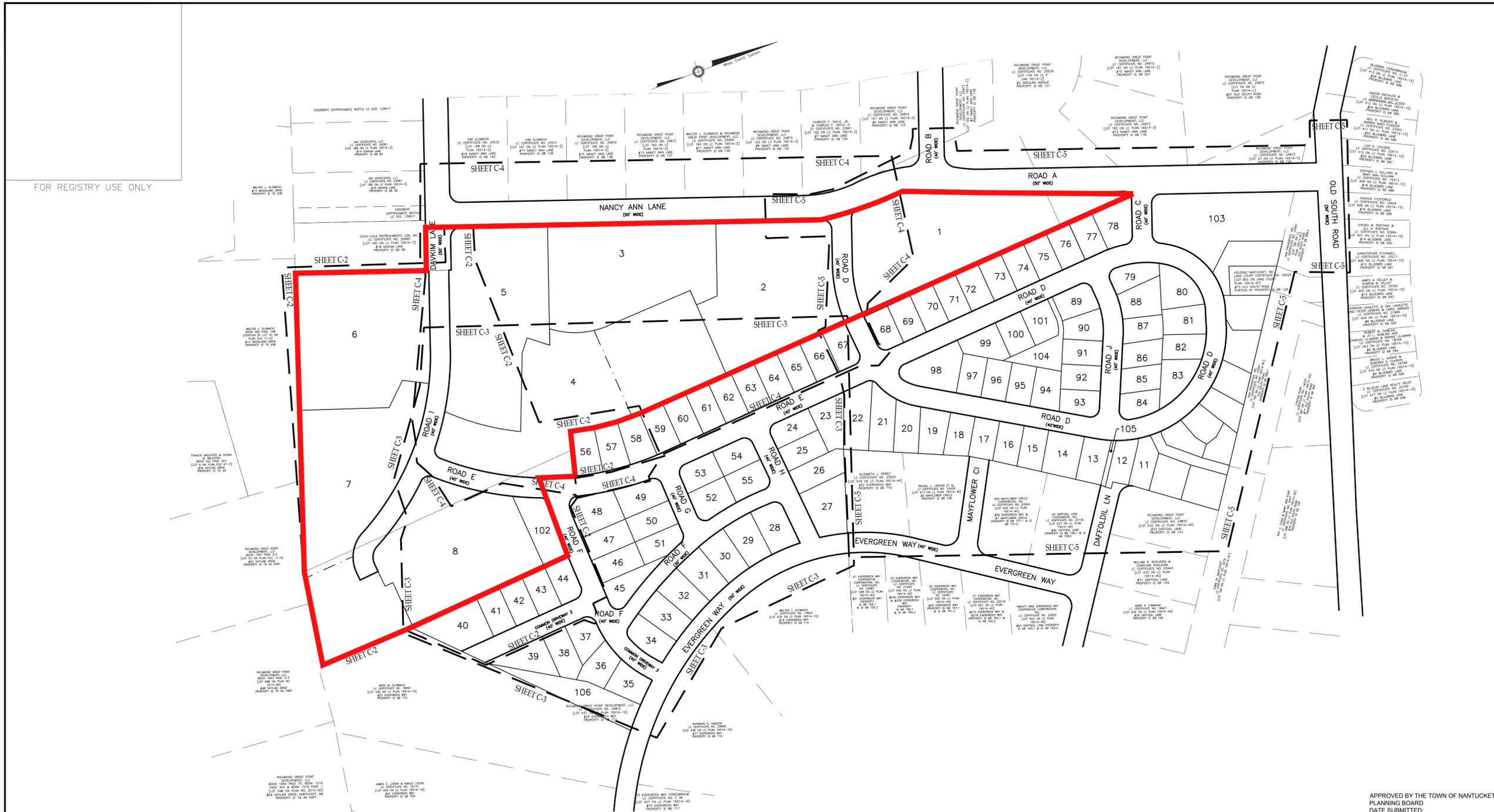
Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com



ROBERT BERSIN MASSACHUSETTS P.E. LICENSE NO. 37391
GREEN SEAL ENVIRONMENTAL, INC. JOB NO. MSTR-2302-0001



TIMOTHY BENNETT MASSACHUSETTS P.L.S. LICENSE NO. 36856
GREEN SEAL ENVIRONMENTAL, INC. JOB NO. MSTR-2302-0001



Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated.

Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR: **RICHMOND GREAT POINT DEVELOPMENT LLC**

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE: **DEFINITIVE INDEX PLAN**

CAD TECH: **JDP** CHECKED BY: **TRB**

ENGINEER: **BLB** DATE: **08/03/2016**

SCALE: **1" = 100'**

SHEET: **C-1** **2 OF 26**

NOTES:
 THE PLANNING BOARD DETERMINES THAT LOTS 1 THROUGH 8 DO NOT CONTAIN AREAS SUBJECT TO PROTECTION UNDER THE MASSACHUSETTS WETLAND PROTECTION ACT WHICH ARE REQUIRED TO BE EXCLUDED FROM LOT AREA UNDER THE NANTUCKET ZONING BY-LAW, BUT STILL MAY BE SUBJECT TO PROTECTION UNDER STATE AND LOCAL WETLAND BYLAWS. DETERMINATION MAY BE OBTAINED THROUGH APPLICATION TO THE CONSERVATION COMMISSION.

ZONE: R-5
 MINIMUM LOT AREA = 5,000 S.F.
 MINIMUM LOT FRONTAGE = 50 FEET
 MINIMUM YARD SETBACKS
 FRONT = 10 FEET
 SIDE = 10 FEET ON ONE SIDE,
 5 FEET THEREAFTER
 REAR = 5 FEET
 ALLOWABLE GROUND COVER % = 40%

ZONE: CN
 MINIMUM LOT AREA = 7,500 S.F.
 MINIMUM LOT FRONTAGE = 50 FEET
 MINIMUM YARD SETBACKS
 FRONT = 10 FEET
 SIDE = 5 FEET
 REAR = 10 FEET
 ALLOWABLE GROUND COVER % = 40%

SHEET INDEX:
 SHEET C-1: DEFINITIVE INDEX SHEET
 SHEET C-2: DEFINITIVE PLAN SHEET 1
 SHEET C-3: DEFINITIVE PLAN SHEET 2
 SHEET C-4: DEFINITIVE PLAN SHEET 3
 SHEET C-5: DEFINITIVE PLAN SHEET 4

LEGEND:
 RIGHT OF WAY LINE
 PROPOSED PROPERTY LINE
 EASEMENT LINE
 ABUTTER PROPERTY LINE
 SHEET INDEX LINE
 ZONING LIMITS
 LOT NUMBER

Richmond Nantucket - "Meadows II" Rental Apartment Development Project
 Summary of Proposed Lots (Definitive Subdivision) and Compliance with Workforce Rental Community Zoning Bylaw Requirements

Lot Number / Location	Lot / Land Area (In Sq. Feet)	Lot / Land Area (In Acres)	Regularity Factor (r) *	Proposed Number of Buildings	Maximum Number of Units Allowed	Proposed Number of Units	Max. Number of Bedrooms Allowed	Proposed Number of Bedrooms
Lot # 1 - Northernmost	70,977	1.63	0.61	4	32	20	57	32
Lot # 2 - Center Area / North Side	63,263	1.45	0.96	6	32	32	57	52
Lot # 3 - Center Area / West Side	61,212	1.41	0.86	5	32	28	57	45
Lot # 4 - Center Area / East Side	98,329	2.26	0.57 *	6	32	30	57	48
Lot # 5 - Center Area / South Side	69,689	1.60	0.78	5	32	28	57	46
Lot # 6 - Southern Area / West Side	69,501	1.60	0.60	5	32	30	57	48
Lot # 7 - Southern Area / Center	87,084	2.00	0.77 *	6	32	32	57	52
Lot # 8 - Southern Area / East Side	61,029	1.40	1.00	5	32	25	57	40
Project Total (8 Lots)	581,084	13.34	0.77	42	256	225	456	363

* Note: The Regularity Factor (r) for Lot # 4 and Lot # 7 was Calculated in Accordance with the Provision of the Town of Nantucket Zoning Bylaw Section 139-16(D)(2) ("excluding the Part of the Lot Area in Excess of the Required Lot Area")

APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____

CLERK'S CERTIFICATION ON THE PLAN
 DATE: _____
 I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

FOR REGISTRY USE ONLY

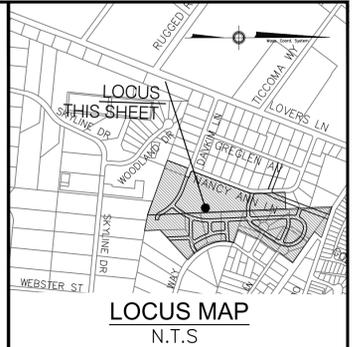


NOTES:
 THE PLANNING BOARD DETERMINES THAT LOTS 1 THROUGH 8 DO NOT CONTAIN AREAS SUBJECT TO PROTECTION UNDER THE MASSACHUSETTS WETLAND PROTECTION ACT WHICH ARE REQUIRED TO BE EXCLUDED FROM LOT AREA UNDER THE NANTUCKET ZONING BY-LAW, BUT STILL MAY BE SUBJECT TO PROTECTION UNDER STATE AND LOCAL WETLAND BYLAWS. DETERMINATION MAY BE OBTAINED THROUGH APPLICATION TO THE CONSERVATION COMMISSION.

ZONE: CN
 MINIMUM LOT AREA = 7,500 S.F.
 MINIMUM LOT FRONTAGE = 50 FEET
 MINIMUM YARD SETBACKS
 FRONT = 10 FEET
 SIDE = 5 FEET
 REAR = 10 FEET
 ALLOWABLE GROUND COVER % = 40%

ZONE: R-5
 MINIMUM LOT AREA = 5,000 S.F.
 MINIMUM LOT FRONTAGE = 50 FEET
 MINIMUM YARD SETBACKS
 FRONT = 10 FEET
 SIDE = 10 FEET ON ONE SIDE,
 5 FEET THEREAFTER
 REAR = 5 FEET
 ALLOWABLE GROUND COVER % = 40%

LEGEND:
 ————— RIGHT OF WAY LINE
 - - - - - PROPOSED PROPERTY LINE



Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

- GENERAL NOTES:**
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or as noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE:
DEFINITIVE PLAN

CAD TECH: JDP	CHECKED BY: TRB
-------------------------	---------------------------

ENGINEER: BLB	DATE: 08/03/2016
-------------------------	----------------------------

SCALE:
 1" = 40'

SHEET:
 4 OF 26

21 EVERGREEN WAY COOPERATIVE CORPORATION, INC. LC CERTIFICATE NO. 22887 [LOT 648 ON LC PLAN 16514-40] #21 EVERGREEN WAY PROPERTY ID 68 759.1 & ID 68 759.2

WALTER J. GLOWACKI LC CERTIFICATE NO. 13923 [LOT 435 ON LC PLAN 16514-16] #19 EVERGREEN WAY PROPERTY ID 68 715

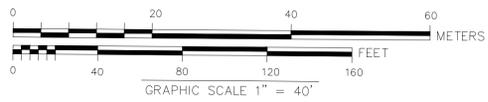
SHANNON S. HADDON LC CERTIFICATE NO. 20828 [LOT 436 ON LC PLAN 16514-16] #17 EVERGREEN WAY PROPERTY ID 68 716

CLERK'S CERTIFICATION ON THE PLAN
 DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

 TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____



CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

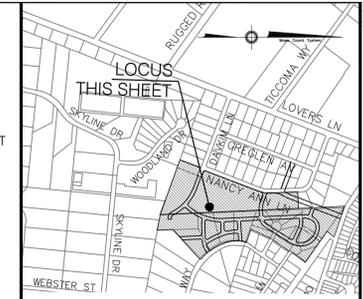
TOWN CLERK _____

NOTES:
THE PLANNING BOARD DETERMINES THAT LOTS 1 THROUGH 8 DO NOT CONTAIN AREAS SUBJECT TO PROTECTION UNDER THE MASSACHUSETTS WETLAND PROTECTION ACT WHICH ARE REQUIRED TO BE EXCLUDED FROM LOT AREA UNDER THE NANTUCKET ZONING BY-LAW, BUT STILL MAY BE SUBJECT TO PROTECTION UNDER STATE AND LOCAL WETLAND BYLAWS. DETERMINATION MAY BE OBTAINED THROUGH APPLICATION TO THE CONSERVATION COMMISSION.

ZONE: R-5
MINIMUM LOT AREA = 5,000 S.F.
MINIMUM LOT FRONTAGE = 50 FEET
MINIMUM YARD SETBACKS
FRONT = 10 FEET
SIDE = 10 FEET ON ONE SIDE,
5 FEET THEREAFTER
REAR = 5 FEET
ALLOWABLE GROUND COVER % = 40%

ZONE: CN
MINIMUM LOT AREA = 7,500 S.F.
MINIMUM LOT FRONTAGE = 50 FEET
MINIMUM YARD SETBACKS
FRONT = 10 FEET
SIDE = 5 FEET
REAR = 10 FEET
ALLOWABLE GROUND COVER % = 40%

LEGEND:
—— RIGHT OF WAY LINE
—— PROPOSED PROPERTY LINE



LOCUS MAP
N.T.S



These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS

NO.	DATE	COMMENT

- GENERAL NOTES:**
- Underground utilities shown on this plan are based on visible above ground utilities and record information of below ground utilities or as noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet; Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:

RICHMOND GREAT POINT DEVELOPMENT LLC

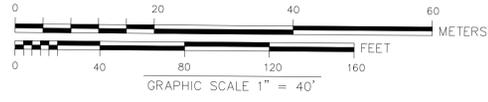
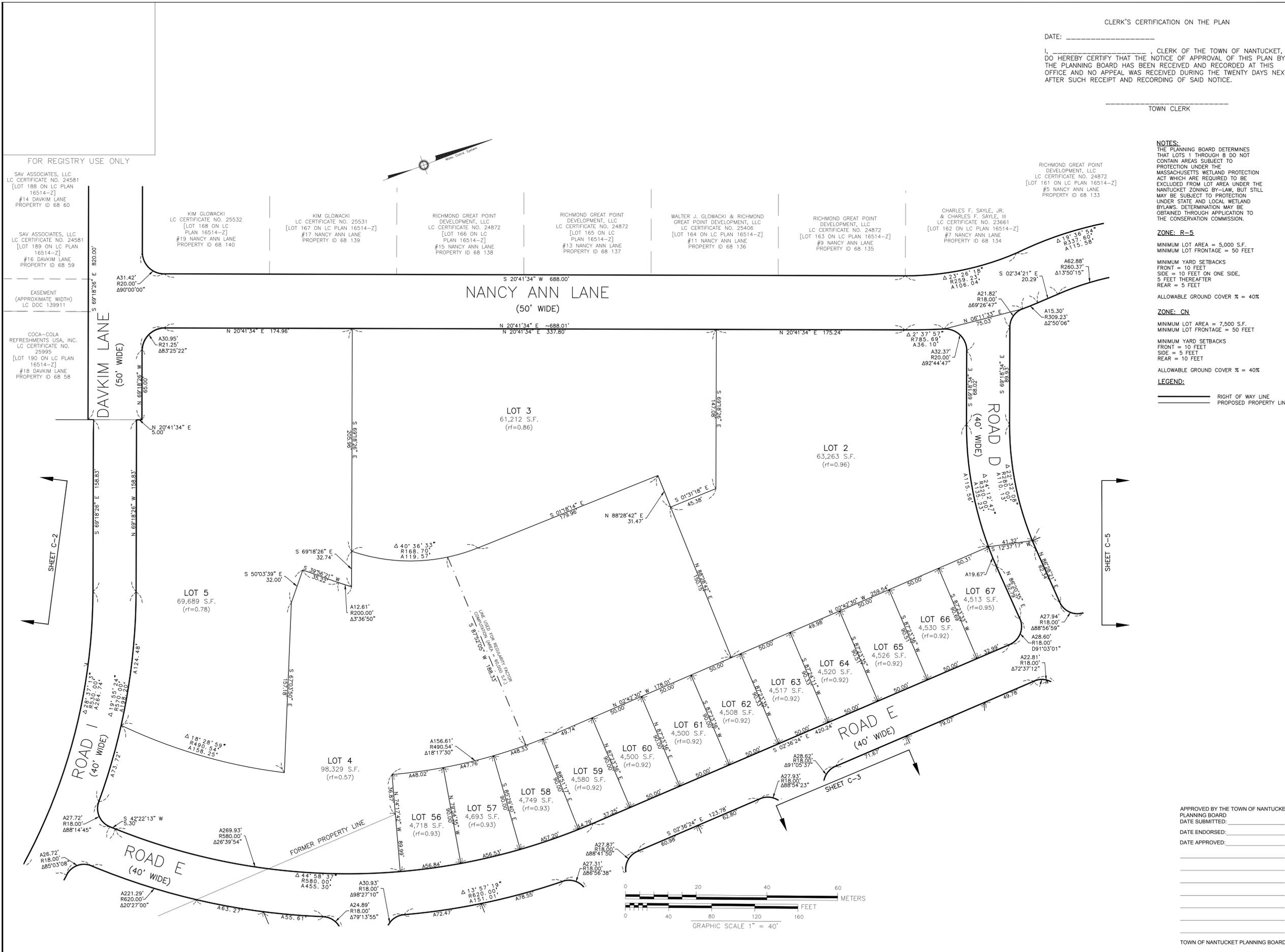
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

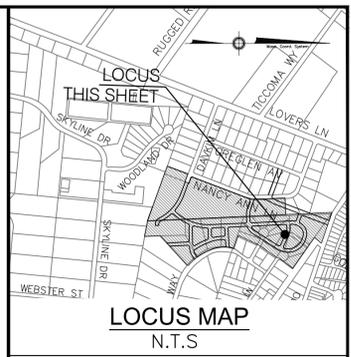
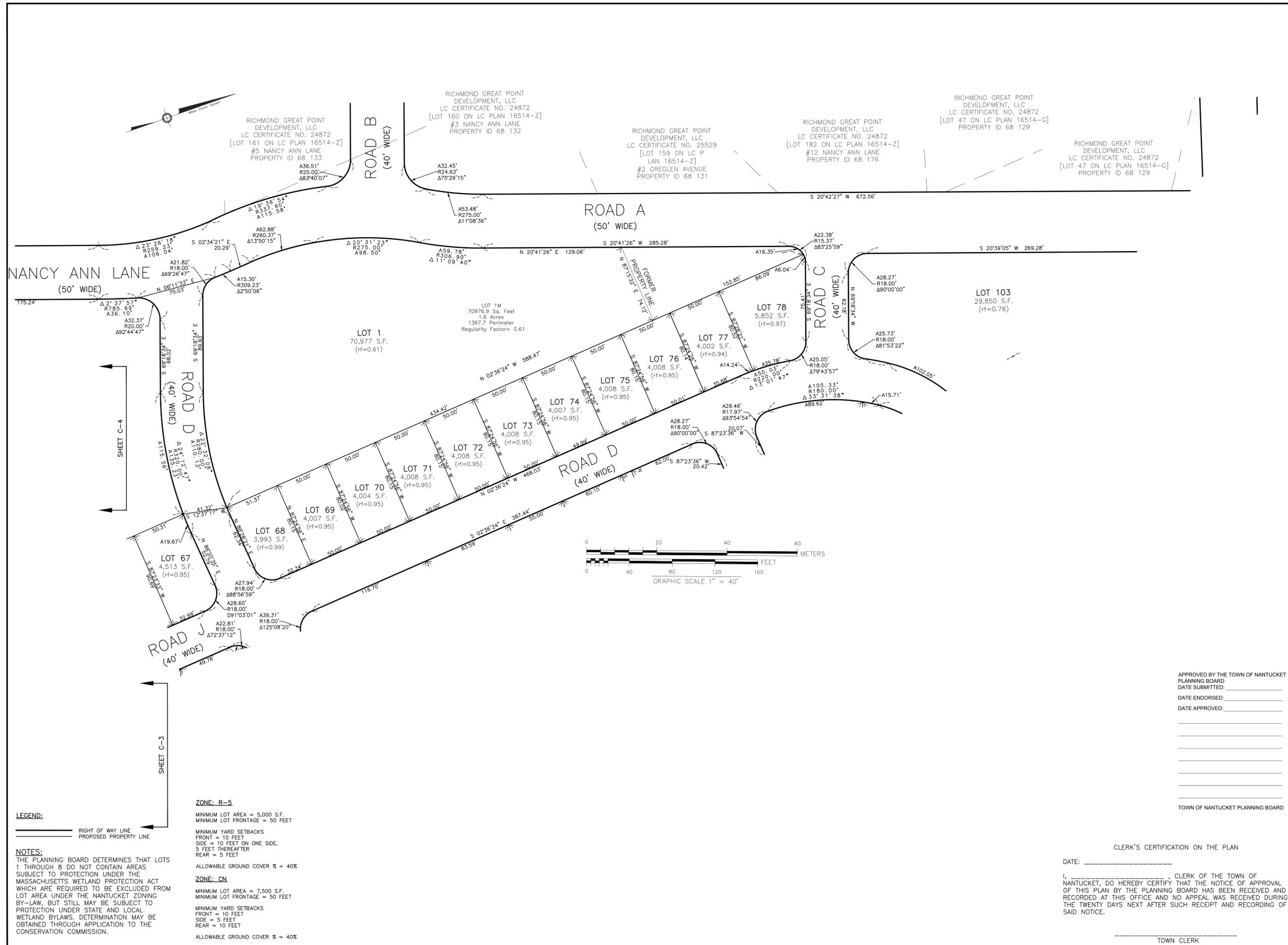
DRAWING TITLE:
DEFINITIVE PLAN

CAD TECH: JDP
CHECKED BY: TRB

ENGINEER: BLB
DATE: 08/03/2016

SCALE: 1" = 40'
SHEET: C-4 OF 26





Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS

NO.	DATE	COMMENT

- GENERAL NOTES:**
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or as noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE:
DEFINITIVE PLAN

CAD TECH: JDP
CHECKED BY: TRB

ENGINEER: BLB
DATE: 08/03/2016

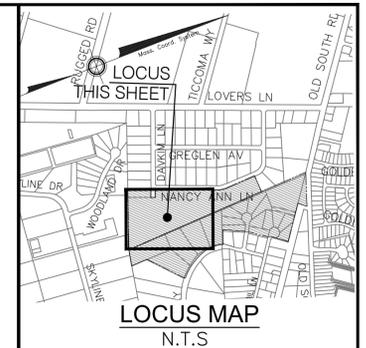
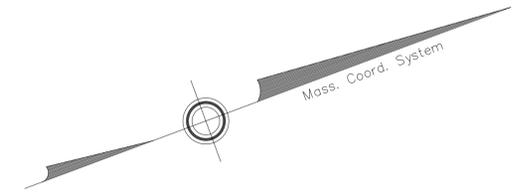
SCALE: 1" = 40'
SHEET: 6 OF 26

APPROVED BY THE TOWN OF NANTUCKET
 PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____
 TOWN OF NANTUCKET PLANNING BOARD

CLERK'S CERTIFICATION ON THE PLAN
 DATE: _____
 I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

 TOWN CLERK

FOR REGISTRY USE ONLY



Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
Dimensions are as indicated.
Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

NO.	DATE	COMMENT

- GENERAL NOTES:**
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:

RICHMOND GREAT POINT DEVELOPMENT LLC
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

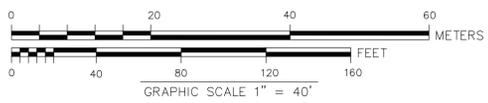
DRAWING TITLE:
TOPOGRAPHIC PLAN

CAD TECH: JDP
ENGINEER: BLB

CHECKED BY: TRB
DATE: 08/03/2016

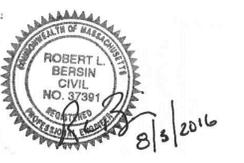
SCALE:
1" = 40'

SHEET:
7 OF 26



CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

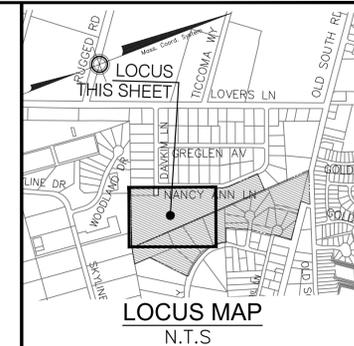
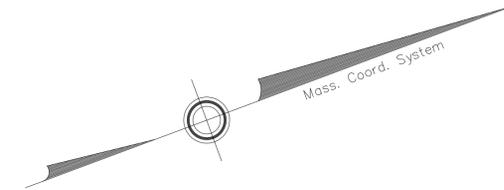
TOWN CLERK



APPROVED BY THE TOWN OF NANTUCKET
PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD

FOR REGISTRY USE ONLY



Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
Dimensions are as indicated.
Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

- GENERAL NOTES:
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR:

RICHMOND GREAT POINT DEVELOPMENT LLC

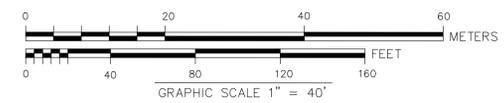
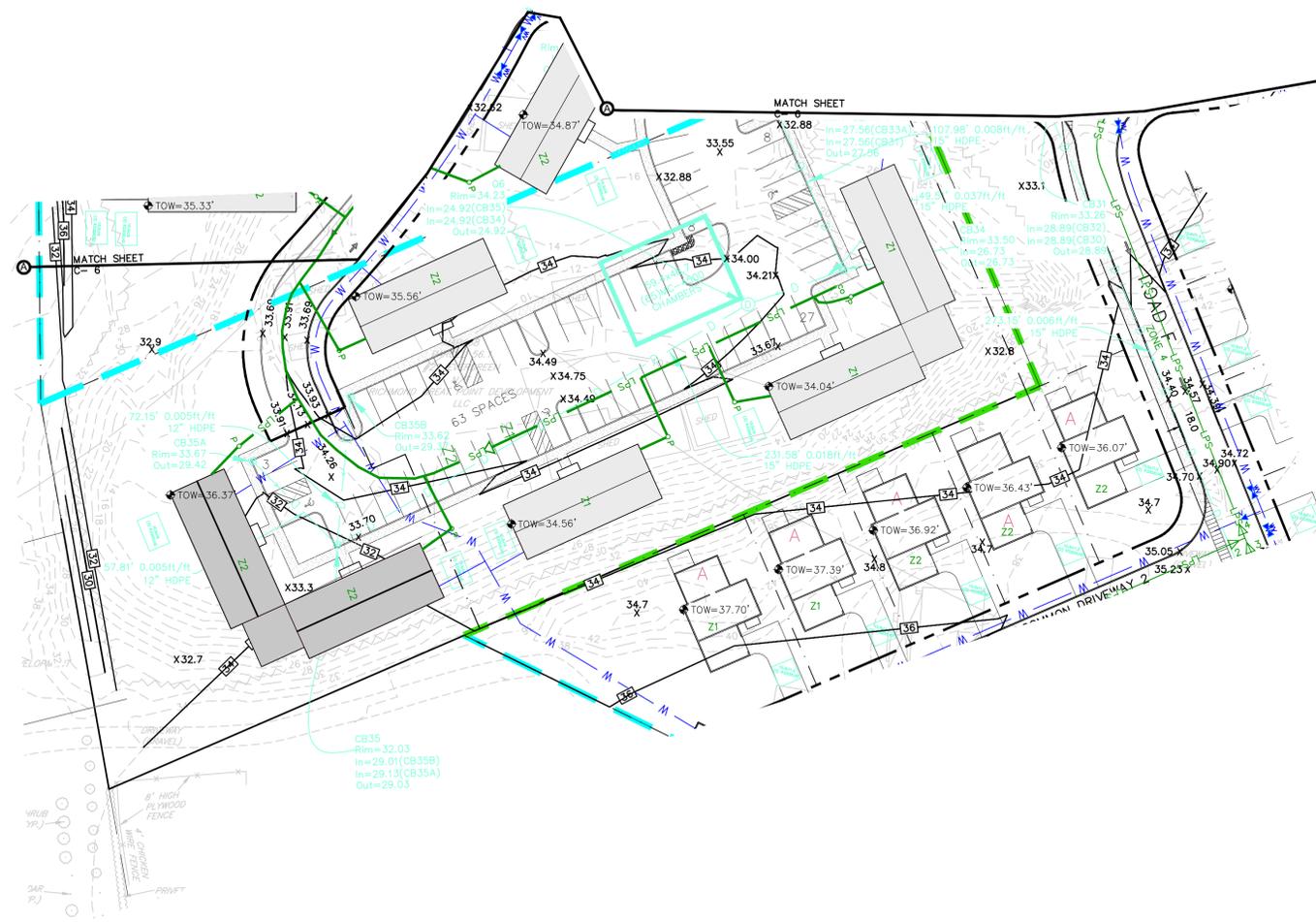
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE: **TOPOGRAPHIC PLAN**

CAD TECH: **JDP** CHECKED BY: **TRB**

ENGINEER: **BLB** DATE: **08/03/2016**

SCALE: **1" = 40'**
SHEET: **8 OF 26**



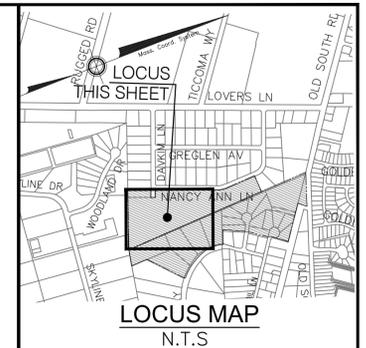
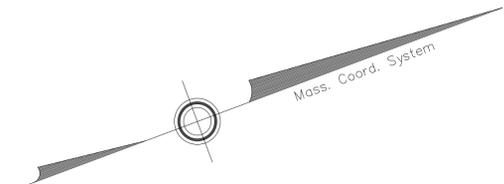
CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET,
DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY
THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS
OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS
NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET
PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD

FOR REGISTRY USE ONLY



Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

NO.	DATE	COMMENT

GENERAL NOTES:

- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
- Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
- Field survey completed on 11/09/2015
- Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
 NANCY ANN LANE

PREPARED FOR:

RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

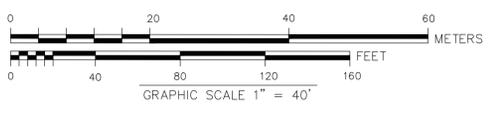
DRAWING TITLE:
TOPOGRAPHIC PLAN

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

C-8

SCALE:
 1" = 40'

SHEET:
 9 OF 26



CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

 TOWN CLERK

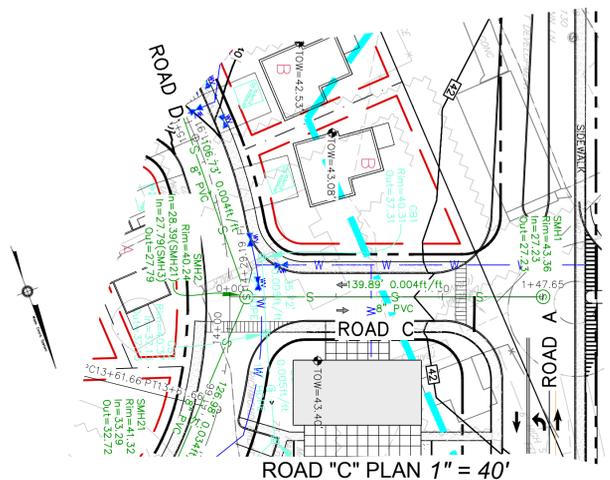
APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD

DATE SUBMITTED: _____

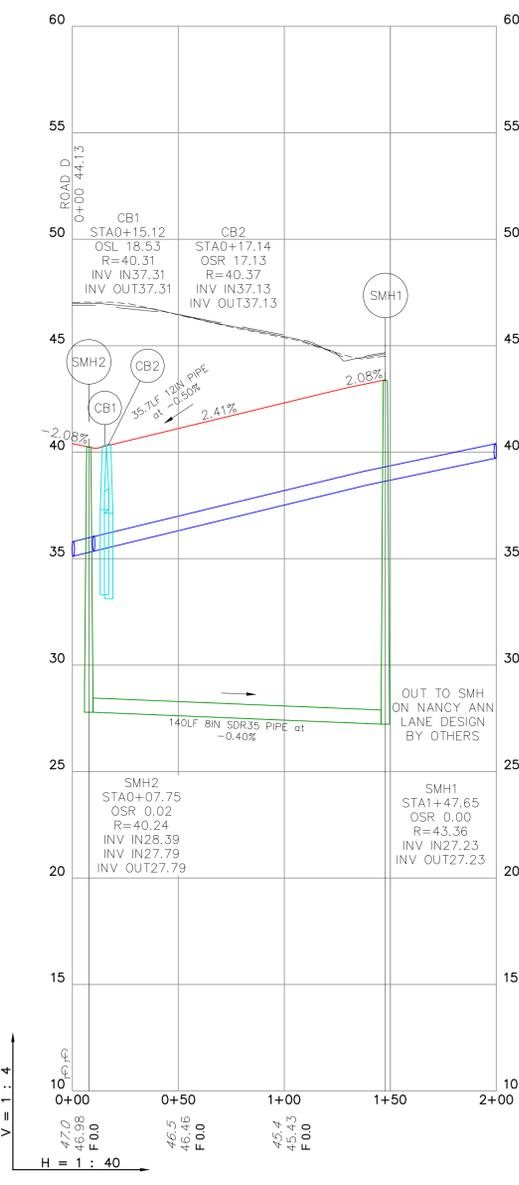
DATE ENDORSED: _____

DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD

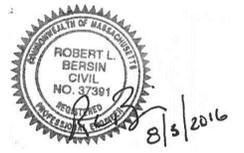


ROAD "C" PLAN 1" = 40'



GENERAL CONSTRUCTION NOTES:

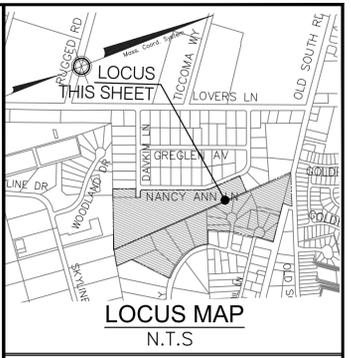
- All construction methods and materials shall conform to the Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges 1998 as amended.
- All sewer pipe shall be SDR-35 Gasketed Integral Bell Gravity Sewer pipe meeting ASTM D3034 as amended. Maximum individual length of pipe shall be 20 feet. Pipe sizes shall be as shown on the plans.
- All water mains shall be Cement Lined Ductile Iron Pipe with standard exterior coating. Pipe shall and manufactured in accordance with the latest revision of ANSI/AWWA C151/A21.51. Cement-mortar lining on the interior shall be in accordance with the latest revision of ANSI/AWWA C104/A21.4. Pipe shall be push on restrained joint meeting ANSI/AWWA C111/A21.11. Water pipe shall be installed and tested in accordance with ANSI/AWWA C800 and disinfected in accordance with the latest revision of ANSI/AWWA C651 prior to being placed in service. Pipe sizes shall be as shown on the plans.
- All Drainage pipe shall be High Density Polyethylene pipe. Pipe sizes shall be as shown on the plans.
- All hydrants shall be installed following the above-described protocol for water line installation. See plan details for material requirements.
- All water connections shall be installed following the above-described protocol for water line installation. Ductile iron tees and gate valves shall be installed on all legs of tees and crossings.
- Water services shall be 3/4-inch PVC water line and installed to the property line for single-family house lots. Water service for multifamily buildings shall be six-inch cement lined ductile iron and installed to the road layout line. The ends of all pipe service laterals shall be capped, located for future use, and marked with minimum 2"x4" lumber set six inches below finished grade.
- Sewer services shall be as follows:
 - Single-family house lots being fed by gravity shall be 4-inch PVC pipe.
 - Multifamily buildings shall be fed by 6-inch PVC pipe.
 - Single-family house lots being fed by Low Pressure Sewer shall be as depicted on the detail sheet. Pump Chambers shall be EOne DH071 simplex chambers with 4-inch PVC inlet connections and 1.25-inch SDR-11 outlet laterals to the low-pressure force main.
 - Multifamily buildings being fed by Low Pressure Sewer shall be as depicted on the detail sheet. Pump Chambers shall be EOne DH152 duplex chambers with 6-inch PVC inlet connections and 1.5-inch SDR-11 outlet laterals to the low-pressure force main.
 The ends of all pipe service laterals shall be capped, marked with minimum 2"x4" lumber set six inches below finished grade, and located for future use.



CLERK'S CERTIFICATION ON THE PLAN
 DATE: _____
 I, _____, CLERK OF THE TOWN OF NANTUCKET,
 DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY
 THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS
 OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS
 NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

51.5 EXISTING CL. GRADE
 41.92 PROPOSED FINAL GRADE
 C 9.6 CUT TO REACH FINAL FINISH GRADE
 F 9.6 FILL TO REACH FINAL FINISH GRADE

APPROVED BY THE TOWN OF NANTUCKET
 PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____
 TOWN OF NANTUCKET PLANNING BOARD



Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.

Dimensions are as indicated.

Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.

It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

- GENERAL NOTES:**
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
 NANCY ANN LANE

PREPARED FOR:

RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE:
 PLAN AND PROFILE

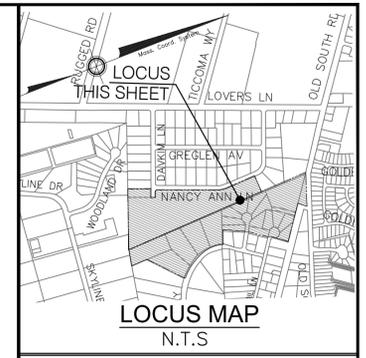
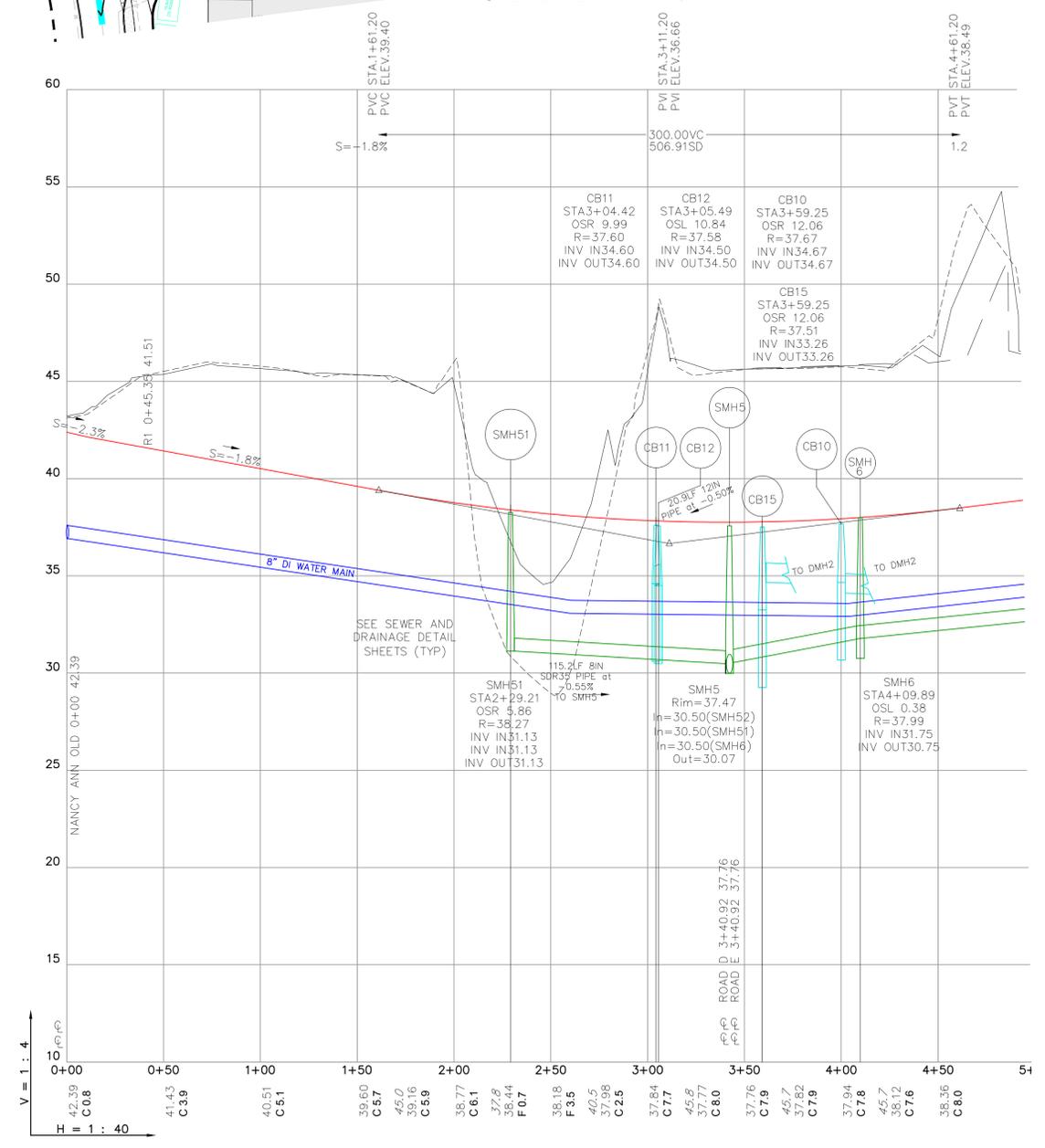
CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

C-9

SCALE:
 1" = 40'

SHEET:
 10 OF 26

FOR REGISTRY USE ONLY



Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
 Dimensions are as indicated.
 Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
 It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

- REVISIONS**
- | NO. | DATE | COMMENT |
|-----|------|---------|
| | | |
| | | |
| | | |
| | | |
- GENERAL NOTES:**
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE
SUBDIVISION

LOCUS:
 NANCY ANN LANE

PREPARED FOR:

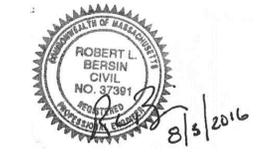
RICHMOND GREAT POINT DEVELOPMENT LLC
 RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE:
 PLAN AND PROFILE

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

CAD TECH: JDP
ENGINEER: BLB
DATE: 08/03/2016
SCALE: 1" = 40'
SHEET: 11 OF 26

CLERK'S CERTIFICATION ON THE PLAN
 DATE: _____
 I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.



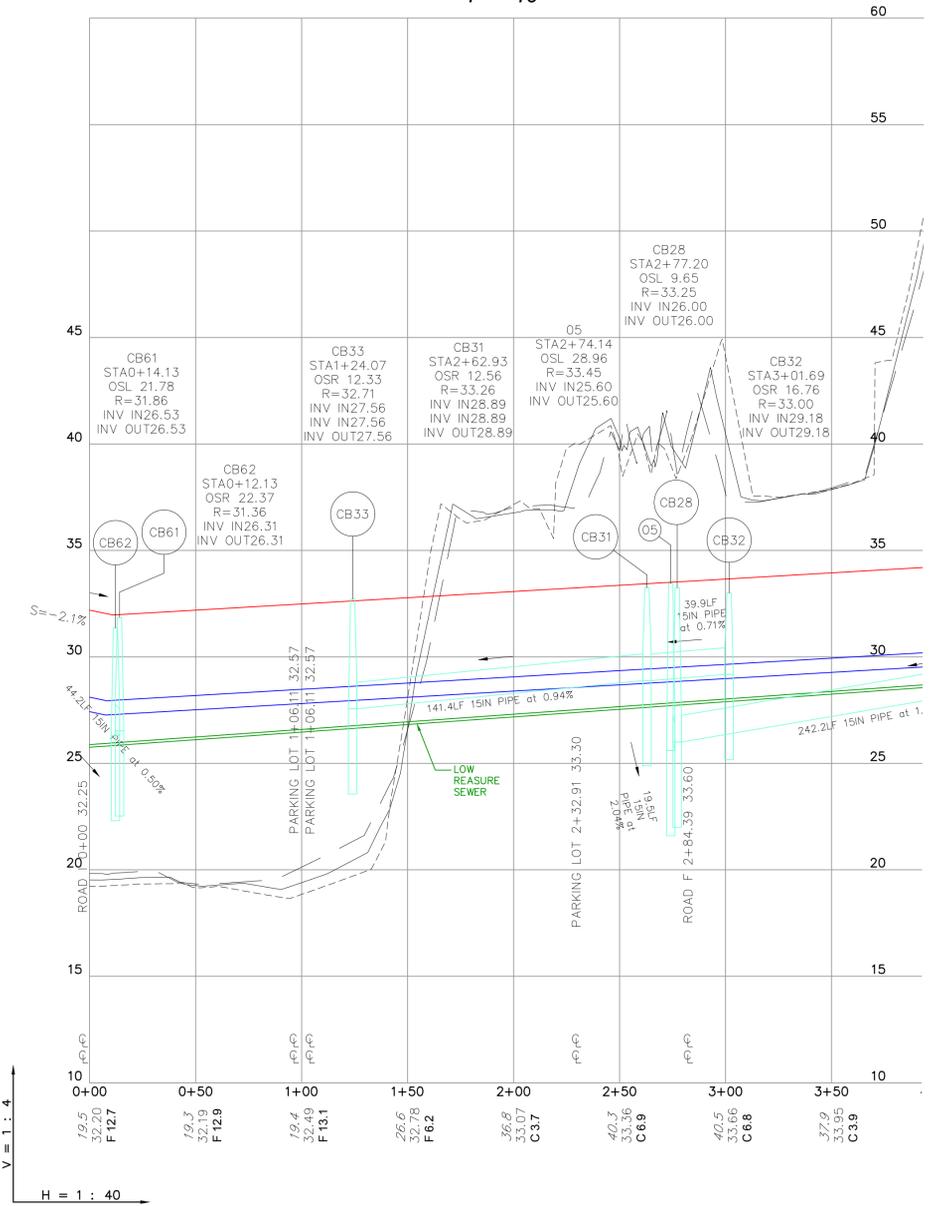
51.5 EXISTING CL GRADE
 41.92 PROPOSED FINAL GRADE
 C 9.6 CUT TO REACH FINAL FINISH GRADE
 F 9.6 FILL TO REACH FINAL FINISH GRADE

TOWN CLERK
 APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____
 TOWN OF NANTUCKET PLANNING BOARD

FOR REGISTRY USE ONLY



ROAD "E" PLAN
1" = 40'



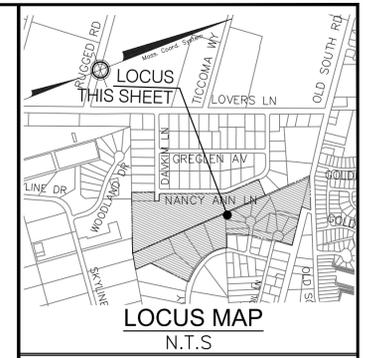
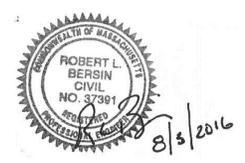
V = 1 : 4
H = 1 : 40

51.5 EXISTING CL GRADE
41.92 PROPOSED FINAL GRADE
C 9.6 CUT TO REACH FINAL FINISH GRADE
F 9.6 FILL TO REACH FINAL FINISH GRADE

CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____



Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
Dimensions are as indicated.
Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS	
NO.	DATE

- GENERAL NOTES:
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

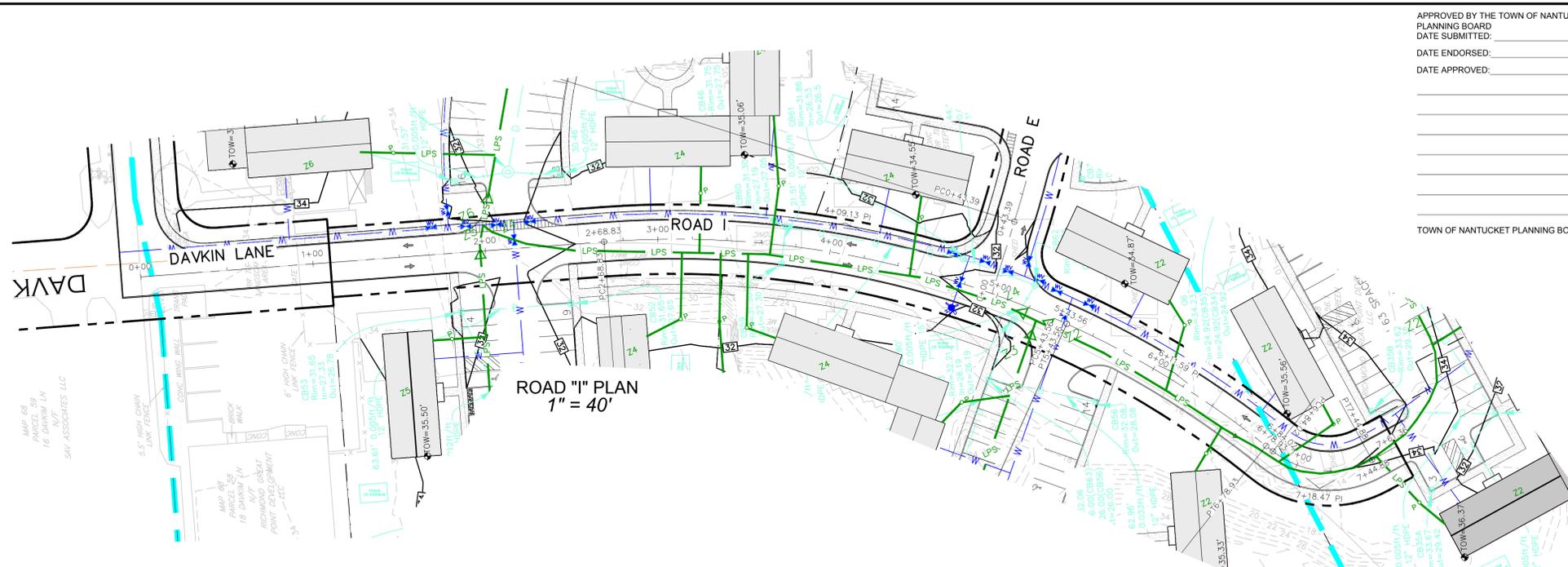
DRAWING TITLE:
PLAN AND PROFILE

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

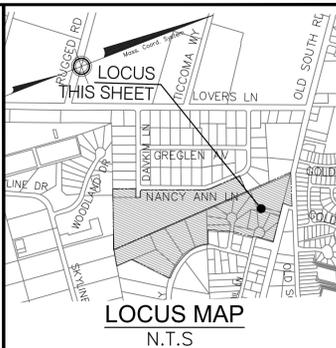
C-11
SCALE:
1" = 40'
SHEET:
12 OF 26

TOWN OF NANTUCKET PLANNING BOARD

FOR REGISTRY USE ONLY



APPROVED BY THE TOWN OF NANTUCKET
 PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____
 TOWN OF NANTUCKET PLANNING BOARD



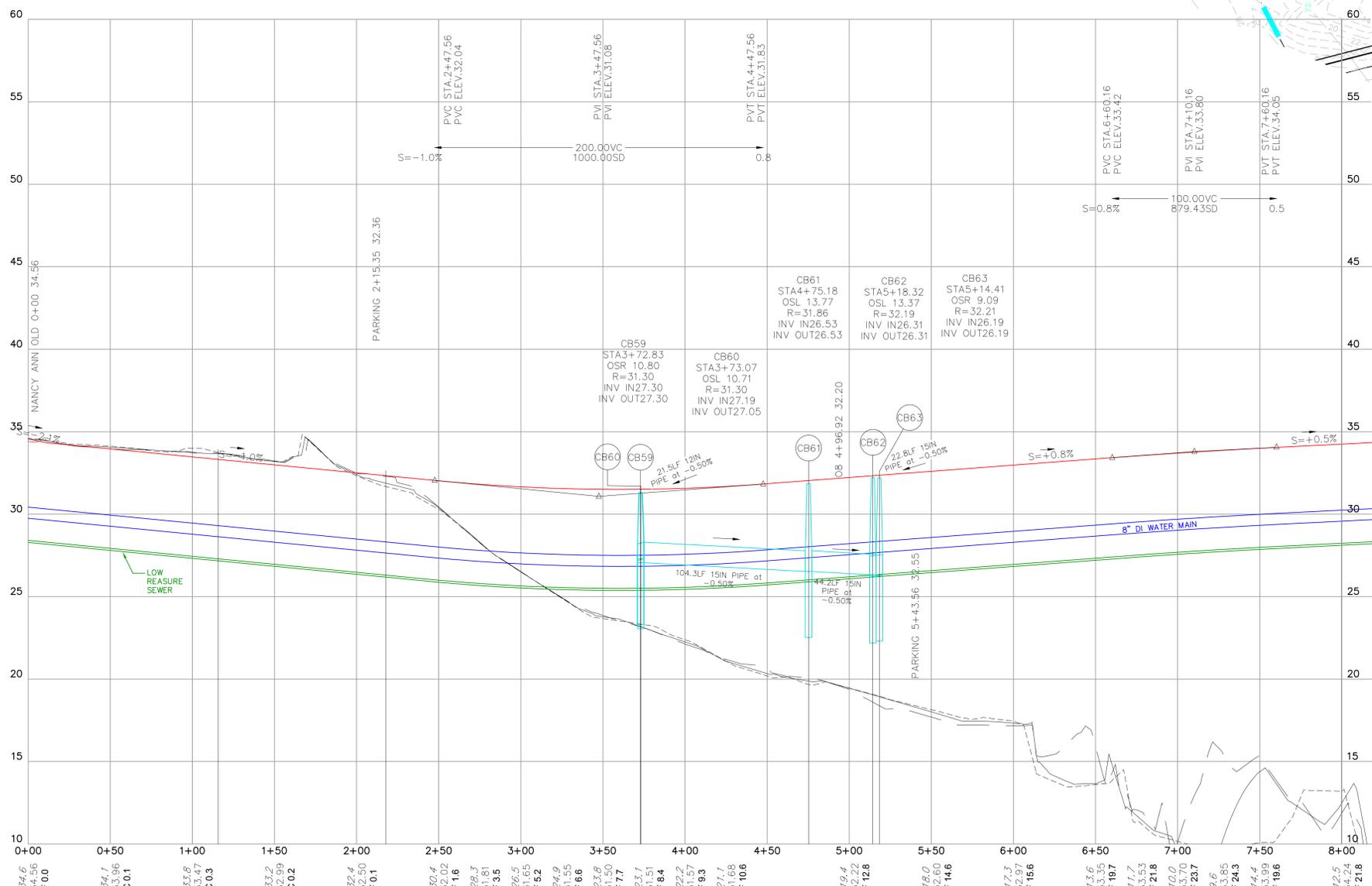
Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
 Dimensions are as indicated.
 Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
 It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

CLERK'S CERTIFICATION ON THE PLAN
 DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

 TOWN CLERK



- GENERAL NOTES:
- Underground utilities shown on this plan are based upon visible above ground utilities and recorded information of below ground utilities or noted otherwise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
 NANCY ANN LANE

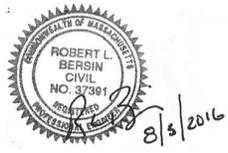
PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE:
PLAN AND PROFILE

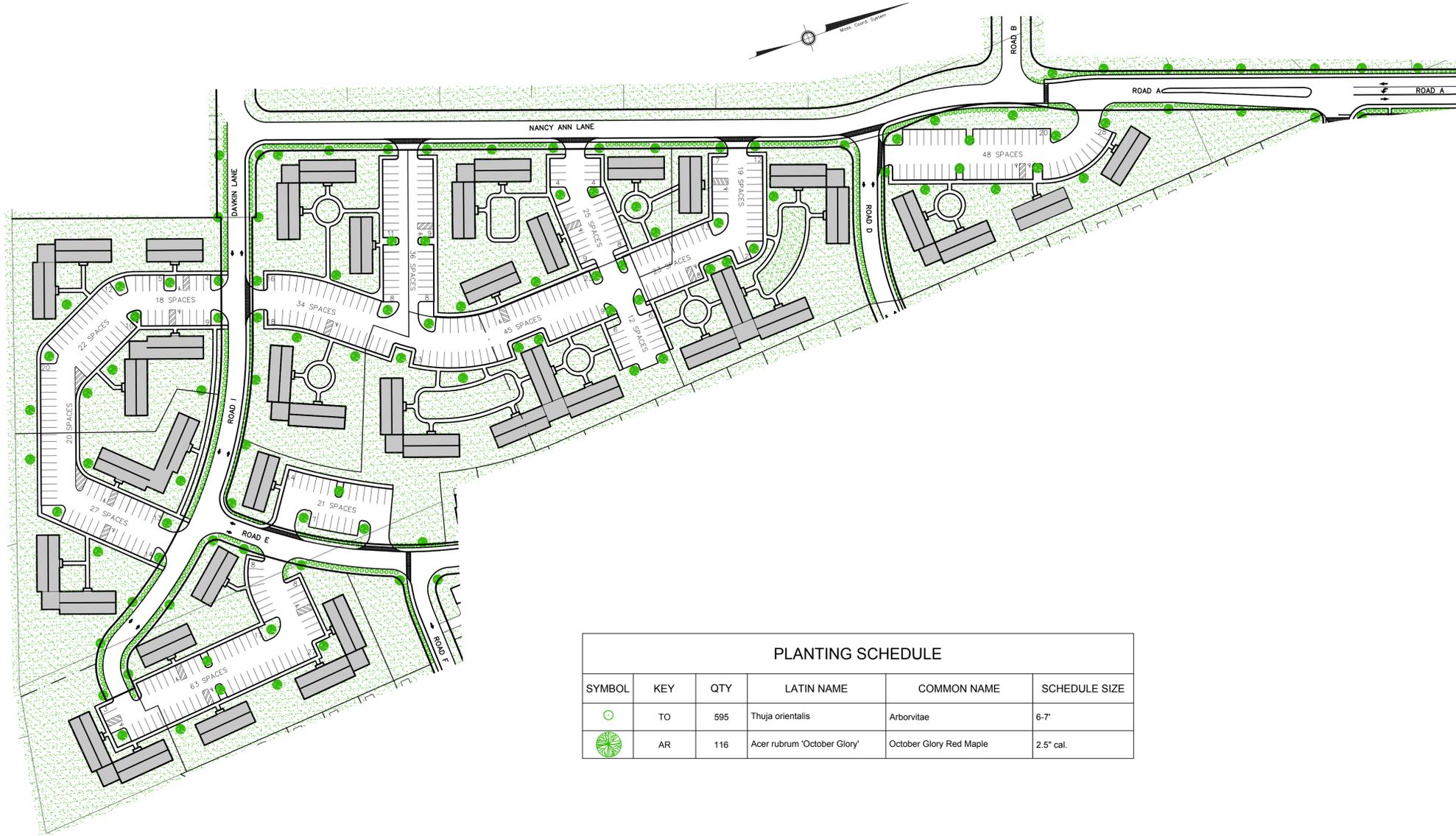
CAD TECH: JDP
 CHECKED BY: TRB
 ENGINEER: BLB
 DATE: 08/03/2016

SCALE:
1" = 40'
 SHEET:
13 OF 26



57.5 EXISTING CL GRADE
 41.92 PROPOSED FINAL GRADE
 C 9.6 CUT TO REACH FINAL FINISH GRADE
 F 9.6 FILL TO REACH FINAL FINISH GRADE

FOR REGISTRY USE ONLY



PLANTING SCHEDULE

SYMBOL	KEY	QTY	LATIN NAME	COMMON NAME	SCHEDULE SIZE
	TO	595	Thuja orientalis	Arborvitae	6-7'
	AR	116	Acer rubrum 'October Glory'	October Glory Red Maple	2.5" cal.

CLERK'S CERTIFICATION ON THE PLAN

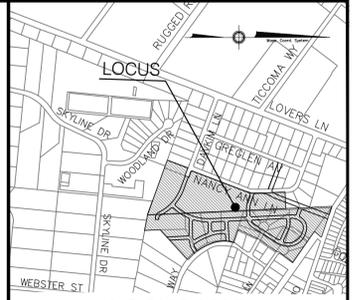
DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET
PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD



LOCUS MAP
N.T.S.

Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
Dimensions are as indicated.
Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS

NO.	DATE	COMMENT

- GENERAL NOTES:
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted other wise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE:
LANDSCAPE PLAN

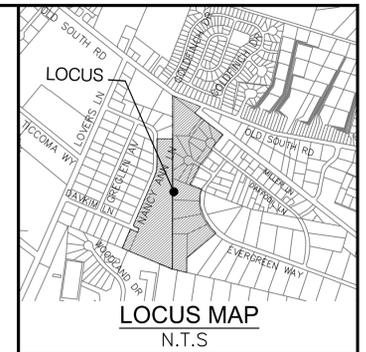
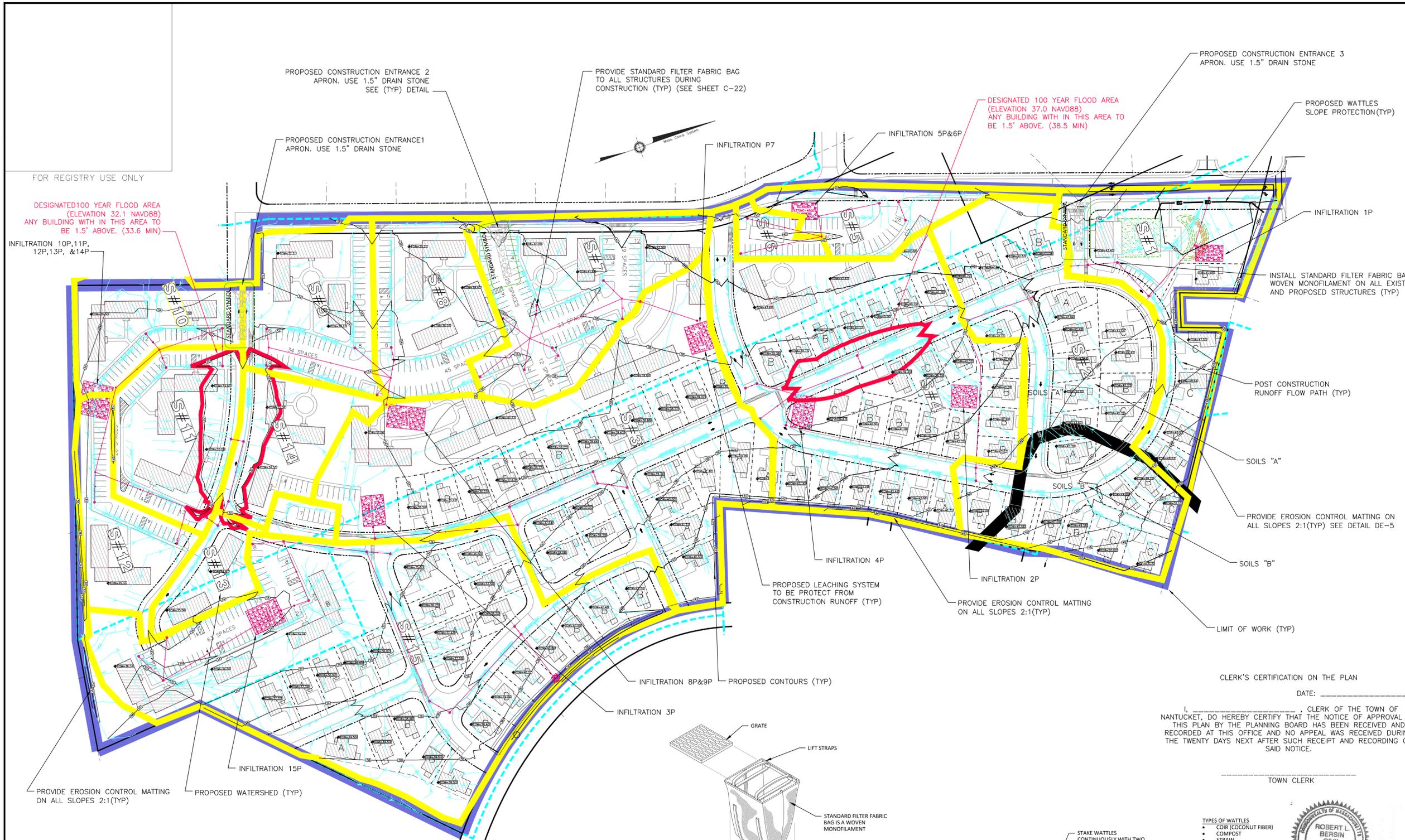
CAD TECH: JDP	CHECKED BY: TRB
-------------------------	---------------------------

ENGINEER: BLB	DATE: 08/03/2016
-------------------------	----------------------------

C-13

SCALE:
1" = 80'

SHEET:
14 OF 26



Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

NO.	DATE	COMMENT

- GENERAL NOTES:**
- Underground utilities shown on this plan are based upon visible above ground utilities and record information of below ground utilities or noted other wise, and are approximate only. Contractor is responsible for taking all necessary precautions before beginning any excavation. (Digsafe 1-888-344-7233)
 - Horizontal Datum is based upon Massachusetts State Coordinate System, NAD 83 in feet. Vertical Datum is based upon NAVD 88 in feet.
 - Field survey completed on 11/09/2015
 - Plan Not for construction, Permitting only.

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
 NANCY ANN LANE

PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE:
EROSION & DUST CONTROL PLAN

CAD TECH: JDP
CHECKED BY: TRB

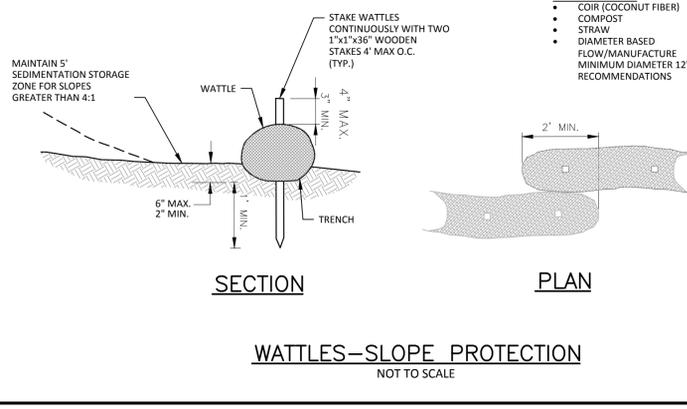
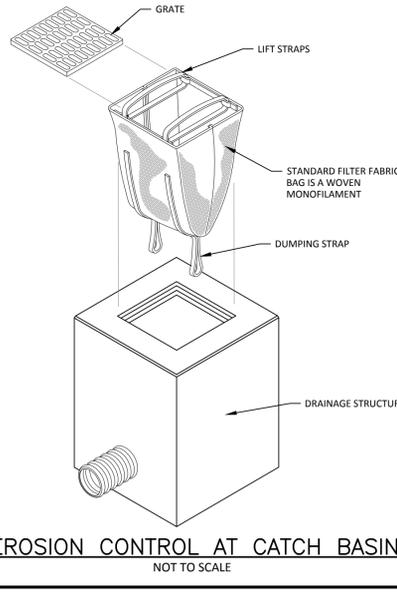
ENGINEER: BLB
DATE: 08/03/2016

SCALE: 1" = 80'
SHEET: 15 OF 26

CLERK'S CERTIFICATION ON THE PLAN
 DATE: _____
 I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.



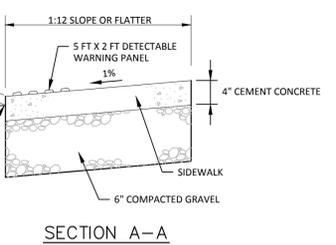
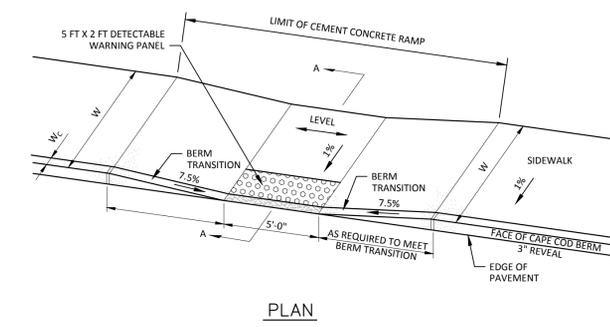
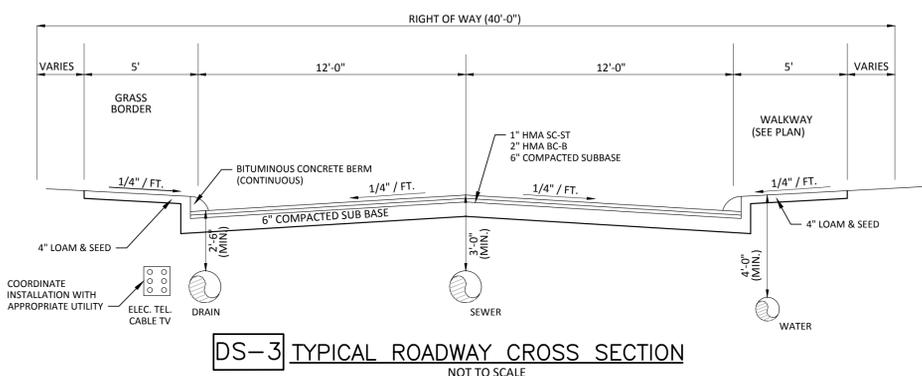
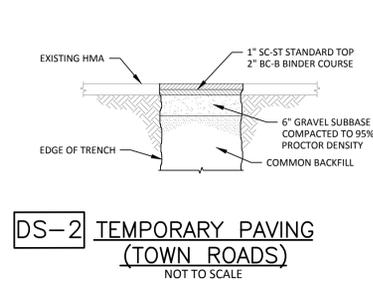
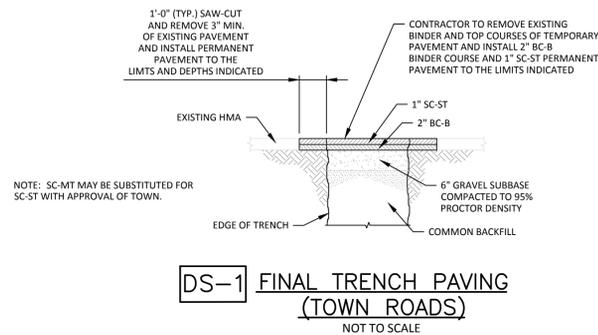
APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____
 TOWN OF NANTUCKET PLANNING BOARD



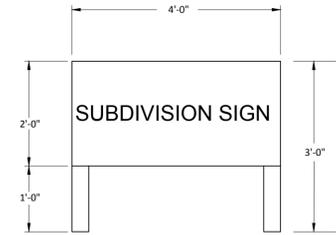
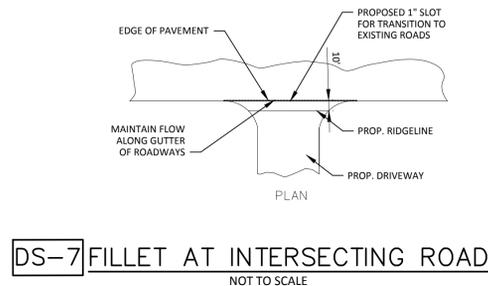
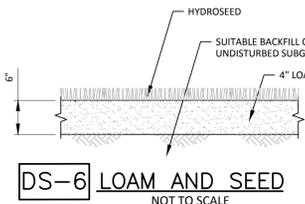
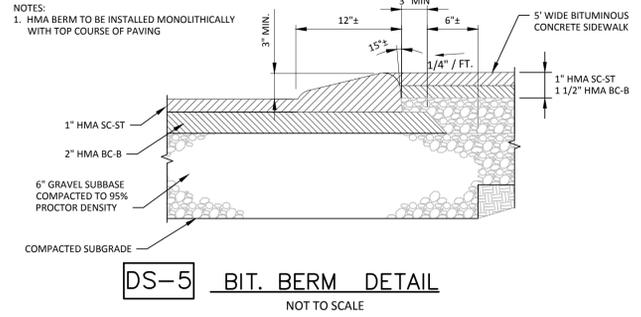
PERIMETER MONITORING
 During projects that will disturb greater than 500 square feet (s.f.) of cover, the selected contractor shall provide perimeter monitoring at two downwind locations and one upwind location. The monitors shall be capable of reading PM-10 particulates on a real-time and time-weighted average (TWA) basis. The PM-10 standard includes particles with a diameter of 10 micrometers or less. The Environmental Protection Agency (EPA) health-based national air quality standard for PM-10 is 35 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) (measured as an annual mean) and 150 $\mu\text{g}/\text{m}^3$ (measured as a daily concentration). During the project duration, background levels of particulates shall be monitored at the upwind monitoring location. The air monitors shall be monitored on an hourly basis and shall be in operation during any project activities that involve the excavation, transfer, or other management of soil from the Site. Particulate concentrations from the upwind monitoring location may be subtracted from the downwind monitoring locations to obtain an accurate measurement of project related levels of particulates. The action level for the Site is 0.2 milligrams per cubic meter (mg/m^3) above background. Accordingly, if the TWA average for downwind readings is 0.2 mg/m^3 greater than background, project work must cease until operational changes are implemented that reduce dust levels to below the action level.

DUST CONTROL
 The contractor shall be responsible for controlling and limiting dust generated during the proposed project. During excavation activities, the contractor shall control dust primarily through the application of a light water spray across the project work area, as needed throughout the work day. The amount of water used to control dust shall be controlled such that no water runoff is generated from the project work area. Regular sweeping of the project work area to minimize tracking of soil is also recommended. Sweepings can be deposited into the excavation or stockpiled with excavated soil, on, and under, 6-mil polyethylene sheeting. The contractor will be responsible for providing all equipment and labor for dust control procedures.
 6.1 Visible Dust
 When visible dust is observed originating at the project area, all work must cease until operational changes are implemented that eliminate visible dust.
 Visible Dust
 When visible dust is observed originating at the project area, all work must cease until operational changes are implemented that eliminate visible dust.

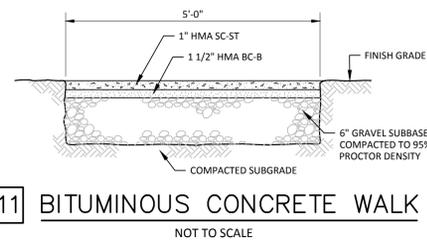
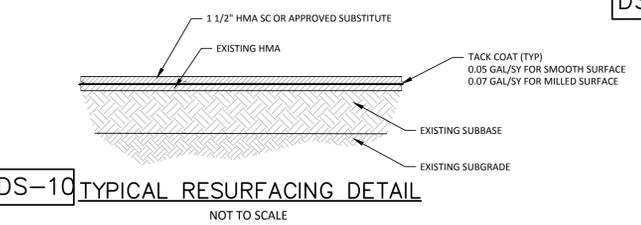
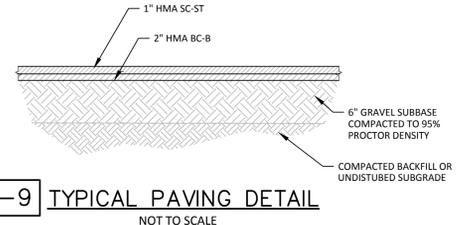
FOR REGISTRY USE ONLY



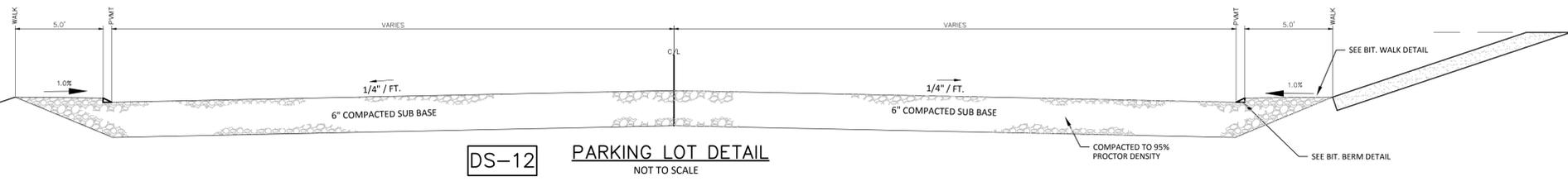
DS-4 WHEEL CHAIR RAMP (NTS)
FOR SIDEWALKS UP TO 8' WIDE
WHEELCHAIR RAMP SHALL MEET MASSDOT
DRAWING NUMBER E 107.2.1 AS AMENDED



DS-8 SUBDIVISION SIGN DETAIL
NOT TO SCALE



DS-11 BITUMINOUS CONCRETE WALK
NOT TO SCALE



DS-12 PARKING LOT DETAIL
NOT TO SCALE

Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

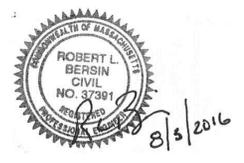
CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

PURPOSE: **DEFINITIVE SUBDIVISION**
LOCUS: **NANCY ANN LANE**
PREPARED FOR: **RICHMOND GREAT POINT DEVELOPMENT LLC**
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE: **DETAIL-SITE**

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

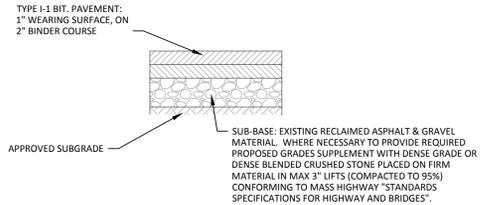
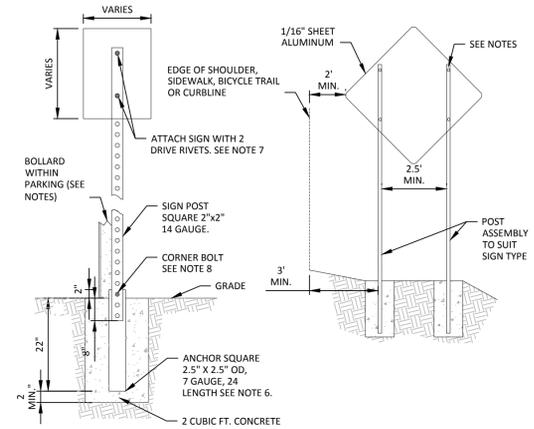
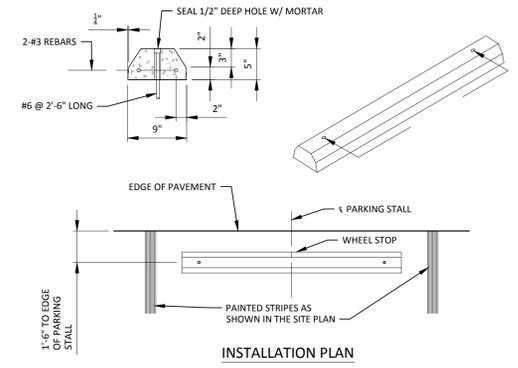
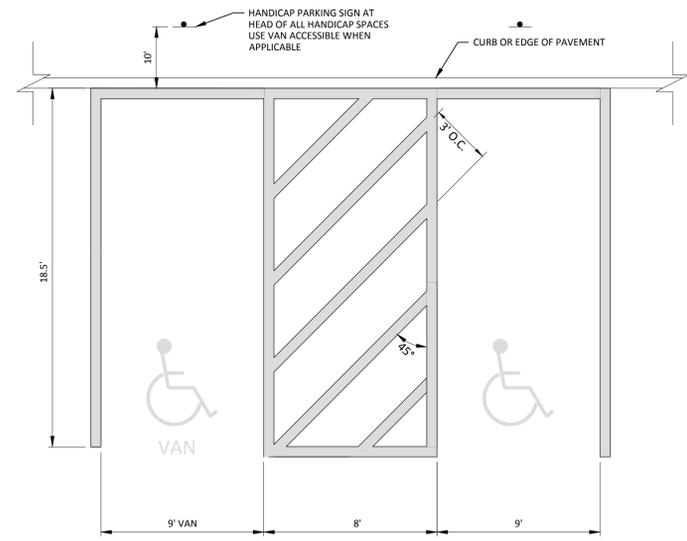
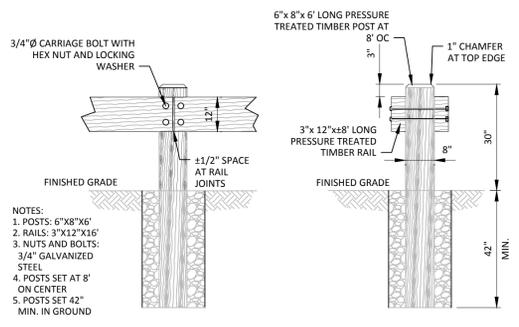
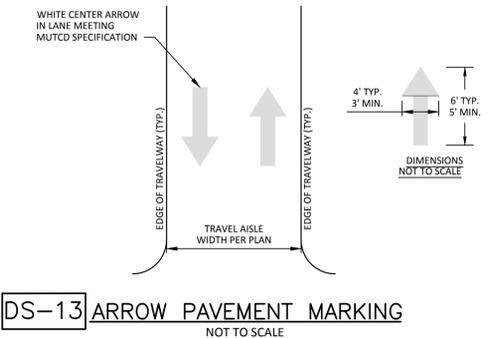
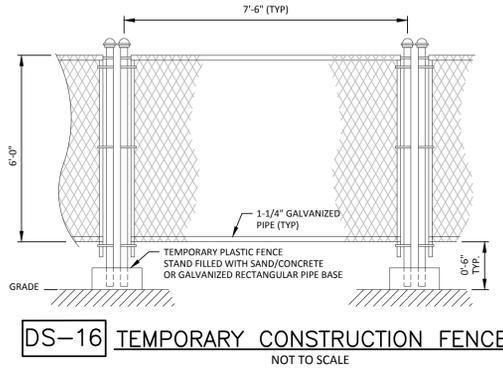
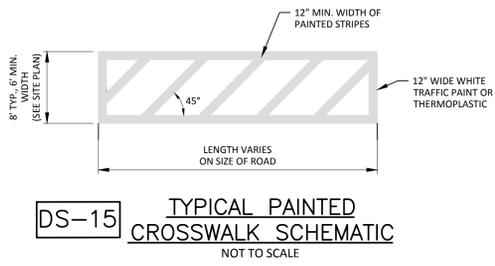


APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

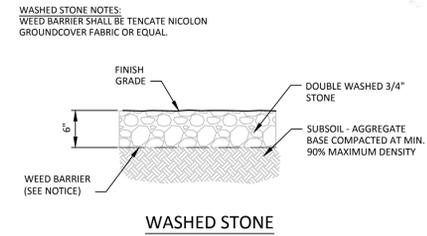
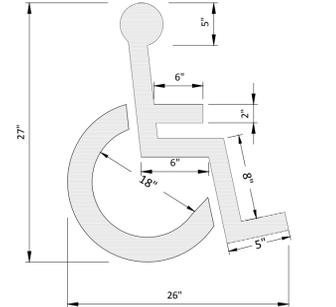
TOWN OF NANTUCKET PLANNING BOARD

C-15
SCALE: **NOTED**
SHEET: **16 OF 26**

FOR REGISTRY USE ONLY



DS-18 VAN HANDICAP PARKING STALLS @ 90°
NOT TO SCALE



DS-22 HANDICAP PAVEMENT PARKING
NOT TO SCALE

DS-24 SURFACE TREATMENT DETAIL
NOT TO SCALE

Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
Dimensions are as indicated.
Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

NO.	DATE	COMMENT

CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

PURPOSE: **DEFINITIVE SUBDIVISION**
LOCUS: **NANCY ANN LANE**
PREPARED FOR: **RICHMOND GREAT POINT DEVELOPMENT LLC**

RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAYKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE: **DETAIL-SITE**

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

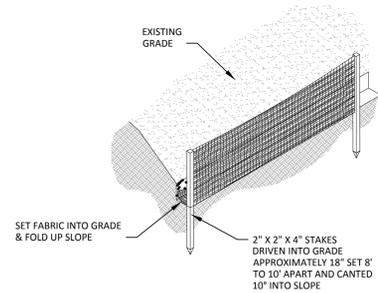
SCALE: **NOTED**
SHEET: **17 OF 26**



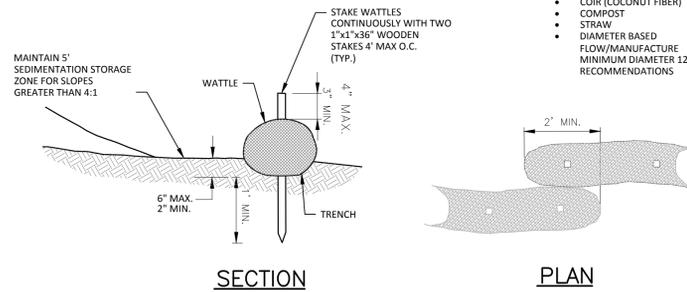
APPROVED BY THE TOWN OF NANTUCKET
PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD

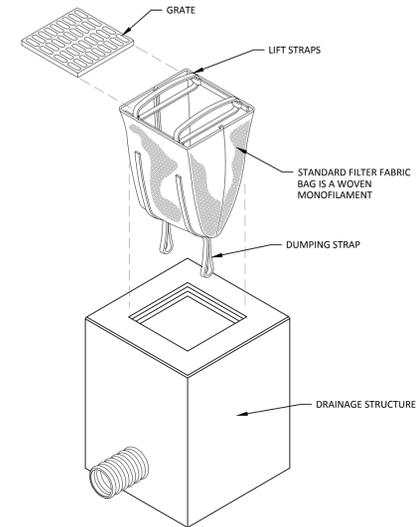
FOR REGISTRY USE ONLY



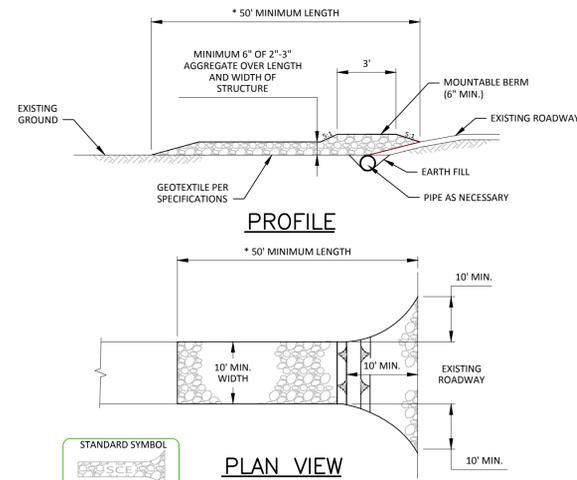
DE-1 SILT FENCE DETAIL
NOT TO SCALE



DE-2 WATTLES-SLOPE PROTECTION
NOT TO SCALE



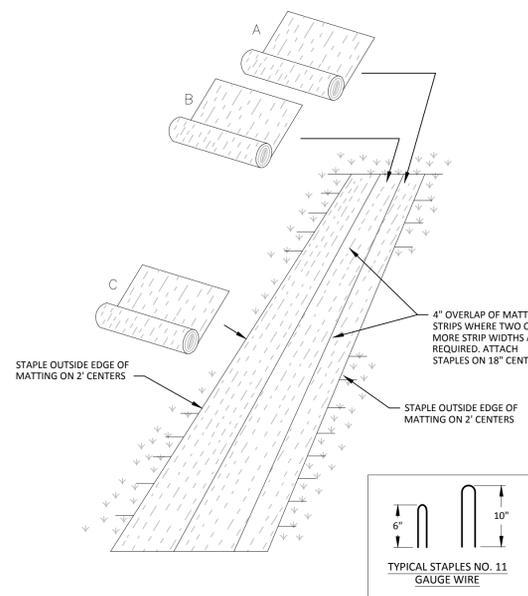
DE-3 EROSION CONTROL AT CATCH BASIN
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

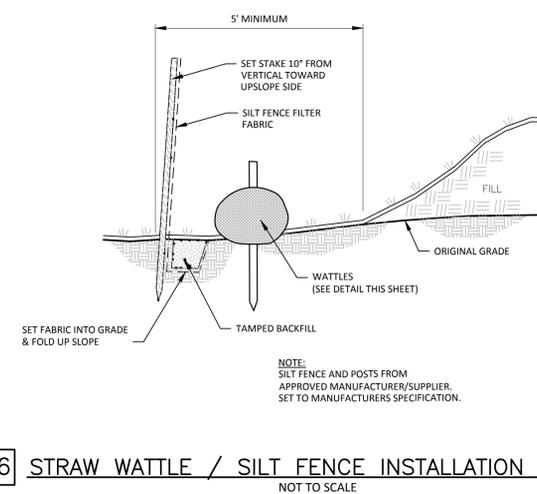
1. LENGTH - MINIMUM OF 50'.
2. WIDTH - 10' MINIMUM, SHOULD BE FLARED AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
3. GEOTEXTILE FABRIC (MIRAFI 180N OR EQUAL) SHALL BE PLACED OVER THE EXISTING GROUND PRIOR TO PLACING STONE.
4. STONE - CRUSHED AGGREGATE (2\"/>

DE-4 STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE



DE-5 EROSION CONTROL MATTING
NOT TO SCALE

- NOTES:
1. EROSION CONTROL MATS MANUFACTURED BY NORTH AMERICAN GREEN'S, MODEL S150 & SC150 AND SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.
 2. USE S150 EROSION CONTROL MATS ON 3:1 TO 2:1 SLOPES. USE SC150 EROSION CONTROL MATS ON 2:1 TO 1:1 SLOPES.



DE-6 STRAW WATTLE / SILT FENCE INSTALLATION DETAIL
NOT TO SCALE

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK



APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD

Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
Dimensions are as indicated.
Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR:

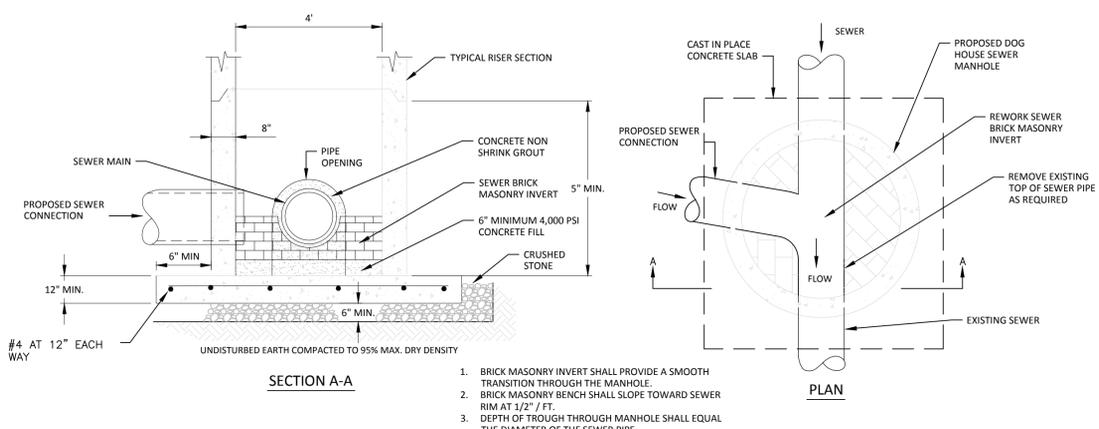
RICHMOND GREAT POINT DEVELOPMENT LLC
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE: **DETAIL-EROSION CONTROL**

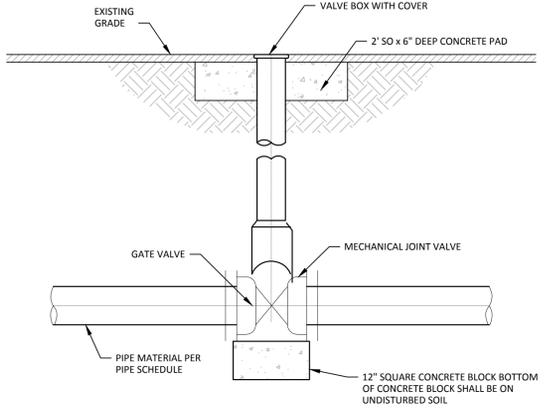
CAD TECH:	CHECKED BY:
JDP	TRB
ENGINEER:	DATE:
BLB	08/03/2016

C-17
SCALE: **NOTED**
SHEET: **18 OF 26**

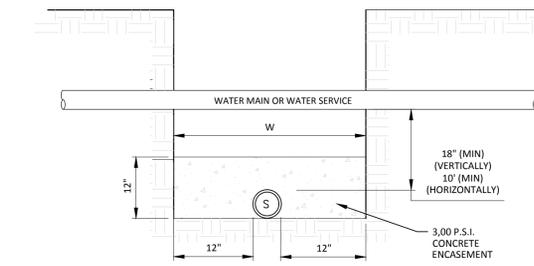
FOR REGISTRY USE ONLY



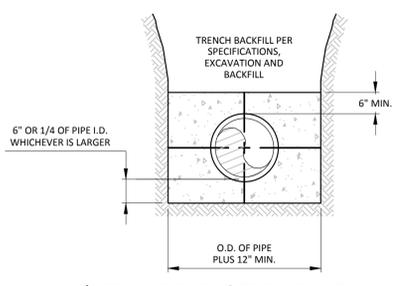
DSE-1 SEWER MANHOLE BASE
NOT TO SCALE



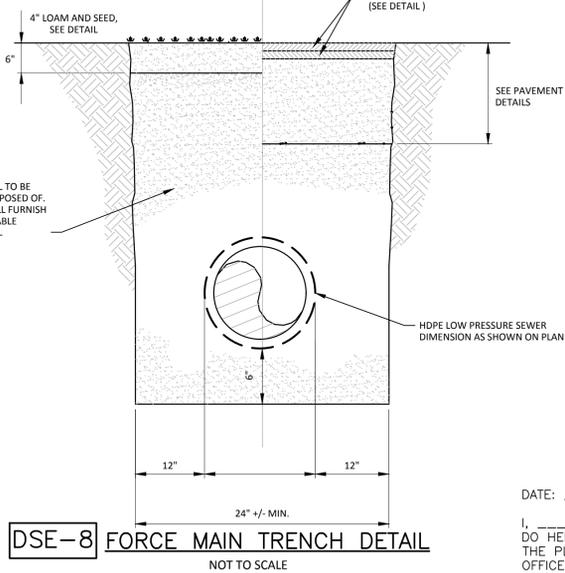
DSE-4 TYPICAL DETAIL FOR ALL BURIED VALVES CONNECTION TO PROPOSED PIPES
NOT TO SCALE



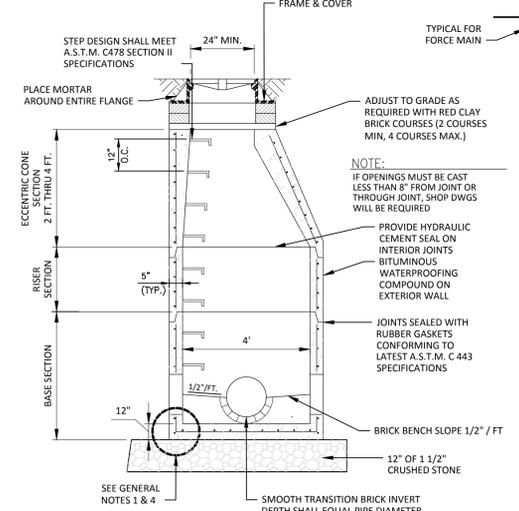
DSE-6 MINIMUM DISTANCE FOR SEWER AND WATER LINE CROSSINGS
NOT TO SCALE



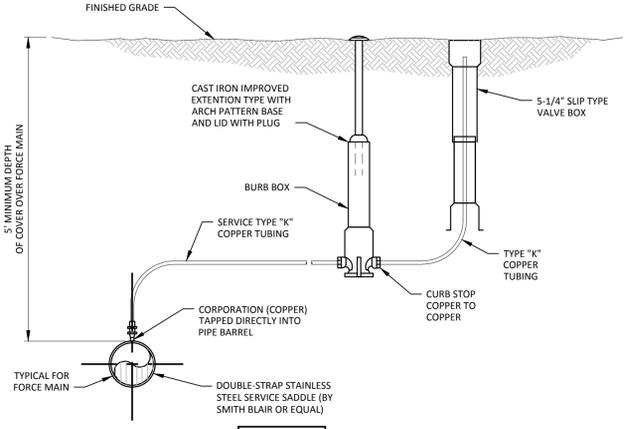
DSE-7 TYPE VI PLAIN CONCRETE ENCASEMENT DETAIL
NOT TO SCALE



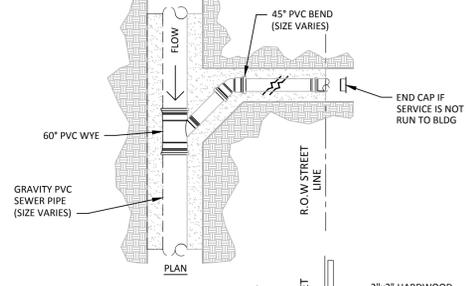
DSE-8 FORCE MAIN TRENCH DETAIL
NOT TO SCALE



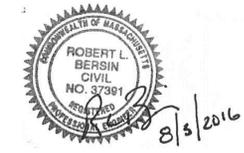
DSE-5 TYPICAL SEWER MANHOLE COVER
NOT TO SCALE



DSE-2 AIR RELEASE DETAIL
NOT TO SCALE



DSE-9 SEWER SERVICE CONNECTION
NOT TO SCALE



CLERK'S CERTIFICATION ON THE PLAN

DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____
TOWN OF NANTUCKET PLANNING BOARD

Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

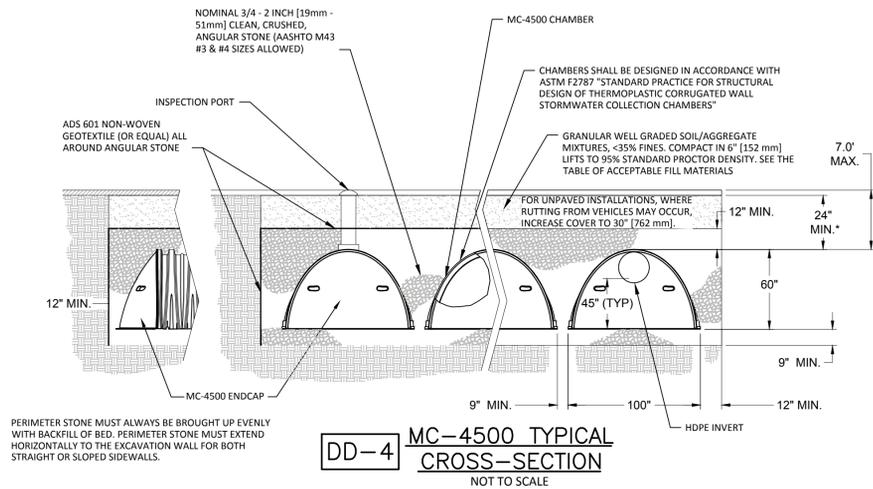
PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE:
DETAIL-SEWER

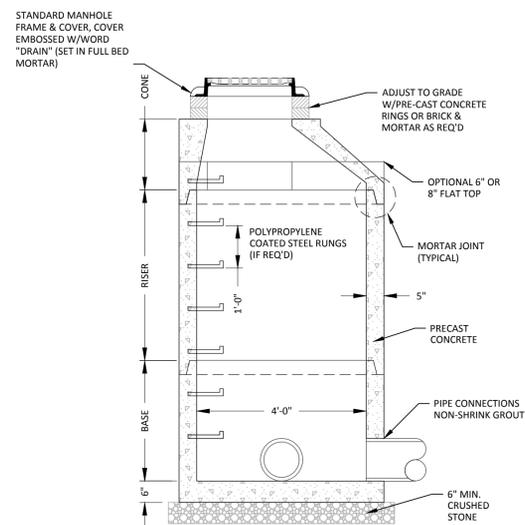
CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

SCALE:
NOTED
SHEET:
19 OF 26

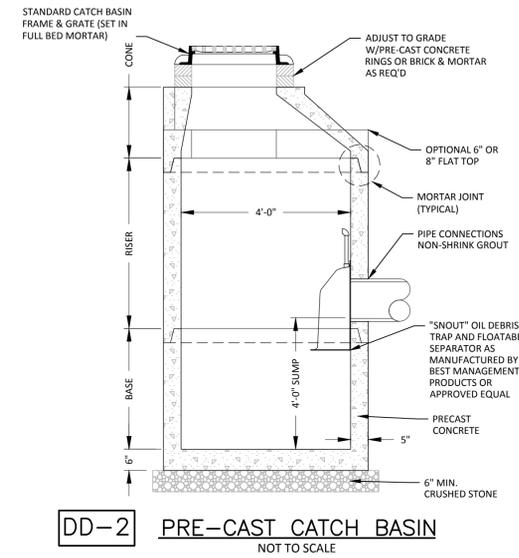
FOR REGISTRY USE ONLY



DD-4 MC-4500 TYPICAL CROSS-SECTION
NOT TO SCALE

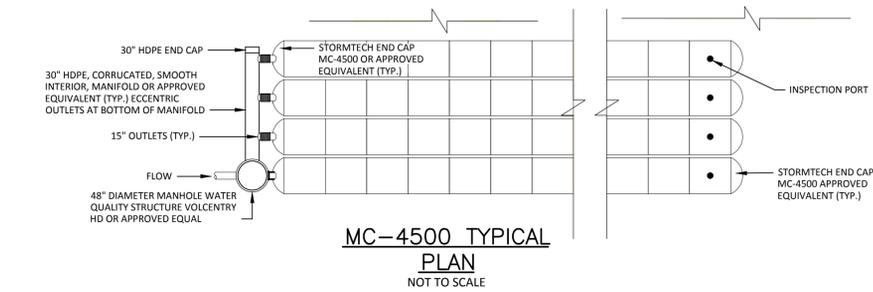


DD-1 PRE-CAST DRAIN MANHOLE
NOT TO SCALE

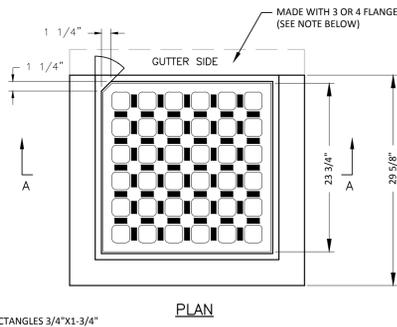


DD-2 PRE-CAST CATCH BASIN
NOT TO SCALE

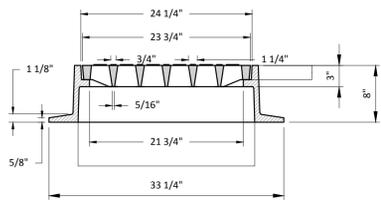
- NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
 2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
 3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."



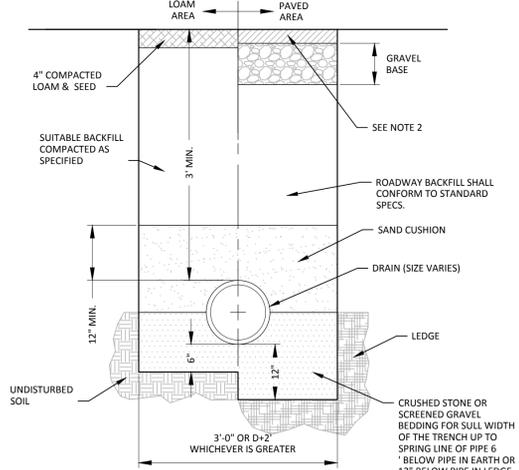
MC-4500 TYPICAL PLAN
NOT TO SCALE



- RECTANGLES 3/4"x1-3/4" RAISED 1/8" FROM COVER TOP
- 2-1/2" SQUARE OPENINGS

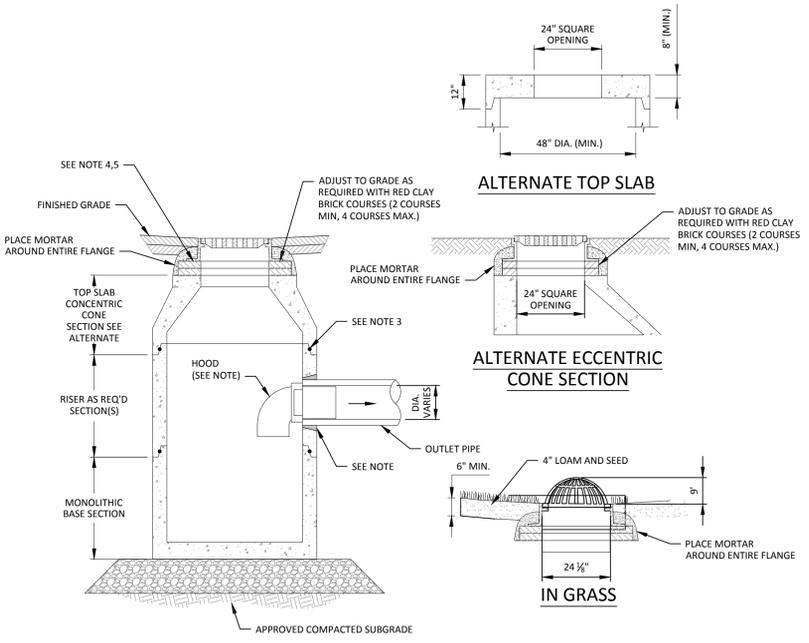


DD-7 CATCH BASIN FRAME AND GRATE DETAIL
NOT TO SCALE



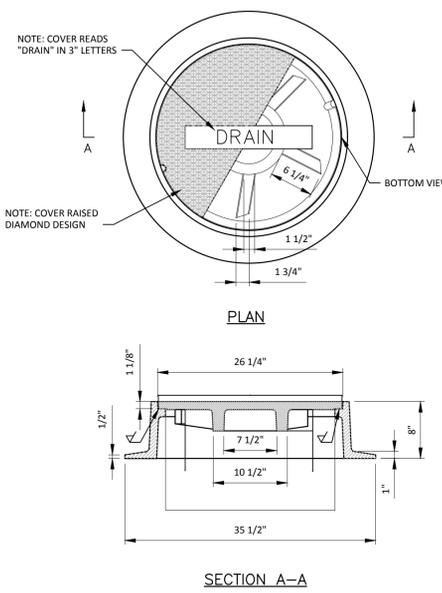
DD-8 DRAIN TRENCH
NOT TO SCALE

- NOTES:
1. ALL MATERIAL SHALL CONFORM TO CITY/TOWN OF DEPARTMENT OF PUBLIC WORKS.
 2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO CITY/TOWN SPECIFICATIONS.
 3. IN LIEU OF THE 12" GRAVEL COURSE AND 9" OF CRUSHED GRAVEL, 18" OF CRUSHED GRAVEL OR RECLAIMED STABILIZED BASE MAY BE USED AS A BASE FOR THE PAVEMENT REPAIR.
 4. MATERIAL SHALL BE REPLACED IN KIND WHENEVER POSSIBLE.
 5. A MINIMUM 2' CUTBACK IS REQUIRED AT THE TOP OF THE TRENCH WALL OVER UNDISTURBED MATERIAL.



DD-5 TYPICAL PRECAST CONCRETE CATCH BASIN WITH HOOD
NOT TO SCALE

- NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
 2. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.
 3. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."



DD-6 MANHOLE FRAME AND COVER DETAIL
NOT TO SCALE

- NOTES:
1. ALL DMH FRAME AND COVERS TO BE LEBARON FOUNDRY MODEL NO. LK110A DRAIN OR EQUAL.
 2. MANHOLE FRAME AND COVER TO BE H-20 LOAD RATED.

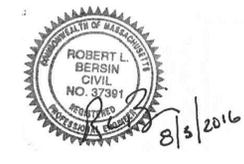
CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET
PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____



Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR: **RICHMOND GREAT POINT DEVELOPMENT LLC**

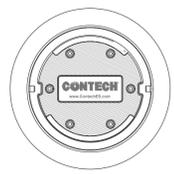
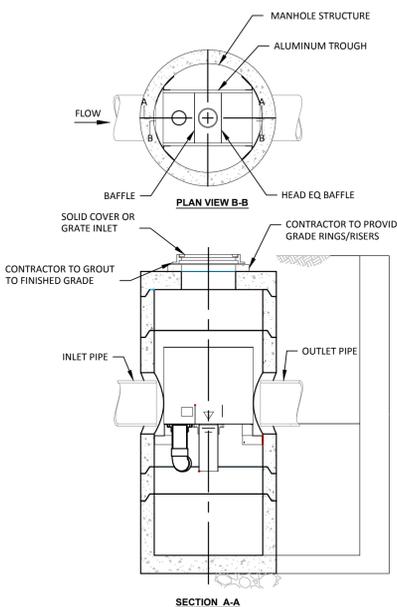
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE: **DETAIL-DRAINAGE**

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

SCALE: **NOTED**

SHEET: **20 OF 26**



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

- GENERAL NOTES**
- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
 - DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
 - FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.conteches.com
 - VORTSENTRY HS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
 - STRUCTURE SHALL MEET AASHTO H20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.

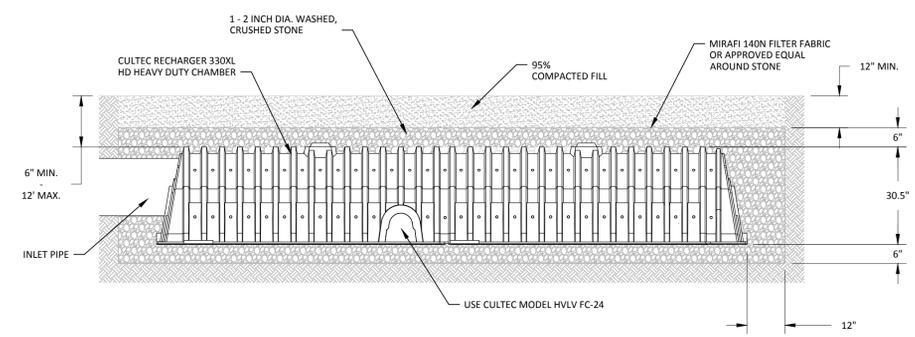
- INSTALLATION NOTES**
- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
 - CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTSENTRY HS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
 - CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
 - CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
 - CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

NOTES

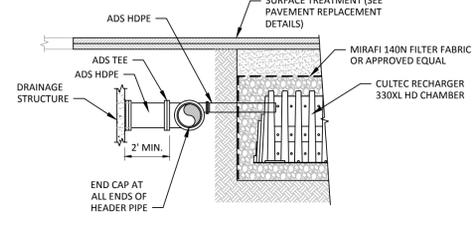
*ANY MANUFACTURER'S NAMES AND/OR MODEL NUMBERS IDENTIFIED HEREIN ARE INTENDED TO ASSIST IN ESTABLISHING A GENERAL LEVEL OF QUALITY, CONFIGURATION, FUNCTIONALITY, AND APPEARANCE REQUIRED. THIS IS NOT A PROPRIETARY SPECIFICATION AND IT SHOULD BE NOTED THAT "OR APPROVED EQUAL" APPLIES TO ALL PRODUCTS DENOTED HEREIN. IT IS UNDERSTOOD THAT ALL MANUFACTURERS WILL HAVE MINOR VARIATIONS IN CONFIGURATION, APPEARANCE, AND PRODUCT SPECIFICATION TO ENCOURAGE OPEN AND COMPETITIVE INVOLVEMENT FROM MULTIPLE MANUFACTURERS THAT ARE ABLE TO SUPPLY SIMILAR PRODUCTS.

Underground Retention / Infiltration Areas for Watershed				
No.	Watershed	Storage Area	No. Storage Chambers	Vortsenry Model
1	S1	46.67' W x 27.24' L x 6.75' H	25	HS72
2	S2	37.58' W x 43.34' L x 6.75' H	36	HS72
3	S3	37.58' W x 51.39' L x 6.75' H	44	HS84
4	S4	55.75' W x 35.29' L x 6.75' H	42	HS84
5	S5, S6	28.50' W x 43.34' L x 6.75' H	27	HS84
6	S7	46.67' W x 47.37' L x 6.75' H	50	HS84
7	S8, S9	37.58' W x 63.47' L x 6.75' H	56	HS96
8	S10, S11, S12, S13, S14	55.75' W x 51.39' L x 6.75' H	66	HS96
9	S15	46.67' W x 59.44' L x 6.75' H	65	HS84

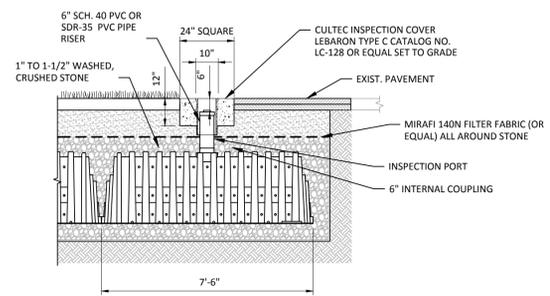
DD-14 VORTSENTRY HD STANDARD DETAIL
NOT TO SCALE



DD-9 CULTEC RECHARGER 330XL HD PROFILE
NOT TO SCALE



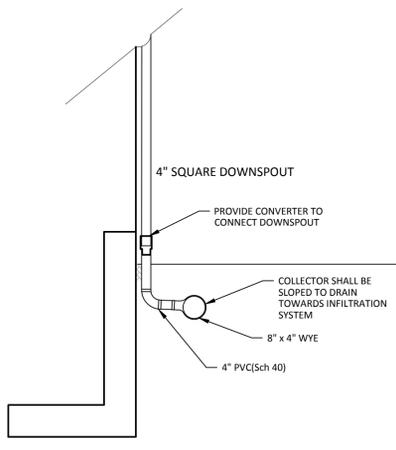
DD-10 HEADER PIPE DETAIL



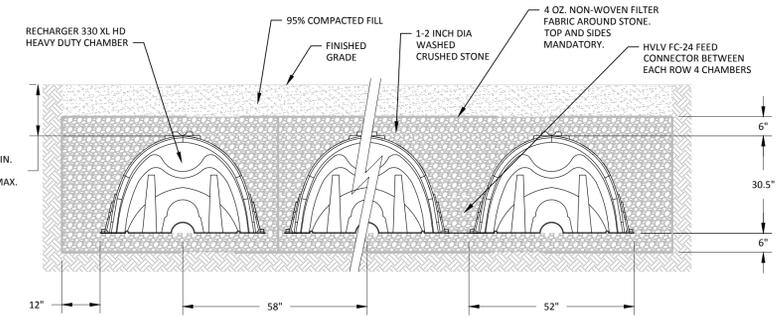
INSPECTION PORT DETAIL



CLEANOUT ACCESS COVER DETAIL
NOT TO SCALE



DD-12 BUILDING DOWNSPOUT ROOF DRAIN DETAIL
NOT TO SCALE

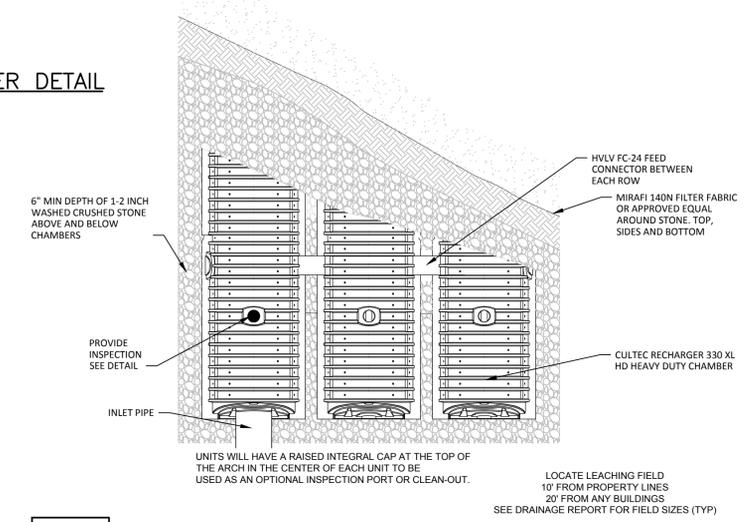


GENERAL NOTES

RECHARGER 330XL HD BY CULTEC, INC. OF BROOKFIELD, CT. STORAGE PROVIDED = 11.32 CF/FT PER DESIGN UNIT. REFER TO CULTEC, INC.'S CURRENT RECOMMENDED INSTALLATION GUIDELINES. USE RECHARGER 330XL HD HEAVY DUTY FOR TRAFFIC AND/OR H-25 APPLICATIONS.

ALL RECHARGER 330XL HD HEAVY DUTY UNITS ARE MARKED WITH A COLOR STRIPE FORMED INTO THE PART ALONG THE LENGTH OF THE CHAMBER. ALL RECHARGER 330XL HD CHAMBERS MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

DD-8 CULTEC RECHARGER 330XL HD SECTION
NOT TO SCALE



DD-11 CULTEC RECHARGER 330XL HD PLAN
NOT TO SCALE

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

_____ TOWN CLERK



APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD

FOR REGISTRY USE ONLY

Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS

NO.	DATE	COMMENT

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR:

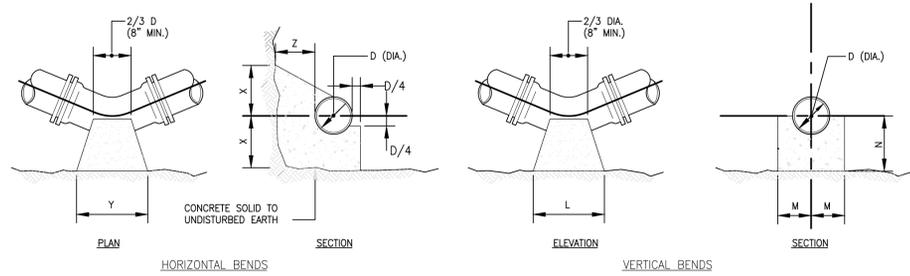
RICHMOND GREAT POINT DEVELOPMENT LLC
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAYKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE: **DETAIL-DRAINAGE**

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

SCALE: **NOTED**

SHEET: **21 OF 26**

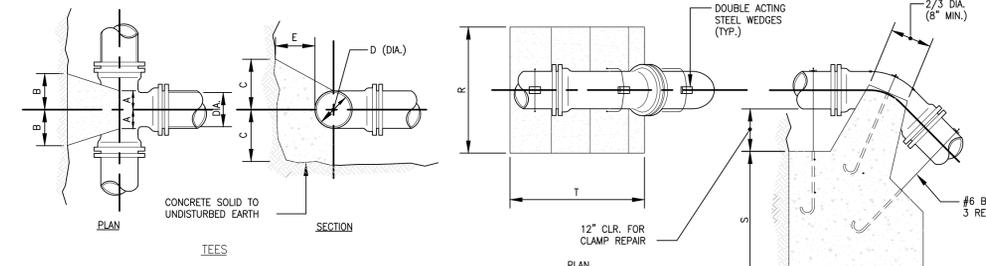


TEES		PIPE SIZE-D (DIA.)				
		6"	8"	12"	16"	20"
A	8"	10"	1'-0"	1'-3"	1'-6"	1'-6"
B	8"	10"	1'-2"	1'-4"	1'-6"	1'-6"
C	10"	1'-0"	1'-3"	1'-6"	1'-8"	1'-8"
E	8"	10"	1'-2"	1'-6"	1'-10"	1'-10"

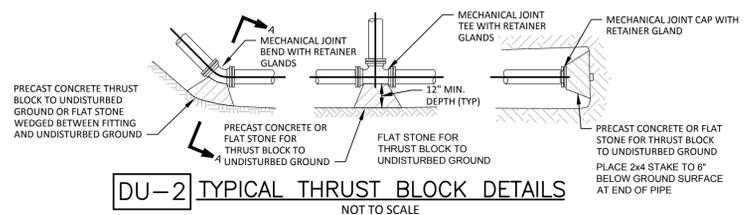
HORIZONTAL BENDS		PIPE SIZE-D (DIA.)				
		6"	8"	12"	16"	20"
1/8	X	1'-0"	1'-0"	1'-0"	1'-3"	1'-6"
	Y	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"
	Z	8"	10"	1'-2"	1'-4"	1'-6"
1/16	X	1'-0"	1'-0"	1'-0"	1'-3"	1'-6"
	Y	1'-0"	1'-4"	1'-6"	1'-9"	2'-6"
	Z	8"	10"	1'-2"	1'-4"	1'-6"
1/32	X	1'-0"	1'-0"	1'-0"	1'-2"	1'-4"
	Y	1'-0"	1'-0"	1'-2"	1'-4"	1'-6"
	Z	8"	10"	1'-2"	1'-4"	1'-6"

VERTICAL BENDS		PIPE SIZE-D (DIA.)				
		6"	8"	12"	16"	20"
1/8	L	1'-3"	1'-8"	2'-6"	3'-6"	4'-8"
	M	7"	8"	11"	1'-4"	1'-6"
	N	7"	8"	11"	1'-4"	1'-6"
	L	9"	1'-0"	1'-9"	2'-6"	3'-0"
1/16	M	7"	7"	10"	1'-0"	1'-2"
	N	7"	7"	8"	10"	1'-0"
	L	6"	8"	1'-0"	1'-4"	1'-9"
	T	2'-6"	3'-4"	4'-0"	6'-0"	8'-6"
1/32	R	1'-4"	2'-0"	3'-0"	3'-8"	4'-3"
	S	1'-3"	1'-9"	2'-0"	2'-4"	2'-6"
	T	2'-0"	2'-6"	3'-0"	4'-6"	5'-9"
	T	2'-6"	3'-4"	4'-0"	6'-0"	8'-6"

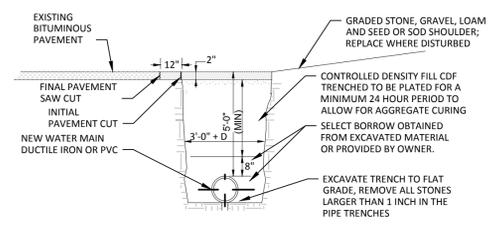
ANCHORAGES		PIPE SIZE-D (DIA.)				
		6"	8"	12"	16"	20"
1/8	R	2'-6"	3'-0"	4'-6"	5'-4"	6'-0"
	S	2'-6"	2'-9"	3'-6"	2'-6"	5'-6"
	T	3'-0"	4'-0"	4'-9"	7'-0"	9'-6"
	R	2'-0"	2'-8"	4'-0"	4'-6"	5'-0"
1/16	S	1'-9"	2'-3"	2'-6"	3'-2"	3'-8"
	T	2'-6"	3'-4"	4'-0"	6'-0"	8'-6"
	R	1'-4"	2'-0"	3'-0"	3'-8"	4'-3"
	S	1'-3"	1'-9"	2'-0"	2'-4"	2'-6"
1/32	T	2'-0"	2'-6"	3'-0"	4'-6"	5'-9"



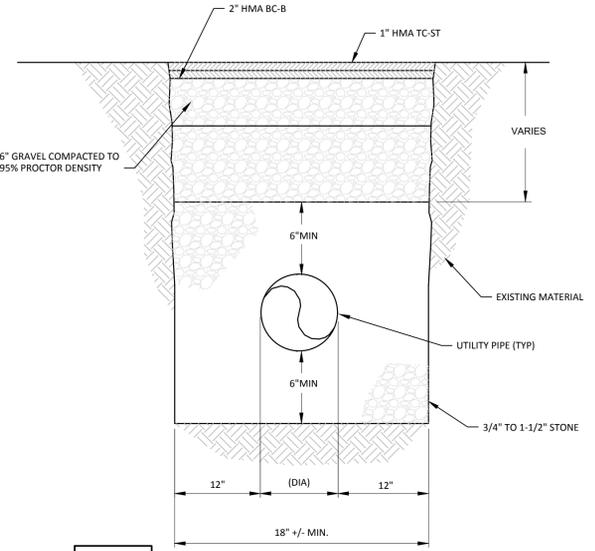
- NOTES:
- ALL CONCRETE SHALL BE CL. B (AE) CONCRETE AND COMPLY WITH STANDARD SPECIFICATIONS.
 - CONCRETE THRUST BLOCKS SHALL BEAR AGAINST UNDISTURBED EARTH. IN AREAS WHERE BEARING SOILS HAVE BEEN DISTURBED, RESTRAINED JOINTS SHALL BE USED.
 - ALL FORCE MAIN BENDS, TEES, MAN TAPS, AND END CAPS SHALL REQUIRE A CONCRETE THRUST BLOCK.



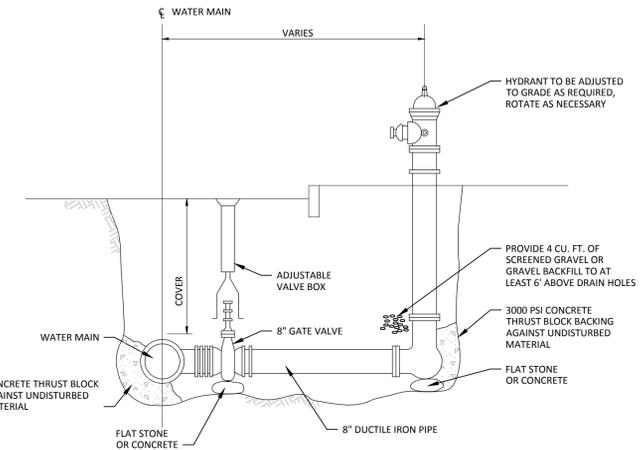
DU-2 TYPICAL THRUST BLOCK DETAILS
NOT TO SCALE



DU-1 TYPICAL TRENCH IN ROADWAY SURFACE
(RIGHT SIDE INSTALLATION LEFT SIDE SIMILAR)
NOT TO SCALE

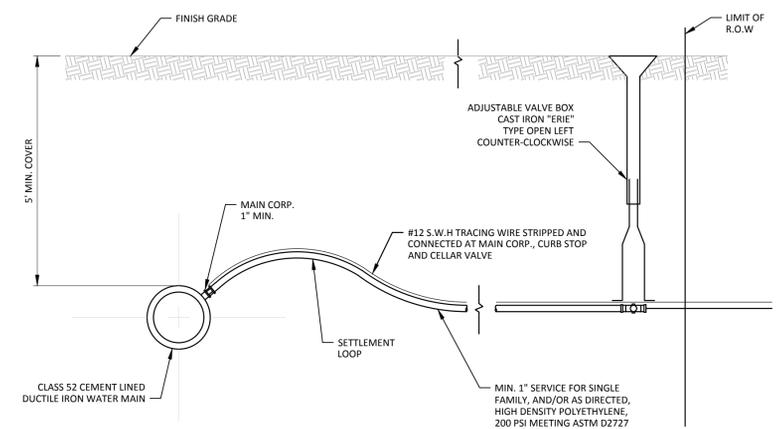


DU-3 UTILITY TRENCH SECTION
NOT TO SCALE
COORDINATE ALL UTILITY TRENCHING WITH APPROPRIATE UTILITY.

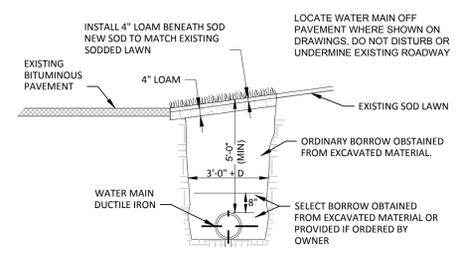


- NOTES:
- HYDRANTS ARE TO BE INSTALLED WITHIN THE ROADWAY LAYOUT
 - FOR HYDRANTS INSTALLED AT DEAD END OF WATER MAINS, INSTALL VALVE WITH RESTRAINED JOINTS AND ONE FULL LENGTH OF PIPE BETWEEN VALVE AND HYDRANT WITH RESTRAINED JOINTS
 - ALL HYDRANT BRANCH PIPING TO BE 8\"/>

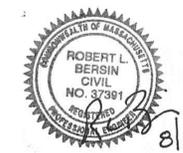
DU-4 FIRE HYDRANT DETAIL
NOT TO SCALE



DU-5 TYPICAL PERMANENT SERVICE CONNECTION DETAIL
NOT TO SCALE



DU-6 TYPICAL TRENCH IN SHOULDER (SOD)
(SHOWN RIGHT SIDE INSTALLATION LEFT SIDE SIMILAR)
NOT TO SCALE



APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL HAS BEEN RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

TOWN OF NANTUCKET PLANNING BOARD

Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.

Dimensions are as indicated.

Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.

It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR: **RICHMOND GREAT POINT DEVELOPMENT LLC**
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAYKIM LANE
NANTUCKET, MA 02554

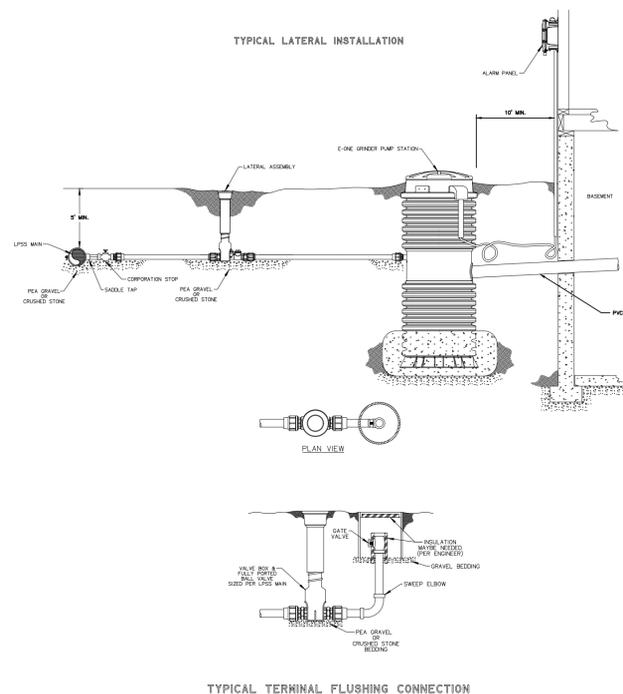
DRAWING TITLE: **DETAIL-UTILITIES**

CAD TECH: JDP	CHECKED BY: TRB
ENGINEER: BLB	DATE: 08/03/2016

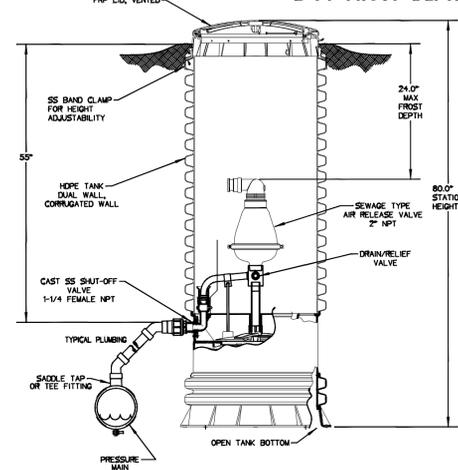
C-21

SCALE: **NOTED**

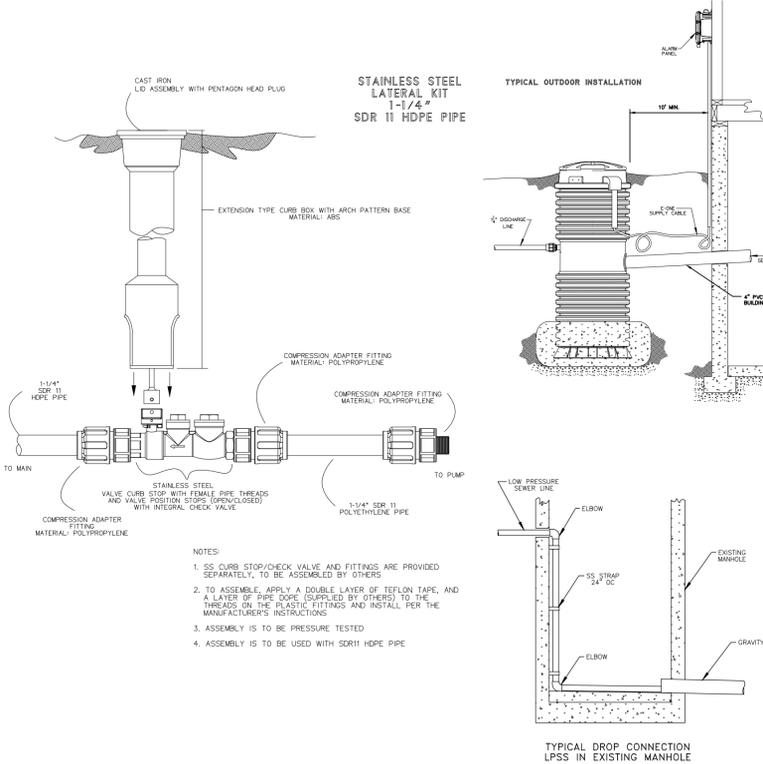
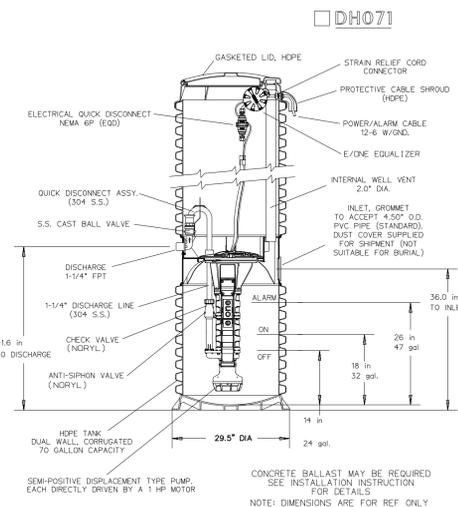
SHEET: **22 OF 26**



**AIR RELEASE STATION
2 FT FROST DEPTH**



- DH071**
- SIMPLEX PUMP CHAMBER ASSEMBLY FOR ALL SINGLE FAMILY LOTS
 - DUPLEX PUMP CHAMBER ASSEMBLY FOR NON GRAVITY MULTI-FAMILY UNITS.

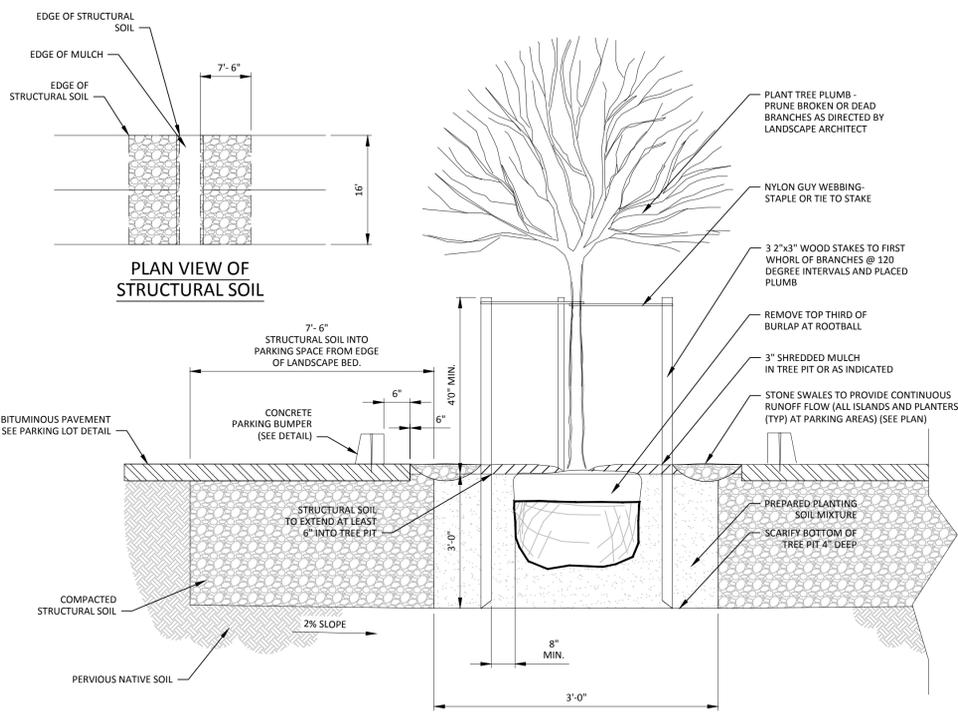


**DM-5 E ONE SEWER SYSTEM DETAILS
NOT TO SCALE**

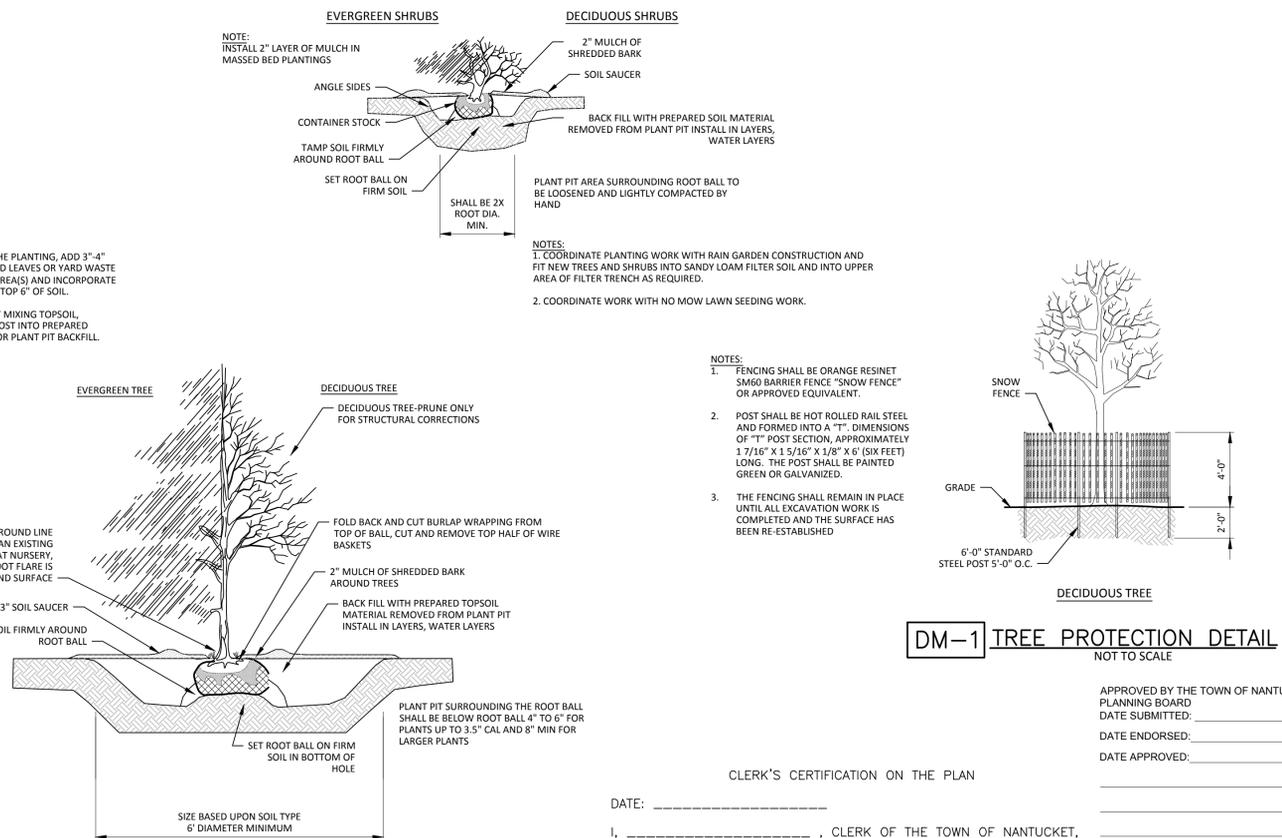
Green Seal Environmental, Inc.
114 State Road, Building B
Sagamore Beach, MA 02562
Tel: (508) 888-6034
Fax: (508) 888-1506
www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT



- NOTES:**
- BEFORE STARTING THE PLANTING, ADD 3"-4" OF WELL COMPOSTED LEAVES OR YARD WASTE ACROSS PLANTING AREA(S) AND INCORPORATE COMPOST INTO THE TOP 6" OF SOIL.
 - EXCAVATE PLANT PIT MIXING TOPSOIL, SUBSOIL AND COMPOST INTO PREPARED TOPSOIL AND USE FOR PLANT PIT BACKFILL.



- NOTES:**
- COORDINATE PLANTING WORK WITH BAIN GARDEN CONSTRUCTION AND FIT NEW TREES AND SHRUBS INTO SANDY LOAM FILTER SOIL AND INTO UPPER AREA OF FILTER TRENCH AS REQUIRED.
 - COORDINATE WORK WITH NO MOW LAWN SEEDING WORK.

- NOTES:**
- FENCING SHALL BE ORANGE RESINET SMOG BARRIER FENCE "SNOW FENCE" OR APPROVED EQUIVALENT.
 - POST SHALL BE HOT ROLLED RAIL STEEL AND FORMED INTO A "T" DIMENSIONS OF "T" POST SECTION, APPROXIMATELY 1 7/16" X 1 5/16" X 1/8" X 6' (SIX FEET) LONG. THE POST SHALL BE PAINTED GREEN OR GALVANIZED.
 - THE FENCING SHALL REMAIN IN PLACE UNTIL ALL EXCAVATION WORK IS COMPLETED AND THE SURFACE HAS BEEN RE-ESTABLISHED.

CLERK'S CERTIFICATION ON THE PLAN

DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____

TOWN OF NANTUCKET PLANNING BOARD

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR:

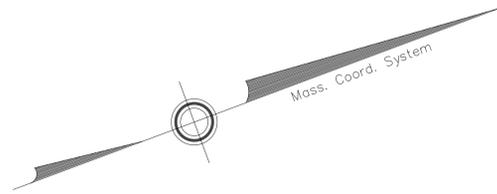
RICHMOND GREAT POINT DEVELOPMENT LLC
RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE: **DETAIL-LANSCAPE**

CAD TECH: **JDP** CHECKED BY: **TRB**

ENGINEER: **BLB** DATE: **08/03/2016**

SCALE: **NOTED**
SHEET: **23 OF 26**

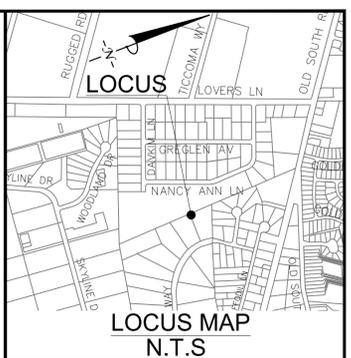


Existing Contour
 Test Pit Location 7/14/2016



CLERK'S CERTIFICATION ON THE PLAN
 DATE: 8/5/2016
 I, ROBERT L. BERSIN, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.
 TOWN CLERK

APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
 DATE SUBMITTED: _____
 DATE ENDORSED: _____
 DATE APPROVED: _____
 TOWN OF NANTUCKET PLANNING BOARD



Green Seal Environmental, Inc.
 114 State Road, Building B
 Sagamore Beach, MA 02562
 Tel: (508) 888-6034
 Fax: (508) 888-1506
 www.gseenv.com

These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution.
 Dimensions are as indicated.
 Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
 It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

REVISIONS		
NO.	DATE	COMMENT

PURPOSE: **DEFINITIVE SUBDIVISION**

LOCUS: **NANCY ANN LANE**

PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
 20 DAVKIM LANE
 NANTUCKET, MA 02554

DRAWING TITLE:
TEST PIT LOCATION

CAD TECH: JDP	CHECKED BY: TRB
------------------	--------------------

ENGINEER: BLB	DATE:
------------------	-------

C-23	SCALE: NOTED
	SHEET: 24 OF 26

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 1

DEPTH FROM SURFACE FEET INCHES TOP EL.=34.0	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-8"	FILL	MED-C SAND	7.5YR 7/8		SILTY
8-18"	C1	COARSE SAND	5YR 5/8		20% GRAVEL
18-32"	C2	COARSE SAND	10YR 8/3	PT	10% GRAVEL
32-64"	C3	COARSE SAND	10YR 7/4		CLEAN SAND
64-120"	C4	COARSE SAND	10YR8/3		CLEAN SAND

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 2

DEPTH FROM SURFACE FEET INCHES TOP EL.=11.0	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-16"	C1	LOAMY SAND	7.5YR 4/2	PT	WET
GROUND WATER FOUND @ 40"					
16-66"	C2	COARSE SAND	10YR6/3		10% GRAVEL

ESTIMATED SEASONAL HIGH GROUND WATER ELEV 7.2

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 3

DEPTH FROM SURFACE FEET INCHES TOP EL.=10.6	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-30"	C1	COARSE SAND	5YR6/8	PT	
GROUND WATER FOUND @ 35"					
30-66"	C2	COARSE SAND	10YR8/1		5% GRAVEL

ESTIMATED SEASONAL HIGH GROUND WATER ELEV 6.9

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 4

DEPTH FROM SURFACE FEET INCHES TOP EL.=31.2	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-4"	A	SANDY LOAM	10YR5/1	PT	RUNOFF FROM ADJACENT LOAM PILE
4-120"	C	MEDIUM/COARSE SAND IN LAYERS	2.5Y7/2		5% GRAVEL

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 5

DEPTH FROM SURFACE FEET INCHES TOP EL.=37.4	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-14"	C1	LOAMY SAND			MIXED STONE DUST / CRUSHED STONE
14-120"	C2	LOAMY SAND			MIXED FILL CRUSHED STONE

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 6

DEPTH FROM SURFACE FEET INCHES TOP EL.=40.2	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-12"	A	SANDY LOAM	2.5Y2.5/1		DARK RICH LOAM
12-20"	B	LOAMY SAND	7.5YR6/8		ORANGE
20-120"	C1	MEDIUM SAND	10YR8/5		2% GRAVEL BRIGHT YELLOW

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 7

DEPTH FROM SURFACE FEET INCHES TOP EL.=42.2	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-12"	A	SANDY LOAM	10YR3/3		MEDIUM BROWN LOAM
12-26"	B	LOAMY SAND	10YR6/6		YELLOW/BROWN
26-120"	C1	MEDIUM/COARSE SAND	10YR8/4		CLEAN SAND PALE TAN

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 8

DEPTH FROM SURFACE FEET INCHES TOP EL.=45.9	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-10"	A	SANDY LOAM	2.5Y2.5/3		DARK RICH LOAM
10-20"	B	LOAMY SAND	7.5YR7/8		ORANGE
20-120"	C1	COARSE SAND	10YR8/3		LOOSE SAND & GRAVEL TAN/LIGHT BROWN

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 9

DEPTH FROM SURFACE FEET INCHES TOP EL.=46.5	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-12"	A	SANDY LOAM	2.5Y2.4/1		DARK BROWN LOAM
12-21"	B	LOAMY SAND	10YR6/8		YELLOW/ORANGE
21-38"	C1	FINE SAND	2.5Y8/1	PT	FINE WHITE SAND
38-120"	C2	MEDIUM/COARSE SAND	10YR8/1		CLEAN WHITE SAND

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 10

DEPTH FROM SURFACE FEET INCHES TOP EL.=49.8	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-6"	A	SANDY LOAM	2.5Y2.4/2		
6-12"	B	LOAMY SAND	2.5Y2.7/6		
12-32"	C1	CLAY	5G7/1		
32-60"	C2	SANDY CLAY LOAM	10YR7/8		LOOKS LIKE FILL MIXED "A" & CLAY
60-120"	C3	MEDIUM SAND	10YR8/1		CLEAN WHITE SAND

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 11

DEPTH FROM SURFACE FEET INCHES TOP EL.=48.2	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-12"	A	LOAMY SAND	10YR2/1		DARK RICH LOAM
12-24"	B	SANDY SAND	10YR7/8		YELLOW/ORANGE
24-48"	C1	LOAMY SAND	2.5Y7/6	PT	YELLOW SAND SOME SILT
48-120"	C2	MEDIUM/COARSE SAND	10YR8/2		CLEAN WHITE SAND

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+

TEST PIT INFORMATION

DEEP OBSERVATION HOLE LOG 12

DEPTH FROM SURFACE FEET INCHES TOP EL.=44.8	SOIL HORIZON	SOIL TEXTURE (USDA)	SOIL COLOR (MUNSELL)	SOIL MOTTLING	OTHER (STRUCTURE, STONES, BOULDERS CONSISTENCY, % GRAVEL)
0-10"	A	SANDY LOAM	7.5YR3/3		DARK BROWN LOAM
10-28"	B	LOAMY SAND	7.5YR6/8		YELLOW/ORANGE
28-51"	C1	LOAMY SAND	7.5YR7/4	PT	TAN/LIGHT BROWN SAND SOME SILT
51-120"	C2	COARSE SAND	10YR8/2		LIGHT TAN CLEAN SAND

ESTIMATED SEASONAL HIGH GROUND WATER = 6.9+



These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Violators will be subject to prosecution. Dimensions are as indicated. Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation. It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

NO.	DATE	COMMENT

CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.
TOWN CLERK

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:
RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAVKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE:
SOIL LOGS

CAD TECH: JDP
CHECKED BY: TRB

ENGINEER: BLB
DATE:

SCALE: NOTED
SHEET: 25 OF 26

SOIL EXAMINATIONS PERFORMED BY: TIM BENNETT, SE2748 ALL PERCOLATION RATES < 2

CLERK'S CERTIFICATION ON THE PLAN
DATE: _____
I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.
TOWN CLERK



APPROVED BY THE TOWN OF NANTUCKET PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROVED: _____
TOWN OF NANTUCKET PLANNING BOARD

GENERAL CONSTRUCTION NOTES

- ALL SITE PREPARATION NECESSARY TO COMPLETE THIS PROJECT ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- THE CONTRACTOR SHALL COORDINATE ALL NECESSARY POLICE DETAILS WITH THE LOCAL POLICE DEPARTMENT.
- THE CONTRACTOR SHALL MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL REQUIRED CONSTRUCTION PERMITS. ALL FEES INCLUDING POLICE DETAILS AND POSTING OF BONDS, ARE TO BE PAID BY THE CONTRACTOR, AND COORDINATED WITH THE OWNER AND THE ENGINEER.
- ALL EXISTING CONDITIONS SHOWN SHALL BE CONSIDERED APPROXIMATE AND ARE BASED ON THE BEST INFORMATION AVAILABLE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED CONDITIONS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLING ANY WORK.
- THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF PREVIOUS OWNERS, VARIOUS UTILITY COMPANIES, AND WHEREVER POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS GUARANTEED AS BEING EXACT OR COMPLETE. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANIES, ANY GOVERNING PERMITTING AUTHORITIES, AND "DISSAFE" AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RESOLVE CONFLICTS BETWEEN THE PROPOSED UTILITIES AND FIELD-LOCATED UTILITIES AND SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED, INCOMPLETELY OR INACCURATELY SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ACCURATE RECORDS OF THE LOCATION AND ELEVATION OF ALL WORK INSTALLED AND EXISTING UTILITIES FOUND DURING CONSTRUCTION FOR THE PREPARATION OF THE AS-BUILT PLAN.
- THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EXISTING UTILITIES IN WORKING ORDER AND FREE FROM DAMAGE DURING THE ENTIRE DURATION OF THE PROJECT. ALL COSTS RELATED TO THE REPAIR OF UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER.
- THE CONTRACTOR SHALL UTILIZE ALL PRECAUTIONS AND MEASURES TO ENSURE THE SAFETY OF THE PUBLIC. ALL PERSONAL AND PROPERTY DURING CONSTRUCTION IN ACCORDANCE WITH OSHA STANDARDS, INCLUDING BARRICADES, SAFETY LIGHTING, CONES, POLICE DETAIL AND/OR FLAGMEN AS DETERMINED NECESSARY BY THE ENGINEER AND/OR OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF POLICE DETAIL AND FOR COORDINATING WITH THE LOCAL OR STATE POLICE DEPARTMENT FOR ALL REQUIRED POLICE DETAIL.
- ALL TRENCHING WORK WITHIN A PUBLIC OR PRIVATE ROADWAY SHALL BE COORDINATED WITH THE OWNER AND/OR PROPER LOCAL & STATE AGENCIES. TRENCH SAFETY AND RELATED PERMITS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THIS WORK MAY BE REQUIRED TO TAKE PLACE OUTSIDE OF NORMAL HOURS OF OPERATION FOR THE FACILITY.
- ALL TRENCH WORK WITHIN EXISTING PAVEMENT SHALL BE NEATLY SAWCUT PER THE APPLICABLE DETAILS. TRENCH WORK BACKFILL SHALL BE PLACED AND COMPACTED IN 4-INCH LIFTS OR AS OTHERWISE INDICATED ON PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY SETTLING DUE TO INADEQUATE COMPACTION AS DETERMINED BY THE ENGINEER WITHIN THE 36 MONTH WARRANTY PERIOD.
- THE CONTRACTOR SHALL MAKE ALL CONNECTION ARRANGEMENTS WITH UTILITY COMPANIES, AS NECESSARY.
- ALL IMPORTED MATERIAL SHALL BE CLEAN AND FREE OF ANY HAZARDOUS WASTE OR OTHER CHEMICAL CONTAMINATION. NO MATERIAL WILL BE ACCEPTED FROM AN EXISTING OR FORMER 21E SITE AS DEFINED BY THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.0000.
- SITE LAYOUT SURVEY REQUIRED FOR CONSTRUCTION WILL BE PROVIDED BY THE CONTRACTOR AND SHALL BE CONDUCTED BY A MASSACHUSETTS REGISTERED PROFESSIONAL LAND SURVEYOR. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE SURVEYOR FOR ALL SITE SURVEY WORK. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING AN AS-BUILT PLAN OF THE SITE CONDUCTED BY REGISTERED PROFESSIONAL LAND SURVEYOR AND APPROVED BY THE ENGINEER.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL HORIZONTAL AND VERTICAL CONTROL POINTS DURING CONSTRUCTION INCLUDING BENCHMARK LOCATIONS AND ELEVATIONS AT CRITICAL AREAS. THE LOCATION OF ALL CONTROL POINTS AND BENCHMARKS SHALL BE COORDINATED WITH THE ENGINEER.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL GRADE STAKES AND MONUMENTATION. GRADE STAKES SHALL REMAIN IN PLACE UNTIL A FINAL INSPECTION OF THE SITE HAS BEEN COMPLETED BY THE ENGINEER. ANY RE-STAKING OF PREVIOUSLY SURVEYED SITE FEATURES SHALL BE THE RESPONSIBILITY (INCLUDING COSTS) OF THE CONTRACTOR.
- UNLESS OTHERWISE SPECIFIED ON THE PLANS AND DETAILS/SPECIFICATIONS, ALL SITE CONSTRUCTION MATERIALS AND METHODOLOGIES ARE TO CONFORM TO THE MOST RECENT VERSION OF THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSACHUSETTS HIGHWAY DEPARTMENT) STANDARD SPECIFICATIONS (THE MASSACHUSETTS HIGHWAY DEPARTMENT 1998 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE 2002 SUPPLEMENTAL SPECIFICATIONS, AND THE 2005 STANDARD SPECIAL PROVISIONS).
- CONSTRUCTION AND/OR DEMOLITION SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING NOISE, VIBRATION, DUST, SEDIMENTATION CONTAINMENT, HAZARDOUS WASTES AND TRENCH WORK.
- SOLID WASTES AND/OR CONSTRUCTION OR DEMOLITION DEBRIS SHALL BE COLLECTED AND STORED IN A SECURED DUMPSTER. THE DUMPSTER SHALL MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS.
- THE CONTRACTOR SHALL RESTORE ALL SITE SURFACES OFF SCOPE EQUAL TO THEIR ORIGINAL CONDITION AFTER CONSTRUCTION IS COMPLETE. AREAS NOT DISTURBED BY CONSTRUCTION SHALL BE LEFT NATURAL. THE CONTRACTOR SHALL TAKE CARE TO PREVENT DAMAGE TO SHRUBS, TREES, OTHER LANDSCAPING AND/OR NATURAL FEATURES. IF THE PLANS FAIL TO IDENTIFY ALL LANDSCAPE FEATURES, EXISTING CONDITIONS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORK.
- UNPAVED AREAS DISTURBED BY THE WORK SHALL HAVE A MINIMUM OF 6-INCHES OF LOAM AND HYDROSEED INSTALLED AS SHOWN ON THE PLAN AND/OR DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR WATERING ANY LOAM AND SEEDS AREAS UNTIL GROWTH IS ESTABLISHED AND APPROVED BY THE ENGINEER AND/OR OWNER.
- ALL PROPOSED STRUCTURES AND COMPONENTS SHALL BE DESIGNED BY THEIR MANUFACTURERS TO WITHSTAND AASHTO H-20 LOADING. PRECAST CONCRETE SHALL HAVE A MINIMUM 28-DAY STRENGTH OF 4,000 PSI UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
- THE CONTRACTOR SHALL PROVIDE A UNIT PRICE COST IN CUBIC YARD MEASURE FOR LEDGE AND/OR BOULDER REMOVAL. LEDGE AND/OR BOULDERS LESS THAN 1 CUBIC YARD IN SIZE BASED ON THE AVERAGE DIMENSIONS WILL NOT BE CONSIDERED PAYABLE ROCK. UNIT PRICE SHALL BE GIVEN FOR BOTH ON AND OFF SITE DISPOSAL. COST OF REPLACEMENT MATERIAL SHALL BE INCLUDED IF ADDITIONAL FILL MATERIAL IS REQUIRED.
- DEVIATION OR ALTERATION OF THE PROPOSED WORK IS TO BE VERIFIED BY THE ENGINEER AND OWNER PRIOR TO CONDUCTING THE WORK.
- AT THE END OF CONSTRUCTION, THE CONTRACTOR SHALL REMOVE ALL CONSTRUCTION DEBRIS AND SURPLUS MATERIALS FROM THE SITE. A THOROUGH INSPECTION OF THE WORK SITE AND PERIMETER IS TO BE MADE AND ALL DISCARDED MATERIALS AND WIND BLOWN OR WATER CARRIED DEBRIS, SHALL BE COLLECTED, AND REMOVED FROM THE SITE.

STORMWATER FACILITY OPERATION & MAINTENANCE:

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE OF ALL EROSION CONTROL AND STORMWATER MANAGEMENT FACILITIES UNTIL THE PROJECTS IS DEEMED AS COMPLETE BY THE OWNER AND ENGINEER.
- THE CONTRACTOR SHALL INSPECT AND CLEAR ALL INLETS, MANHOLES, INFILTRATION BASINS AND OTHER STRUCTURES OF SEDIMENT AND DEBRIS PRIOR TO THE OWNER'S ACCEPTANCE.
- THE CONTRACTOR SHALL PROPERLY DISPOSE OF ALL SEDIMENT AND DEBRIS IN A PRE-APPROVED LOCATION.
- THE CONTRACTOR SHALL REFER TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) FOR INFORMATION REGARDING STORMWATER FACILITY OPERATION AND MAINTENANCE REQUIREMENTS. THE CONTRACTOR SHALL MAINTAIN A WORKING COPY ON SITE AT ALL TIMES.
- THE CONTRACTOR SHALL INSPECT ALL STORMWATER FACILITIES AFTER EVERY MAJOR RAINFALL EVENT FOR THE ENTIRE DURATION OF THE CONSTRUCTION PROJECT AND THE FIRST 3-MONTHS AFTER COMPLETION TO MONITOR SYSTEM OPERATION.
- SPECIFIC ANNUAL MAINTENANCE SHALL BE AS FOLLOWS:
 - DRAINAGE STRUCTURES (INLETS, MANHOLES & CATCHBASINS):** ALL DRAINAGE STRUCTURES SHALL BE INSPECTED ANNUALLY TO MONITOR FOR PROPER OPERATION, COLLECTION OF LITTER OR DEBRIS, AND STRUCTURAL DETERIORATION. THE BASINS SHALL BE CLEANED OF SEDIMENT (INCLUDING SUMP) AS NECESSARY, AND REPAIRED WHEN REQUIRED.
 - SWALES:** GENERAL INSPECTION OF THE SWALE SHALL BE CONDUCTED ANNUALLY AND AFTER MAJOR STORM EVENTS. THE WORK CONSISTS OF REMOVAL OF ANY TRASH AND/OR DEBRIS FROM THE BOTTOM OF THE SWALE, AND REMOVAL OF SEDIMENTATION IF ACCUMULATION IS GREATER THAN OR EQUAL TO 3-INCHES. SEDIMENT SHALL BE PROPERLY DISPOSED OF OFF-SITE IN A PRE-APPROVED LOCATION.
 - ROUTINE MAINTENANCE:** OTHER ROUTINE MAINTENANCE SHALL INCLUDE REMOVAL OF TRASH AND DEBRIS FROM PAVED AND PERIMETER AREAS, AND ANNUAL STREET AND PARKING LOT SWEEPING AFTER THE SPRING THAW TO AVOID EXCESSIVE ACCUMULATION OF SEDIMENT IN THE DRAINAGE SYSTEM. THE PIPES DRAINING THE PROJECT WILL BE INSPECTED ANNUALLY FOR PROPER FLOW.

BASIC CONSTRUCTION SEQUENCE

- SURVEY AND DELINEATE THE PROPOSED LIMIT OF DISTURBANCE AND LIMIT OF SEDIMENTATION BARRIERS.
- STAKE OUT THE LOCATIONS FOR SEDIMENTATION BARRIERS (HAYBALES, SILT FENCE, ETC.) AND INSTALL ACCORDING TO THE PLANS. IN NO CASE IS THE LIMIT OF WORK TO EXTEND BEYOND THE SEDIMENTATION BARRIERS/LIMIT OF DISTURBANCE AS SHOWN ON THE PROJECT PLANS AS APPROVED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP).
- INSTALL TEMPORARY CONSTRUCTION ENTRANCES ONLY IN LOCATIONS INDICATED ON PLANS. NO OTHER ENTRANCES SHALL BE USED TO GAIN ACCESS TO THE SITE BY ANY CONSTRUCTION OR DELIVERY VEHICLES.
- BEGIN NECESSARY CLEARING AND DEMOLITION WORK.
- SURVEY AND STAKE OUT CLEARING LIMITS AND ROADWAY/ACCESS DRIVE CENTERLINE.
- EXCAVATE AND ROUGH GRADE THE PROPOSED DRAINAGE BASINS AND ANY ADDITIONAL TEMPORARY BASINS NECESSARY TO CONTROL SITE RUNOFF AND SEDIMENTS. PERMANENT DRAINAGE BASINS SHALL BE TEMPORARILY SEEDED. PERMANENT DRAINAGE BASIN SEEDING AND PLANTING SHALL BE COMPLETED AFTER THE CONTRIBUTING AREA TO THE BASIN HAS REACHED A MINIMUM OF 80% STABILIZATION AND IS NO LONGER REQUIRED TO BE USED AS A CONSTRUCTION SEDIMENTATION BASIN.
- BEGIN CLEARING AND GRUBBING IN AREA OF ROADWAYS/DRIVES AND DRAINAGE BASINS. TOPSOIL IS TO BE STRIPPED FROM THE AREA OF THE PROPOSED ROADWAYS AND DRAINAGE BASINS AND STOCKPILED IN APPROVED LOCATIONS. TOPSOIL STOCKPILES ARE TO BE PROTECTED BY A SEDIMENT BARRIER.
- INSTALL TEMPORARY CONVEYANCE DEVICES (SWALES, CHECK DAMS, PIPES, ETC.) AS NECESSARY TO CONVEY RUNOFF TO TREATMENT AREAS.
- BEGIN ROUGH GRADING AREAS FOR ROADS AND PARKING. BRING ROUGH GRADING TO PROPER ELEVATIONS AS SOON AS PRACTICABLE. WORK SHALL PROGRESS DILIGENTLY TO MINIMIZE TIME SOILS ARE UN-STABILIZED.
- BEGIN UTILITY CONSTRUCTION. CONTRACTOR SHALL BE FREE TO INSTALL UTILITIES IN ANY ORDER HE/SHE CHOOSES. ANY EROSION CONTROL DEVICE DISTURBED DURING THE UNDERGROUND UTILITY CONSTRUCTION SHALL BE IMMEDIATELY REPAIRED OR REPLACED IN KIND AND STABILIZED. MODIFY TEMPORARY CONVEYANCE DEVICES AS NECESSARY TO CONVEY RUNOFF TO TREATMENT AREAS.
- INSTALL DRAINAGE PIPES, DRAINAGE MANHOLES AND CATCH BASINS, AND UNDERGROUND DRAINAGE STRUCTURES. WORK SHALL BEGIN AT THE DRAINAGE BASINS AND PROGRESS UP-GRADE. THE DRAINAGE BASIN(S) AND DRAINAGE NETWORK ARE TO BE PROTECTED FROM SEDIMENTATION WITH SILT FENCE AND STRAWBALES UNTIL ALL UN-STABILIZED AREAS ARE STABILIZED WITH STONE SUB-BASE OR VEGETATION. INSTALL SEDIMENT BARRIERS AT ALL POINTS OF ENTRY INTO THE DRAINAGE NETWORK. PARTICULAR CARE SHALL BE TAKEN TO PROTECT THE UNDERGROUND DRAINAGE BASINS FROM SEDIMENT.
- PERMANENTLY SEED ALL DISTURBED AREAS OUTSIDE OF THE AREA TO BE PAVED.
- ONCE ALL UNDERGROUND UTILITIES HAVE BEEN CONSTRUCTED, PLACE COMPACTED GRADE FOUNDATION AND ROUGH GRADE THE ROADWAYS/PARKING AREAS IN ACCORDANCE WITH THE SITE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS AS SOON AS POSSIBLE.
- BEGIN ROAD AND PARKING CONSTRUCTION PER SITE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS. ROADS AND PARKING AREAS ARE NOT TO BE PAVED UNTIL THE ENTIRE PERMANENT DRAINAGE SYSTEM HAS BEEN INSTALLED AND ALL PIPE CONNECTIONS COMPLETE.
- FINISH PERMANENT STABILIZATION. SWEEP THE ROADWAY TO REMOVE ALL SEDIMENTS. REPAIR BASINS AS REQUIRED. THE CONTRACTOR SHALL CLEAN AND FLUSH THE DRAINAGE STRUCTURES AND PIPES AT THE END OF CONSTRUCTION AND ALL ACCUMULATED SEDIMENTS IN THE DRAINAGE BASINS SHALL BE REMOVED. CONTRACTOR SHALL INSPECT THE DRAINAGE NETWORK AND REPAIR ANY DAMAGE IMMEDIATELY.
- COMPLETE ALL REMAINING PLANTING AND SEEDING.
- REMOVAL OF ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES FOLLOWING VEGETATIVE ESTABLISHMENT OF ALL DISTURBED AREAS SHALL BE APPROVED BY THE ENGINEER AND WHEN THE CONTRIBUTING AREA HAS REACHED A MINIMUM OF 80% STABILIZATION.

GENERAL GRADING AND DRAINAGE NOTES

- ALL CUT AND FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
- CONTRACTOR SHALL ADJUST AND/OR NEATLY SAWCUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH TRANSITION AND CONTINUOUS GRADE.
- CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS UNLESS OTHERWISE DIRECTED BY ENGINEER.
- PROPOSED ELEVATIONS ARE SHOWN TO FINISHED PAVEMENT OR GRADE UNLESS OTHERWISE SPECIFIED.
- PARKING AREAS AND TRAVEL LANES ARE NOT TO BE PAVED UNTIL THE ENTIRE PROPOSED DRAINAGE SYSTEM HAS BEEN INSTALLED, COMPACTED PROPERLY AND ALL PIPE CONNECTIONS COMPLETE.
- DRAINAGE PIPING SHALL BE 12" ADS UNLESS OTHERWISE NOTED.
- BACKFILL ADJACENT TO PIPES AND STRUCTURES SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT AS SPECIFIED. BACKFILL SHALL BE PLACED IN LIFTS NOT TO EXCEED EIGHT INCHES IN THICKNESS AND COMPACTED TO 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN +/- 2% OF OPTIMUM. ALL COMPACTION IS TO BE DETERMINED BY AASHTO METHOD T-99. TESTING OF BACKFILL MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND WILL BE INSPECTED BY THE ENGINEER.
- ALL DRAINAGE STRUCTURES AND PIPES MUST BE PROPERLY CONNECTED TO THE DRAINAGE SYSTEM PRIOR TO THE INSTALLATION OF ANY PAVEMENT. THIS INCLUDES THE STABILIZATION OF ALL DISTURBED AREAS CONTRIBUTING TO THE DRAINAGE SYSTEMS AND ANY STORMWATER BASIN FLOORS AND SIDE SLOPES.
- AT SUBSTANTIAL COMPLETION ANY LOW LYING AREAS (NON STORMWATER FEATURES) FOUND TO CREATE PONDING SHALL HAVE LOAM OR SURFACE TREATMENT REMOVED AND THE SUBGRADE MATERIAL SHALL BE REPAIRED AND REGRADED WITH GRANULAR NATIVE BACKFILL MATERIAL. AFTER BACKFILL, LOAM SHALL BE REPLACED AND RESEEDED. NO TOP DRESSING SHALL BE ALLOWED. REGRADED AREAS SHALL BE HOSE TESTED TO ENSURE POSITIVE DRAINAGE AND THE PONDING PROBLEM TO BE ALLEVIATED.

GENERAL DEMOLITION NOTES

- THE CONTRACTOR IS RESPONSIBLE FOR THE RELOCATION, DEMOLITION, REMOVAL AND DISPOSAL, IN A LOCATION APPROVED BY ALL GOVERNING AUTHORITIES AND ENGINEER, OF ALL EXISTING SITE ELEMENTS AND STRUCTURES.
- THE CONTRACTOR IS RESPONSIBLE FOR THE BACKFILL OF ALL EARTH CAVITIES REMAINING FROM THE DEMOLITION OF THE EXISTING BUILDINGS, FOUNDATIONS, BURIED TANKS AND VAULTS, AND OTHER BURIED CONCRETE STRUCTURES PERFORMED BY OTHERS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL ROCK, RUBBLE, CONSTRUCTION DEBRIS AND CONCRETE TO ALLOW FOR PROPER GRADING.
- THE CONTRACTOR HAS THE OPTION TO REUSE CRUSHED CONCRETE, STONE, DRAINAGE STRUCTURES, AND RUBBLE AS SUITABLE FILL PER SPECIFICATION ATTACHMENT A.
- BURIED CONCRETE STRUCTURES MAY BE FILLED AND LEFT IN PLACE IF APPROVED BY NANTUCKET HEALTH DEPARTMENT.
- ALL UNDERGROUND UTILITIES TO BE DEMOLISHED.
- THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND LEGAL/PROPER DISPOSAL OF ALL DEBRIS FROM THE SITE. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING THE DISPOSAL PERMIT. THE OWNER WILL OBTAIN BUILDING DEMOLITION PERMIT FROM THE STATE BUILDING DEPARTMENT.
- THE CONTRACTOR SHALL COORDINATE WITH APPROPRIATE UTILITY COMPANIES PRIOR TO THE REMOVAL AND/OR RELOCATION OF UTILITIES. THE CONTRACTOR SHALL COORDINATE WITH THE UTILITY COMPANIES CONCERNING PORTIONS OF THE WORK WHICH MAY BE PERFORMED BY THE UTILITY COMPANY AND ANY FEES WHICH ARE TO BE PAID TO THE UTILITY COMPANY FOR THEIR SERVICES. THE CONTRACTOR IS RESPONSIBLE FOR PAYING ALL FEES AND CHARGES.
- THE CONTRACTOR IS TO PROVIDE NOTICE TO ALL UTILITY COMPANIES REGARDING DESTRUCTION, RELOCATION AND REMOVAL OF ALL SERVICE LINES AND CAPPING ALL UTILITY LINES, AS REQUIRED, PRIOR TO COMMENCEMENT OF THE WORK.
- THE CONTRACTOR SHALL MAINTAIN SAFE, PASSABLE, CONTINUOUS SITE ACCESS AND OPERATION FOR SURROUNDING FACILITIES, AS DEEMED BY THE OWNER, AT ALL TIMES DURING DEMOLITION OF THE EXISTING FACILITIES.
- PRIOR TO COMMENCEMENT OF DEMOLITION, ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED.
- BUILDINGS ON SITE WILL BE REMOVED BY OTHERS PRIOR TO START OF CONSTRUCTION. NOT ALL CONCRETE SLABS, CONDUITS, STRUCTURES OR OTHER FEATURES MAY BE SHOWN ON THESE PLANS. PLANS ARE INTENDED TO BE A GENERAL GUIDE OF SITE FEATURES TO BE DEMOLISHED.

ENVIRONMENTAL - EROSION & SEDIMENT CONTROL NOTES

- THE SITE CONSTRUCTION FOREMAN SHALL BE RESPONSIBLE FOR THE DAILY INSPECTION AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS AND SHALL IMPLEMENT ALL NECESSARY MEASURES TO CONTROL EROSION AND PREVENT SEDIMENT FROM LEAVING THE SITE.
- THE CONTRACTOR SHALL INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES AS SHOWN ON THE PLANS AND AS DETERMINED NECESSARY IN THE FIELD BY THE ENGINEER BEFORE ANY CONSTRUCTION ACTIVITIES ARE TO BEGIN. THESE MEASURES SHALL BE INSPECTED, MAINTAINED AND REPLACED AS NECESSARY DURING THE ENTIRE CONSTRUCTION PERIOD OF THE PROJECT. SUCH MEASURE SHALL REPRESENT THE LIMIT OF WORK AND ALL WORKERS SHALL BE INFORMED THAT NO CONSTRUCTION ACTIVITY IS TO OCCUR BEYOND THE LIMIT OF WORK AT ANY TIME THROUGH THE CONSTRUCTION PERIOD.
- A MINIMUM SURPLUS OF 25-FEET OF EROSION CONTROL BARRIER (SILT FENCE, HAYBALE, &/OR SILT SOCK) SHALL BE STORED ONSITE AT ALL TIMES.
- THE CONTRACTOR SHALL PREVENT ANY SEDIMENT TRANSPORT TO THE ADJACENT PROPERTIES DURING CONSTRUCTION AND UNTIL ACCEPTANCE BY THE OWNER/ENGINEER.
- A CONSTRUCTION EXIT SHALL BE CONSTRUCTED AS SHOWN IN THE DETAILS TO SHED DIRT FROM CONSTRUCTION VEHICLE TIRES. THE CRUSHED STONE PAD WILL BE REPLACED/CLEANED AS NEEDED TO MAINTAIN ITS EFFECTIVENESS AND RECONSTRUCTED AS NECESSARY DURING SEPARATE PHASES OF THE PROJECT.
- THE LIMIT OF ALL CLEARING, GRADING AND DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. THE CONTRACTOR SHALL PHASE THE SITE WORK IN A MANNER TO MINIMIZE AREAS OF EXPOSED OR UNSTABILIZED SOIL. IF TREES ARE TO BE CUT ON THE ENTIRE SITE, ONLY THOSE AREAS WHICH ARE ACTIVELY UNDER CONSTRUCTION SHALL BE GRUBBED. THE REQUIRED SEDIMENTATION CONTROL FACILITIES MUST BE PROPERLY ESTABLISHED, CLEARLY VISIBLE AND IN OPERATION PRIOR TO INITIATING ANY LAND CLEARING ACTIVITY AND/OR OTHER CONSTRUCTION RELATED WORK.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO MONITOR LOCAL WEATHER REPORTS DURING CONSTRUCTION AND PRIOR TO SCHEDULING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES WHICH WILL LEAVE LARGE DISTURBED AREAS UNSTABILIZED. IF IMLEMENT WEATHER IS FORECAST, THE CONTRACTOR SHALL USE THEIR BEST PROFESSIONAL JUDGEMENT WHEN SCHEDULING CONSTRUCTION ACTIVITIES AND SHALL BE RESPONSIBLE FOR ENSURING THE NECESSARY EROSION CONTROL DEVICES ARE INSTALLED AND FUNCTIONING PROPERLY TO MINIMIZE EROSION FROM ANY IMPENDING WEATHER EVENTS.
- SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED ON WEEKLY BASIS AND AFTER EACH RAINFALL EVENT OF 0.25 INCH OR GREATER DURING CONSTRUCTION TO ENSURE THAT THE EROSION AND SEDIMENTATION CONTROL MEASURES ARE OPERATING/FUNCTIONING PROPERLY. IDENTIFIED DEFICIENCIES SHALL BE CORRECTED IMMEDIATELY AND NO LATER THAN 24 HOURS AFTER IDENTIFICATION.
- SOIL STOCKPILES LEFT OVERNIGHT SHALL BE SURROUNDED ON THEIR PERIMETERS WITH SILT SOCK, SILT FENCE, HAYBALES, OR A COMBINATION OF SILT FENCE WITH HAYBALES.
- DISTURBED AREAS AND SLOPES SHALL NOT BE LEFT UNATTENDED OR EXPOSED FOR EXCESSIVE PERIODS OF TIME SUCH AS DURING THE INACTIVE WINTER SEASON. THE CONTRACTOR SHOULD PROVIDE APPROPRIATE STABILIZATION PRACTICES ON ALL DISTURBED AREAS AS SOON AS POSSIBLE BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY OR PERMANENTLY CEASED. TEMPORARY AREAS HAVING A SLOPE GREATER THAN 4:1 SHALL BE REINFORCED WITH EROSION BLANKETS OR APPROVED EQUIVALENT UNTIL THE SITE IS PROPERLY STABILIZED. TEMPORARY SWALES MAY ALSO BE REQUIRED IF DETERMINED NECESSARY IN THE FIELD BY THE ENGINEER.
- THE CONTRACTOR SHALL INSTALL A SILT SACK OR APPROVED EQUIVALENT IN EACH EXISTING CATCHBASIN RECEIVING RUNOFF FROM THE SITE. UPON THE INSTALLATION OF ANY NEW CATCH BASIN, THE CONTRACTOR SHALL INSTALL A SILT SACK OR APPROVED EQUIVALENT. THESE ARE TO BE INSPECTED AFTER EACH SIGNIFICANT STORM EVENT AND EMPTIED AS NEEDED DURING THE ENTIRE CONSTRUCTION PERIOD.
- SMALL SEDIMENTATION BASINS MAY BE CONSTRUCTED ON AN AS-NEEDED BASIS DURING CONSTRUCTION TO AID IN THE CAPTURE OF SITE RUNOFF AND SEDIMENT. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR, IN CONSULTATION WITH THE ENGINEER, TO SIZE AND CONSTRUCT THESE BASINS IN APPROPRIATE LOCATIONS.
- ALL EXITS FROM THE SITE SHALL BE SWEEP AS NECESSARY, INCLUDING ANY TRACKING TO ENSURE SEDIMENT IS CONTAINED ONSITE. PAVED AREAS SHALL BE SWEEP AS NEEDED TO REMOVE SEDIMENT OR POTENTIAL POLLUTANTS WHICH MAY ACCUMULATE DURING CONSTRUCTION ACTIVITIES.
- ACCUMULATED SEDIMENT SHALL BE COLLECTED AND DISPOSED OF IN A PRE-APPROVED LOCATION BY THE CONTRACTOR AS DIRECTED BY THE ENGINEER.
- THE CONTRACTOR SHALL PROVIDE ON SITE OR MAKE READILY AVAILABLE THE NECESSARY EQUIPMENT AND SITE PERSONNEL DURING CONSTRUCTION HOURS FOR THE DURATION OF THE PROJECT TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER. IF SITE WORK IS SUSPENDED DURING THE WINTER MONTHS THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE PERSONNEL AND EQUIPMENT EITHER ON SITE OR MAKE READILY AVAILABLE TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER
- IF DEWATERING IS NECESSARY DURING CONSTRUCTION, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO IMPLEMENT PROPER MEASURES INCLUDING DEWATERING BAGS, TEMPORARY HAYBALES, SILT FENCES, SILT SOCKS AND/OR OTHER APPROVED DEVICES. THE DEWATERING MEASURES SHALL BE APPROVED BY THE ENGINEER.
- ALL SEDIMENT COLLECTED IN THE TEMPORARY/PARTIALLY CONSTRUCTED BIORETENTION AREAS WILL BE REMOVED AND DISPOSED OF PROPERLY PRIOR TO FILTER FABRIC AND MEDIA INSTALLATION WITHIN THE BIORETENTION AREAS. PARTIALLY CONSTRUCTED BIORETENTION AREAS WILL HAVE A SURFACE ELEVATION AT A MINIMUM 1-FOOT ABOVE THE BOTTOM OF MEDIA ELEVATION OR AS INDICATED IN THE PLANS. THIS WILL ALLOW AN OVER-DIG OF THE COLLECTED SEDIMENT FROM WITHIN THE BIORETENTION AREA PRIOR TO MEDIA/FABRIC INSTALLATION.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTROL DUST, BY WATERING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER AT NO EXTRA COST TO THE OWNER.
- THE CONTRACTOR SHALL ROUTINELY INSPECT THE PERIMETER OF THE SITE PROPERTY TO GATHER AND REMOVE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. ALL DEMOLITION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE SITE AND PROPERLY DISPOSED OF. ALL TRUCKS AND CONTAINERS LEAVING THE SITE SHALL BE COVERED.
- CEMENT TRUCKS SHALL NOT BE WASHED ONSITE. ANY CEMENT OR CONCRETE PRODUCTS LEAVING THE SITE OR ENTERING RESOURCE AREAS SHALL BE REMOVED BY HAND AT THE CONTRACTOR'S EXPENSE.
- BURIAL OF ANY STUMPS, SOLID DEBRIS, AND/OR STONES/BOULDERS ONSITE IS PROHIBITED UNLESS OTHERWISE INDICATED BY THE ENGINEER. NO ROAD SALT, SAND, OR OTHER DE-ICING CHEMICALS SHALL BE USED ON THE ACCESS ROADWAYS.
- THE CONTRACTOR IS RESPONSIBLE FOR ROUTINE INSPECTION AND MAINTENANCE DURING CONSTRUCTION OF ALL STORMWATER FACILITIES INSTALLED OR IMPACTED BY THE PROJECT. ANY SEDIMENT OR DEBRIS COLLECTED WITHIN THESE FACILITIES FROM THE PROJECT WORK SHALL BE REMOVED PRIOR TO THE OWNER'S ACCEPTANCE.

LEGEND

EXISTING	PROPOSED	
		APARTMENT BUILDING
		HOUSE
		CENTERLINE
		CONTOUR - MINOR
		CONTOUR - MAJOR
		GRASS
		STONES OR BOULDERS
		EDGE OF PAVEMENT
		BITUMINOUS CONCRETE
		CONCRETE
		PROPERTY LINE
		ROW LINE
		DRAIN PIPE
		GAS LINE

SYMBOLS

	CATCH BASIN SQUARE
	DRAIN MANHOLE
	SEWER MANHOLE
	RED MAPLE
	ARBOR VITAE
	TOW=45.23' TOP OF FOUNDATION
	HANDICAP SYMBOL

APPROVED BY THE TOWN OF NANTUCKET
PLANNING BOARD
DATE SUBMITTED: _____
DATE ENDORSED: _____
DATE APPROV _____

TOWN OF NANTUCKET PLANNING BOARD



These drawings are the property of the Design Engineer, Green Seal Environmental, Inc. Unauthorized reproduction for any purpose is an infringement upon copyright laws. Visitors will be subject to prosecution.
Dimensions are as indicated.
Use of this plan constitutes acceptance of terms and conditions set forth in accompanying project documentation.
It is the responsibility of the user to confirm discrepancies with the Engineer prior to use.

NO.	DATE	COMMENT

CLERK'S CERTIFICATION ON THE PLAN
DATE: _____

I, _____, CLERK OF THE TOWN OF NANTUCKET, DO HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

TOWN CLERK

PURPOSE:
DEFINITIVE SUBDIVISION

LOCUS:
NANCY ANN LANE

PREPARED FOR:

RICHMOND GREAT POINT DEVELOPMENT LLC

RICHMOND GREAT POINT DEVELOPMENT LLC
20 DAYKIM LANE
NANTUCKET, MA 02554

DRAWING TITLE:

NOTES

CAD TECH: **JDP** CHECKED BY: **TRB**

ENGINEER: **BLB** DATE: **08/03/2016**

SCALE: **NOTED**

C-25
SHEET: **26 OF 26**

**Richmond Great Point Inc.
20 Davkim Lane
Nantucket, MA 02554**



Drainage Calculations Narrative

PROJECT SUMMARY

Richmond Great Point Inc., Inc. (RGP) is proposing to reconfigure the existing property as shown on sheets C-1 to C-5. The project includes single family home development and rental apartment development.

The proposed development of “Sandpiper Place” workforce homeownership housing development, comprised of one hundred (100) single family housing lots on a combination of nineteen (19) existing lots totaling +/- 17.2 acres of land located along Old South Road, Daffodil Lane, Mayflower Circle, and Evergreen Way.

The proposed development of “Workforce Rental Community” includes a total of 225 apartment units in a series of approximately forty (40) low density, two story, residential structures on a combination of two (2) existing lots totaling +/- 14.5 acres of land located along Davkim Lane and Nancy Ann Lane.

EXISTING CONDITIONS

Currently, access to all parcels owned by RGP is via Nancy Ann Lane. The land located at 20 Davkim Lane contains a former asphalt gravel plant/gravel pit. A paved parking area is located in front of the plant along the corner of Nancy Ann Lane and Davkim lane. North of the plant comprises gravel areas with access driveways along Nancy Ann Lane and storage components of the former Glowacki property. A gravel travelway connects the eastern portion of the plant to Evergreen Way.

The easterly portion of the project along Evergreen Way is primarily wooded with residential properties on the corner of Evergreen Way and Daffodil Lane. A gravel pathway extends from the paved roadway between the asphalt gravel plant and Evergreen Way to the Mayflower Circle cul-de-sac.

In general, the property slopes from North to South and contains two large sand pits that are shown on sheets C-6 to C-8.

PROPOSED CONDITIONS

We have included a set of plans and related documents depicting the proposal for your review. The subdivision will require the construction of new roadways. For discussion purposes during the review process with the town review agencies, we have included conceptual building footprints. The Stormwater runoff generated from the buildings depicted on the plans will be Contain by individual leaching systems sized to retain and infiltrate the Type III 24-hour 100-year storm.

Pre and Post development stormwater analysis was completed for the Type III 24-hour 25-year storm event using Carlson Civil Suite Engineering and Surveying software and HydroCad Stormwater modeling software for the drainage areas identified on the property. These stormwater modeling packages were developed using TR-55 modeling protocol and are widely used in the stormwater modeling arena. The modeling addressed stormwater for this proposal under the following assumptions:

1. We have assumed that the roadways, driveways and sidewalks as depicted on the plans, are constructed.

The two existing Sand Pits will be re-graded. The proposed site generally slopes in a Southerly direction from Old South Road, Easterly from Nancy Ann lane, And Westerly from Evergreen Road.

It should be noted that runoff from the RGP property remains on –site and the proposed conditions will remain the same.

As such, we have not concentrated on the pre and post development conditions on the property as no stormwater leaves the property. Although the impervious area of the property will be increased, the existing fully developed nature of a major portion of the property, the fact that all stormwater stays on the site, and significant drainage system improvements are proposed, the need to concentrate on pre and post development conditions is reduced. The main effort in our drainage analysis for this project centered on the use of deep sump catch basins, grease/grit removal Water Quality Structures and underground infiltration Chambers designed to retain and infiltrate the Type III 24-hour 25-year as well as mitigate the flooding caused by the 100 year event.

Runoff from the post development conditions is subdivided into 15 watersheds. Stormwater Runoff is conveyed to nine underground retention / infiltration areas (refer to table below) containing ADS StormTech MC-4500 + Cap chambers. Under conditions related to large storm events, the system will surcharge and stormwater will spill out of the lowest grate, and overflow into two designated flood areas as shown on sheet C-19.

Underground Retention / Infiltration Areas for Watershed					
No.	Watershed	Pond	Storage Area	No. Storage Chambers	VortSentry Model
1	S1	1P	46.67'W x 27.24'L x 6.75'H	25	HS72
2	S2	2P	37.58'W x 43.34'L x 6.75'H	36	HS72
3	S3	3P	37.58'W x 51.39'L x 6.75'H	44	HS84
4	S4	4P	55.75'W x 35.29'L x 6.75'H	42	HS84
5	S5, S6	5P/6P	28.50'W x 43.34'L x 6.75'H	27	HS84
6	S7	7P	46.67'W x 47.37'L x 6.75'H	50	HS84
7	S8, S9	8P/9P	37.58'W x 63.47'L x 6.75'H	56	HS96
8	S10-S14	10P-14P	55.75'W x 51.39'L x 6.75'H	66	HS96
9	S15	15P	46.67'W x 59.44'L x 6.75'H	65	HS84

Stormwater Runoff from each building is conveyed to underground retention / infiltration areas (refer to table below) containing Cultec Recharger 330XL HD chambers.

Underground Retention / Infiltration Areas for Buildings		
Type*	Storage Area	No. Storage Chambers
Building A	11.83'W x 11.17'L x 3.88'H	2
Building B	11.17'W x 10.50'L x 3.54'H	2
Building C	11.17'W x 10.50'L x 3.54'H	2
Multifamily	17.00'W x 11.50'L x 3.54'H	3

*See sheets C-6 to C-8 for building type locations.

Stormwater Standards

Standard 1 - No New Untreated Discharges

Under the proposed improvements, there are no untreated discharges to or erosion of wetlands or waters of the Commonwealth. All of the runoff from this proposal are directed to and allowed to infiltrate in retention areas within the boundary of the project. There are no off-site discharges from this project.

Standard 2 - Peak Flow Rates

The pre and post-development peak discharge rate from this development is contained within the property. There is no runoff from this property. The stormwater modeling results are included in the Attachments (1 & 2) of this document.

Standard 3 - Recharge Rates

All of the runoff from the area of development on site will be directed into the retention areas depicted on the plans. The proposed drainage system will infiltrate 100% of the excess stormwater volume.

Standard 4 - TSS Removal Rates

The design provides more than 95% TSS removal utilizing the deep sump catch basins, oil/sediment separators, and subsurface leaching systems. See Attachment 3 for these computations.

Standard 5 - Land Use with Higher Potential Pollution Load

This standard is not applicable to the site.

Standard 6 - Wellhead Protection Area

This standard applies to this project as the site is located in a public wellhead protection area. Test pits indicate a minimum of 10 feet of undisturbed soil above groundwater will be maintained for the construction of this project. Improvements to the property include conveying stormwater runoff to nine underground retention / infiltration areas with each containing a grease/grit removal Water Quality Structure.

Standard 7 - Redevelopment

This standard applies to this project as significant improvements are proposed on the property. Improvements include the use of Deep Sump catch basins, the installation of a grease/grit removal Water Quality Structure and construction of nine retention / infiltration areas to eliminate severe ponding at the property. The stormwater modeling results are included in the Appendix A of this document.

As such, Stormwater Standards have been met to the maximum extent practicable.

Standard 8 - Construction Period Pollution Prevention

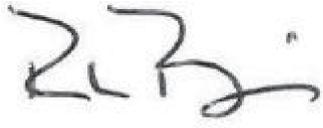
Although this proposal does not require a National Pollution Discharge Elimination System (NPDES) permit for construction, the proposal calls for the installation of silt fencing, hay bales, catchbasin filters, and the remediation of all disturbed areas. Sedimentation will be controlled by inspection of stormwater facilities before and after significant stormwater events.

Standard 9 - Operations and Maintenance

The Operation and Maintenance plan calls for maintaining the landscaped portion of the project as well as regular cleaning of catch basins, grease/grit chambers, and stormwater retention facilities. An Operations and Maintenance Plan is included in this report.

Standard 10- Illicit Discharge Statement

There are no known, illicit discharges associated with this project.
Please review the above information and contact this office with any questions or comments.



Robert L. Bersin, PE
Green Seal Environmental, Inc.

July 25, 2016
Date

GENERAL CONSTRUCTION SEQUENCE

1. Prior to the start of all work, the contractor shall have the Limits of Work flagged by Green Seal Environmental. Flagging shall be inspected by the Town of Nantucket designee, prior to the start of all work.
2. Contractor shall furnish and install construction silt fencing, hay bales, or wattles (as required on approved plans) along the Limits of Work line as depicted on the approved plans. Installation of said fencing shall be inspected by the Town of Nantucket designee.
3. Install Temporary Construction Access as depicted on the approved plans. Installation of said access shall be inspected by the Town of Nantucket designee.
4. Tree Removal along the proposed roadway shall be coordinated with the Nantucket Tree Warden and Planning Department. All debris, including stumps, shall be removed from the site and disposed in a MassDEP approved disposal site. Cut materials may be chipped, stockpiled, and used as mulch, as needed. Use 4-6 inches of topsoil and the seed mixture referenced above to revegetate disturbed areas along the roadway.
5. Install Retention / Infiltration Areas and Treatment units as shown on approved plans. Retention Areas shall be installed by removing all soil above the "C" Sand layer as depicted on the soil logs and backfilled with clean granular sand, free from organic matter, and other deleterious matter. Fill material shall meet the grading specifications in 310 CMR 15.255:3. Install roadway as depicted on the approved plans. Access to the work areas shall be via the proposed construction entrances shown on the Erosion and Dust Control Plan. All efforts shall be employed to prevent soil accumulation from construction vehicles onto the surface of Nancy Ann Lane Rd. If binder course is not installed immediately after cutting, grubbing, re-grading, and compaction, install temporary crushed stone construction entrance as depicted on the Erosion and Dust Control Plan. Final paving shall be after the installation of drainage components and utilities is complete.
6. In general, revegetate disturbed areas as soon as practicable.
7. After the roadway construction, start the installation of landscaping per approved plans. Coordinate installation with the Town of Nantucket designee. All attempts shall be made to avoid planting during summer droughty season, or arrangements shall be made for proper watering required to ensure proper plant growth.
8. Upon completion of the work, inspect all areas of installation. All disturbed areas shall be revegetated as described above.

STORMWATER SYSTEM MAINTENANCE CONSTRUCTION PHASE

Best management practices (BMP) for erosion and sedimentation control are staked straw bales, filter fences, wattles, hydro seeding, and phased development. Although not all of these methods are utilized for this project, it should be noted that these are not designed to handle high concentrations of sediments typically found in construction runoff. High sediment losses are not anticipated on this project, but it is imperative that the BMP's on this site be maintained.

Pre-Construction

- A. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to straw bales, silt fence, wattles, and crushed stone.
- B. The site contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

Construction Phase

- A. All excavated materials should be stockpiled, separating topsoil from other materials. The topsoil shall be kept for future use on the site. Erosion control shall be utilized along the down slope side of the stockpiles and side slopes shall not exceed 2:1.
- B. If intense rainfall is anticipated, the installation of supplemental straw bale dikes, silt fences, or wattles shall be considered.
- C. Unsuitable excavated material shall be removed from the site as soon as practicable.
- D. Construction entrance shall be installed as shown on the approved plans as outlined above.

Ongoing Site Work

- 1. Site work will be completed utilizing proper construction techniques. All efforts are to be employed to minimize the deposition of soil from Construction vehicles on Nancy Ann Lane Road.
- 2. Inspect all sediment and erosion control measures on a weekly basis, prior to, and after significant storm events (0.25 inches or greater), or as otherwise required by the Town of Nantucket designee.

3. Sediment shall be removed from sediment barriers if buildup exceeds ½ of the height of the barrier.
4. Damaged or deteriorated barriers shall be repaired immediately after the defect is identified.
5. The underside of hay bales and wattles shall be kept in close contact with exposed earth. Reset as necessary.
6. Remove vegetative and non-vegetative debris from the retention areas.
7. In general, the area shall be kept neat and litter free, to the maximum extent practicable. Trash, shipping materials, and other disposable materials shall be contained and prevented from becoming windblown litter. The site supervisor shall ensure all debris is either removed or properly contained prior to leaving the site on a daily basis.
8. Erosion control elements shall remain in place until all disturbed areas are stabilized. After removal of erosion control elements, regrade, and stabilize disturbed areas under barriers, as necessary.
9. No pesticides or herbicides are to be used on the site and only organic fertilizers shall be used.

 Mirrione Law Group, LLC

Counselors at Law

2016 AUG 23 AM 8:54

Walter Mirrione
323 Manley Street
West Bridgewater, MA 02379
(508) 510-5727 Tel
(508) 857-0751 Fax
wmirrione@mirrionelaw.com

August 22, 2016

Via Electronic Mail to jsnell@nantucket-ma.gov
Via First Class Mail

Barry G. Rector, Chairman
Nantucket Planning Board
2 Fairgrounds Road
Nantucket, MA 02554

Re: Definitive Subdivision and Special Permit Applications of Richmond Great Point Development LLC (“Applicant”) relative to Property located off Old South Road, Nantucket, MA (“Richmond Project”)

Dear Chairman Rector:

This office represents the Naushop Homeowners Association Trust (hereinafter “Naushop”), a trust representing the individual owners and residents of the residential community containing approximately 196 single family homes directly across Old South Road from the Richmond Project. Our office and Naushop have reviewed the June 2016 definitive subdivision and special permit applications of the Applicant. Based upon that review, Naushop has significant concerns with the impacts of the Richmond Project on its property interests and is therefore closely monitoring the Planning Board’s (“Board”) review of the Richmond Project. Our client will continue to attend any and all public hearings and public meetings and will advise both the Applicant and the Board of any ongoing concerns so that both will have an opportunity to address same. Our initial review reveals the following.

Application No. 1 (Retail Buildings):

The first application that we reviewed seeks approval of a major commercial development special permit and major site plan review to allow for the construction of five “retail “line” buildings” located on five contiguous lots (± 2.39 total acres) with frontage on Old South Road beginning just east of Lovers Lane. The buildings are proposed to be one story and are integrated in the sense that the parking, travel ways, vehicular access, drainage, sewer, water, etc. are all interconnected to varying degrees. The size of the buildings are proposed as 5,170 gross square feet, 3,235 gross square feet, 2,400 gross square feet, 1,500 gross square feet and

Barry G. Rector, Chairman
Nantucket Planning Board
August 22, 2016

3,200 gross square feet. Additionally, there is proposed a 1,200 square feet outdoor dining area adjacent to the 3,200 gross square feet building.

The location of the outdoor dining facility causes significant concern to Naushop due to the proximity of same in relation to the Naushop property. In order to minimize the impact, Naushop requests that the outdoor dining facility be relocated further west to the retail liner building located closest to Lovers Lane. Additionally, Naushop requests that the Board including consider the following conditions in any special permit that it may grant relative to the outdoor dining:

(a) Hours of operation be restricted as follows:

(i) Winter Season (Defined as November 1 through March 31)

Monday through Sunday: 11:00 AM to 9:00 PM

(ii) Summer Season (Defined as April 1 through October 31)

Monday through Thursday: 11:00 AM to 9:00 PM

Friday and Saturday: 11:00 AM to 10:00 PM

Sunday: 11:00 AM to 9:00 PM

- (b) Prohibit live entertainment, mechanical entertainment and so-called piped out music;
- (c) Limit use of the area to patrons being served food such that there is no use of the area for the consumption of alcoholic beverages outdoors;
- (d) Require that any outside lighting be installed so as not to interfere with the use and enjoyment of the nearby Naushop property; and
- (e) Limit the number of patrons in the area to no more than twenty-five.

Application No. 2 (Meadows II Rental Apartments):

The second application reviewed seeks approval of a special permit to create a "Workforce Rental Community" located on the southerly side of Old South Road southeast of the site referenced in Application No. 1. The project will be accessed from the "Primary Project Entrance" as shown on the Plan which is located directly across from Naushop. Specifically, the proposal includes 225 units constructed in 40 two-story structures scattered across \pm 14 acres. The proposal includes on-site parking that exceeds the requirements of the Bylaw and will be serviced by new infrastructure (water, sewer, drainage, lighting, landscaping, etc.). It includes a mix of studio units (22), one bedroom units (87), two bedroom units (94) and three bedroom units (22) which creates a total of 363 bedrooms. Fifty-six of those units, or 25%, will be so

Barry G. Rector, Chairman
Nantucket Planning Board
August 22, 2016

called affordable units, restricted in perpetuity, in accordance with the requirements of the Massachusetts Department of Housing and Community Development. All fifty-six of the units will qualify for Nantucket's Subsidized Housing Inventory List. These units will count towards the State requirement that 10% of the housing stock be qualified affordable housing units.

Naushop has no specific concerns with the rental apartments at this time.

Application No. 3 (Sandpipe Place – Single Family Lots):

The third application seeks a special permit and subdivision approval to create "Workforce Homeownership Housing" located on the southerly side of Old South Road immediately east of the site referenced in Application No. 2. Like the project described in Application No. 2, this project will also be accessed from the "Primary Project Entrance" which is located directly across from Naushop. This proposal seeks to create 100 single family house lots on \pm 17 acres of land along with the necessary infrastructure (water, sewer, drainage, lighting, landscaping, etc.) to service the project. Lot sizes range from a small of 4,000 square feet to a large of 4,500 square feet. Twenty-five of the lots, or 25%, will contain so called affordable homes, restricted in perpetuity, in accordance with the requirements of the Massachusetts Department of Housing and Community Development. All twenty-five of the homes will qualify for Nantucket's Subsidized Housing Inventory List. These homes will count towards the State requirement that 10% of the housing stock be qualified affordable housing units. The project also include a "community focal point" adjacent to the main entrance and shown on the plan submitted as "Community Focal Point/Meeting House and Park". This will be community space including a meeting house, barn, outdoor common area with patio and stage area as well as other landscaping improvements.

The location of the Community Focal Point/Meeting House and Park, as well as the use thereof, causes significant concern to Naushop due to the proximity of same in relation to the Naushop property. In order to minimize the impacts, Naushop requests that the outdoor dining facility be relocated further south into the Richmond Project. Lastly, Naushop requests that the Board consider including the following conditions in any special permit that it grants relative to the Community Focal Point/Meeting House and Park:

- (a) Hours of operation be restricted to Sunday thru Wednesday - 11:00 AM to 9:00 PM and Thursday thru Saturday - 9:00 AM to 10:00 PM;
- (b) Prohibit live entertainment, mechanical entertainment and so-called piped out music;
- (c) Limit use of the area to those residents and guests of Sandpiper Place. General public assembly is prohibited;
- (d) Require that any outside lighting be installed so as not to interfere with the use and enjoyment of the nearby Naushop property;

Barry G. Rector, Chairman
Nantucket Planning Board
August 22, 2016

- (e) Limit the number of occupants in the area to the less or 100 persons or as otherwise restricted by law;
- (f) Install significant live screening on the Richmond Project property to buffer the impacts of this area; and
- (g) Prohibit the consumption of alcoholic beverages outdoors.

Application No. 4 (Old South Road Crossing):

The fourth application seeks definitive subdivision approval for the series of roads and lots located immediately south of the land that makes up Application No. 1. The proposal is somewhat administrative in that there is no construction of structures proposed on this area of the Richmond Property. The primary objective of the subdivision is to reconfigure, re-route, and improve the engineering design, safety, and conditions of portions of the existing Nancy Ann Lane and Greglen Avenue roadways to better accommodate the proposals set forth above. This includes straightening, widening and improving the existing roadway layouts and the slight reconfiguration of fifteen existing lots (most of which are vacant and 13 of which appear to be owned by Richmond). Naushop has no specific concerns with this application at this time.

General Comments:

In addition to the above areas of concern, Naushop has the following general but significant areas of concern with the impacts of the overall Richmond Project.

Notwithstanding, the long term proposal to mitigate traffic impacts as set forth in the Old South Road Corridor Study, Naushop is concerned that the Richmond Project will cause significant traffic issues in this area that will impact Naushop's quality of living. Any mitigation measures offered by implementation of the aforesaid Study, will not be achieved in the near future, therefore, Naushop requests that the Board and the Applicant consider short term traffic mitigation including improvements to the roadway system located south of the Richmond Project. One specific improvement Naushop believes to be necessary is the widening of Old South Road up to Naushop's entrance at Goldfinch Drive East. The agreed upon mitigation should be completed prior to the issuance of any certificate of occupancy relative to the Richmond Project.

Additionally, Naushop is concerned with the impact of the Richmond Project on the municipal sewer system. These concerns are magnified by delays in finalizing the Sewer Connection and Dedication Agreement with Richmond Great Point Development, LLC. The lack of agreement has stalled the necessary implantation of the upgrades to the South Valley lift station which serves the area, including Naushop. Notwithstanding the lack of Agreement, the Town has allowed the Applicant to connect their new sewer main to the lift station in the area thus adding additional flow to an already troubled system. Naushop requests that the Board

Barry G. Rector, Chairman
Nantucket Planning Board
August 22, 2016

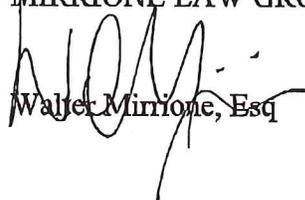
include a condition in any permits issued that the aforesaid Agreement be finalized and the contemplated upgrades be performed prior to issuance of any building permits at the Richmond Project.

Our review of the Richmond Project reveals that the resulting impacts therefrom on the Naushop community will be varied and significant. Zoning regulations are designed to, amongst other things, lessen congestion in the streets, conserve health, secure safety, provide adequate light and air, prevent overcrowding of land, avoid undue concentration of land and facilitate adequate provision of water supply, drainage and sewerage facilities. It is our opinion that the proposed Richmond Project will not accomplish the aforesaid and this will have significant negative impacts on Naushop that can only be mitigated by addressing the concerns raised herein. Accordingly, Naushop requests that the Board and the Applicant give serious consideration to our client's concerns and proposals to address same so as to mitigate the impacts on the Naushop community.

Your consideration of this matter is greatly appreciated. Should you have any questions or comments, please do not hesitate to contact the undersigned. We look forward to being involved in future public meetings.

Sincerely,

MIRRIONE LAW GROUP, LLC



Walter Mirrone, Esq

cc: Ken Gentner Via Electronic Mail
kgentner@optonline.net