TOWNSHIP OF MULLICA PLANNING BOARD APPLICATION

2004 W/L				
Location: <u>2201 Whit</u>	e Horse Pike		-	
Fax Map Page 35	_ Block _3510	_ Lot(8) _	1	
Page	Block	_Lot(s)		
Dimensions Frontage	845 Depth 663	3.40 Tot	al Area 1	2.9 acres

2. APPLICANT

Name KML Building Corp. NI	
Address 1803 Spring Garden Street, Philadelphia PA	19130
Telephone Number 732-947-9135	

Applicant is a Corporation 🖾 Partnership 🗂 Individual 🗖

3. DISCLOSURE STATEMENT

Pursuant to N.J.S. 40:55D-48.1, the names and addresses of all persons owning 10% of the stock in a corporate applicant or 10% interest in any partnership applicant must be disclosed. In accordance with N.J.S. 40:55D-48.2 that disclosure requirement applies to any corporation or partnership which owns more than 10% interest in the applicant followed up the chain of ownership until the names and addresses of the non-corporate stockholders and partners exceeding the 10% ownership criterion have been disclosed. [Attach pages as necessary to fully comply.]

Name	Address	Interest
Name	Address	Interest

4. If Owner is other than the applicant, provide the following information on the Owner(s): Owner's Name_KML Building Corp. NJ

Address	1803 Spri	ng Garden Street, Philadelphia PA 19130	
Telephor	ne Number	732-947-9135	

5. PROPERTY INFORMATION:

Restrictions, covenants, casements, association by-laws, existing or proposed on the property: Yes [attach copies] X No Proposed

Note: All deed restrictions, covenants, easements, association bylaws, existing and proposed must be submitted for review and must be written in easily understandable English in order to be approved.

6. Applicant's Attorney Seth Presiewicz, Esq. Kroll Heineman Carton, LLC Address _99 Wood Avenue South, Ste. 307, Islin, NJ 08830

Teleshows Number (732)-491-2109
FAX Number (732)-491-2120
7. Applicant's Engineer_ARH Associates, (no David J. Cella, PE
Address 215 Bellevue Ave. PO Box 579 Hemmonton, NJ 08037
Telephone Number609.561-0482
FAX Number 609-567-8909
8. Applicant's Planning Consultant ARH Associates, Inc Stuart Wiser, PP
Address 215 Bellevue Ave. PO Box 579 Hammonton, NJ 08037
Telephone Number609-561-0482
FAX Number 609-867-8909
A A THE PATTER FOR HARD HARD AND HARD AND AND AND AND AND AND AND AND AND AN
4 Additional Station Read, Suite F Medford, NJ 08055
Talenhone Number (808)-854.4104
FAX Number
10. List any other Expert who will submit a report or who will testify for the Applicant: [Attach
additional sheets as may be necessary]
Name
Field of Expertise
Address
Telephone Number
FAX Number
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11. APPLICATION REPRESENTS A REQUEST FOR THE FOLLOWING:
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11. APPLICATION REPRESENTS A REQUEST FOR THE FOLLOWING: SUBDIVISION:

Conditional Use Approval [N.J.S. 40:55D-67] Direct issuance of a permit for a structure in bed of a mapped street, public drainage way, or flood control basin [N.J.S. 40:55D-34] Direct issuance of a permit for a lot lacking street frontage [N.J.S. 40:55D-35] Density Transfer

12. Section(s) of Ordinance from which a variance is requested: None are sought

13. Waivers Requested of Development Standards and/or Submission Requirements: [attach additional pages as needed] None are sought

14. Attach a copy of the Notice to appear in the official newspaper of the municipality and to be mailed to the owners of all real property, as shown on the current tax duplicate, located within the State and within 200 feet in all directions of the property which is the subject of this application. The Notice must specify the sections of the Ordinance from which relief is sought, if applicable. To be provided The publication and the service on the affected owners must be accomplished at least 10 days prior to the date scheduled by the Administrative Officer for the hearing. An affidavit of service on all property owners and a proof of publication must be filed before the application will be complete and the hearing can proceed.

15. Explain in detail the exact nature of the application and the changes to be made at the premises, including the proposed use of the premises:

[Attach pages as needed]

See cover letter prepared by ARH dated August 19, 2020

16. Is a public water line available? N/A

17. Is public sanitary sewer available? <u>N/A</u>

18. Does the application propose a well and septic system? YES

20. Are any off-tract improvements required or proposed? _______ NJDOT Minor Access Only

21. Is the subdivision to be filed by Deed or Plat? _____

22. What form of security does the applicant propose to provide as performance and maintenance guarantees?

Date Plans

23. Other approvals which may be required and date plans submitted:

	Yes	No	Submitted	
Atlantic County Health Department	<u> </u>		Pending -	-
Atlantic County Planning Board		_ <u>×</u>		2

Cape/Atlantic Soil Conservation District	(10)	. <u> </u>	Approved
NI Department of Environmental Protection			
Sewer Extension Permit		<u>×</u>	
Sanitary Sewer Connection Permit		_ <u>×</u>	
Stream Encroachment Permit		<u> </u>	
Waterfront Development Permit		<u>×</u>	
Wetlands Permit	·	X	
Tidal Wetlands Permit		<u>×</u>	
Potable Water Construction Permit	<u>×</u>		Pending (well)
Other Pinelande Application COF No. 2001-0549.002	<u>_x</u>		Approved
NI Department of Transportation	<u>×</u>		Approved
Atlantic City Electric & South Jersey Gas Company	<u></u> X		Pending electric connection

24. Certification from the Tax Collector that all taxes due on the subject property have been paid. See attached

* 25. List of Maps, Reports and any and all information required by Schedule A, B and C for the type of application(s) involved. (Attach additional pages as required for complete listing.

Quantity Description of Item

15	Drainage Calculations dated 07/28/20 as signed/sealed by Ted Wilkinson, PE
15	Copy of Pinelands letter dated 7/23/2020

* Please See Attached Sheet

26. The Applicant hereby requests that copies of the reports of the professional staff reviewing the application be provided to the following of the applicant's professionals:

Specify which reports are requested for each of the applicant's professionals or whether all reports should be submitted to the professional listed.

Applicant's

Profession	nal Reports Requested	
Engineer	David J. Cella, PE for ARH Associates, Inc.	
Attorney	Seth Ptasiewicz, EsqKroll Heineman Carton, LLC.	

CERTIFICATIONS

27. I certify that the foregoing statements and the materials submitted are true. I further certify that I am the individual applicant or that I am an Officer of the Corporate applicant and that I am authorized to sign the application for the Corporation or that I am a general partner of the partnership applicant. [If the applicant is a corporation this must be signed by an authorized corporate officer. If the applicant is a partnership, this must be signed by a general partner.]

Sworn to and subscribed before me this <u>19</u> day of August , 20 20

OTARY PUBLIC

GINA M MERTIS NOTARY PUBLIC STATE OF NEW JERSEY MY COMMISSION EXPIRES JULY 21, 2024

SIGNATURE OF APPLICAN

28. I certify that I am the Owner of the property which is the subject of this application, that I have authorized the applicant to make this application and that I agree to be bound by the application, the representations made and the decision in the same manner as if I were the applicant. [If the owner is a corporation this must be signed by an authorized corporate officer. If the owner is a partnership, this must be signed by a general partner.]

Sworn to and subscribed before me this

19 day of August ____, 20 20____ OTARY PUBLIC

OF APPLICANT

has been deposited in an escrow account (Builder's Trust 29. I understand that the sum of \$_ Account). In accordance with the Ordinances of the Township of Mullica, I further understand that the escrow account is established to cover the cost of professional services including engineering, planning, legal and other expenses associated with the review of submitted materials and the publication of the decision by the Board. Sums not utilized in the review process shall be returned. If additional sums are deemed necessary, I understand that I will be notified of the required additional amount and shall add that sum to the escrow account within fifteen (15) days.

08-19-20

Date

Mullica Township Professional Staff

GINA M MERTIS NOTARY PUBLIC STATE OF NEW JERSEY MY COMMISSION EXPIRES JULY 21, 2024

Engineering & Planning Jason T. Sciullo, PE, PP

Sciullo Engineering Services, LLC 9615 Ventnor Avenue, Suite 3 Margate, NJ 08402

Planning Board Attorney

Timothy Maguire, Solicitor 609-641-1166 200 Jackson Avenue Northfield, NJ 08225 magmaglaw@aol.com

Planning Board Secretary

Kimberly Johnson, 609-561-7070 Post Office Box 317 Elwood, NJ 08217 kiohnson@mullicatownship.org

Category

Application Fees

Escrow Fees

CONTINUED ITEM NO. 25: - Supplemental Data Provided to the Board/Engineer

- 1. Engineering Plans last revised 12/04/2020 signed/sealed by David Cella, PE
- 2. Revised Stormwater Report dated 12/04/2020 signed/sealed by David Cella, PE
- 3. Pinelands Certificate of Filing "Inconsistent" Application No. 2001-0549.002 dated 11/19/2020 with accompanying email dated 12/30/2020 confirming "consistent" after revisions submitted.
- 4. Cape Atlantic Soil Conservation District Certification 314-20
- 5. Traffic Study provided as prepared by Horner and Canter dated 4/30/2020.

From: appinfo@pinelands.nj.gov
Sent: Wednesday, December 30, 2020 2:51 PM
To: Marianne Risley
Subject: Pinelands Application #2001-0549.002, Eastern Atlantic States
Council of Carpenters

Hi Marianne:

Just a quick note to let you know that the stormwater information (Plan dated 8/13/20 rev. 12/4/20) and storm water management report dated December 4, 2020 submitted on December 9, 2020 demonstrates that the proposed development is consistent with the stormwater management standards of the Pinelands Comprehensive Management Plan.

Best wishes for a Happy and Healthy New Year,

Branwen Ellis Pinelands Commission PO BOX 359 New Lisbon, NJ 08064 609-894-7300

CONFIDENTIALITY NOTICE:

The information contained in this communication from the Pinelands Commission is privileged and confidential and is intended for the sole use of the persons or entities who are the addressees. If you are not an intended recipient of this email, the dissemination, distribution, copying or use of the information it contains is strictly prohibited. If you have received this communication in error, please immediately contact the Pinelands Commission at 609-894-7300 to arrange for the return of this information.



PHILIP D. MURPHY Governor SHEILA Y. OLIVER Lt. Governor

State of New Jersey

THE PINELANDS COMMISSION PO Box 359 New Lisbon, NJ 08064 (609) 894-7300 www.nj.gov/pinelands



RICHARD PRICKETT Chairman NANCY WITTENBERG Executive Director

General Information: Info@pinelands.nj.gov Application Specific Information: AppInfo@pinelands.nj.gov

November 19, 2020

Frank A. Speziali, III (via email) Eastern Atlantic States Council of Carpenters 1803 Spring Garden Street Philadelphia, PA 19130

> Re: Application # 2001-0549.002 Block 3510, Lot 1 Mullica Township

Dear Mr. Speziali:

Pursuant to N.J.A.C. 7:50-4.34 of the Pinelands Comprehensive Management Plan, the completion of this application has resulted in the issuance of the enclosed *Inconsistent Certificate of Filing*. The reason(s) for the inconsistency is explained on Page 3 and must be resolved.

The Inconsistent Certificate of Filing is not an approval. It is the document necessary to allow any municipal or county agency to review and act on the proposed development application. All municipal and county permits and approvals granted for the proposed development are subject to review by the Pinelands Commission. No permit or approval shall take effect and no development may occur until the Commission issues a letter indicating that the municipal or county permit or approval may take effect.

Upon receipt of any municipal or county permit or approval, please submit a copy to the Commission's office with the additional items listed on the enclosed *Local Agency Approval Submission Checklist*.

If you have any questions, please contact Branwen Ellis of our staff.

Sincerely,

for Charles M. Horner, P.P. Director of Regulatory Programs

- Enc: Inconsistent Certificate of Filing Local Agency Approval Submission Checklist
- c: Secretary, Mullica Township Planning Board (via email) Mullica Township Construction Code Official (via email) Mullica Township Environmental Commission (via email)

Atlantic County Department of Regional Planning and Development (via email) Atlantic County Division of Public Health (via email) Marianne Risley (via email)

•



BACKGROUND

Existing development:

• Vacant land

Relevant Information:

• The proposed development will be serviced by a proposed on-site septic system.

CONDITIONS

- 1. Each septic system shall be located where the seasonal high water table is at least five feet below the natural ground surface.
- 2. Item(s) on the attached *Inconsistencies* document must be resolved prior to Commission issuance of a letter indicating that any county or municipal permit or approval can take effect.

INCONSIS

NEXT STEPS

- This Certificate of Filing is not an approval.
- Submit a copy of this Certificate of Filing to all county and municipal agencies that are required to review and act on your application (municipal planning board, building department, county health department, etc.).
- Send a copy of all approvals/permits that are issued by the county or municipality to the Pinelands
 Commission for review. Please use the attached *Local Agency Approval Submission Checklist* to make sure you are submitting all required documentation related to the approval/permit.
- No local approval/permit takes effect and no development can occur until the Pinelands Commission has reviewed the approval. When we complete our review, we will issue you a letter stating that the approval/permit can take effect.

INCONSISTENCIES:

This application as currently proposed is inconsistent with the following standard(s) of the Mullica Township certified land use ordinance and the Pinelands Comprehensive Management Plan (CMP):

1. Stormwater-permeability (N.J.A.C. 7:50-6.84(a) 6iv (2)

The Mullica Township land use ordinance and the CMP require that stormwater infiltration facilities be sited in suitable soils verified by field testing to have permeability rates between one and twenty inches per hour. The submitted information indicates that the proposed infiltration basin will be located in soils having a permeability rate greater than twenty inches per hour.

Commission receipt of any county or municipal approval or permit for the development as currently proposed will likely result in the scheduling of a Commission staff public hearing to review the issues raised by the above-referenced inconsistency(ies).

INCONSISTENT

052714



6260 Old Harding Highway Mays Landing, New Jersey 08330 Phone (609) 625-3144 Fax (609) 625-7360 www.capeatlantic.org

September 21, 2020

CONSERVATION DISTRICT

Frank Speziali KML Building Corp., NJ 1803 Spring Garden Street Philadelphia, PA 19130

RE:CERTIFICATION - SOIL EROSION AND SEDIMENT CONTROL PLAN
APPLICATION NO. 314-20PROJECT NAME: KML Building Corp Site Plan
BLOCK(S): 3510LOT(S):1MUNICIPALITY: Mullica TownshipPLANS PREPARED BY:ARH Associates
DATE:8/13/2020LAST REVISED DATE:9/10/2020

Pursuant to the New Jersey Soil Erosion and Sediment Control Act; N.J.S.A. 4:24-39 et seq. the Cape Atlantic Conservation District has reviewed the erosion control application and hereby grants certification of the soil erosion and sediment control plan for the above referenced project subject to the following:

- 1. That the applicant carries out all land disturbance activities in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, promulgated by the State Soil Conservation Committee. A copy of the Erosion Control Plan must be on site.
- 2. The owner/applicant must obtain a District issued Report of Compliance prior to the issuance of any Certificates of Occupancy by the municipality. **Requests for** Certificates of Compliance must be made Five (5) working days in advance.
- 3. Revisions to the certified plan relating to, or that will affect land disturbance on the site, must be submitted to the District office for certification.
- 4. Any conveyance of the project (or portion thereof) prior to its completion will transfer full responsibility for compliance to subsequent owner(s). The District must be notified in writing of any change of ownership.
- 5. This approval is limited to the soil erosion and sedimentation controls specified in this plan. It is not authorization to engage in the proposed land use unless such use has been previously approved by the municipality or other controlling agency.
- 6. This Certification is valid for three and one-half years and will expire on 3/21/2024.

The District requires written notification at least 48 hours in advance of any land disturbance activity (use enclosed Start of Construction postcard).

Failure to comply with the above conditions may result in the issuance of a **STOP CONSTRUCTION ORDER.**

If there are any questions, please feel free to call our office.

ALLEN CARTER, JR., Chairman

cc: John Holroyd, Construction Official Jason Sciullo, Municipal Engineer Theodore Wilkinson, ARH Assoc.



December 4, 2020

Deborah Wahl, PE, PP, CME Doran Engineering 840 N. Main Street Pleasantville, NJ 08232

Re: Proposed KML Building Corp. NJ - Site Plan Application - Pinelands Application No. 2001-0549.002 Block 3510, Lot 1 – 3301 White Horse Pike **Mullica Township, Atlantic County** ARH #50-52714

Dear Ms. Wahl:

On behalf of KML Building Corp. NJ, ARH has provided you with the following information regarding the project site to supplement those initial plans provided to the Township's Planning Board Secretary on August 20, 2020. Since the initial submission made, and as you are aware from our later correspondence, the Pinelands review required additional information specifically with regards to the drainage basin design and infiltration requirements.

The project documents have been revised to address the "Inconsistent" Certificate of Filing. The Pinelands Commission is aware of our efforts to move to the Township for review and authorization. We are going to provide them with a copy of the latest plan and report revisions as well to simultaneously move the project to final compliance.

Enclosed please find the following:

- 1. Two (2) sets of engineering design plans, Sheets 1 through 17, last revised 12/04/20, as signed by David J. Cella, PE. (Previously plans were signed by Theodore Wilkinson, who has since left our firm).
- 2. Two (2) copies of the Stormwater Management Report dated 12/04/20 as signed by David J. Cella, PE. This report supplements that which was completed by Theodore Wilkinson, PE relative to revisions. Copies of the Drainage Divides have been included as well.
- 3. One (1) copy of the Pinelands Commission "Inconsistent" Certificate of Filing dated 11/19/20.

OTHER OUTSIDE AGENCY APPROVALS:

We anticipate the NJDOT approval in the near future for the Minor Access proposed, and the Cape Atlantic Soil Conservation District approval has also been granted, a copy has been attached for your files, Certification No. 314-20. Septic design has been submitted to the County Health Department and is currently under review.

ARH Associates

Corporate Headquarters – 215 Bellevue Avenue – PO Box 579 – Hammonton, NJ 08037 – 609.561.0482 – fax 609.567.8909 Bloomfield Office – 2 Broad Street – Suite 602 – Bloomfield, NJ 07003 – 973.337.8562 – fax 973.337.8876

www.arh-us.com



KML's goals and objectives remain to complete the improvements associated with the 4 acre open air training facility, and those drainage, access improvements associated with it. The building phase will follow once these site improvements are approved and completed.

Thank you for your cooperation in the review of this project, we would like to set up a conference call once initial review of the information is completed, in order to continue to move this project forward. You may contact me at <u>MRISL@arh-us.com</u> and/or contact me at (609)-864-4099.

Sincerely,

Marianne G. Risley Marianne G. Risley

Marianne G. Rísley Environmental Specialist

Enclosures

Cc: Frank Speziali III, Director of Operations, KML (via email) Kimberly Johnson, Mullica Township Planning Board Secretary (via email) Nick DeMatteo, Executive Director, KML (via email) Bruce Garganio, Eastern Atlantic States Regional Council of Carpenters (via email) Ed Hagaman, KML (via email) David Cella, PE – ARH Project Engineer (via e-mail) Adam Warburton, ARH, Environmental Specialist (via e-mail)

Mgr//mgr

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STORMWATER MANAGEMENT REPORT

FOR

CARPENTER'S UNION CENTER BLOCK 3510 LOT 1

> TOWNSHIP OF MULLICA in ATLANTIC COUNTY, NEW JERSEY

December 4, 2020

PREPARED FOR:

KML Building Corporation NJ 1803 Spring Garden Street Philadelphia, PA 19130

PREPARED BY:



ADAMS, REHMANN AND HEGGAN ASSOCIATES, INC. 215 BELLEVUE AVENUE HAMMONTON, NJ 08037

David J. Cella, P.E., C.M.E. NJ PE License No. 47269

DJC

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Referenced Report and Calculations	3

I. Executive Summary

The project stormwater management report was initially prepared by Ted Wilkinson, PE of ARH Associates. The report prepared by Mr. Wilkinson is referenced herein and attached. Project background and methodology from that report has been reviewed for a resubmission to the Pinelands Commission and for review by the Township.

There are two issues to be addressed as part of the Pinelands review letter, including impervious area calculations and soil replacement in the basin:

Table 'D' Total Drainage Area Developed Cover Conditions Breakdown			
Area (sq. ft.)	CN	Description (Subcatchment Numbers)	
8,455	39	>75% Grass cover, Good, HSG A (POA-2 P)	
45,390 98 Paved roads, HSG A (POA-2 I)			
19,100	98	Paved parking, HSG A (P-1 I)	
39,660	98	Aggregate parking, HSG A (P-1 I)	
11,315	98	Roofs, HSG A (P-1 I)	
535,740	30	Woods, Good, HSG A (P-1 P, POA-1)	
289,495	49	Work Area, 50-75% Grass cover, Fair, HSG A (P-1 P)	
949.155	44	TOTAL AREA	

A. Impervious Areas

There is a request in the latest review letter to confirm the impervious areas that are proposed. In reviewing the areas submitted it appears all proposed impervious has been accounted and was presented in the chart to the left from the original report.

Additionally, these values are confirmed when viewing the Proposed Drainage Area Divides plan sheet 2 of 2 dated June 2020, which show the following values (note based upon the review comment requested drainage plans, perhaps these were not provided, but are included as an attachment hereto):



The proposed impervious areas appear to be called out correctly.

B. <u>Basin Soils (K-4 replacement)</u>

One of the modifications to the report and previously submitted calculations relates to the treatment of the basin bottom (import of K-4 material), which will have an impact on the 72-hour drain time. (technically the report used a K-4 rating for this calculation) The applicant proposes to include K-4 material along the bottom of the basin for a depth/thickness of 2'. The detail in the plans also shows K-4 along the basin side slopes up to the 100-year elevation. The K-4 on the side slopes is proposed to be covered with 6" of topsoil which will have an infiltration rate less than the K-4 and will act as a confining layer.

While the plan shows the K-4 along the side slopes it is believed with the use of the topsoil along the side slopes and the top of basin that the K-4 is not warranted, however it is included to comply with the latest review letter from the Pinelands.

The report modification for the drain time is technically unchanged however, applying a factor of safety of 2, the value shown below can be adjusted to 34.94 hrs.

Below is what appeared in the prior report:

72-Hour Drainage

The following table shows how the basins meets or exceeds the requirement at full build out:

Basin	Maximum Water Volume (cf)	Design Permeability Rate of In-Situ Soil (in/hr)	Drain Time (hrs)
1	173,617	10	17.47

The basins is designed to drain the largest design storm within 72-hours.

II. Conclusion

The site retains the 100-year storm volume. There is no discharge proposed and does not currently exist. The site will require a functioning basin, which shall be maintained and monitored to ensure functionality. In the event the basin begins to poorly function in the future it is suggested to install a pump, to be used for dually draining the basin and irrigating the site. Once dry, soil replacement may be warranted (K-4 as designed).

The following attachments are included as part of this report. Additionally, this report is prepared to accompany design plans dated 12-4-20 inclusive of sheets 1 through 17.

III. Attachments/Enclosures

A. Stormwater Management Report prepared by ARH (Ted Wilkinson) latest revised 9-10-20

B. Drainage Divide Plans consisting of 2 sheets prepared by ARH (Ted Wilkinson)

Sheet 1 of 2 EXISTING DRAINAGE DIVIDES dated June 2020 Sheet 2 of 2 PROPOSED DRAINAGE DIVIDES dated June 2020

STORMWATER MANAGEMENT REPORT

FOR

CARPENTER'S UNION CENTER BLOCK 3510 LOT 1

TOWNSHIP OF MULLICA in ATLANTIC COUNTY, NEW JERSEY

July 28th, 2020

PREPARED FOR:

KML Building Corporation NJ 1803 Spring Garden Street Philadelphia, PA 19130

PREPARED BY:



ADAMS, REHMANN AND HEGGAN ASSOCIATES, INC. 215 BELLEVUE AVENUE HAMMONTON, NJ 08037

Theodore Wilkinson, P.E. NJ PE License No. 39607

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I. Executive Summary

A. Project Description

The project site is located in the Township of Mullica (Atlantic County, NJ) off of State Highway- Route 30 White Horse Pike. The land is currently owned by KML Building Corporation NJ and is fully wooded.

The new development will include two (2) driveways into the site, approximately 11,315 square foot building, paved parking for ADA compliance, stone parking for the students, a 4-acre cleared work space, a storm water quality planted swale, and storm water management infiltration basin.

The proposed development includes approximately 19,100 square feet of HMA surface which will be used for access into the site off of the state highway as well as ADA compliance within the site. The other parking areas for the students will be a crushed stone to reduce the amount of pollutants generated by the site runoff. The proposed workspace will be a fully grassed area used for the students to practice building techniques and processes during scheduled school classes.

The site will utilize a new well for potable water as well as a septic field for the wastewater.

Storm water is to be collected from the developed areas and stored as needed to not increase the water elevation at the sink, provide adequate water quality, and recharge.

The entire drainage watershed, today, flows, overland to an on-site low point and is infiltrated due to the extremely permeable sandy soil. The watershed contributing to this low point includes approximately 8.92 acres of off-site adjacent lands as well as the State Highway roadway and Right-of-Way.

Since the proposed parcel has a natural sink in topography there is not a pre-existing rate of runoff which means that there is not a viable way to provide calculations proving one of the three standards set by N.J.A.C. 7:50-6.84(a)6ii. All existing runoff is stored within the depressed sink area.

The following report and calculations are to prove that the pre-existing vs proposed site does not significantly increase the water elevation of the area or cause the high water elevation to encroach onto adjacent properties.

Design Methodology

The existing and developed condition runoff characteristics were modeled using HydroCAD® 10.00-25 and utilizes the Delmarva unit hydrograph in accordance with NRCS New Jersey Bulletin No. NJ210-3-1. Additionally, pervious and impervious areas have been separated to more accurately compute rates and runoff volumes from connected impervious surfaces within each drainage area. The latest 24 hr rainfall frequency data from NOAA Atlas 14 for Hammonton is utilized as indicated in Table A below:

Table 'A'NOAA Atlas 14 - 24 Hour Rainfall Frequency Rate
Hammonton

2 Year	3.30 Inches
10 Year	5.14 Inches
100 Year	8.86 Inches



NOAA Atlas 14, Volume 2, Version 3 Location name: Hammonton, New Jersey, USA* Latitude: 39.6035°, Longitude: -74.7571° Elevation: m/ft** * source: ESRI Maps ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PD	PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹									
Duration				Averaç	ge recurrenc	e interval (y	ears)			
Duration	1	2	5	10	25	50	100	200	500	1000
5-min	0.351	0.417	0.488	0.550	0.620	0.675	0.727	0.776	0.835	0.885
	(0.316-0.390)	(0.375-0.461)	(0.438-0.539)	(0.493-0.608)	(0.553-0.686)	(0.599-0.748)	(0.643-0.807)	(0.680-0.865)	(0.724-0.937)	(0.760-1.00)
10-min	0.561	0.666	0.782	0.879	0.988	1.08	1.16	1.23	1.32	1.39
	(0.505-0.622)	(0.599-0.737)	(0.702-0.864)	(0.788-0.973)	(0.882-1.09)	(0.954-1.19)	(1.02-1.28)	(1.08-1.37)	(1.15-1.48)	(1.20-1.58)
15-min	0.701	0.838	0.989	1.11	1.25	1.36	1.46	1.55	1.66	1.75
	(0.631-0.778)	(0.753-0.927)	(0.888-1.09)	(0.996-1.23)	(1.12-1.39)	(1.21-1.51)	(1.29-1.62)	(1.36-1.73)	(1.44-1.87)	(1.50-1.98)
30-min	0.962	1.16	1.41	1.61	1.86	2.05	2.24	2.42	2.64	2.83
	(0.865-1.07)	(1.04-1.28)	(1.26-1.55)	(1.44-1.78)	(1.66-2.05)	(1.82-2.27)	(1.98-2.48)	(2.12-2.69)	(2.29-2.97)	(2.43-3.20)
60-min	1.20	1.45	1.80	2.10	2.47	2.78	3.08	3.39	3.79	4.14
	(1.08-1.33)	(1.31-1.61)	(1.62-1.99)	(1.88-2.32)	(2.20-2.73)	(2.47-3.08)	(2.72-3.42)	(2.97-3.78)	(3.29-4.26)	(3.55-4.67)
2-hr	1.45	1.75	2.19	2.57	3.06	3.46	3.86	4.28	4.84	5.31
	(1.29-1.63)	(1.56-1.98)	(1.94-2.47)	(2.27-2.90)	(2.68-3.44)	(3.03-3.90)	(3.36-4.38)	(3.69-4.87)	(4.12-5.54)	(4.47-6.12)
3-hr	1.58 (1.41-1.79)	1.91 (1.70-2.16)	2.39 (2.11-2.70)	2.82 (2.48-3.19)	3.37 (2.95-3.81)	3.84 (3.34-4.35)	4.32 (3.72-4.91)	4.82 (4.11-5.49)	5.50 (4.62-6.31)	6.08 (5.05-7.01)
6-hr	1.96	2.36	2.93	3.47	4.19	4.82	5.48	6.18	7.17	8.05
	(1.75-2.24)	(2.09-2.69)	(2.60-3.35)	(3.06-3.96)	(3.66-4.78)	(4.18-5.50)	(4.71-6.26)	(5.25-7.09)	(5.98-8.28)	(6.61-9.35)
12-hr	2.37 (2.11-2.70)	2.84 (2.53-3.23)	3.56 (3.16-4.04)	4.25 (3.76-4.82)	5.21 (4.57-5.91)	6.09 (5.28-6.91)	7.03 (6.02-8.01)	8.06 (6.80-9.23)	9.58 (7.89-11.0)	11.0 (8.84-12.7)
24-hr	2.71 (2.48-2.99)	3.30 (3.01-3.64)	4.29 (3.91-4.73)	<mark>5.14</mark> (4.67-5.66)	6.44 (5.80-7.06)	7.58 (6.78-8.28)	<mark>8.86</mark> (7.87-9.65)	10.3 (9.06-11.2)	12.5 (10.8-13.6)	14.4 (12.3-15.6)
2-day	3.12	3.80	4.93	5.91	7.38	8.67	10.1	11.7	14.2	16.3
	(2.85-3.44)	(3.47-4.20)	(4.50-5.44)	(5.38-6.51)	(6.67-8.11)	(7.78-9.50)	(9.00-11.1)	(10.3-12.8)	(12.3-15.5)	(14.0-17.9)
3-day	3.28	3.98	5.15	6.15	7.64	8.94	10.4	12.0	14.4	16.5
	(3.01-3.59)	(3.66-4.37)	(4.73-5.64)	(5.62-6.72)	(6.95-8.34)	(8.08-9.74)	(9.31-11.3)	(10.7-13.0)	(12.6-15.7)	(14.3-18.0)
4-day	3.44 (3.17-3.74)	4.17 (3.85-4.54)	5.37 (4.95-5.84)	6.39 (5.87-6.94)	7.90 (7.23-8.57)	9.21 (8.37-9.97)	10.7 (9.62-11.5)	12.3 (11.0-13.3)	14.7 (13.0-15.8)	16.7 (14.6-18.1)
7-day	4.00 (3.72-4.34)	4.83 (4.49-5.23)	6.11 (5.68-6.63)	7.20 (6.67-7.79)	8.81 (8.11-9.50)	10.2 (9.33-11.0)	11.7 (10.6-12.6)	13.4 (12.0-14.4)	15.8 (14.1-17.0)	17.9 (15.8-19.3)
10-day	4.50	5.40	6.73	7.83	9.42	10.7	12.2	13.7	16.0	18.0
	(4.20-4.85)	(5.05-5.83)	(6.28-7.25)	(7.29-8.42)	(8.73-10.1)	(9.91-11.5)	(11.2-13.0)	(12.5-14.7)	(14.4-17.1)	(16.1-19.3)
20-day	6.08	7.23	8.75	9.97	11.7	13.1	14.5	16.0	18.0	19.7
	(5.74-6.45)	(6.84-7.68)	(8.25-9.29)	(9.39-10.6)	(11.0-12.4)	(12.2-13.9)	(13.5-15.4)	(14.8-17.0)	(16.6-19.2)	(18.0-21.0)
30-day	7.55 (7.14-7.98)	8.94 (8.46-9.46)	10.6 (10.1-11.3)	12.0 (11.3-12.7)	13.9 (13.1-14.6)	15.3 (14.4-16.2)	16.8 (15.7-17.8)	18.3 (17.1-19.4)	20.4 (18.9-21.6)	21.9 (20.2-23.3)
45-day	9.60 (9.13-10.1)	11.3 (10.8-11.9)	13.3 (12.6-14.0)	14.8 (14.0-15.5)	16.7 (15.8-17.6)	18.2 (17.2-19.1)	19.6 (18.5-20.6)	21.1 (19.8-22.1)	22.9 (21.4-24.1)	24.3 (22.6-25.6)
60-day	11.5 (10.9-12.1)	13.5 (12.9-14.2)	15.6 (14.9-16.4)	17.2 (16.4-18.1)	19.2 (18.3-20.2)	20.7 (19.6-21.7)	22.1 (20.9-23.2)	23.4 (22.2-24.6)	25.1 (23.7-26.4)	26.3 (24.7-27.7)

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

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

Please refer to NOAA Atlas 14 document for more information.

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PF graphical







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Maps & aerials

Small scale terrain



Large scale terrain





Large scale aerial

Description of Existing Site

The existing site consists of completely forested area light underbrush.

Two main types of soil groups have been identified on this land including:

- 1. Evesboro Sand (EveB) with 0 to 5% slopes. This soil is a "A" soil and well drained as defined by the NRCS.
- 2. Fort Mott Sand (FobB) with 0 to 5% slopes. This soil is a "A" soil and well drained as defined by the USDA.
- 3. Soil explorations using a backhoe were completed and said soil logs are included at the close of this report in Appendix D. Locations of each pit are identified on the Proposed Drainage Area plan sheet 2 of 2.
- 4. The soils encountered on site where test pits were completed, are conclusive of a "well-drained" Soil Groups 'A' as stated on the NRCS classification. The soil maps and descriptions can be found in Appendix D.

In the instance of this project site, the existing conditions are to be evaluated as follows:

- 1) Woods, Good, HSG A (On-site)
- 2) >75% Grass cover, Good, HSG A (Off-site)
- 3) Paved Roads (Off-site)

Description of Existing Drainage Conditions

The existing site has one (1) onsite drainage area with one low point that all the stormwater collects and infiltrates. There are also two (2) offsite drainage areas that runoff to the low point. One of the offsite drainage areas comes from adjacent undeveloped wooded lands and the other drainage area is the State Highway Right-of-Way that sheet flows directly onto the lands.

The total existing site area included in the calculations includes $12.87\pm$ acres of onsite area and $8.92\pm$ acres of offsite area; totaling $21.79\pm$ acres.

The site only has one (1) point of interest for analysis and it is an existing natural sink on the property. A plan is attached at the end of this report in the pocket. A description of each discharge point is as follows:

• The onsite land depression collects runoff from all 949,155 square feet within the watershed. The onsite depression has no outfall and is roughly 6± feet lower than the state highway. The railroad along the south property line is raised up to approximately elevation 85± which creates a dam blocking downstream flow.

The drainage conditions for the property were analyzed using the method described in Technical Release No. 20 (TR-20), published by the U.S. Soil Conservation Service. Soils information utilized in the calculations was based off of on-site soil test pits and permeability tests that were

conclusive to the NRCS classifications. The modeling done utilized A grade soils as the site most resembled from testing and NRCS.

The existing sink was modeled as a pond in HydroCAD to obtain an existing water elevation for each of the high intensity storms. The existing volumes and water elevation may be verified by review of the detailed calculations included as Appendix A.

Table 'B' Total Drainage Area Existing Cover Conditions Breakdown

Area (sq.ft.)	CN	Description (Subcatchment Numbers)
8,455	39	>75% Grass cover, Good, HSG A (OA-2 P)
45,390	98	Paved Road (OA-2 I)
895,310	30	Woods, Good, HSG A (EX-1, OA-1)
949,155	33	TOTAL AREA

Summary Table 'C' Existing Conditions Water Elevation and Volume to On-site Natural Sink

Point of Interest #	Storm Event (Year)	Water within Natural Sink	Runoff Volume (CU-FT)
1	2 yr	78.27	11,599 cu-ft
1	10 yr	78.55	19,406 cu-ft
1	100 yr	79.56	81,336 cu-ft

B. Description of Proposed Site Characteristics

Stormwater runoff under developed conditions is designed for complete sheet flow with limited shallow concentrated flow to the proposed basin.

Sheet flow from the front HMA surface into a planted swale for water quality will continue under the driveways during high intensity storms by way of a 12" diameter DI culvert pipe and continue flowing through the woods into the proposed basin. All other stone parking areas are graded to sheet flow into the surrounding grass and down to the basin.

There are no collection structures or conveyance piping proposed for the sites runoff flow. There is adequate area for runoff to permeate and recharge prior to reaching the basin.

The stormwater drainage patterns under post-development conditions are similar to those under existing conditions since the proposed basin is located at the sites low point. Due to the basin being at the low point of the site there is no positive outfall.

A brief description of the drainage point of interest is provided below and a plan denoting each of these points is attached at the end of this report in the pocket.

Basin 1 (1P) consists of 949,155 square feet. The proposed basin is designed to store the entire watersheds runoff volume. The entire area is accounted for within this design so that the 100-year water elevation is accurately calculated and adequately stored and managed. The proposed building finished floor elevation is 84.00 which is 4.47± above the 100-year water elevation.

Modeling of the post-development drainage was done utilizing 'A' grade soils as most represented from the onsite backhoe test pits that were conducted.

Table 'D'Total Drainage AreaDeveloped Cover Conditions Breakdown

Area	CN	Description (Subcatchment Numbers)
(sq. ft.)		
8,455	39	>75% Grass cover, Good, HSG A (POA-2 P)
45,390	98	Paved roads, HSG A (POA-2 I)
19,100	98	Paved parking, HSG A (P-1 I)
39,660	98	Aggregate parking, HSG A (P-1 I)
11,315	98	Roofs, HSG A (P-1 I)
535,740	30	Woods, Good, HSG A (P-1 P, POA-1)
289,495	49	Work Area, 50-75% Grass cover, Fair, HSG A (P-1 P)
949,155	44	TOTAL AREA

Summary Table 'E' Developed Conditions Water Elevation and Volume to Proposed Basin

Point of Interest #	Storm Event (Year)	Water Elevation within Basin	Runoff Volume (CU-FT)
Basin	2 yr	76.62	30,005 cu-ft
Basin	10 yr	77.61	60,160 cu-ft
Basin	100 yr	79.57	173,638 cu-ft

Due to the Basin being located within the natural sink there is no positive outfall from the Basin. The Basin has been designed to store and infiltrate the entire 100-year storm and not increase the water elevations from existing to proposed conditions.

C. Summary of Methodology

The site is designed to comply with N.J.A.C. 7:8 (Stormwater Management regulations promulgated by the NJDEP) and the Ordinance of Galloway Township. The proposed stormwater management system is designed to:

- 1) provide for 80% Total Suspended Solids (TSS) removal from discharged stormwater;
- 2) 72 hour basin drainage time;
- 3) infiltrate the volume from the increase in impervious area the 10-year storm;
- 4) provide a calculation concluding that the natural sink water elevation from existing to proposed conditions is unaffected and that the water elevation will be contained within the subject property;
- 5) provide ground water recharge of 100% of the difference between the site's pre- and post-development 2-year runoff volumes be infiltrated.

A detailed description of each of the methodologies provided for the design of the stormwater management system follows.

Water Quality

In order to meet the 80% reduction of the TSS, the basin is designed to infiltrate the 1.25" Water Quality Storm. The purpose of an infiltration basin is to have the Water Quality Storm Volume permeate the sand layer to allow pollutants to be treated through settling, filtration, and adsorption. A 6" thick K-5 sand basin bottom with a 20 inch per hour permeability rate will provide 80% TSS removal as well as draining the Water Quality Storm volume within 36 hours. The area of the sand bed totals 11,925 sq. ft for Basin 1.

The basin provides the necessary water quality for the entire developed area. However, the proposed development has a small concentrated HMA area that produces pollutants. Since this area is concentrated, we are implementing a planted runoff swale in front of the HMA area to allow the sheet flow from the HMA to have a more direct water quality solution. This area is designed to provide additional water quality before continuing downstream to the basin. During high intensity storms 12" DI culvert pipes under the driveways allow for the higher flow and volume storms to continue through the planted swale and downstream to the basin. This will prevent the planted swale from being overtaken and drowned.

The following table shows how the basin meets and exceeds the requirement:

Basin	Water Quality Storm Volume (cf)	Design Permeability Rate of In-Situ Soil (in/hr)	Drain Time (hrs)
1	9,952	10	1.00

It is concluded that the Water Quality Storm will drain from the basin well before the 36-hour threshold.

72-Hour Drainage

Basin	Maximum Water Volume (cf)	Design Permeability Rate of In-Situ Soil (in/hr)	Drain Time (hrs)
1	173,617	10	17.47

The following table shows how the basins meets or exceeds the requirement at full build out:

The basins is designed to drain the largest design storm within 72-hours.

Permeability Testing

Three (3) test pits were completed, along with three grab samples for laboratory testing by Craig Testing to determine the permeability ratings associated within the basin area. The average resulting stabilized infiltration rate for Basin 1 is over 20 inches per hour which equates to a K-5 soil. The basin testing proves to have soils that are adequate per the CMP regulations which will not require soil replacement and instead soil tilling down 6 inches.

The basin floor will be tested and as-built at the end of construction to verify design permeability rates can be achieved to get the proper drain time.

All permeability testing results are provided in Appendix D. All soil boring logs and report are provided in Appendix D. Locations and elevations of such are provided on the Proposed Drainage Area Plan provided in the back pocket folder.

Pinelands CMP

Infiltration

The site is within the Pineland Jurisdictional Area and is subject to the conditions of the Pinelands CMP. The Pinelands CMP requires that the surface water runoff from the net increase in proposed impervious area from the site during a 10-year storm event be retained and infiltrated onsite.

It should be noted that the basin is designed to store and infiltrate the entire runoff volume of the Water Quality storm along with all of the Quantity storms. This includes the offsite areas that drain to the onsite sink. There is no outfall.

Mounding

The Pinelands CMP requires a mounding analysis be performed to assess the hydraulic impacts of mounding of the water table resulting from infiltration of stormwater. Stormwater mounding analysis for the basin can be found in Appendix C.

The increase in groundwater for Basin 1 was calculated to be 19.933 feet. (Hantush Method)

The existing site has never had standing water in the natural sink. With no signs of mottles within the test pits and the sites highly permeable sandy soil types ground water is likely to be more than 25' below the existing surface. With groundwater at that depth mounding from this Basins infiltration would not be an issue. There are not any nearby structures that would be affected by the calculated mounding.

As-Built

The basin shall be topographically as-built and permeability as-built at the end of construction to ensure the design volume and permeability rate is achieved. The plan and permeability results shall be submitted to the Pinelands Commission as well as the local municipal engineer for approval and final acceptance.

Existing Natural Sink Storm Water Elevation and Proposed Basin Water Elevation Comparison

	EXISTING DEPRESSION	
	NATURAL SINK (EX-P)	BASIN 1 (PR-P)
STORM EVENT	Water Elevation	Water Elevation
2 yr	78.27	76.62
10 yr	78.55	77.61
100 yr	79.56	79.57

Summary Table 'F' Pre and Post Developed Comparison of Water Elevation

The existing 100-year storm event has a runoff high water elevation of 79.56 which is contained on the subject parcel per the topographic survey.

The proposed 100-year storm event has a runoff high water elevation of 79.57 which is only 0.01 feet higher than existing conditions. The proposed basin and water elevation is still contained on the subject parcel and does not contain risk of flood damage to onsite or offsite structures. The proposed finished floor elevation of the building is 84.00 which is approximately 4.43 feet above the 100-year water elevation.

Ground Water Recharge

To achieve ground water recharge for this site which complies with N.J.A.C. 7:8 (Stormwater Management regulations promulgated by the NJDEP) there are two requirements; one of which needs to be achieved in order to comply with ground water recharge:

Requirement 2: That 100 percent of the difference between the site's pre- and postdevelopment 2-year runoff volumes be infiltrated.

2 yr Volumes Pre-Development		
TOTAL	0 cf	
2 yr Volumes Post-Development		
TOTAL 18,402 cf		

TOTAL DIFFERENCE	
IN 2-YR STORM	
VOLUME	18,402 cf

As seen from the tables the total difference in volume that needs to be infiltrated is 18,402 cf. The proposed basin is designed to store and infiltrate the 100-year storm and has over 173,683 cf of storage.

Nine Non-Structural Strategies

Utilization of non-structural strategies in accordance with NJAC 7:8-5.3 to the maximum extent possible.

A. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;

- The site has been designed and graded to minimize clearing and allow runoff to drain naturally as much as possible. Basin slopes follow existing grade as much as possible to limit the amount of earthwork necessary. The development utilizes the existing natural sink to limit the amount of earthwork and also keep drainage patterns similar to existing.
- As many woods as possible have been saved on the site and wooded areas are utilized to store the 100- year storm volume so that the basin could require the least amount of disturbance as possible.
- B. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
 - The new impervious surfaces were, to the maximum extent practical, designed to drain over pervious areas.
 - The entire site was designed as sheet flow to the proposed basin meaning that all of the impervious surfaces will travel over a pervious area prior to reaching the proposed basin.
 - The area in the front of the site which includes HMA pavement for the two entrance driveways and front parking lot for ADA compliance has been designed to sheet flow into a planted swale to be treated for runoff quality prior to reaching the basin.
 - The site proposes over land flow from roof leaders and sheet flow into the proposed basins.

- The Carpenter Union School has decided to utilize a grassed work area where there training will take place which will be grass surface and will have regular upkeep.
- C. Maximize the protection of natural drainage features and vegetation;
 - The site is designed to keep the natural depression terrain that assists with stormwater runoff. The areas will also still be naturally grassed. Where trees are being removed grass will be planted along with minimal landscaping
- D. Minimize the decrease in the "time of concentration" from pre-construction to postconstruction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed.
 - The "Time of Concentration" has decreased from existing to proposed conditions. The travel paths are similar but the slope of the terrain and the surface condition of the Tc path changed. However, the design still implements a lot of pervious areas and offers a lot of recharge area. The roof leaders will discharge overland to allow for as much 'clean' runoff as possible recharge before entering the basin.
- E. Minimize land disturbance including clearing and grading;
 - This site minimizes land disturbance by utilizing existing depressions to construct the infiltration basin. 3:1 slopes are proposed where appropriate to match existing conditions. Limit of disturbance lines are also proposed on the plan for the contractor to stay within. The design also allows for a lot of existing topography to be utilized. Grading will be very minimal just to level out some of the surfaces within the work area. Major earthwork is not proposed for this project.
- F. Minimize soil compaction;
 - Notes are indicated on the basin construction details requiring the use of low ground pressure construction equipment to minimize over compaction of the pervious areas of the site and working outside the basin bottom to the maximum extent practical to minimize compaction of underlying soils to maximize the basin's infiltration capabilities. The contractor will also be required to till the basin floor a minimum 6" along with the other areas around the site that are required to be tested.
- G. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimize the use of lawns, fertilizers and pesticides;
 - Native vegetation is provided on the landscaping plan according to the approved Pinelands Plant species list. Lawns are proposed for this site to help with over land flow and the planted swale has proposed plants that are native to the Pinelands and the area.

- H. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas.
 - This site has natural terrain that is relatively evenly sloped to allow stormwater to sheet flow into the proposed basins. Graded swales have been proposed to assist with directing the stormwater runoff into the proposed basins. Drainage structures are not designed on this site. All areas are designed for sheet flow. There are only two culvert pipes that are proposed under the driveways to allow for stormwater to pass under instead of on top of the asphalt. This will bring the runoff from the front around the building and to the basin area.
- I. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
 - i. Site design features that help to prevent accumulation of trash and debris in drainage systems;
 - ii. Site design features that help to prevent discharge of trash and debris from drainage systems;
 - iii. Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
 - iv. When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.
 - The basin area will serve as a gravity based collection system for trash and silts to minimize offsite release. A maintenance plan is proposed to maintain all lawn and basin area clearing. Fertilizer rates proposed are pursuant to the Soil Conservation District SCD Standards.

D. Conclusions

As shown in our calculations the proposed major development meets the NJDEP stormwater standards, Pinelands CMP requirements and Erosion Control Measures. NJAC 7:8-5.3 Nine Non-Structural Strategies have been demonstrated to the most practicable extent possible as stated above in the narrative. NJAC 7:8-5.4 Erosion control, groundwater recharge and runoff quantity has been met. Compliance of these requirements have been outlined in the above tables and narrative. NJAC 7:8-5.5 Stormwater runoff quality standards have been met through the proposed infiltration basins and comply with the design standards and drain times. This site also utilizes a planted swale that will remove TSS from the proposed parking area prior to entering the entering the infiltration basin. Therefore, the stormwater management system, as designed, complies with all the appropriate agency regulations.
II. Quantitative Calculations

<u>Appendix A – Existing Drainage</u> <u>Calculations</u>



Area Listing (selected nodes)

Area	CN	Description
(sq-ft)		(subcatchment-numbers)
8,455	39	>75% Grass cover, Good, HSG A (OA-2 P)
45,390	98	Paved roads, HSG A (OA-2 I)
895,310	30	Woods, Good, HSG A (EX-1, OA-1)
949,155	33	TOTAL AREA

Soil Listing (selected nodes)

Area	Soil	Subcatchment
(sq-ft)	Group	Numbers
949,155	HSG A	EX-1, OA-1, OA-2 I, OA-2 P
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
949,155		TOTAL AREA

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Sub	Ground	Total	Other	HSG-D	HSG-C	HSG-B	HSG-A
Nur	Cover	(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)
_	>75% Grass	8,455	0	0	0	0	8,455
	cover, Good						
	Paved roads	45,390	0	0	0	0	45,390
	Woods, Good	895,310	0	0	0	0	895,310
	TOTAL AREA	949,155	0	0	0	0	949,155

Ground Covers (selected nodes)

Time span=0.00-80.00 hrs, dt=0.05 hrs, 1601 points Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: ON-SITE RUNOFF	Runoff Area=560,570 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=816' Tc=46.5 min CN=30 Runoff=0.00 cfs 0 cf
SubcatchmentOA-1: OFF-SITE RUNOFF	Runoff Area=334,740 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=1,110' Tc=42.7 min CN=30 Runoff=0.00 cfs 0 cf
SubcatchmentOA-2 I: OFF-SITE STATE F	Runoff Area=45,390 sf 100.00% Impervious Runoff Depth=3.07" low Length=620' Tc=30.4 min CN=98 Runoff=1.36 cfs 11,601 cf
Subcatchment OA-2 P: OFF-SITE STATE	Runoff Area=8,455 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=592' Tc=33.7 min CN=39 Runoff=0.00 cfs 1 cf
Pond EX-P: Existing Depression Natural	Peak Elev=78.27' Storage=11,599 cf Inflow=1.36 cfs 11,603 cf Outflow=0.00 cfs 0 cf
Total Runoff Area = 949,155 s 9	f Runoff Volume = 11,603 cf Average Runoff Depth = 0.15" 5.22% Pervious = 903,765 sf 4.78% Impervious = 45,390 sf

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume=

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

Are	a (sf)	CN I	Description		
560),570	30 \	Noods, Go	od, HSG A	
560),570	100.00% Pervious Are		ervious Are	a
Tc L (min)	ength (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2	150	0.0086	0.06		Sheet Flow, Sheet Flow- Woods
5.3	666	0.0171	2.11		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
46.5	816	Total			

Subcatchment EX-1: ON-SITE RUNOFF AREA TO NATURAL LOW POINT



0 cf, Depth= 0.00"

Summary for Subcatchment OA-1: OFF-SITE RUNOFF AREA TO NATURAL LOW POINT

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume=

0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

Area (sf	CN	Description	1	
334,740	30	Woods, Go	od, HSG A	
334,740		100.00% P	ervious Are	a
Tc Leng (min) (fee	h Slop t) (ft/l	e Velocity ft) (ft/sec)	Capacity (cfs)	Description
29.0 15	0 0.020	06 0.09	· · ·	Sheet Flow, Sheet Flow- Woods
13.7 96	0 0.005	53 1.17		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
42.7 1.11	0 Total			

Subcatchment OA-1: OFF-SITE RUNOFF AREA TO NATURAL LOW POINT



Summary for Subcatchment OA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO NATURAL LOW POIN

Page 8

Runoff 1.36 cfs @ 12.45 hrs, Volume= 11,601 cf, Depth= 3.07" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

	A	rea (sf)	CN	Description		
*		45,390	98	Paved road	s, HSG A	
		45,390		100.00% Im	npervious A	rea
	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
	0.4	28	0.0250) 1.18		Sheet Flow, Sheet Flow- Pavement
	22.9	122	0.0246	6 0.09		Sheet Flow, Sheet Flow- Woods
	7.1	470	0.0047	7 1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
	30.4	620	Total			

Subcatchment OA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO NATURAL LOW POINT



Summary for Subcatchment OA-2 P: OFF-SITE STATE ROW TO NATURAL LOW POINT

Runoff = 0.00 cfs @ 24.13 hrs, Volume= 1 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

A	rea (sf)	CN [Description		
	8,455	39 >	>75% Gras	s cover, Go	ood, HSG A
	8,455	100.00% Pervious Area			a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	150	0.0246	0.09		Sheet Flow, Sheet Flow- Woods
6.7	442	0.0047	1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
33.7	592	Total			

Subcatchment OA-2 P: OFF-SITE STATE ROW TO NATURAL LOW POINT



Summary for Pond EX-P: Existing Depression Natural Sink

Inflow A	Area	=	949,155 sf,	4.78% Ir	mpervious,	Inflow Depth =	0.15	5" for 2	2 YR e	event	
Inflow	=	=	1.36 cfs @	12.45 hrs,	Volume=	11,603 c	of				
Outflov	v =	=	0.00 cfs @	0.00 hrs,	Volume=	0 c	of, At	tten= 10	0%, L	.ag= 0.0 mi	n

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs Peak Elev= 78.27' @ 27.75 hrs Surf.Area= 22,326 sf Storage= 11,599 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Stora	age Storage	e Description	
#1	77.00'	137,176	S cf Existin	g Depression (F	Prismatic)Listed below (Recalc)
Elevation	Surf./	Area	Inc.Store	Cum.Store	
(feet)	(s	:q-ft) (cubic-feet)	(cubic-feet)	
77.00	1	,322	0	0	
78.00	12	,505	6,914	6,914	
79.00	49	,005	30,755	37,669	
80.00	150	,010	99,508	137,176	

Pond EX-P: Existing Depression Natural Sink



5052714 Carpenters Union	NOAA 24-hr C	10 YR Rair	nfall=5.14"
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			-

Time span=0.00-80.00 hrs, dt=0.05 hrs, 1601 points Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: ON-SITE RUNOFF	Runoff Area=560,570 sf 0.00% Impervious Runoff Depth=0.01" Flow Length=816' Tc=46.5 min CN=30 Runoff=0.03 cfs 440 cf
Subcatchment OA-1: OFF-SITE RUNOFF	Runoff Area=334,740 sf 0.00% Impervious Runoff Depth=0.01" Flow Length=1,110' Tc=42.7 min CN=30 Runoff=0.02 cfs 263 cf
Subcatchment OA-2 I: OFF-SITE STATE	Runoff Area=45,390 sf 100.00% Impervious Runoff Depth=4.90" Flow Length=620' Tc=30.4 min CN=98 Runoff=2.14 cfs 18,545 cf
Subcatchment OA-2 P: OFF-SITE STATE	Runoff Area=8,455 sf 0.00% Impervious Runoff Depth=0.23" Flow Length=592' Tc=33.7 min CN=39 Runoff=0.01 cfs 162 cf
Pond EX-P: Existing Depression Natural	Peak Elev=78.55' Storage=19,406 cf Inflow=2.14 cfs 19,409 cf Outflow=0.00 cfs 0 cf
Total Runoff Area = 949,155 s	sf Runoff Volume = 19,409 cf Average Runoff Depth = 0.25" 95.22% Pervious = 903,765 sf 4.78% Impervious = 45,390 sf

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Summary for Subcatchment EX-1: ON-SITE RUNOFF AREA TO NATURAL LOW POINT

Runoff 0.03 cfs @ 24.14 hrs, Volume= 440 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

Are	a (sf)	CN I	Description		
560),570	30 \	Woods, Go	od, HSG A	
560,570 100.00% Pervious Area				ervious Area	a
Tc L (min)	ength (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2	150	0.0086	0.06	<u>_</u>	Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
5.3	666	0.0171	2.11		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
46.5	816	Total			

Subcatchment EX-1: ON-SITE RUNOFF AREA TO NATURAL LOW POINT



Summary for Subcatchment OA-1: OFF-SITE RUNOFF AREA TO NATURAL LOW POINT

Runoff = 0.02 cfs @ 24.12 hrs, Volume= 263 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

Area (s	f) Cl	N De	escription		
334,74	0 3	0 W	oods, Goo	od, HSG A	
334,74	334,740 100.00% Pervious Area			ervious Area	a
Tc Len (min) (fe	gth S et) (lope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0 1	50 0.0)206	0.09	, <i>r</i>	Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
13.7 9	60 0.0	0053	1.17		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
427 11	10 To	tal			·

Subcatchment OA-1: OFF-SITE RUNOFF AREA TO NATURAL LOW POINT



Summary for Subcatchment OA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO NATURAL LOW POIN

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Runoff 2.14 cfs @ 12.45 hrs, Volume= 18,545 cf, Depth= 4.90" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

	A	rea (sf)	CN	Description				
*		45,390	98	Paved road	s, HSG A			
	45,390 100.00% I				npervious Area			
	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity (ft/sec)	Capacity (cfs)	Description		
	0.4	28	0.0250	0 1.18		Sheet Flow, Sheet Flow- Pavement Smooth surfaces n= 0.011 P2= 3.27"		
	22.9	122	0.0246	6 0.09		Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"		
	7.1	470	0.0047	7 1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps		
	30.4	620	Total					

Subcatchment OA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO NATURAL LOW POINT



Summary for Subcatchment OA-2 P: OFF-SITE STATE ROW TO NATURAL LOW POINT

Runoff = 0.01 cfs @ 13.61 hrs, Volume= 162 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

A	rea (sf)	CN I	Description		
	8,455	39 :	>75% Gras	s cover, Go	ood, HSG A
	8,455 100.00% Pervious Area				a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	150	0.0246	0.09	()	Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
6.7	442	0.0047	1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
33.7	592	Total			

Subcatchment OA-2 P: OFF-SITE STATE ROW TO NATURAL LOW POINT



Summary for Pond EX-P: Existing Depression Natural Sink

Inflow .	Area	=	949	9,155 sf,	, 4.78% li	mpervious,	Inflow Depth =	0.25"	for 10 Y	'R event
Inflow		=	2.14	cfs @	12.45 hrs,	Volume=	19,409 c	of		
Outflov	N	=	0.00	cfs @	0.00 hrs,	Volume=	0 c	of, Atten=	= 100%,	Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs Peak Elev= 78.55' @ 29.20 hrs Surf.Area= 32,685 sf Storage= 19,406 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storag	je Storage	Description	
#1	77.00'	137,176	cf Existing	g Depression (I	Prismatic)Listed below (Recalc)
Elevation	Surf./	Area	Inc.Store	Cum.Store	
(feet)	(s	sq-ft) (c	ubic-feet)	(cubic-feet)	
77.00	1	,322	0	0	
78.00	12	,505	6,914	6,914	
79.00	49	,005	30,755	37,669	
80.00	150	,010	99,508	137,176	

Pond EX-P: Existing Depression Natural Sink



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Time span=0.00 Runoff by SCS TR-2 Reach routing by Stor-Ind+T	0-80.00 hrs, dt=0.05 hrs, 1601 points 20 method, UH=Delmarva, Weighte rans method - Pond routing by Sto	s d-CN or-Ind method
Subcatchment EX-1: ON-SITE RUNOFF	Runoff Area=560,570 sf 0.00% Im Flow Length=816' Tc=46.5 min CN=3	pervious Runoff Depth=0.64" 30 Runoff=1.40 cfs 29,841 cf
Subcatchment OA-1: OFF-SITE RUNOFF	Runoff Area=334,740 sf 0.00% Im ow Length=1,110' Tc=42.7 min CN=3	pervious Runoff Depth=0.64" 30 Runoff=0.87 cfs 17,819 cf
Subcatchment OA-2 I: OFF-SITE STATE	Runoff Area=45,390 sf 100.00% Im Flow Length=620' Tc=30.4 min CN=9	pervious Runoff Depth=8.62" 98 Runoff=3.70 cfs 32,604 cf
Subcatchment OA-2 P: OFF-SITE STATE	Runoff Area=8,455 sf 0.00% Im Flow Length=592' Tc=33.7 min CN	pervious Runoff Depth=1.54" =39 Runoff=0.09 cfs 1,083 cf
Pond EX-P: Existing Depression Natural	Peak Elev=79.56' Storage=81,336	o cf Inflow=4.71 cfs 81,348 cf Outflow=0.00 cfs 0 cf
Total Runoff Area = 949,155	sf Runoff Volume = 81,348 cf A 95.22% Pervious = 903,765 sf 4.	verage Runoff Depth = 1.03" 78% Impervious = 45,390 sf

Summary for Subcatchment EX-1: ON-SITE RUNOFF AREA TO NATURAL LOW POINT

Runoff 1.40 cfs @ 13.48 hrs, Volume= 29,841 cf, Depth= 0.64" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

Ar	rea (sf)	CN	Description		
5	560,570 30 Woods, Good, HSG A				
560,570 100.00% Pervious Area				ervious Are	a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2	150	0.0086	0.06		Sheet Flow, Sheet Flow- Woods
5.3	666	0.0171	2.11		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
46.5	816	Total			

Subcatchment EX-1: ON-SITE RUNOFF AREA TO NATURAL LOW POINT



Runoff 0.87 cfs @ 13.40 hrs, Volume= 17,819 cf, Depth= 0.64" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

	Ai	rea (sf)	CN	Description		
	334,740 3		30	Woods, Go	od, HSG A	
334,740			100.00% Pe	ervious Are	a	
(1	Tc min)	Length (feet)	Slope (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
	29.0	150	0.0206	6.09	· · ·	Sheet Flow, Sheet Flow- Woods
	13.7	960	0.0053	3 1.17		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
	127	1 110	Total			

Subcatchment OA-1: OFF-SITE RUNOFF AREA TO NATURAL LOW POINT



Summary for Subcatchment OA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO NATURAL LOW POIN

Runoff = 3.70 cfs @ 12.45 hrs, Volume= 32,604 cf, Depth= 8.62"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

_	A	rea (sf)	CN	Description		
*		45,390	98	Paved road	s, HSG A	
	45,390 100.00% Impervious			100.00% In	npervious A	rea
	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
	0.4	28	0.0250) 1.18		Sheet Flow, Sheet Flow- Pavement
						Smooth surfaces n= 0.011 P2= 3.27"
	22.9	122	0.0246	6 0.09		Sheet Flow, Sheet Flow- Woods
						Woods: Light underbrush n= 0.400 P2= 3.27"
	7.1	470	0.0047	7 1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods
_						Unpaved Kv= 16.1 fps
	30.4	620	Total			

Subcatchment OA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO NATURAL LOW POINT



Runoff 0.09 cfs @ 12.72 hrs, Volume= 1,083 cf, Depth= 1.54"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

A	rea (sf)	CN I	Description		
	8,455	39 >	>75% Gras	s cover, Go	ood, HSG A
	8,455 100.00% Pervious Area			ervious Are	a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	150	0.0246	0.09		Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
6.7	442	0.0047	1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
33.7	592	Total			

Subcatchment OA-2 P: OFF-SITE STATE ROW TO NATURAL LOW POINT



Hydrograph

Summary for Pond EX-P: Existing Depression Natural Sink

Inflow .	Area	=	949,155 sf,	4.78% Ir	mpervious,	Inflow Depth =	1.03"	for 100	YR event
Inflow	:	=	4.71 cfs @	12.77 hrs,	Volume=	81,348 c	f		
Outflov	N :	=	0.00 cfs @	0.00 hrs,	Volume=	0 c	f, Atten=	= 100%,	Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs Peak Elev= 79.56' @ 29.20 hrs Surf.Area= 105,938 sf Storage= 81,336 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storag	e Storage	Description	
#1	77.00'	137,176	cf Existing	g Depression (I	Prismatic)Listed below (Recalc)
Elevation	Surf./	Area	Inc.Store	Cum.Store	
(feet)	(s	sq-ft) (ci	ubic-feet)	(cubic-feet)	
77.00	1	,322	0	0	
78.00	12	,505	6,914	6,914	
79.00	49	,005	30,755	37,669	
80.00	150	,010	99,508	137,176	

Pond EX-P: Existing Depression Natural Sink



<u>Appendix B – Proposed Drainage</u> <u>Calculations</u>



Area Listing (selected nodes)

Area	CN	Description
(sq-ft)		(subcatchment-numbers)
8,455	39	>75% Grass cover, Good, HSG A (POA-2 P)
39,660	98	Aggregate parking, HSG A (P-1 I)
19,100	98	Paved parking, HSG A (P-1 I)
45,390	98	Paved roads, HSG A (POA-2 I)
11,315	98	Roofs, HSG A (P-1 I)
535,740	30	Woods, Good, HSG A (P-1 P, POA-1)
289,495	49	Work Area, 50-75% Grass cover, Fair, HSG A (P-1 P)
949,155	44	TOTAL AREA

Soil Listing (selected nodes)

Area	Soil	Subcatchment
(sq-ft)	Group	Numbers
949,155	HSG A	P-1 I, P-1 P, POA-1, POA-2 I, POA-2 P
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
949,155		TOTAL AREA

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HSG-A	HSG-B	HSG-C	HSG-D	Other	Total	Ground
(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	Cover
 8,455	0	0	0	0	8,455	>75% Grass
						cover, Good
39,660	0	0	0	0	39,660	Aggregate parking
19,100	0	0	0	0	19,100	Paved parking
45,390	0	0	0	0	45,390	Paved roads
11,315	0	0	0	0	11,315	Roofs
535,740	0	0	0	0	535,740	Woods, Good
289,495	0	0	0	0	289,495	Work Area,
						50-75% Grass
						cover, Fair
949,155	0	0	0	0	949,155	TOTAL AREA

Ground Covers (selected nodes)

5052714 Carpenters Union Prepared by ARH Associates HydroCAD® 10.00-25 s/n 04530 © 2019 HydroCAD	NJ DEP 2-hr WQ Rainfall=1.25" Printed 7/29/2020 Software Solutions LLC Page 5							
Time span=0.00-80.00 hrs, dt=0.05 hrs, 1601 points Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method								
SubcatchmentP-1 I: PROPOSED ON-SITE Rur	off Area=70,075 sf 100.00% Impervious Runoff Depth=1.03" Tc=6.0 min CN=98 Runoff=3.74 cfs 6,041 cf							
Subcatchment P-1 P: PROPOSED ON-SITE Ru	noff Area=490,495 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=780' Tc=53.9 min CN=41 Runoff=0.00 cfs 0 cf							
Subcatchment POA-1: OFF-SITE RUNOFF Runoff Runoff Runoff Rundary R	noff Area=334,740 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=715' Tc=54.9 min CN=30 Runoff=0.00 cfs 0 cf							
Subcatchment POA-2 I: OFF-SITE STATE Rur Flow	off Area=45,390 sf 100.00% Impervious Runoff Depth=1.03" Length=315' Tc=25.8 min CN=98 Runoff=1.08 cfs 3,913 cf							
Subcatchment POA-2 P: OFF-SITE STATE	Runoff Area=8,455 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=287' Tc=29.1 min CN=39 Runoff=0.00 cfs 0 cf							
Pond PR-P: Basin 1	Peak Elev=75.68' Storage=9,952 cf Inflow=4.21 cfs 9,955 cf Outflow=0.00 cfs 0 cf							

Total Runoff Area = 949,155 sf Runoff Volume = 9,955 cf Average Runoff Depth = 0.13" 87.83% Pervious = 833,690 sf 12.17% Impervious = 115,465 sf

Summary for Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS

Runoff = 3.74 cfs @ 1.12 hrs, Volume= 6,041 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

	A	rea (sf)	CN	Description				
		11,315	98	Roofs, HSG	βA			
		19,100	98	Paved parking, HSG A				
*		39,660	98	Aggregate	parking, HS	G A		
		70,075	98	Weighted A	verage			
		70,075		100.00% In	npervious A	rea		
	Tc (min)	Length (feet)	Slop (ft/ft	e Velocity t) (ft/sec)	Capacity (cfs)	Description		
	6.0					Direct Entry, Direct-Impervious		

Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS



0 cf, Depth= 0.00"

Summary for Subcatchment P-1 P: PROPOSED ON-SITE PERVIOUS

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume=

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

	A	rea (sf)	CN E	Description		
* 289,495 49 Work Area, 50-75% Grass c					50-75% Gi	rass cover, Fair, HSG A
	2	01,000	30 V	Voods, Go	od, HSG A	
	4	90,495	41 V	Veighted A	verage	
	4	90,495	1	00.00% Pe	ervious Are	а
	_		~		• •	— • • •
	IC	Length	Slope	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	37.2	112	0.0062	0.05		Sheet Flow, Sheet Flow- Woods
						Woods: Light underbrush n= 0.400 P2= 3.27"
	4.0	38	0.0263	0.16		Sheet Flow, Sheet Flow- Grass
						Grass: Short n= 0.150 P2= 3.27"
	5.6	330	0.0200	0.99		Shallow Concentrated Flow, Shallow Conc- Grass
						Short Grass Pasture Kv= 7.0 fps
	7.1	300	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc. Grass
						Short Grass Pasture Kv= 7.0 fps
	53.9	780	Total			

Subcatchment P-1 P: PROPOSED ON-SITE PERVIOUS



Summary for Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

Are	ea (sf)	CN E	Description		
33	84,740	30 V	Voods, Go	od, HSG A	
334,740		100.00% Pervious Area			а
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0206	0.09		Sheet Flow, Sheet flow- Woods
25.9	565	0.0053	0.36		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Conc. Woods Woodland Kv= 5.0 fps
54.9	715	Total			

Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN



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Runoff 3,913 cf, Depth= 1.03" = 1.08 cfs @ 1.37 hrs, Volume=

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

	A	rea (sf)	CN	Description		
*		45,390	98	Paved road	s, HSG A	
45,390		45,390	100.00% Impervious			rea
	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
	0.4	28	0.0250) 1.18		Sheet Flow, Sheet Flow- Pavement Smooth surfaces n= 0.011 P2= 3.27"
	22.9	122	0.0246	6 0.09		Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
	2.5	165	0.0047	7 1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
	25.8	315	Total			

Subcatchment POA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO ON-SITE BASIN



Summary for Subcatchment POA-2 P: OFF-SITE STATE ROW TO ON-SITE BASIN

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, De

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

A	rea (sf)	CN	Description		
	8,455	39	>75% Gras	s cover, Go	ood, HSG A
8,455 100.00% Pervious Area					a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	150	0.0246	0.09		Sheet Flow, Sheet Flow- Woods
2.1	137	0.0047	1.10		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
29.1	287	Total			

Subcatchment POA-2 P: OFF-SITE STATE ROW TO ON-SITE BASIN



0 cf, Depth= 0.00"

Summary for Pond PR-P: Basin 1

 Inflow Area =
 949,155 sf, 12.17% Impervious, Inflow Depth =
 0.13" for WQ event

 Inflow =
 4.21 cfs @
 1.13 hrs, Volume=
 9,955 cf

 Outflow =
 0.00 cfs @
 0.00 hrs, Volume=
 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs Peak Elev= 75.68' @ 4.85 hrs Surf.Area= 17,376 sf Storage= 9,952 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert /	Avail.Storage	Storage	Description	
#1	75.00'	403,448 cf	Basin 1	(Prismatic)List	ed below (Recalc)
Elevation	Surf.Ar	rea In	c.Store	Cum.Store	
(feet)	(sq	-ft) (cub	ic-feet)	(cubic-feet)	
75.00	11,9	25	0	0	
76.00	19,9	50	15,938	15,938	
77.00	28,6	75	24,313	40,250	
78.00	40,8	00	34,738	74,988	
79.00	61,6	75	51,238	126,225	
80.00	135,5	60	98,618	224,843	
81.00	221,6	50 1	78,605	403,448	

Pond PR-P: Basin 1


5052714 Carpenters Union Prepared by ARH Associates	NOAA 24-hr C 2 YR Rainfall=3.30" Printed 7/29/2020						
HydroCAD® 10.00-25 S/N 04530 © 2019 HydroC	AD Soliware Solutions LLC Page 12						
Time span=0.00-80.00 hrs, dt=0.05 hrs, 1601 points Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method							
Subcatchment P-1 I: PROPOSED ON-SITE Runoff Area=70,075 sf 100.00% Impervious Runoff Depth=3.07" Tc=6.0 min CN=98 Runoff=4.49 cfs 17,911 cf							
Subcatchment P-1 P: PROPOSED ON-SITE	Runoff Area=490,495 sf 0.00% Impervious Runoff Depth=0.01" Flow Length=780' Tc=53.9 min CN=41 Runoff=0.02 cfs 491 cf						
Subcatchment POA-1: OFF-SITE RUNOFF	Runoff Area=334,740 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=715' Tc=54.9 min CN=30 Runoff=0.00 cfs 0 cf						
Subcatchment POA-2 I: OFF-SITE STATE F Flow	Runoff Area=45,390 sf 100.00% Impervious Runoff Depth=3.07" v Length=315' Tc=25.8 min CN=98 Runoff=1.49 cfs 11,601 cf						
Subcatchment POA-2 P: OFF-SITE STATE	Runoff Area=8,455 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=287' Tc=29.1 min CN=39 Runoff=0.00 cfs 1 cf						
Pond PR-P: Basin 1	Peak Elev=76.62' Storage=30,005 cf Inflow=5.43 cfs 30,005 cf Outflow=0.00 cfs 0 cf						

Total Runoff Area = 949,155 sf Runoff Volume = 30,005 cf Average Runoff Depth = 0.38" 87.83% Pervious = 833,690 sf 12.17% Impervious = 115,465 sf

Summary for Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS

Runoff = 4.49 cfs @ 12.14 hrs, Volume= 17,911 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

	Area (sf)	CN	Description			
	11,315	98	Roofs, HSG	βA		
	19,100	98	Paved park	ing, HSG A		
*	39,660	98	Aggregate p	barking, HS	G A	
	70,075 98 Weighted Average					
	70,075		100.00% Im	pervious A	rea	
T	c Length	Slope	e Velocity	Capacity	Description	
(min) (feet)	(ft/ft) (ft/sec)	(cfs)		
6.0)				Direct Entry, Direct-Impervious	

Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS



Summary for Subcatchment P-1 P: PROPOSED ON-SITE PERVIOUS

Runoff = 0.02 cfs @ 24.09 hrs, Volume= 491 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

	A	rea (sf)	CN D	Description		
*	2	89,495	49 V	Vork Area,	50-75% Gi	rass cover, Fair, HSG A
	2	01,000	30 V	Voods, Go	od, HSG A	
	4	90,495	41 V	Veighted A	verage	
	4	90,495	1	00.00% Pe	ervious Are	a
	_				- ··	
	Tc	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	37.2	112	0.0062	0.05		Sheet Flow, Sheet Flow- Woods
						Woods: Light underbrush n= 0.400 P2= 3.27"
	4.0	38	0.0263	0.16		Sheet Flow, Sheet Flow- Grass
						Grass: Short n= 0.150 P2= 3.27"
	5.6	330	0.0200	0.99		Shallow Concentrated Flow, Shallow Conc- Grass
						Short Grass Pasture Kv= 7.0 fps
	7.1	300	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc. Grass
_						Short Grass Pasture Kv= 7.0 fps
	53.9	780	Total			

Subcatchment P-1 P: PROPOSED ON-SITE PERVIOUS



Summary for Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

Area (sf)	CN	Description		
334,740	30	Woods, Go	od, HSG A	
334,740	334,740 100.00% Pervious Area			a
Tc Length (min) (feet	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0 150	0.0206	0.09		Sheet Flow, Sheet flow- Woods
25.9 565	0.0053	0.36		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Conc. Woods Woodland Kv= 5.0 fps
54.9 715	Total			

Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN



Summary for Subcatchment POA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO ON-SITE BASIN

Runoff = 1.49 cfs @ 12.39 hrs, Volume= 11,601 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

	A	rea (sf)	CN	Description		
*		45,390	98	Paved road	s, HSG A	
		45,390		100.00% In	npervious A	rea
	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
	0.4	28	0.0250	0 1.18		Sheet Flow, Sheet Flow- Pavement Smooth surfaces n= 0.011 P2= 3.27"
	22.9	122	0.0246	6 0.09		Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
	2.5	165	0.0047	7 1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
	25.8	315	Total			

Subcatchment POA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO ON-SITE BASIN



Runoff 0.00 cfs @ 24.11 hrs, Volume= 1 cf, Depth= 0.00" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2 YR Rainfall=3.30"

Ar	ea (sf)	CN I	Description		
	8,455	39 >	>75% Gras	s cover, Go	bod, HSG A
	8,455		100.00% Pe	ervious Are	a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	150	0.0246	0.09		Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
2.1	137	0.0047	1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
29.1	287	Total			

Subcatchment POA-2 P: OFF-SITE STATE ROW TO ON-SITE BASIN



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Summary for Pond PR-P: Basin 1

 Inflow Area =
 949,155 sf, 12.17% Impervious, Inflow Depth =
 0.38" for 2 YR event

 Inflow =
 5.43 cfs @
 12.15 hrs, Volume=
 30,005 cf

 Outflow =
 0.00 cfs @
 0.00 hrs, Volume=
 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs Peak Elev= 76.62' @ 30.00 hrs Surf.Area= 25,367 sf Storage= 30,005 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.S	Storage	Storage	e Description	
#1	75.00'	403	,448 cf	Basin 1	I (Prismatic)List	ed below (Recalc)
Elevation (feet)	Surf. (s	Area sq-ft)	Inc (cubi	:.Store c-feet)	Cum.Store (cubic-feet)	
75.00 76.00 77.00 78.00 79.00 80.00 81.00	11 19 28 40 61 135 221	1,925 9,950 3,675 9,800 1,675 5,560 1,650	1 2 3 5 9 17	0 15,938 24,313 34,738 51,238 51,238 98,618 78,605	0 15,938 40,250 74,988 126,225 224,843 403,448	

Pond PR-P: Basin 1



5052714 Carpenters Union	NOAA 24-hr C 10 YR Rainfall=5.14"
Prepared by ARH Associates	Printed 7/29/2020
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Time span=0.00-80.00 hrs,	dt=0.05 hrs, 1601 points
Runoff by SCS TR-20 method, l	JH=Delmarva, Weighted-CN
Reach routing by Stor-Ind+Trans method	d - Pond routing by Stor-Ind method
Subcatchment P-1 I: PROPOSED ON-SITE Runoff Are	a=70,075 sf 100.00% Impervious Runoff Depth=4.90" Tc=6.0 min CN=98 Runoff=7.05 cfs 28,631 cf
Subcatchment P-1 P: PROPOSED ON-SITE Runoff Ar	ea=490,495 sf 0.00% Impervious Runoff Depth=0.31"
Flow Length=	780' Tc=53.9 min CN=41 Runoff=0.51 cfs 12,559 cf
Subcatchment POA-1: OFF-SITE RUNOFF Runoff Ar	ea=334,740 sf 0.00% Impervious Runoff Depth=0.01"
Flow Leng	th=715' Tc=54.9 min CN=30 Runoff=0.02 cfs 263 cf
Subcatchment POA-2 I: OFF-SITE STATE Runoff Are	a=45,390 sf 100.00% Impervious Runoff Depth=4.90"
Flow Length=	315' Tc=25.8 min CN=98 Runoff=2.34 cfs 18,545 cf

Subcatchment POA-2 P: OFF-SITE STATE Runoff Area=8,455 sf 0.00% Impervious Runoff Depth=0.23" Flow Length=287' Tc=29.1 min CN=39 Runoff=0.01 cfs 162 cf

> Peak Elev=77.61' Storage=60,154 cf Inflow=8.53 cfs 60,160 cf Outflow=0.00 cfs 0 cf

Pond PR-P: Basin 1

Total Runoff Area = 949,155 sf Runoff Volume = 60,160 cf Average Runoff Depth = 0.76" 87.83% Pervious = 833,690 sf 12.17% Impervious = 115,465 sf

Summary for Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS

Runoff = 7.05 cfs @ 12.14 hrs, Volume= 28,631 cf, Depth= 4.90"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

	A	rea (sf)	CN	Description				
		11,315	98	Roofs, HSG	βA			
		19,100	98	Paved park	ing, HSG A	N N N N N N N N N N N N N N N N N N N		
*		39,660	98	Aggregate	parking, HS	G A		
		70,075	70,075 98 Weighted Average					
		70,075		100.00% In	npervious A	rea		
	Tc (min)	Length (feet)	Slop (ft/ft	e Velocity t) (ft/sec)	Capacity (cfs)	Description		
	6.0					Direct Entry, Direct-Impervious		

Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS



Summary for Subcatchment P-1 P: PROPOSED ON-SITE PERVIOUS

Runoff = 0.51 cfs @ 13.80 hrs, Volume= 12,559 cf, Depth= 0.31"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

	A	rea (sf)	CN D	Description		
*	2	89,495	49 V	Vork Area,	50-75% Gi	rass cover, Fair, HSG A
	2	01,000	30 V	Voods, Go	od, HSG A	
	4	90,495	41 V	Veighted A	verage	
	4	90,495	1	00.00% Pe	ervious Are	a
	_				- ··	
	Tc	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	37.2	112	0.0062	0.05		Sheet Flow, Sheet Flow- Woods
						Woods: Light underbrush n= 0.400 P2= 3.27"
	4.0	38	0.0263	0.16		Sheet Flow, Sheet Flow- Grass
						Grass: Short n= 0.150 P2= 3.27"
	5.6	330	0.0200	0.99		Shallow Concentrated Flow, Shallow Conc- Grass
						Short Grass Pasture Kv= 7.0 fps
	7.1	300	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc. Grass
_						Short Grass Pasture Kv= 7.0 fps
	53.9	780	Total			

Subcatchment P-1 P: PROPOSED ON-SITE PERVIOUS



Summary for Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN

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Runoff 0.02 cfs @ 24.16 hrs, Volume= 263 cf, Depth= 0.01" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

A	rea (sf)	CN E	Description		
3	34,740	30 V	Voods, Go	od, HSG A	
3	34,740	1	00.00% Pe	ervious Are	a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0206	0.09		Sheet Flow, Sheet flow- Woods
 25.9	565	0.0053	0.36		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Conc. Woods Woodland Kv= 5.0 fps
54.9	715	Total			

Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN



Summary for Subcatchment POA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO ON-SITE BASIN

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Runoff 2.34 cfs @ 12.39 hrs, Volume= 18,545 cf, Depth= 4.90" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

_	A	rea (sf)	CN	Description		
*		45,390	98	Paved road	s, HSG A	
		45,390		100.00% Im	npervious A	rea
	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
	0.4	28	0.0250) 1.18		Sheet Flow, Sheet Flow- Pavement Smooth surfaces n= 0.011 P2= 3.27"
	22.9	122	0.0246	6 0.09		Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
	2.5	165	0.0047	7 1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
_	25.8	315	Total			

Subcatchment POA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO ON-SITE BASIN



Summary for Subcatchment POA-2 P: OFF-SITE STATE ROW TO ON-SITE BASIN

Runoff 0.01 cfs @ 13.50 hrs, Volume= 162 cf, Depth= 0.23" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10 YR Rainfall=5.14"

Area	(sf)	CN [Description		
8,	455	39 >	>75% Gras	s cover, Go	ood, HSG A
8,	455		100.00% Pe	ervious Are	a
Tc Le (min) (ength (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	150	0.0246	0.09		Sheet Flow, Sheet Flow- Woods
2.1	137	0.0047	1.10		Woods: Light underbrush n= 0.400 P2= 3.27" Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
29.1	287	Total			

Subcatchment POA-2 P: OFF-SITE STATE ROW TO ON-SITE BASIN



Summary for Pond PR-P: Basin 1

 Inflow Area =
 949,155 sf, 12.17% Impervious, Inflow Depth =
 0.76"
 for 10 YR event

 Inflow =
 8.53 cfs @
 12.15 hrs, Volume=
 60,160 cf

 Outflow =
 0.00 cfs @
 0.00 hrs, Volume=
 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs Peak Elev= 77.61' @ 30.05 hrs Surf.Area= 36,124 sf Storage= 60,154 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert A	Avail.Storage	Storage	Description	
#1	75.00'	403,448 cf	Basin 1	(Prismatic)List	ed below (Recalc)
Elevation	Surf.Ar	ea Ind	c.Store	Cum.Store	
(feet)	(sq-	-ft) (cubi	ic-feet)	(cubic-feet)	
75.00	11,9	25	0	0	
76.00	19,9	50	15,938	15,938	
77.00	28,6	75	24,313	40,250	
78.00	40,8	00	34,738	74,988	
79.00	61,6	75	51,238	126,225	
80.00	135,5	60	98,618	224,843	
81.00	221,6	50 1	78,605	403,448	

Pond PR-P: Basin 1



5052714 Carpenters Union	NOAA 24-hr C	100 YR Rainfall=8.86"
Prepared by ARH Associates		Printed 7/29/2020
HydroCAD® 10.00-25 s/n 04530 © 2019 HydroCAD Software Sol	utions LLC	Page 26
		-

Time span=0.00-80.00 hrs, dt=0.05 hrs, 1601 points Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1 I: PROPOSED ON-SITE Runoff Area=70,075 sf 100.00% Impervious Runoff Depth=8.62" Tc=6.0 min CN=98 Runoff=12.20 cfs 50,336 cf

Subcatchment P-1 P: PROPOSED ON-SITE Runoff Area=490,495 sf 0.00% Impervious Runoff Depth=1.76" Flow Length=780' Tc=53.9 min CN=41 Runoff=4.88 cfs 71,796 cf

Subcatchment POA-1: OFF-SITE RUNOFF Runoff Area=334,740 sf 0.00% Impervious Runoff Depth=0.64" Flow Length=715' Tc=54.9 min CN=30 Runoff=0.78 cfs 17,819 cf

Subcatchment POA-2 I: OFF-SITE STATE Runoff Area=45,390 sf 100.00% Impervious Runoff Depth=8.62" Flow Length=315' Tc=25.8 min CN=98 Runoff=4.06 cfs 32,604 cf

Subcatchment POA-2 P: OFF-SITE STATE Runoff Area=8,455 sf 0.00% Impervious Runoff Depth=1.54" Flow Length=287' Tc=29.1 min CN=39 Runoff=0.10 cfs 1,083 cf

Pond PR-P: Basin 1 Peak Elev=79.57' Storage=173,617 cf Inflow=15.12 cfs 173,638 cf Outflow=0.00 cfs 0 cf

> Total Runoff Area = 949,155 sf Runoff Volume = 173,638 cf Average Runoff Depth = 2.20" 87.83% Pervious = 833,690 sf 12.17% Impervious = 115,465 sf

Summary for Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS

Runoff = 12.20 cfs @ 12.14 hrs, Volume= 50,336 cf, Depth= 8.62"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

	A	rea (sf)	CN	Description		
		11,315	98	Roofs, HSC	βA	
		19,100	98	Paved park	ing, HSG A	N N N N N N N N N N N N N N N N N N N
*		39,660	98	Aggregate	parking, HS	G A
		70,075	98	Weighted A	verage	
		70,075		100.00% Impervious Area		
	То	Longth	Slon	Velocity	Capacity	Description
(r	nin)	(foot)	(ff/ff	(ft/sec)	Capacity (cfs)	Description
(I	<u>((((</u>	(ieet)	וועונ) (10/560)	(015)	
	6.0					Direct Entry, Direct-Impervious

Subcatchment P-1 I: PROPOSED ON-SITE IMPERVIOUS



Runoff 4.88 cfs @ 13.04 hrs, Volume= 71,796 cf, Depth= 1.76" =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

	A	rea (sf)	CN D	Description		
*	2	89,495	49 V	Vork Area,	50-75% Gi	rass cover, Fair, HSG A
	2	01,000	30 V	Voods, Go	od, HSG A	
	4	90,495	41 V	Veighted A	verage	
	4	90,495	1	00.00% Pe	ervious Are	а
	_				- ··	
	Tc	Length	Slope	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	37.2	112	0.0062	0.05		Sheet Flow, Sheet Flow- Woods
						Woods: Light underbrush n= 0.400 P2= 3.27"
	4.0	38	0.0263	0.16		Sheet Flow, Sheet Flow- Grass
						Grass: Short n= 0.150 P2= 3.27"
	5.6	330	0.0200	0.99		Shallow Concentrated Flow, Shallow Conc- Grass
						Short Grass Pasture Kv= 7.0 fps
	7.1	300	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc. Grass
						Short Grass Pasture Kv= 7.0 fps
	53.9	780	Total			

Subcatchment P-1 P: PROPOSED ON-SITE PERVIOUS



Summary for Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN

Runoff 17,819 cf, Depth= 0.64" 0.78 cfs @ 13.66 hrs, Volume= =

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

Area (sf)	CN E	Description		
334,740	30 V	Voods, Go	od, HSG A	
334,740 100.00% Pervious Area				a
Tc Length (min) (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0 150	0.0206	0.09		Sheet Flow, Sheet flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
25.9 565	0.0053	0.36		Shallow Concentrated Flow, Shallow Conc. Woods Woodland Kv= 5.0 fps
54.9 715	Total			

Subcatchment POA-1: OFF-SITE RUNOFF AREA TO ON-SITE BASIN



Summary for Subcatchment POA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO ON-SITE BASIN

Runoff = 4.06 cfs @ 12.39 hrs, Volume= 32,604 cf, Depth= 8.62"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

	A	rea (sf)	CN	Description		
*		45,390	98	Paved road	s, HSG A	
		45,390		100.00% In	npervious A	rea
	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
	0.4	28	0.0250	0 1.18		Sheet Flow, Sheet Flow- Pavement Smooth surfaces n= 0.011 P2= 3.27"
	22.9	122	0.0246	6 0.09		Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
	2.5	165	0.0047	7 1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
	25.8	315	Total			

Subcatchment POA-2 I: OFF-SITE STATE HIGHWAY ROADWAY TO ON-SITE BASIN



Summary for Subcatchment POA-2 P: OFF-SITE STATE ROW TO ON-SITE BASIN

Runoff = 0.10 cfs @ 12.64 hrs, Volume= 1,083 cf, Depth= 1.54"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100 YR Rainfall=8.86"

Α	vrea (sf)	CN	Description		
	8,455	39	>75% Gras	s cover, Go	bod, HSG A
	8,455		100.00% P	ervious Are	a
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	150	0.0246	0.09	(010)	Sheet Flow, Sheet Flow- Woods Woods: Light underbrush n= 0.400 P2= 3.27"
2.1	137	0.0047	1.10		Shallow Concentrated Flow, Shallow Concentrated- Woods Unpaved Kv= 16.1 fps
29.1	287	Total			i

Subcatchment POA-2 P: OFF-SITE STATE ROW TO ON-SITE BASIN



Summary for Pond PR-P: Basin 1

Inflow Area = 949,155 sf, 12.17% Impervious, Inflow Depth = 2.20" for 100 YR event Inflow 15.12 cfs @ 12.15 hrs, Volume= 173.638 cf = Outflow 0.00 cfs @ 0.00 hrs, Volume= = 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.05 hrs Peak Elev= 79.57' @ 30.05 hrs Surf.Area= 103,956 sf Storage= 173,617 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert A	Avail.Storage	Storage	Description	
#1	75.00'	403,448 cf	Basin 1	(Prismatic)List	ed below (Recalc)
Elevation	Surf.Ar	ea In	c.Store	Cum.Store	
(feet)	(sq-	-ft) (cub	ic-feet)	(cubic-feet)	
75.00	11,9	25	0	0	
76.00	19,9	50	15,938	15,938	
77.00	28,6	75	24,313	40,250	
78.00	40,8	00	34,738	74,988	
79.00	61,6	75	51,238	126,225	
80.00	135,5	60	98,618	224,843	
81.00	221,6	50 1	78,605	403,448	

Pond PR-P: Basin 1



Appendix C – Pinelands CMP

CRAIG TESTING LABORATORIES Mays Landing, NJ •a Division of Maser Consulting P.A.• (609) 625-1700

CLIENT:	ARH Associates
	215 Bellevue Avenue, PO Box 579
	Hammonton, NJ 08037
	ATTN: Mr. Andrew Warburton

PROJECT:	Block 3510, Lot 1
	Mullica Township, Atlantic Count
	ARH# 50-52714.02
MC No.:	20C003645S
Date:	July 17, 2020
Sample(s) Received:	July 9, 2020
Sample(s) Tested:	7/9/20 - 7/16/20
Technician:	K. Perry

LABORATORY TEST RESULTS

Sample No.	Permeability* k ₂₀ (in/hr)	Soil Permeability Class	Dry Density+ (pcf)
TP-1	25.9	K5	88.3
TP-2	40.9	K5	85.6
TP-3	21.9	K5	87.2

* Permeability corrected to 20° C

+ Dry density of tested sample as received in sampling tube

Summary of Laboratory Testing:

 Tube Permeameter Test (NJAC 7:9A-6.2) - Undisturbed
 Total Tests

 3

CRAIG TESTING LABORATOR

Mays Landing, NJ .a Division of Maser Consulting P.A. (609) 625-1700

TUBE PERMEAMETER TEST

(N.J.A.C. 7:9A - Standards for Individual Subsurface Sewage Disposal Systems; Subchapter 6, Section 6.2, page 39, Modified)

Client:	ARH Assoc	iates							MC #:	20C003645S
Project:	Block 3501	Date:	July 16, 2020							
Boring/Sam	Boring/Sample # or Descrip./Location: TP-1									
Visual Desci	ription of So	il (USCS):	Tan poorly g	raded SA	ND					
Technician:	K. Perry			Proc	tor Data:	Max Dry D	ensity (pcf)	% of Ma	x Dry Density	Opt. Moisture (%)
				-		-	-		-	-
Initial Speci	men Data:									
Sample Type Undisturbed		Water Content (%)	Length, L (in)	Diame	eter (in)	Wet Den	sity (pcf)	Dry D	ensity (pcf)	
Re-Compacte	ed 🔽	2.4	5.63	2.8	375	90).4		88.3	
	Radius of Burette, r: 0.3141 in Radius of Soil Specimen, R: 1.4375 in									1.4375 in
					1691	DATA				
1	2	3	4		5	6	7		8	9
Trial No	Burette I	Readings	Head, h	Tin	ne, t	Temp, T	Permeat	oility at	Temp	Permeability at
Thai NO.	h ₁ (cm)	h ₂ (cm)	(cm)	Sec	Min	(°C)	T°C,	k _τ	Correc.	20°C, k ₂₀
1	90.0	80.0	10.0	4.3	0.072	18.9	26.4	4	1.028	27.18
2	90.0	80.0	10.0	4.4	0.073	18.9	26.2	20	1.028	26.93
3	90.0	80.0	10.0	4.3	0.072	18.9	26.2	26	1.028	26.99
4	80.0	70.0	10.0	5.0	0.083	18.9	26.0	00	1.028	26.72
5	80.0	70.0	10.0	5.0	0.083	18.9	26.1	0	1.028	26.83
6	80.0	70.0	10.0	4.9	0.082	18.9	26.3	37	1.028	27.10
7	70.0	60.0	10.0	5.9	0.098	19.0	25.5	50	1.025	26.14
8	70.0	60.0	10.0	5.9	0.098	19.0	25.4	1	1.025	26.05
9	70.0	60.0	10.0	5.9	0.098	19.0	25.2	28	1.025	25.92
10	60.0	50.0	10.0	7.2	0.120	19.0	24.8	50	1.025	25.12
11	60.0	50.0	10.0	7.2	0.120	19.0	24.4	17	1.025	25.09
12	60.0	50.0	10.0	7.2	0.120	19.0	24.5	54	1.025	25.16
13	50.0	40.0	10.0	9.0	0.150	19.0	23.9	9	1.025	24.60

23.83

23.60

Perm, \mathbf{k}_{T} (7) = 60 * L/t * r^{2}/R^{2*} ln(h1/h2) = 60* L/(5) * r^{2}/R^{2} * ln((2)/(3))

40.0

40.0

10.0

10.0

9.1

9.2

0.151

0.153

19.0

19.0

Head, h (4) = (2) - (3); Perm,
$$k_{20}$$
 (9) = (7)*(8)

Soil Permeability Classes

14

15

> 20 inches per hour (in/hr)	K5
6 - 20 in/hr	K4
2 - 6 in/hr	K3
0.6 - 2 in/hr	K2
0.2 - 0.6 in/hr	K1
< 0.2 in/hr	K0
<u>Remarks</u>	

50.0

50.0

- Sample recomapcted to loose/medium dense per client request.

24.43

24.19

25.9

K5

1.025

1.025

AVERAGE k₂₀ (in/hr):

SOIL PERMEABILITY CLASS:

CRAIG TESTING LABORATORIES Mays Landing, NJ .a Division of Maser Consulting P.A. (609) 625-1700

TUBE PERMEAMETER TEST

(N.J.A.C. 7:9A - Standards for Individual Subsurface Sewage Disposal Systems; Subchapter 6, Section 6.2, page 39, Modified)

Client:	ARH Associates	MC #:	20C003645S	
Project:	Block 3501 Lot 1 Mullica Township, Atlantic County	Date:	July 16, 2020	
Boring/San	nple # or Descrip./Location: TP-2	Depth:	72"-75"	

Visual Description of Soil (USCS): Brown poorly graded SAND with silt/clay and trace gravel

Technician: K. Perry			Proctor Data:	Max Dry Density (pcf)	Opt. Moisture (%)	
				-	-	-
Initial Specimen Data:			-			
Sample Type:	Water	Length, L	Diameter (in)	Wet Density (pcf)	Dry Density (ncf)	
Undisturbed	Content (%)	(in)	Drameter (m)	(i et Density (per)	Dif Density (per)	
Re-Compacted 🔽	9.4	5.34	2.875	93.6	85.6	
Rad	ius of Burett	e, r: 0.3141	in	Rad	lius of Soil Specimen, R:	1.4375 in

TEST DATA

1	2	3	4		5	6	7	8	9
Trial No.	Burette F	Readings	Head, h	Tim	ne, t	Temp, T	Permeability at	Temp	Permeability at
Thai NO.	h ₁ (cm)	h ₂ (cm)	(cm)	Sec	Min	(°C)	T°C, k _T	Correc.	20°C, k ₂₀
1	90.0	80.0	10.0	2.7	0.044	19.3	40.82	1.018	41.54
2	90.0	80.0	10.0	2.6	0.044	19.3	41.14	1.018	41.86
3	90.0	80.0	10.0	2.7	0.045	19.3	40.37	1.018	41.08
4	80.0	70.0	10.0	3.0	0.050	19.3	40.88	1.018	41.60
5	80.0	70.0	10.0	3.0	0.051	19.3	40.48	1.018	41.19
6	80.0	70.0	10.0	3.1	0.051	19.3	39.95	1.018	40.66
7	70.0	60.0	10.0	3.1	0.051	19.0	46.27	1.025	47.44
8	70.0	60.0	10.0	3.6	0.060	19.0	39.22	1.025	40.21
9	70.0	60.0	10.0	3.7	0.062	19.0	38.16	1.025	39.13
10	60.0	50.0	10.0	4.3	0.072	19.0	38.86	1.025	39.83
11	60.0	50.0	10.0	4.2	0.070	19.0	39.68	1.025	40.68
12	60.0	50.0	10.0	4.3	0.072	19.0	38.68	1.025	39.65
13	50.0	40.0	10.0	5.3	0.088	19.0	39.04	1.025	40.02
14	50.0	40.0	10.0	5.3	0.089	19.0	38.60	1.025	39.57
15	50.0	40.0	10.0	5.4	0.090	19.0	38.17	1.025	39.13
Perm, k _T (7	Perm , $\mathbf{k}_{T}(7) = 60 * L/t * r^{2}/R^{2*} \ln(h1/h2) = 60* L/(5) * r^{2}/R^{2} * \ln((2)/(3))$							GE k ₂₀ (in/hr):	40.9
Head $h(4) = (2) - (3)$. Perm $k_{ex}(9) = (7)^{*}(8)$							SOIL PERMEAB	LITY CLASS:	K5

Head, h (4) = (2) - (3); Perm,
$$k_{20}$$
 (9) = (7)*(8)

Soil Permeability Classes

> 20 inches per hour (in/hr)	K5
6 - 20 in/hr	K4
2 - 6 in/hr	K3
0.6 - 2 in/hr	K2
0.2 - 0.6 in/hr	K1
< 0.2 in/hr	K0
<u>Remarks</u>	

- Sample recomapcted to loose/medium dense per client request.

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TUBE PERMEAMETER TEST

(N.J.A.C. 7:9A - Standards for Individual Subsurface Sewage Disposal Systems; Subchapter 6, Section 6.2, page 39, Modified)

Client:	ARH Associates	MC #:	20C003645S				
Project:	Block 3501 Lot 1 Mullica Township, Atlantic County	Date:	July 16, 2020				
Boring/Sai	nple # or Descrip./Location: TP-3	Depth:	60"-65"				
Visual Description of Soil (USCS): Brown poorly graded SAND with silt/clay and trace gravel / trace organics							

Technician: K. Perry			Proctor Data:	Max Dry Density (pcf)	% of Max Dry Density	Opt. Moisture (%)	
				-	-	-	
Initial Specimen Data:			-				
Sample Type:	Water	Length, L	Diamatan (in)	Wat Dansity (nof)	Der Donaitre (n of)		
Undisturbed	Content (%)	(in)	Diameter (III)	wet Density (pci)	Dry Density (pci)		
Re-Compacted 🗹	6.8	5.34	2.875	93.1	87.2		
Radi	us of Burett	e.r: 0.3141	in	Rad	lius of Soil Specimen, R:	1.4375 in	

TEST DATA

1	2	3	4	ļ	5	6	7	8	9
Trial No	Burette F	Readings	Head, h	Tim	ne, t	Temp, T	Permeability at	Temp	Permeability at
marino.	h ₁ (cm)	h ₂ (cm)	(cm)	Sec	Min	(°C)	T°C, k _T	Correc.	20°C, k ₂₀
1	90.0	80.0	10.0	4.8	0.080	19.3	22.45	1.018	22.85
2	90.0	80.0	10.0	5.0	0.083	19.3	21.73	1.018	22.11
3	90.0	80.0	10.0	4.9	0.081	19.3	22.27	1.018	22.66
4	80.0	70.0	10.0	5.6	0.093	19.0	22.02	1.025	22.58
5	80.0	70.0	10.0	5.5	0.092	19.0	22.18	1.025	22.74
6	80.0	70.0	10.0	5.6	0.093	19.0	21.98	1.025	22.54
7	70.0	60.0	10.0	6.4	0.107	18.9	22.02	1.028	22.63
8	70.0	60.0	10.0	6.5	0.108	18.9	21.92	1.028	22.52
9	70.0	60.0	10.0	6.5	0.108	18.9	21.75	1.028	22.35
10	60.0	50.0	10.0	8.0	0.133	18.9	20.98	1.028	21.56
11	60.0	50.0	10.0	8.1	0.134	18.9	20.74	1.028	21.32
12	60.0	50.0	10.0	8.0	0.134	18.9	20.85	1.028	21.42
13	50.0	40.0	10.0	10.3	0.171	18.8	19.90	1.030	20.51
14	50.0	40.0	10.0	10.3	0.172	18.8	19.85	1.030	20.45
15	50.0	40.0	10.0	10.3	0.172	18.8	19.89	1.030	20.49
Perm, $\mathbf{k}_{T}(7) = 60 * L/t * r^{2}/R^{2*} \ln(h1/h2) = 60* L/(5) * r^{2}/R^{2} * \ln((2)/(3))$						AVERA	21.9		
Head. h (4) = (2) - (3); Perm. k_{20} (9) = (7)*(8)							SOIL PERMEABI	LITY CLASS:	K5

Head, h (4) = (2) - (3); **Perm, k**₂₀ (9) = (7)*(8)

Soil Permeability Classes

> 20 inches per hour (in/hr)	K5
6 - 20 in/hr	K4
2 - 6 in/hr	K3
0.6 - 2 in/hr	K2
0.2 - 0.6 in/hr	K1
< 0.2 in/hr	K0
<u>Remarks</u>	

- Sample recomapcted to loose/medium dense per client request.

JOB NAME: CARPENTERS UNION JOB NO: 5052714 CALC BY: NM CHECK BY: DATE: 7/28/2020	TW	Minimum Desi Factor of Safet Permeability =	ign Infiltration Rate y =	0.5 "/H 2 20 "/H	IR IR		Actual Design Rate 10 "/HR
		Using Minimum Des	sign Standard (0.5"/HR) yie	elds a rate of	0.1380	CFS	
			Using (20"/HR) yie	elds a rate of	5.5208	CFS	
		Using.	Actual Design (10"/HR) yie	elds a rate of	2.7604	CFS	
BASIN BOTTOM AREA (SF): 1 25" WO STORM EVENT (CF):	11,9	25 SF					
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		COMMENT	Ś			
LENGTH OF TIME TO INFILTRATE (.5"/HR):	20.03	HOURS	O.K.				
LENGTH OF TIME TO INFILTRATE (20"/HR):	0.50	HOURS	O.K.				
LENGTH OF TIME TO INFILTRATE (10"/HR):	1.00	HOURS	O.K.				

STORMWATER BASIN 1- INFILTRATION CALCULATION SHEET BASIN BOTTOM

COMMENTS:

The design rate of 10"/HR will infiltrate the water quality storm in 1 hours. The actual volume the basin is capable of infiltrating at each rate is as follows:

72 Hour Volume (.5"/HR):	35775 CF
72 Hour Volume (20"/HR):	1431000 CF
72 Hour Volume (10"/HR):	715500 CF

JOB NAME: CARPENTERS UNION JOB NO: 5052714 CALC BY: NM CHECK BY: DATE: 7/28/2020	TW	Minimum Design Infiltra Factor of Safety = Permeability =	ation Rate 0.5 "/ 2 20 "/	/HR /HR	Actual Design Rate 10 "/HR
		Using Minimum Design Standar	d (0.5"/HR) yields a rate of	0.1380	CFS
		Usin	ng (20"/HR) yields a rate of	5.5208	CFS
		Using Actual Desig	gn (10"/HR) yields a rate of	2.7604	CFS
BASIN BOTTOM AREA (SF): FULL BASIN BELOW OUTFALL INVERT (CF):	11,92 173,6	25 SF 17 CF			
LENGTH OF TIME TO INFILTRATE (.5"/HR): LENGTH OF TIME TO INFILTRATE (20"/HR): LENGTH OF TIME TO INFILTRATE (10"/HR):	349.42 8.74 17 47	HOURS I HOURS O HOURS O	COMMENTS NEED MORE RECHAR D.K. D K	GE SURFA	CE AREA

STORMWATER BASIN 1 - INFILTRATION CALCULATION SHEET BASIN BOTTOM

COMMENTS:

The design rate of 10"/HR will infiltrate the volume that is stored in the basin in 17.47 hours. The actual volume the basin is capable of infiltrating at each rate is as follows:

72 Hour Volume (.5"/HR):	35775 CF
72 Hour Volume (20"/HR):	1431000 CF
72 Hour Volume (10"/HR):	715500 CF

Input Values	
10.00	R
0.150	Sy
50.00	Kh
20.000	х
230.000	У
17.47	t
10.00	hi(0)
29.933	h(max)

19.933

Δh(max)

Distance from

Recharge rate (permeability rate) (in/hr)
Specific yield, Sy (dimensionless)
default value is 0.15; max value is 0.2 provided that a lab test data is submitted
Horizontal hydraulic conductivity (in/hr)
Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
1/2 length of basin (x direction, in feet)
1/2 width of basin (y direction, in feet)
Duration of infiltration period (hours)
Initial thickness of saturated zone (feet)

Maximum thickness of saturated zone (beneath center of basin at end of infiltration period) Maximum groundwater mounding (beneath center of basin at end of infiltration period)



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Carpenter's Union ARH #5052714

Proposed Basin

Pinelands Recharge Standards July 28th, 2020

Design Criteria:

Provide adequate infiltration basin storage volume to store and infiltrate on-site at least the volume generated from the sites net increase in impervious surfaces during a 10-yr, 24-hr storm event [7:50-6:84(a) 6*iii* (1)].

Given:

Basin volume (elevation 75.00 to 79.60)	=	176,529 0	ef
Existing Impervious Surfaces	=	0 ac	
Developed Impervious Surfaces	=	1.61 ac	
Net Increase of Impervious Surfaces: A _(1mp)	=	1.61 ac	
10yr-24hr Rainfall: P _(in)	=	5.14 in	(4.90 in. of runoff)

Determine Runoff Volume From New Impervious Surfaces:

$$V_{10yr} = A_{(1mp)} x 43,560 \text{ sf } x P_{(in)} x (1ft/12in)$$

 $V_{10yr} = 1.61 \text{ ac x } 43,560 \text{ sf/ac x } 4.90 \text{ in x } (1 \text{ ft}/12 \text{ in})$

 $V_{10yr} = 28,637 \text{ cf}$

CONCLUSION:

Since the volume of runoff from the net increase in site impervious surfaces (28,637 cf) is less than the total basin volume, (176,529 cf) adequate volume is provided and the Pinelands storage requirement is achieved.

<u>Appendix D – Soil Logs</u>



National Cooperative Soil Survey

Conservation Service

MAP L	EGEND	MAP INFORMATION		
Area of Interest (AOI) Area of Interest (AOI)	Spoil AreaStony Spot	The soil surveys that comprise your AOI were mapped at 1:24,000.		
 Area of Interest (AOI) Soils Soil Map Unit Polygons Soil Map Unit Lines Soil Map Unit Points Special Features Blowout Blowout Clay Spot Clay Spot Closed Depression Clavel Pit Gravel Pit Gravelly Spot Landfill Lava Flow Marsh or swamp Mine or Quarry Miscellaneous Water 	 Stony Spot Very Stony Spot Very Stony Spot Wet Spot Other Special Line Features Water Features Water Features Streams and Canals Transportation Interstate Highways INS Routes INS Routes INS Routes Local Roads Eackgrout Interstate Physical Roads Aerial Photography	 1:24,000. 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: Coordinate System: Web Mercator (EPSG:3857) Maps from the Web Soil Survey are based on the Web Mercator grojection, 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 of the version date(s) listed below. Soil Survey Area: Atlantic County, New Jersey Survey Area Data: Version 17, Jun 1, 2020 		
 Perennial Water Rock Outcrop Saline Spot Sandy Spot Severely Eroded Spot Sinkhole Slide or Slip Sodic Spot 		Soil map units are labeled (as space allows) for map scales 1:50,000 or larger. Date(s) aerial images were photographed: Feb 14, 2019—M 26, 2019 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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EveB	Evesboro sand, 0 to 5 percent slopes	9.7	78.0%
FobB	Fort Mott sand, 0 to 5 percent slopes	2.7	22.0%
Totals for Area of Interest	•	12.5	100.0%



Atlantic County, New Jersey

EveB—Evesboro sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: t136 Elevation: 0 to 150 feet Mean annual precipitation: 28 to 59 inches Mean annual air temperature: 46 to 79 degrees F Frost-free period: 161 to 231 days Farmland classification: Farmland of local importance

Map Unit Composition

Evesboro and similar soils: 80 percent Minor components: 20 percent Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Evesboro

Setting

Landform: Low hills Landform position (three-dimensional): Interfluve, side slope Down-slope shape: Convex Across-slope shape: Linear Parent material: Sandy eolian deposits and/or sandy fluviomarine deposits

Typical profile

A - 0 to 4 inches: sand AB - 4 to 17 inches: sand Bw - 17 to 31 inches: sand C - 31 to 80 inches: stratified loamy sand to sand

Properties and qualities

Slope: 0 to 5 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 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 7s Hydrologic Soil Group: A Hydric soil rating: No

USDA

Minor Components

Mullica, rarely flooded

Percent of map unit: 5 percent Landform: Flood plains, depressions, drainageways Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope Down-slope shape: Linear, concave Across-slope shape: Linear, concave Hydric soil rating: Yes

Lakehurst

Percent of map unit: 5 percent Landform: Flats, depressions Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope Down-slope shape: Linear, concave Across-slope shape: Linear, concave Hydric soil rating: No

Atsion

Percent of map unit: 5 percent Landform: Flats Landform position (two-dimensional): Footslope Landform position (three-dimensional): Dip, talf Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: Yes

Downer

Percent of map unit: 5 percent Landform: Knolls, low hills Landform position (three-dimensional): Interfluve Down-slope shape: Linear Across-slope shape: Convex Hydric soil rating: No

Data Source Information

Soil Survey Area: Atlantic County, New Jersey Survey Area Data: Version 17, Jun 1, 2020


Atlantic County, New Jersey

FobB—Fort Mott sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: t139 Elevation: 0 to 450 feet Mean annual precipitation: 28 to 59 inches Mean annual air temperature: 46 to 79 degrees F Frost-free period: 161 to 231 days Farmland classification: Farmland of statewide importance

Map Unit Composition

Fort mott and similar soils: 85 percent Minor components: 15 percent Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fort Mott

Setting

Landform: Knolls Landform position (three-dimensional): Interfluve Down-slope shape: Convex Across-slope shape: Linear Parent material: Sandy eolian deposits and/or fluviomarine deposits

Typical profile

- Oe 0 to 2 inches: moderately decomposed plant material
- A 2 to 4 inches: sand
- E 4 to 24 inches: sand
- Bt 24 to 35 inches: sandy loam
- C1 35 to 49 inches: stratified sand to sandy loam
- C2 49 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 5 percent Depth to restrictive feature: More than 80 inches Natural drainage class: Well drained Runoff class: Very low Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 5.95 in/hr) Depth to water table: About 48 to 122 inches Frequency of flooding: None Frequency of ponding: None Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 3s Hydrologic Soil Group: A

USDA

Hydric soil rating: No

Minor Components

Evesboro

Percent of map unit: 3 percent Landform: Dunes Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: No

Galloway

Percent of map unit: 3 percent Landform: Dunes Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: No

Mullica, rarely flooded

Percent of map unit: 3 percent Landform: Flood plains, depressions, drainageways Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope Down-slope shape: Linear, concave Across-slope shape: Linear, concave Hydric soil rating: Yes

Aura

Percent of map unit: 3 percent Landform: Low hills Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Downer

Percent of map unit: 3 percent Landform: Low hills Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Data Source Information

Soil Survey Area: Atlantic County, New Jersey Survey Area Data: Version 17, Jun 1, 2020





National Cooperative Soil Survey

Conservation Service



Hydrologic Soil Group

Map unit symbol	p unit symbol Map unit name		Map unit name Rating		Acres in AOI	Percent of AOI	
EveB	Evesboro sand, 0 to 5 percent slopes	A	9.7	78.0%			
FobB	Fort Mott sand, 0 to 5 percent slopes	A	2.7	22.0%			
Totals for Area of Intere	st	12.5	100.0%				

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

USDA

Component Percent Cutoff: None Specified Tie-break Rule: Higher





National Cooperative Soil Survey

Conservation Service



Drainage Class

Map unit symbol	Map unit symbol Map unit name		Acres in AOI	Percent of AOI	
EveB	Evesboro sand, 0 to 5 percent slopes	Excessively drained	9.7	78.0%	
FobB	Fort Mott sand, 0 to 5 percent slopes	Well drained	2.7	22.0%	
Totals for Area of Intere	st	12.5	100.0%		

Description

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Rating Options

Aggregation Method: Dominant Condition Component Percent Cutoff: None Specified Tie-break Rule: Higher



National Cooperative Soil Survey

Conservation Service

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Depth to Any Soil Restrictive Layer

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
EveB	Evesboro sand, 0 to 5 percent slopes	>200	9.7	78.0%
FobB	Fort Mott sand, 0 to 5 percent slopes	>200	2.7	22.0%
Totals for Area of Intere	st	12.5	100.0%	

Description

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to any type of restrictive layer that is described for each map unit. If more than one type of restrictive layer is described for an individual soil type, the depth to the shallowest one is presented. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters Aggregation Method: Dominant Component Component Percent Cutoff: None Specified Tie-break Rule: Lower Interpret Nulls as Zero: No



National Cooperative Soil Survey

Conservation Service

7/27/2020 Page 1 of 3



USDA Nat

Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
EveB	Evesboro sand, 0 to 5 percent slopes	>200	9.7	78.0%
FobB	Fort Mott sand, 0 to 5 percent slopes	183	2.7	22.0%
Totals for Area of Intere	st	12.5	100.0%	

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters Aggregation Method: Dominant Component Component Percent Cutoff: None Specified Tie-break Rule: Lower Interpret Nulls as Zero: No Beginning Month: January Ending Month: December CRAIG TESTING LABORATORIES Mays Landing, NJ •a Division of Maser Consulting P.A.• (609) 625-1700

CLIENT:	ARH Associates
	215 Bellevue Avenue, PO Box 579
	Hammonton, NJ 08037
	ATTN: Mr. Andrew Warburton

PROJECT:	Block 3510, Lot 1
	Mullica Township, Atlantic Count
	ARH# 50-52714.02
MC No.:	20C003645S
Date:	July 17, 2020
Sample(s) Received:	July 9, 2020
Sample(s) Tested:	7/9/20 - 7/16/20
Technician:	K. Perry

LABORATORY TEST RESULTS

Sample No.	Permeability* k ₂₀ (in/hr)	Soil Permeability Class	Dry Density+ (pcf)
TP-1	25.9	K5	88.3
TP-2	40.9	K5	85.6
TP-3	21.9	K5	87.2

* Permeability corrected to 20° C

+ Dry density of tested sample as received in sampling tube

Summary of Laboratory Testing:

 Tube Permeameter Test (NJAC 7:9A-6.2) - Undisturbed
 Total Tests

 3

CRAIG TESTING LABORATOR

Mays Landing, NJ .a Division of Maser Consulting P.A. (609) 625-1700

TUBE PERMEAMETER TEST

(N.J.A.C. 7:9A - Standards for Individual Subsurface Sewage Disposal Systems; Subchapter 6, Section 6.2, page 39, Modified)

Client:	ARH Assoc	iates							MC #:	20C003645S	
Project:	Block 3501	Lot 1 Mullic	a Township, A	Atlantic C	County				Date:	July 16, 2020	
Boring/Sam	ple # or Desc	crip./Locatio	on: TP-1						Depth:	72"-75"	
Visual Description of Soil (USCS): <u>Tan poorly graded SAND</u>											
Technician:	K. Perry			Proc	tor Data:	Max Dry D	ensity (pcf)	% of Ma	x Dry Density	Opt. Moisture (%)	
Initial Specimen Data:											
Sample Type Undisturbed		Water Content (%)	Length, L (in)	Diame	eter (in)	Wet Den	sity (pcf)	Dry D	ensity (pcf)		
Re-Compacte	ed 🔽	2.4	5.63	2.8	875	90).4		88.3		
Radius of Burette, r: 0.3141 in Radius of Soil Specimen, R: 1.4375 in											
					TEST	' ДАТА					
1	2	3	4		5	6	7		8	Q	
	Burette F	Readings	Head h	Tim	ne. t	Temp, T	Permeat	oility at	Temp	Permeability at	
Trial No.	h₁ (cm)	h_2 (cm)	(cm)	Sec	Min	(°C)	T°C,	, k _τ	Correc.	20°C, k ₂₀	
1	90.0	80.0	10.0	4.3	0.072	18.9	26.4	.4	1.028	27.18	
2	90.0	80.0	10.0	4.4	0.073	18.9	26.2	20	1.028	26.93	
3	90.0	80.0	10.0	4.3	0.072	18.9	26.2	26	1.028	26.99	
4	80.0	70.0	10.0	5.0	0.083	18.9	26.0	00	1.028	26.72	
5	80.0	70.0	10.0	5.0	0.083	18.9	26.2	0	1.028	26.83	
6	80.0	70.0	10.0	4.9	0.082	18.9	26.3	37	1.028	27.10	
7	70.0	60.0	10.0	5.9	0.098	19.0	25.5	50	1.025	26.14	
8	70.0	60.0	10.0	5.9	0.098	19.0	25.4	1	1.025	26.05	
9	70.0	60.0	10.0	5.9	0.098	19.0	25.2	28	1.025	25.92	
10	60.0	50.0	10.0	7.2	0.120	19.0	24.5	50	1.025	25.12	
11	60.0	50.0	10.0	7.2	0.120	19.0	24.4	17	1.025	25.09	
12	60.0	50.0	10.0	7.2	0.120	19.0	24.8	54	1.025	25.16	

Perm, \mathbf{k}_{T} (7) = 60 * L/t * r^{2}/R^{2*} ln(h1/h2) = 60* L/(5) * r^{2}/R^{2} * ln((2)/(3))

40.0

40.0

40.0

10.0

10.0

10.0

Head, h (4) = (2) - (3); Perm,
$$k_{20}$$
 (9) = (7)*(8)

Soil Permeability Classes

13

14

15

> 20 inches per hour (in/hr)	K5
6 - 20 in/hr	K4
2 - 6 in/hr	K3
0.6 - 2 in/hr	K2
0.2 - 0.6 in/hr	K1
< 0.2 in/hr	K0
<u>Remarks</u>	

50.0

50.0

50.0

- Sample recomapcted to loose/medium dense per client request.

24.60

24.43

24.19

25.9

K5

1.025

1.025

1.025

AVERAGE k₂₀ (in/hr):

SOIL PERMEABILITY CLASS:

19.0

19.0

19.0

23.99

23.83

23.60

0.150

0.151

0.153

9.0

9.1

9.2

CRAIG TESTING LABORATORIES Mays Landing, NJ .a Division of Maser Consulting P.A. (609) 625-1700

TUBE PERMEAMETER TEST

(N.J.A.C. 7:9A - Standards for Individual Subsurface Sewage Disposal Systems; Subchapter 6, Section 6.2, page 39, Modified)

Client:	ARH Associates	MC #:	20C003645S	
Project:	Block 3501 Lot 1 Mullica Township, Atlantic County	Date:	July 16, 2020	
Boring/San	nple # or Descrip./Location: TP-2	Depth:	72"-75"	

Visual Description of Soil (USCS): Brown poorly graded SAND with silt/clay and trace gravel

Technician: K. Perry			Proctor Data:	Max Dry Density (pcf)	% of Max Dry Density	Opt. Moisture (%)
				-	-	-
Initial Specimen Data:			-			
Sample Type:	Water	Length, L	Diameter (in)	Wet Density (ncf)	Dry Density (nof)	
Undisturbed	Content (%)	(in)	Diameter (III)	wei Density (per)	Dry Density (per)	
Re-Compacted 🗹	9.4	5.34	2.875	93.6	85.6	
Rad	ius of Burett	e, r: 0.3141	in	Rad	lius of Soil Specimen, R:	1.4375 in

TEST DATA

1	2	3	4		5	6	7	8	9
Trial No.	Burette F	Readings	Head, h	Tim	ne, t	Temp, T	Permeability at	Temp	Permeability at
Thai NO.	h ₁ (cm)	h ₂ (cm)	(cm)	Sec	Min	(°C)	T°C, k _T	Correc.	20°C, k ₂₀
1	90.0	80.0	10.0	2.7	0.044	19.3	40.82	1.018	41.54
2	90.0	80.0	10.0	2.6	0.044	19.3	41.14	1.018	41.86
3	90.0	80.0	10.0	2.7	0.045	19.3	40.37	1.018	41.08
4	80.0	70.0	10.0	3.0	0.050	19.3	40.88	1.018	41.60
5	80.0	70.0	10.0	3.0	0.051	19.3	40.48	1.018	41.19
6	80.0	70.0	10.0	3.1	0.051	19.3	39.95	1.018	40.66
7	70.0	60.0	10.0	3.1	0.051	19.0	46.27	1.025	47.44
8	70.0	60.0	10.0	3.6	0.060	19.0	39.22	1.025	40.21
9	70.0	60.0	10.0	3.7	0.062	19.0	38.16	1.025	39.13
10	60.0	50.0	10.0	4.3	0.072	19.0	38.86	1.025	39.83
11	60.0	50.0	10.0	4.2	0.070	19.0	39.68	1.025	40.68
12	60.0	50.0	10.0	4.3	0.072	19.0	38.68	1.025	39.65
13	50.0	40.0	10.0	5.3	0.088	19.0	39.04	1.025	40.02
14	50.0	40.0	10.0	5.3	0.089	19.0	38.60	1.025	39.57
15	50.0	40.0	10.0	5.4	0.090	19.0	38.17	1.025	39.13
Perm, $\mathbf{k}_{T}(7) = 60 * \text{L/t} * \text{r}^2/\text{R}^{2*} \ln(\text{h1/h2}) = 60* \text{L/(5)} * \text{r}^2/\text{R}^2* \ln((2)/(3))$						AVERA	GE k ₂₀ (in/hr):	40.9	
Head, $\mathbf{h}(4) = (2) - (3)^2$ Perm, $\mathbf{k}_{ee}(9) = (7)^*(8)$						SOIL PERMEAB	LITY CLASS:	K5	

Head, h (4) = (2) - (3); Perm,
$$k_{20}$$
 (9) = (7)*(8)

Soil Permeability Classes

> 20 inches per hour (in/hr)	K5
6 - 20 in/hr	K4
2 - 6 in/hr	K3
0.6 - 2 in/hr	K2
0.2 - 0.6 in/hr	K1
< 0.2 in/hr	K0
<u>Remarks</u>	

- Sample recomapcted to loose/medium dense per client request.

CRAIG TESTING LABORATORIES Mays Landing, NJ .a Division of Maser Consulting P.A. (609) 625-1700

TUBE PERMEAMETER TEST

(N.J.A.C. 7:9A - Standards for Individual Subsurface Sewage Disposal Systems; Subchapter 6, Section 6.2, page 39, Modified)

Client:	ARH Associates	MC #:	20C003645S	
Project:	Block 3501 Lot 1 Mullica Township, Atlantic County	Date:	July 16, 2020	
Boring/Sai	nple # or Descrip./Location: TP-3	Depth:	60"-65"	
Visual Des	cription of Soil (USCS): Brown poorly graded SAND with silt/clay and trace gravel / trace org	anics		

Technician: K. Perry			Proctor Data:	Max Dry Density (pcf)	% of Max Dry Density	Opt. Moisture (%)
				-	-	-
Initial Specimen Data:						
Sample Type:	Water	Length, L	Diamatan (in)	Wat Dansity (nof)	Der Donaitz (nof)	
Undisturbed	Content (%)	(in)	Diameter (III)	wet Density (pci)	Dry Density (pci)	
Re-Compacted 🔽	6.8	5.34	2.875	93.1	87.2	
Radi	us of Burett	e.r: 0.3141	in	Rad	lius of Soil Specimen, R:	1.4375 in

TEST DATA

1	2	3	4	ļ	5	6	7	8	9
Trial No	Burette F	Readings	Head, h	Time, t Temp, T		Permeability at	Temp	Permeability at	
Thai NO.	h1 (cm)	h ₂ (cm)	(cm)	Sec	Min	(°C)	T°C, k _T	Correc.	20°C, k ₂₀
1	90.0	80.0	10.0	4.8	0.080	19.3	22.45	1.018	22.85
2	90.0	80.0	10.0	5.0	0.083	19.3	21.73	1.018	22.11
3	90.0	80.0	10.0	4.9	0.081	19.3	22.27	1.018	22.66
4	80.0	70.0	10.0	5.6	0.093	19.0	22.02	1.025	22.58
5	80.0	70.0	10.0	5.5	0.092	19.0	22.18	1.025	22.74
6	80.0	70.0	10.0	5.6	0.093	19.0	21.98	1.025	22.54
7	70.0	60.0	10.0	6.4	0.107	18.9	22.02	1.028	22.63
8	70.0	60.0	10.0	6.5	0.108	18.9	21.92	1.028	22.52
9	70.0	60.0	10.0	6.5	0.108	18.9	21.75	1.028	22.35
10	60.0	50.0	10.0	8.0	0.133	18.9	20.98	1.028	21.56
11	60.0	50.0	10.0	8.1	0.134	18.9	20.74	1.028	21.32
12	60.0	50.0	10.0	8.0	0.134	18.9	20.85	1.028	21.42
13	50.0	40.0	10.0	10.3	0.171	18.8	19.90	1.030	20.51
14	50.0	40.0	10.0	10.3	0.172	18.8	19.85	1.030	20.45
15	50.0	40.0	10.0	10.3	0.172	18.8	19.89	1.030	20.49
Perm, $\mathbf{k}_{T}(7) = 60 * L/t * r^{2}/R^{2*} \ln(h1/h2) = 60* L/(5) * r^{2}/R^{2} * \ln((2)/(3))$					AVERAG	GE k ₂₀ (in/hr):	21.9		
Head. h (4) = (2) - (3): Perm. k_{20} (9) = (7)*(8)						SOIL PERMEABI	LITY CLASS:	K5	

Head, h (4) = (2) - (3); Perm,
$$k_{20}$$
 (9) = (7)*(8)

Soil Permeability Classes

> 20 inches per hour (in/hr)	K5
6 - 20 in/hr	K4
2 - 6 in/hr	K3
0.6 - 2 in/hr	K2
0.2 - 0.6 in/hr	K1
< 0.2 in/hr	K0
<u>Remarks</u>	

- Sample recomapcted to loose/medium dense per client request.

SOIL BORING LOG

Project: <u>Plar</u> (AR) Name: <u>Ada</u>	nned Carpenters Union Elev.: 80.70 RH#50-52714) Boring No.: TP-1 am Warburton (Upland Forest)		Elev.: <u>80.70</u> Boring No.: <u>TP-1</u> (Upland Forest)		7/9/2020 11:11 am Sunny, Hot,	GW: ESHWT: 90 degree	Not Encountered at 10.5' (Elev - 70.20) Not Encountered at 10.5' (Elev - 70.20) s - No Rain in Past 48 Hours
<u>Depth</u> (in. below grade)	Color (Munsell Chart)	<u>Texture</u>	Mottling	Consistency	Structure	Boundary	<u>Remarks</u>
0-12	7.5YR 5/1	SL	-	A1	1	С	Loose fine sandy loam; some small root matter
12-26	7.5YR 7/6	SL	-	A1	1	С	Dry and loose; no stone; single grain; root matter to 17" depth
26-84	7.5YR 5/6	SL	-	A1	1	С	Loose sandy loam; 1/8" to 1/4" stone (60%); coarse
84-110	7.5YR 8/1	S	-	A1	1	С	Clean coarse white gray sand; 1/8" stone (25%); dry
110-126	7.5YR 5/6	SL	-	B2	3	С	Sandy loam; friable; some clay coating (10%); non- cohesive
			End TP @ 126"				

TEXTURE: Sand (S), Loamy Sand (LS), Sandy Loam (SL), Loam (LM), Silty Loam (STL), Sandy Clay Loam (SCL), Silt (ST), Sandy Clay (SC), Clayey Sand (CLYS) Silty Sand (STS), Clay Loam (CL), Silty Clay Loam (STCL), Silty Clay (STC), or Clay (C) --- Modifiers: Fine (F), Medium (M), Coarse (Crse), Coarse Fragments (CF)

MOTTLING: A. ABUNDANCE: (F) FEW: < 2% (C) COMMON: 2%-20% (M) MANY: > 20%

B. CONTRAST: (F) FAINT: Barely Distinguishable (D) DISTINCT: Easily Recognizable

1) Nonsticky

4) Very Sticky

5) Nonplastic

3) Sticky

2) Slightly Sticky

6) Slightly Plastic

CONSISTENCY:

B. MOIST A. DRY 1) Loose 1) Loose 2) Soft 2) Very Friable 3) Slightly Hard 3) Friable 4) Hard 4) Firm 5) Very Hard 5) Very Firm 6) Cemented 6) Extremely Firm (P) PROMINENT: Obvious and Outstanding C. WET

DESCRIPTION Non-Coherent Easily Broken Breakable w/Pressure Barely Breakable Breaks w/Hands Only Can't Break w/Hands

C. SIZE: (F) FINE: < 0.3" (M) MEDIUM: 0.3"-0.8" (C) COARSE: > 0.8"

STRUCTURE:

1) SINGLE GRAIN (SG): Loose Individual Sand Grains

- 2) SPHEROIDAL (SP): Crumb and Granular Aggregates
- 3) SUBANGULAR BLOCKY (SB): Equi-Dimensional Aggregates, Well Defined Faces, No Sharp Edges nor Corners
- 4) ANGULAR BLOCKY (AB): Same as Subangular Blocky but

BOUNDARY DISTINCTNESS:

(G) GRADUAL: 2.5" to 5" thick (D) DIFFUSE: >5" thick

(A) ABRUPT: <1" thick

(C) CLEAR: 1" to 2.5" thick

- with Sharp Edges & Corners
- 5) PRISMATIC (PR): One Axis Longer than Other Two
- 6) PLATY (PL): One Axis Shorter than Other Two
- 7) MASSIVE (MS): Dense, Compact Mass

SOIL BORING LOG

Project: <u> </u> (Planned Carpenters Union (ARH#50-52714) Adam Warburton	Elev.: 80.15 Boring No.: TP-2		Date: 7/9/20 Time: 10:30		GW: ESHWT: 90 degree	Not Encountered at 10.5' (Elev - 69.65) Not Encountered at 10.5' (Elev - 69.65)
<u>Depth</u> (in. below grade)	Color (Munsell Chart)	Texture	Mottling	Consistency	Structure	Boundary	Remarks
0-12	7.5YR 5/1	SL	-	A1	1	С	Loose fine sandy loam; some small root matter
12-32	7.5YR 6/8	SL	-	B1	1	С	Sandy loam; moist; medium to coarse grain; non- cohesive
32-55	7.5YR 6/8	SL	-	B2	2	С	Moist sandy loam; 1/8" Stone (25%); coarse grain
55-96	7.5YR 6/8	SL	-	B2	2	С	Sandy loam with some clay coating (5%); 1/8" stone (10%); coarse grain
96-110	7.5YR 6/8	SL	-	B1	2	С	Sandy loam with very little clay coating (<5%); no stone; coarse
110-126	7.5YR 8/2	S	-	A1	1	С	Loose clean sand; white to gray in color; coarse grain
			End TP @ 126"				

TEXTURE: Sand (S), Loamy Sand (LS), Sandy Loam (SL), Loam (LM), Silty Loam (STL), Sandy Clay Loam (SCL), Silt (ST), Sandy Clay (SC), Clayey Sand (CLYS) Silty Sand (STS), Clay Loam (CL), Silty Clay Loam (STCL), Silty Clay (STC), or Clay (C) --- Modifiers: Fine (F), Medium (M), Coarse (Crse), Coarse Fragments (CF)

DESCRIPTION

Non-Coherent

Easily Broken

Barely Breakable

Breakable w/Pressure

Breaks w/Hands Only

Can't Break w/Hands

MOTTLING: A. ABUNDANCE: (F) FEW: < 2% (C) COMMON: 2%-20% (M) MANY: > 20%

B. CONTRAST: (F) FAINT: Barely Distinguishable (D) DISTINCT: Easily Recognizable

C. WET

3) Sticky

1) Nonsticky

4) Very Sticky

5) Nonplastic

2) Slightly Sticky

6) Slightly Plastic

CONSISTENCY:

B. MOIST A. DRY 1) Loose 1) Loose 2) Soft 2) Very Friable 3) Slightly Hard 3) Friable 4) Hard 4) Firm 5) Very Hard 5) Very Firm 6) Cemented 6) Extremely Firm (P) PROMINENT: Obvious and Outstanding

C. SIZE: (F) FINE: < 0.3" (M) MEDIUM: 0.3"-0.8" (C) COARSE: > 0.8"

STRUCTURE:

1) SINGLE GRAIN (SG): Loose Individual Sand Grains

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- 4) ANGULAR BLOCKY (AB): Same as Subangular Blocky but

BOUNDARY DISTINCTNESS:

(G) GRADUAL: 2.5" to 5" thick (D) DIFFUSE: >5" thick

(A) ABRUPT: <1" thick

(C) CLEAR: 1" to 2.5" thick

- with Sharp Edges & Corners
- 5) PRISMATIC (PR): One Axis Longer than Other Two
- 6) PLATY (PL): One Axis Shorter than Other Two
- 7) MASSIVE (MS): Dense, Compact Mass

SOIL BORING LOG

Project:	Planned Carpenters Union (ARH#50-52714)	Elev.: <u>77.50'</u> Boring No.: TP-3		Date: Time:	7/9/2020 9:55 am	GW: ESHWT:	Not Encountered at 10.5' (Elev - 67.00) Not Encountered at 10.5' (Elev - 67.00)
Name:	Adam Warburton	((Upland Forest)		Wx: Sunny, Hot, 90 degrees		s - No Rain in Past 48 Hours
<u>Depth</u> (in. below grade)	Color (Munsell Chart)	Texture	Mottling	<u>Consistency</u>	<u>Structure</u>	<u>Boundary</u>	Remarks
0-12	7.5YR 5/1	SL	-	A1	1	С	Loose fine sandy loam; some small root matter
12-53	7.5YR 6/8	SL	-	B2	2	С	Soft; loose; friable coarse to medium sandy loam; non cohesive
53-96	7.5YR 6/8	SL	-	B1	1	С	Loose; coarse sandy loam; moist; no stone
96-98	7.5YR 6/8	SL	-	B3	3	D	Small lense of sandy loam with 10% clay coating; coarse grain; friable
98-115	7.5YR 6/8	SCL	-	B3	3	D	Sandy clay loam; friable and easily broken; no stone; coarse grain
115-126	7.5YR 6/8	SL	-	B1	1	С	Loose sandy loam; 5% clay coating; non-cohesive;
			End TP @ 126"				

TEXTURE: Sand (S), Loamy Sand (LS), Sandy Loam (SL), Loam (LM), Silty Loam (STL), Sandy Clay Loam (SCL), Silt (ST), Sandy Clay (SC), Clayey Sand (CLYS) Silty Sand (STS), Clay Loam (CL), Silty Clay Loam (STCL), Silty Clay (STC), or Clay (C) --- Modifiers: Fine (F), Medium (M), Coarse (Crse), Coarse Fragments (CF)

DESCRIPTION

Non-Coherent

Easily Broken

Barely Breakable

Breakable w/Pressure

Breaks w/Hands Only

Can't Break w/Hands

MOTTLING: A. ABUNDANCE: (F) FEW: < 2% (C) COMMON: 2%-20% (M) MANY: > 20%

B. CONTRAST: (F) FAINT: Barely Distinguishable (D) DISTINCT: Easily Recognizable

C. WET

3) Sticky

1) Nonsticky

4) Very Sticky

5) Nonplastic

2) Slightly Sticky

6) Slightly Plastic

CONSISTENCY:

B. MOIST A. DRY 1) Loose 1) Loose 2) Soft 2) Very Friable 3) Slightly Hard 3) Friable 4) Hard 4) Firm 5) Very Hard 5) Very Firm 6) Cemented 6) Extremely Firm (P) PROMINENT: Obvious and Outstanding

C. SIZE: (F) FINE: < 0.3" (M) MEDIUM: 0.3"-0.8" (C) COARSE: > 0.8"

STRUCTURE:

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(C) CLEAR: 1" to 2.5" thick

- 4) ANGULAR BLOCKY (AB): Same as Subangular Blocky but
- with Sharp Edges & Corners
- 5) PRISMATIC (PR): One Axis Longer than Other Two
- 6) PLATY (PL): One Axis Shorter than Other Two
- 7) MASSIVE (MS): Dense, Compact Mass



 DRAWING LOCATION
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 AST DATE SAVED
 8/10/2020

 AST SAVE BY
 nminn





TRAFFIC IMPACT STUDY

CARPENTERS UNION CENTER (3301 S. WHITE HORSE PIKE)

Mullica Township, Atlantic County

New Jersey

April 23, 2020



Horner & Canter Associates A PROFESSIONAL CORPORATION TRANSPORTATION AND TRAFFIC ENGINEERING

TRAFFIC IMPACT STUDY

CARPENTERS UNION CENTER (3301 S. WHITE HORSE PIKE)

S. White Horse Pike (U.S. Route 30)

Mullica Township Atlantic County New Jersey

Prepared by:

HORNER & CANTER ASSOCIATES A Professional Corporation Transportation and Traffic Engineering 105 Atsion Road, Suite F Medford, NJ 08055

> April 23, 2020 Dad H. Hann

David H. Horner, P.E., PTOE Professional Engineer N.J. Lic. No. 40101

File No. 20-002

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INTRODUCTION

Horner & Canter Associates has prepared this Traffic Impact Study for the proposed Carpenters Union Center to be located along the south side of S. White Horse Pike (U.S. Route 30) in Mullica Township, Atlantic County, New Jersey (Figure 1). The proposed development will consist of an 18,328 square feet office building and training center. Access to the proposed development is proposed to be provided via two driveways intersecting S. White Horse Pike (U.S. Route 30).

The proposed development has been assumed to be built-out in two years. Thus, the 2022 horizon year has been fully evaluated in this report.

The traffic study includes the following scope:

- A site inspection and inventory of existing roadway features such as geometric layout, lane configurations, traffic control devices, and other pertinent physical characteristics.
- Conduct of Manual Turning Movement (MTM) counts during the weekday AM (7:00 AM -9:00 AM) and weekday PM (4:00 PM - 6:00 PM) peak periods at the following intersections which constitute the study area:
 - S. White Horse Pike (U.S. Route 30)/2nd Street/Mazza's Flooring
 - S. White Horse Pike (U.S. Route 30)/2nd Street/Columbia II Restaurant
- Analysis of existing traffic conditions at the study area intersections.
- Projection of site-generated traffic volumes for the proposed development and distribution of this traffic to the study area roadway network.
- Establishment of future traffic volumes for the anticipated built-out year of the proposed development (2022), including background traffic growth projections and the site-generated traffic.
- Analysis of future No-Build and Build 2022 traffic conditions at the study area intersections and site access driveways.

• Formulation of conclusions with regard to the traffic impact of the proposed development and the roadway and intersection improvement needs.

EXISTING CONDITIONS

The study area roadway network was inventoried with regard to the existing physical and operating characteristics as they affect traffic flow. The study area roadway network is described in further detail below.

S. White Horse Pike is a State highway carrying the U.S. Route 30 designation in a general east-west direction. S. White Horse Pike is classified as an Urban Principal Arterial in this area pursuant to the NJDOT Straight Line Diagram (attached in Appendix A). In the vicinity of the site, S. White Horse Pike provides two travel lanes in each direction within an approximate 48 feet-wide cartway including shoulders. The posted speed limit on S. White Horse Pike is 50 miles per hour in the vicinity of the site.

2nd Street is a local roadway extending in a general north-south direction between S. White Horse Pike and Moss Mill Road. 2nd Street is a two-lane roadway providing a 17-19 feet cartway. Situated at the northwest corner of the intersection is the Columbia II restaurant. The existing Carpenters Local 255 building is situated along 2nd Street north of the intersection. There is no posted speed limit on 2nd Street.

There is another roadway identified as 2nd Street located to the east of the site directly opposite Mazza's Flooring. This roadway is essentially an unimproved cartway extending to Moss Mill Road.

Both intersections in the study area are stop-sign controlled for the respective minor street approaches.

Existing Traffic Volumes

Since the peak hour traffic conditions reflect the critical periods for evaluation of operating conditions and traffic impact, existing traffic volumes were acquired at the study area intersections through the conduct of Manual Turning Movement (MTM) counts. The peak hour counts were conducted in February 2020 while school was in session during the weekday AM (7:00 - 9:00 AM) and weekday PM (4:00 - 6:00 PM) peak periods. These count periods were selected to capture both the peak hours of adjacent street traffic as well as the peak periods of the proposed development. The peak hour traffic count summaries are provided in Appendix B.

The resultant existing peak hour traffic volumes are presented in Figures 2 and 3 for the AM and PM peak periods, respectively.

Existing Levels of Service

In order to determine the ability of the adjoining streets and intersections to accommodate the expansion-generated traffic, the Level of Service of these facilities is computed using the HCS analysis software which is based on the methodologies contained in the Highway Capacity Manual (6th Edition). Level of Service (LOS) is a measure of the quality of the traffic flow and generally is expressed as follows:

Level of Service A - Excellent - Free flow

- B Very Good Minor adjustments in traffic flows
- C Good Stable flow of traffic
- D Satisfactory flow Occasional short periods with minor delays
- E CAPACITY FLOW- Regular delays
- F Forced Flow Significant delays and queuing

At unsignalized intersections, Level of Service is based on the average delay to controlled and yielding movements, such as exiting movements from a stop sign or the left-turn from a through street into a side street. The delay thresholds for various Levels of Service are contained in Appendix C.

An existing conditions analysis of the study area intersections was completed. The resultant Level of Service (LOS) findings for the existing conditions are shown in Figure 4. The detailed capacity/LOS analysis worksheets are provided in Appendix D.

SITE TRAFFIC

The estimation of the amount of traffic a development proposal will generate is dependent upon the type of use, the size of the use, and in some cases, site-specific operating characteristics. The nationally-accepted standard for estimating the trip generation characteristics is the Institute of Transportation Engineers (ITE) publication *Trip Generation Manual, 10th Edition.* This publication is a compilation of trip generation studies at different types of land uses, such as those which are proposed.

The proposed development will consist of a two-story, 18,328 square feet office and training center. For the proposed development, Land Use Code 710 – General Office Building was selected as the most appropriate. Table 1 below summarizes the projected site trips for the proposed development. The trip generation worksheets are provided in Appendix E.

	S	Table lite Trij	1 0 S				
		AN	l Peak H	lour	PN	l Peak H	lour
	Daily	ln.	Out	Total	In	Out	Total
Office (18,328 s.f.)	205	38	6	44	4	19	23

The traffic projected to be generated by the proposed development was distributed to the study area roadway network based on existing traffic patterns in the area. The following are the resultant traffic distribution percentages for the proposed development:

S. White Horse Pike (U.S. Route 30)	
to/from the east	45%
to/from the west	<u>55%</u>

100%

The distributed site trips for the proposed development are presented in Figures 5A and 5B for the respective AM and PM peak hours.

FUTURE 2022 CONDITIONS

To assess the impact of the proposed development on the study area roadway network, the future traffic volumes in the anticipated build-out year of the development (2022) were determined. To account for regional growth that is expected to occur during the intervening period, a background traffic growth rate was applied to the existing traffic volumes. Based on NJDOT's Annual Background Growth Rate Table, April 2017 – April 2019, a 1.50 percent per year growth is appropriate for Urban Principal Arterials in Atlantic County. Thus, a total 3.0 percent background traffic growth was applied to the existing 2020 traffic volumes to yield the 2022 No-Build traffic volumes which are presented in Figures 6 and 7 for the respective peak periods.

The 2022 Build traffic volumes, which include the proposed development trips (Figures 5A and 5B) added to the No-Build traffic volumes (Figures 6 and 7), are presented in Figures 8 and 9 for the respective peak periods.

Assessment

An assessment of the 2022 No-Build and Build operating conditions within the study area was completed. The assessment included a Level of Service (LOS) analysis of the study area intersections and proposed development accesses. The 2022 No-Build LOS results are presented in Figure 10 with the detailed capacity/LOS analysis worksheets provided in Appendix F. The 2022 Build LOS results are presented in Figure 11 with the capacity/LOS analysis worksheets provided in Appendix F. The 2022 Build LOS results are presented in Figure 11 with the capacity/LOS analysis worksheets provided in Appendix G.

A summary of the operating conditions for each of the study locations is provided below:

<u>S. White Horse Pike (U.S. Route 30)/2nd Street/Mazza's Flooring</u> – This unsignalized intersection currently operates at acceptable LOS B/C for the stop-controlled approaches during both peak periods, with the left-turn movements from S. White Horse Pike (U.S. Route 30) operating at highly acceptable LOS A. Under No-Build and Build conditions these LOS will be maintained at acceptable LOS B/C operation. There are no improvements necessary to mitigate the site traffic at this intersection.

<u>S. White Horse Pike (U.S. Route 30)/2nd Street/Columbia II Restaurant</u> – This unsignalized intersection currently operates at acceptable LOS A/B for the stop-controlled approach during both peak periods, with the left-turn movements from S. White Horse Pike (U.S. Route 30) operating at highly acceptable LOS A. Under No-Build and Build conditions these LOS A/B will be maintained. There are no improvements necessary to mitigate the site traffic at this intersection.

<u>S. White Horse Pike (U.S. Route 30/Site Accesses</u> – The proposed site accesses intersecting S. White Horse Pike (U.S. Route 30) will accommodate all ingress and egress movements. With this configuration, both accesses will operate at acceptable LOS C or better for all movements during both peak periods.

Left-Turn Lane Warrant Analysis

Left-turn lane warrant analyses were conducted for the left-turn movements from S. White Horse Pike (U.S. Route 30) to determine whether a separate left-turn lane for ingress vehicles would be warranted at either access location. The left-turn lane warrant analysis worksheets, using the methodologies contained in the Highway Research Record (HRR) 211, are provided in Appendix H. The results show that left-turn lanes are <u>not</u> warranted at these access driveways.
CONCLUSIONS

The conduct of this Traffic Impact Study for the proposed Carpenters Union Center located at 3301 S. White Horse Pike in Mullica Township, Atlantic County, has led to the following conclusions and recommendations:

- The proposed development will be provided access at two locations intersecting S. White Horse Pike (U.S. Route 30). Both access driveways will operate at acceptable LOS C or better during both study peak periods.
- 2. The development will generate approximately 44 and 23 trips during the respective AM and PM peak hours.
- 3. The proposed development will have no adverse impact on the study area roadway network. The development traffic can be safely and efficiently accommodated within the study area.
- 4. Left-turn lanes along S. White Horse Pike (U.S. Route 30) at the respective accesses are not warranted.
- 5. The accesses to S. White Horse Pike (U.S. Route 30) will require review and approval by the New Jersey Department of Transportation (NJDOT).







FIGURE 1 SITE LOCATION MAP

CARPENTERS UNION CENTER

MULLICA TOWNSHIP, ATLANTIC COUNTY, NJ

20-002 APRIL 2020

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FIGURE 2 EXISTING WEEKDAY AM PEAK HOUR TRAFFIC VOLUMES

CARPENTERS UNION CENTER

MULLICA TOWNSHIP, ATLANTIC COUNTY, NJ

20-002 APRIL 2020

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FIGURE 3 EXISTING WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

CARPENTERS UNION CENTER

20-002 APRIL 2020

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LEGEND:

— AM/PM PEAK HOUR

FIGURE 4 EXISTING LEVELS OF SERVICE

CARPENTERS UNION CENTER

MULLICA TOWNSHIP, ATLANTIC COUNTY, NJ

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FIGURE 5A SITE TRIPS: AM PEAK HOUR

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FIGURE 5B SITE TRIPS: PM PEAK HOUR

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FIGURE 6 NO-BUILD WEEKDAY AM PEAK HOUR TRAFFIC VOLUMES

CARPENTERS UNION CENTER

MULLICA TOWNSHIP, ATLANTIC COUNTY, NJ

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FIGURE 7 NO-BUILD WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

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FIGURE 8 BUILD WEEKDAY AM PEAK HOUR TRAFFIC VOLUMES

CARPENTERS UNION CENTER

MULLICA TOWNSHIP, ATLANTIC COUNTY, NJ

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FIGURE 9 BUILD WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

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LEGEND:

▲ AM/PM PEAK HOUR

FIGURE 10 NO-BUILD LEVELS OF SERVICE

CARPENTERS UNION CENTER

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LEGEND:

← AM/PM PEAK HOUR

FIGURE 11 BUILD LEVELS OF SERVICE

CARPENTERS UNION CENTER

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APPENDIX A

Straight-Line Diagram



APPENDIX B

Traffic Counts

Horner & Canter Associates

Transportation and Traffic Engineering

4950 York Rd, Suite 2C, P.O. 301, Holicong, PA 18928-0301 105 Atsion Rd, Suite F, Medford, NJ 08055

SB: 2nd St. EB/WB: US Rt 30 Mullica Twp./Atlantic Co./NJ Tuesday/Cloudy, Rain/E-06/GP

File Name	: 20-002-001
Site Code	: 20002001
Start Date	: 2/25/2020
Page No	: 1

	Groups Printed-	Passenger and	2 Axle Vehicles	- Buses and He	avy Vehicles		
	2nd St.		US Rt 30		US Rt 30		
	Southbour	nd	Westbour	d	Eastbound	d l	
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
06:45 AM	0	1	83	1	1	91	177
Total	0	1	83	1	1	91	177
07:00 AM	0	0	80	4	0	116	200
07:15 AM	0	0	91	5	0	149	245
07:30 AM	0	0	97	0	0	141	238
07:45 AM	0	0	81	1	3	126	211
Total	0	0	349	10	3	532	894
08:00 AM	0	0	108	2	1	111	222
08:15 AM	0	1	82	0	3	98	184
08:30 AM	1	1	72	0	0	87	161
*** BREAK ***						-	i.
Total	1	2	262	2	4	296	567
*** BREAK ***							
03:45 PM	2	1	106	3	3	84	199
Total	. 2	1	106	3	3	84	199
04:00 PM	0	1	121	5	2	112	241
04:15 PM	0	2	157	1	4	135	299
04:30 PM	0	0	144	1	1	113	259
04:45 PM (1	0	155	0	1	118	275
Total	1	3	577	7	8	478	1074
05:00 PM	2	0	124	0	1	109	236
05:15 PM	1	1	120	1	0	99	222
05:30 PM	0	0	123	1	0	112	236
Grand Total	7	8	1744	25	20	1801	3605
Apprch %	46.7	53.3	98.6	1.4	1.1	98.9	
Total %	0.2	0.2	48.4	0.7	0.6	50	
Passenger and 2 Axle Vehicles	7	8	1711	24	20	1747	3517
% Passenger and 2 Axle Vehicles	100	100	98.1	96	100	97	97.6
Buses and Heavy Vehicles	0	0	33	1	0	54	88
% Buses and Heavy Vehicles	0	0	1.9	4	0	3	2.4

Horner & Canter Associates

Transportation and Traffic Engineering

4950 York Rd, Suite 2C, P.O. 301, Holicong, PA 18928-0301 105 Atsion Rd, Suite F, Medford, NJ 08055

SB: 2nd St. EB/WB: US Rt 30 Mullica Twp./Atlantic Co./NJ Tuesday/Cloudy, Rain/E-06/GP

File Name	: 20-002-001
Site Code	: 20002001
Start Date	: 2/25/2020
Page No	: 2

		2nd St.			US Rt 30	·· · -		US Rt 30		I
		Southbound	b		Westboun	d		Eastbound	1	
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis Fr	om 06:45 Al	VI to 08:30 A	M - Peak 1 o	of 1						
Peak Hour for Entire Ir	ntersection E	Begins at 07:	:15 AM							
07:15 AM	0	0	0	91	5	96	0	149	149	245
07:30 AM	0	0	0	97	0	97	0	141	1 41	238
07:45 AM	0	0	0	81	1	82	3	126	129	211
08:00 AM	0	0	0	108	2	110	1	1 1 1	112	222
Total Volume	0	0	0	377	8	385	4	527	531	916
% App. Total	0	0		97.9	2.1		0.8	99.2		
PHF	.000	.000	.000	.873	.400	.875	.333	.884	.891	.935
Passenger and 2 Axle Vehicles	0	0	0	366	8	374	4	499	503	877
% Passenger and 2 Axle Vehicles	0	0	0	97.1	100	97.1	100	94.7	94.7	95.7
Buses and Heavy Vehicles	0	0	0	11	0	11	0	28	28	39
% Buses and Heavy Vehicles	0	0	0	2.9	0	2.9	0	5.3	5.3	4.3
Peak Hour Analysis Fr	om 03:45 Pl	M to 05:30 F	M - Peak 1 o	f 1						
Peak Hour for Entire Ir	itersection E	eqins at 04:	00 PM							
04:00 PM	0	1	1	121	5	126	2	112	114	241
04:15 PM	0	2	2	157	1	158	4	135	139	299
04:30 PM	0	0	0	144	1	145	1	113	114	259
04:45 PM	1	Ó	1	155	0	155	1	118	119	275
Total Volume	1	3	4	577	7	584	8	478	486	1074
% App. Total	25	75		98.8	1,2		1.6	98.4		
PHF	.250	.375	.500	.919	.350	.924	.500	.885	.874	.898
Passenger and 2 Axle Vehicles	1	3	. 4	573	7	580	8	470	478	1062
- % Passenger and 2 Axle Vehicles	100	100	100	99.3	100	99.3	100	. 98.3	98.4	98.9
Buses and Heavy Vehicles	0	0	0	4	0	4	0	8	8	12
% Buses and Heavy Vehicles	0	0	0	0.7	0	0.7	0	1.7	1.6	1.1

Horner & Canter Associates Transportation and Traffic Engineering

4950 York Rd, Suite 2C, P.O. 301, Holicong, PA 18928-0301 105 Atsion Rd, Suite F, Medford, NJ 08055

NB: 2 Mazza Flooring Driveways EB/WB: US Rt 30 Mullica Twp./Atlantic Co./NJ Wednesday/Cloudy/E-06/GP ~

File Name : 20-002-002 Site Code : 20002002 Start Date : 2/26/2020 Page No : 1

	Groups Printed-	Passenger	and 2 Axle Vehicles	- Buses and	Heavy Vehicles		
	US Rt 30)	2 Mazza Flooring	Driveways	US Rt 30		
	Westbour	id j	Northbour	nd	Eastboun	<u>d</u>	
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
06:45 AM	0	92	0	0	79	0	171_
Total	0	92	0	0	79	0	171
07:00 AM	1	85	0	0	132	2	220
07:15 AM	1	103	0	0	131	0	235
07:30 AM	0	98	0	1	147	0	246
07:45 AM	0	83	1	0	129	0	213
Total	2	369	1	1	539	2	914
08:00 AM	0	113	0	0	106	1	220
08:15 AM	1	94	0	0	89	1 .	185
08:30 AM	1	80	1	0	85	1	168
*** BREAK ***		007	4	01		al	573
Jotal	2	287	1	01	200	21	515
*** BREAK ***							
03:45 PM	0	122	0	1	130	0	253
Total	0	122	0	1	130	0	253
04:00 PM	0	124	0	0	143	0	267
04:15 PM	0	131	0	0	121	0	. 252
04:30 PM	0	151	0	0	121	0	272
04:45 PM	0	125	2	0	137	0	264
Total	0	531	2	0	522	0	1055
05:00 PM	0	124	0	0	132	0	256
05:15 PM	0	141	0	0	106	0	247
05:30 PM	0	118	2	2	94	1	217
Grand Total	4	1784	6	4 [1882	6	3686
Approh %	0.2	99.8	60	40	99.7	0.3	
Total %	0.1	48.4	0.2	0.1	<u>51.1</u>	0.2	
Passenger and 2 Axle Vehicles	4	1743	6	- 4	1834	6	3597
% Passenger and 2 Axle Vehicles	100	97.7	100	100	97.4	100	_ 97.6
Buses and Heavy Vehicles	0	41	0	0	48	0	89
% Buses and Heavy Vehicles	0	2.3	0	0	2.6	0	2.4

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NB: 2 Mazza Flooring Driveways EB/WB: US Rt 30 Mullica Twp./Atlantic Co./NJ Wednesday/Cloudy/E-06/GP

% Buses and Heavy Vehicles

File Name : 20-002-002 Site Code : 20002002 Start Date : 2/26/2020 Page No : 2

		US Rt 30		2 Mazz	a Flooring D	riveways				
		Westbound	d		Northbound	1	· · · · · · · · · · · ·	Lastbound		
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right {	App, Total	Int. Lotal
Peak Hour Analysis Fr	om 06:45 Al	VI to 08:30 /	AM - Peak 1 o	f 1						
Peak Hour for Entire In	ntersection E	egins at 07	:00 AM						1	
07:00 AM	1	85	86	0	0	0	132	2	134	220
07:15 AM	1	103	104	0	0	0	131	0	131	235
07:30 AM	0	98	98	0	1	1	147	0	147	246
07:45 AM	0	83	83	1	0	1_	129	0	129	213
Total Volume	2	369	371	1	1	- 2	539	2	541	914
% App. Total	0.5	99.5	;	50	50		99.6	0.4		
PHF	.500	.896	.892	.250	.250	.500	.917	.250	.920	.929
Passenger and 2 Ayle Vehicles	2	357	359	1	1	2	519	2	521	882
% Passancer and 2 Artic Vehicles	100	96.7	96.8	100	100	100	96.3	100	96.3	96.5
Buses and Heavy Vehicles	0	12	12	0	0	0	20	0	20	32
% Buses and Heavy Vehicles	0	3.3	3.2	0	0	0	3.7	0	3.7	3.5
Reak Hour Analysis Fr	om 03:45 Pl	M to 05:30 F	PM - Peak 1 o	f 1						
Peak Hour for Entire In	tersection F	Regins at 04	:00 PM							
	0	124	124	0	0	0	143	0	143	267
04:15 PM	õ	131	131	Ō	0	0	121	0	121	252
04:30 PM	Ő	151	151	ō	0	0	121	0	121	272
04:45 PM	ň	125	125	2	Ō	2	137	0	137	264
Total Volume	- 0-	531	531	2	0	2	522	0	522	1055
% App. Total	Ő	100		100	0		100	0		
PHF	0	879	879	.250	.000	.250	.913	.000	.913	.970
		528	528	2	0	2	512	Ō	512	1042
Passenger and 2 Axle Vehicles	0	99.4	99.4	100	Ő	100	98.1	0	98.1	98.8
% Passenger and 2 Axie Vehicles	0	्र २	<u>२</u>	.30	0.	0	10	Ó	10	13
ouses and Heavy vehicles	0 0	06	0 Å	ň	n n	õ	1.9	ō	1.9	1.2
% Buses and Heavy Venicles	U U	0.0	0.0		•	•		-		

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APPENDIX C

Level of Service Delay Thresholds

Level of Service Criteria

Level of Service at intersections is defined in terms of DELAY. Delay is a measure of driver discomfort, frustration, and lost travel time, thus the rating of delay from highly acceptable LOS A to unacceptable LOS F.

At traffic signals, delay is a complex measure and is dependent on a number of variables including signal progression, the cycle length, the green-time ratio, clearance times, trucks, pedestrians, parking, and signal phasing.

At unsignalized intersections, delay is dependent on the available gaps in the two-way flow of the uninterrupted traffic movement, intersection width, and queuing.

Intersection LOS

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APPENDIX D

Capacity/LOS Analysis Worksheets – Existing Conditions

		Н	CS7	Two	-Way	v Sto	p-Co	ntro	l Rep	ort						
General Information	_			1 A			Site	Infor	matio	n		÷ .	· .			
Analyst	DHH						Intersection Rt 30/2nd State					/2nd St/	t/Columbia			
Agency/Co.	Horn	er & Car	nter Asso	с			Juriso	diction			Mullica Twp					
Date Performed	4/23/	2020					East/	West Str	eet		S. WI	nite Hors	e Pk (Rt	30)		
Analysis Year	2020						Norti	i/South	Street		2nd St/Columbia II					
Time Analyzed	AM P	eak Hou	ır				Peak	Hour Fa	ctor	-	0.94					
Intersection Orientation	East-	West					Analy	sis Time	Period	(hrs)	0.25					
Project Description	20-00)2 Carpe	nters Ur	nion Cen	ter		<u> </u>									
Lanes		<u>.</u>	1.1	· .												
Vehicle Volumes and Ad	justme	ents	н 1911 г. 1911 г.	-							· .			1. 1 1		
Approach	T	East	ound			West	bound			North	nbound			South	bound	<u></u>
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		LT	Т				т	TR							LR	
Volume (veh/h)		4	527				377	8						0		0
Percent Heavy Vehicles (%)	-	0				İ		Í						0		0
Proportion Time Blocked							1							1		
Percent Grade (%)	+										•				0	
Right Turn Channelized	<u> </u>												1			
Median Type Storage				Undi	ivided		-									
Critical and Follow-up H	eadwa	ys	 										•	·		
Base Critical Headway (sec)		4.1				1								7.5		6.9
Critical Headway (sec)		4.10		Ī	1		İ.	<u> </u>	ŀ				Ī	6.80		6.90
Base Follow-Up Headway (sec)		2.2		[1	1		Ī	1	1		l	3.5		3.3
Follow-Up Headway (sec)		2.20			Ī		1							3,50		3.30
Delay, Queue Length, an	d Leve	l of S	ervice				-									
Flow Rate, v (veh/h)		4						İ							0	
Capacity, c (veh/h)		1160	1	[1			1		I				
v/c Ratio		0.00	<u> </u>	İ	1	<u> </u>	1	I		Î –		<u> </u>	Ī			Ī
95% Queue Length, Q ₉₅ (veh)		0.0			1			1		1	1	l –				
Control Delay (s/veh)		8.1			<u> </u>	İ	1	1		t	1	Ī	1	1		
Level of Service (LOS)	+	А			<u> </u>		1		1	t				1		<u> </u>
Approach Delay (s/veh)	1	0	.1	<u> </u>	Í		<u></u>	•				<u></u>	1			<u> </u>
Approach LOS												-	l			

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HCS7 Two-Way Stop-Control Report																
General Information							Site	Infor	natio	n			_			
Analyst	DHH						Intersection Rt 30/2nd St,					/2nd St/	Columbia			
Agency/Co.	Horn	er & Car	ter Asso	ж			Jurisdiction Mullic					ca Twp				
Date Performed	4/23/	2020					East/	West Str	eet		S. WI	nite Hors				
Analysis Year	2020						North	1/South	Street		2nd S	St/Colum	bia II			
Time Analyzed	PM P	eak Hou	r				Peak	Hour Fa	ctor		0.90					
Intersection Orientation	East-	West					Analy	sis Time	Period	(hrs)	0.25					
Project Description	20-00)2 Carpe	nters Ur	nion Cen	ter											
Lanes				· .			-	1 .		•					÷	
Vehicle Volumes and Ad	ljustme	ents			(yid)				2							
Approach	T	Eastbound We								North	bound			South	bound	
Movement	υ	L	Т	R	υ	L	T	R	U	L	Ť	R	U	L	т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		٤T	T				Т	TR							LR	
Volume (veh/h)		8	478				577	7						1		3
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)			<u>.</u>			•	•	<u> </u>							0	
Right Turn Channelized																
Median Type Storage				Und	ivided										_	
Critical and Follow-up H	leadwa	ys										÷				
Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.10			1									6.80		6.90
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30
Delay, Queue Length, ar	nd Leve	el of S	ervice	<u>.</u>										··		
Flow Rate, v (veh/h)		9													4	
Capacity, c (veh/h)		947		1			1								489	
v/c Ratio		0.01		1			Γ								0.01	
95% Queue Length, Q ₉₅ (veh)		0.0													0.0	
Control Delay (s/veh)		8.8	Ť	Ĭ	T										12.4	
Level of Service (LOS)		A		1											В	
Approach Delay (s/veh)		<u> </u>),2	<u> </u>	1									12	2.4	
Approach LOS															В	
	_															

HCS7 Two-Way Stop-Control Report																	
General Information			· -	-			Site Information										
Analyst	DHH		<u>.</u>		<u> </u>		Inters	ection			Rt 30/2nd St/Mazzas						
Agency/Co.	Horn	er & Can	ter Asso				Jurisd	iction			Mullica Twp						
Date Performed	4/23/	2020					East/\	West Str	eet		S. White Horse Pk (Rt 30)						
Analysis Year	2020						North	/South	Street	_	2nd St/Mazzas Flooring						
Time Analyzed	AM P	eak Hou	r -				Peak	Hour Fa	ctor		0.93						
Intersection Orientation	East-	West					Analy	sis Time	Period	(hrs)	0.25						
Project Description	20-00)2 Carpe	nters Un	nion Cent	er					_			•				
Lanes	<u> </u>															÷	
						-1-											
Vehicle Volumes and Adj	ustme	ents		· · ·							·						
Approach	T	Eastbound				West	bound			North	bound		1	South	bound		
Movement	U	L	Т	R	U	L	т	R	U	L	r	R	U	L	Т	R	
Priority	10	1	2	З	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0	
Configuration		ιτ		TR		LT		TR			LTR	Ī			LTR		
Volume (veh/h)		0	539	2		2	369	0		1	0	1		0	0	.0	
Percent Heavy Vehicles (%)	1	0	<u> </u>			0	i		ĺ	0	0	0		0	0	0	
Proportion Time Blocked	1						1			1							
Percent Grade (%)	<u> </u>	•		·							0			- (0		
Right Turn Channelized							_										
Median Type Storage				Undi	vided		_					·					
Critical and Follow-up H	eadwa	ys											_				
Base Critical Headway (sec)	T –	4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9	
Critical Headway (sec)	1	4,10				4.10				7.50	6.50	6,90		7.50	6.50	6.90	
Base Follow-Up Headway (sec)		2.2		1		2.2				3.5	4.0	3.3	ĺ	3,5	4.0	3.3	
Follow-Up Headway (sec)		2.20				2.20	1			3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, an	d Leve	el of S	ervice	<u>.</u>	. •								•				
Flow Rate, v (veh/h)		0				2					2				0		
Capacity, c (veh/h)		1173				1002					409						
v/c Ratio		0.00				0.00					0.01						
95% Queue Length, Q ₉₅ (veh)		0.0				0.0					0.0						
Control Delay (s/veh)		8.1				8.6					13.9						
Level of Service (LOS)		A				Α					В						
Approach Delay (s/veh)).0			C).1		13.9								
Approach LOS										В							

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HCS™ TWSC Version 7.8.5 S. White Horse Pk_2nd St_Mazzas_ea.xtw

	HCS7 Two-Way Stop-Control Report																		
General Information				•		Site Information										-			
Analyst	DHH						Inters	ection			Rt 30	/2nd St/	Mazzas	;					
Agency/Co.	Horn	er & Can	iter Asso	с			Jurisc	liction			Mullica Twp								
Date Performed	4/23/	2020	· · ·				East/	West Str	eet		S. White Horse Pk (Rt 30)								
Analysis Year	2020						North	1/South	Street		2nd St/Mazzas Flooring								
Time Analyzed	PM P	eak Hou	r				: Peak	Hour Fa	ctor		0.97								
Intersection Orientation	East-	West					Analysis Time Period (hrs) 0.25												
Project Description	20-00)2 Carpe	nters Ur	ion Cen	ter									-					
Lanes	A .									1.1									
Hajor Street East-West																			
Vehicle Volumes and Adj	ustme	ents																	
Approach	Eastbound We						bound			North	bound			South	bound				
Movement	U	L	Т	R	U	L	T	R	U	Ł	ľ	R	U	L	т	R			
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0			
Configuration	Γ	LT		TR		LT		TR			LTR		-		LTR				
Volume (veh/h)		0	522	0		Ó	531	0		2	0	0		0	0	0			
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0			
Proportion Time Blocked																			
Percent Grade (%)															0				
Right Turn Channelized																			
Median Type Storage				Undi	vided														
Critical and Follow-up He	eadwa	ys												-					
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9			
Critical Headway (sec)		4.10				4.10				7.50	6.50	6.90		7.50	6.50	6.90			
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3,3		3.5	4.0	3.3			
Follow-Up Headway (sec)		2.20				2.20				3.50	4,00	3.30		3.50	4.00	3.30			
Delay, Queue Length, and					* * * *			•		-									
Flow Rate, v (veh/h)		0				0					2				0				
Capacity, c (veh/h)		1032				1040					274								
v/c Ratio		0.00				0.00					0.01								
95% Queue Length, Q∍₅ (veh)		0.0				0.0					0.0								
Control Delay (s/veh)		8.5				8.5					18.2								
Level of Service (LOS)		Α				Α					С								
Approach Delay (s/veh)	0.0			0.0				18.2											
Approach LOS								С											

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APPENDIX E

Trip Generation Worksheets

General Office Building (710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA On a: Weekday

Setting/Location:	General Urban/Suburban
Number of Studies:	66
Avg. 1000 Sq. Ft. GFA:	171
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.74	2.71 - 27.56	5.15

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement • Institute of Transportation Engineers

General Office Building (710) Vehicle Trip Ends vs: 1000 Sq. Ft. GFA On a: Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. Setting/Location: General Urban/Suburban Number of Studies: 35 Avg. 1000 Sq. Ft. GFA: 117 Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.16	0.37 - 4.23	0.47

Data Plot and Equation



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 Institute of Transportation Engineers

General Office Building (710) Vehicle Trip Ends vs: 1000 Sq. Ft. GFA On a: Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. Setting/Location: General Urban/Suburban Number of Studies: 32 Avg. 1000 Sq. Ft. GFA: 114 Directional Distribution: 16% entering, 84% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.15	0.47 - 3.23	0.42

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement

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APPENDIX F

Capacity/LOS Analysis Worksheets – No-Build Conditions

		H	CS7	Two-	Way	Sto	o-Co	ntrol	Rep	ort									
General Information							Site	Inforr	natio	n	· · · ·				· .`				
Analyst	DHH		· · · ·				Inters	ection		Columbia									
Agency/Co.	Horne	er & Can	ter Asso	с			Jurisc	iction			Mullio	ca Twp							
Date Performed	4/23/	2020					East/	Nest Str	eet		S. Wh	ite Hors	e Pk (Rt	30)					
Analysis Year	2022			_			North/South Street 2nd St/Columbia II												
Time Analyzed	AM P	eak Hou	r - No-E	Build			Peak	Hour Fa	ctor		0.94								
Intersection Orientation	East-	West			-		Analysis Time Period (hrs) 0.25												
Project Description	20-00	2 Carpe	nters Ur	nion Cent	ter														
Lanes	I ,						·	_						· · ·					
Vehicle Volumes and Adj	ustme	ents										· .							
Approach		Eastb	ound			West	bound			North	bound			South	uthbound				
Movement	U	L	Т	R	υ	ե	ľ	R	U	L	T	R	U	L	Т	R			
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	1	0			
Configuration		LT	Ť	1			Т	TR							LR				
Volume (veh/h)	+	4	543				388	8						0		0			
Percent Heavy Vehicles (%)		0					† –	<u> </u>					1	0		0			
Proportion Time Blocked										 				<u> </u>		<u> </u>			
Percent Grade (%)			L				<u> </u>			•	<u> </u>				0	<u>L</u>			
Right Turn Channelized							·			_									
Median Type Storage				Und	ivided								•						
Critical and Follow-up He	eadwa	ys		· .															
Base Critical Headway (sec)	T	4.1												7.5		6.9			
Critical Headway (sec)	<u> </u>	4.10			<u> </u>				<u> </u>					6.80		6.90			
Base Follow-Up Headway (sec)		2.2					+							3.5		3.3			
Follow-Up Headway (sec)		2.20		┨───				<u> </u>		<u> </u>		<u> </u>		3.50		3.30			
Delay, Queue Length, an	d Leve	l of S	ervico	- ! e .		<u>, </u>		<u>.</u>	•	4		· .			:	<u>L</u>			
Elow Rate, v (veh/h)	T -	4	<u> </u>	1	<u> </u>	1	<u> </u>		T		Г				0				
Capacity, c (veh/h)	+	1149			†	1	<u>† </u>		<u> </u>	1	\dagger	1		1	<u> </u>				
v/c Ratio	+	0,00		<u>+</u> -	<u> </u>	<u>† </u>	1	<u> </u>	1	1	1	<u>†</u>		1		—			
95% Queue Length, One (veh)	+	0.0		+		<u> </u>	1	<u> </u>		<u> </u>		<u>†</u>			1	1			
Control Delay (s/veh)	+	8.1			 	1	 	1	<u> </u>	1	1	ţ	1 -	t	<u> </u>	1			
Level of Service (LOS)	+				┼──		+		<u> </u>	1	╀━━━			İ –	<u> </u>	t			
Approach Delay (s/yeb)	+	 ().1	<u> </u>	1	1	.!	<u> </u>	1	1		1	1	<u> </u>	<u>ı.</u>	<u> </u>			
Approach LOS	+								1										

		H	CS7	Two	Way	Sto	p-Co	ntrol	Rep	ort									
General Information							Site	Inforr	natio	n									
Analyst	DHH						Intersection Rt 30/2nd St/Columbia												
Agency/Co.	Horne	er & Can	ter Asso	c .			Jurisc	liction	-		Mullica Twp								
Date Performed	4/23/	2020	_				East/	West Str	eet		S. Wh	ite Hors	e Pk (Rt	30)					
Analysis Year	2022						North	n/South S	Street		2nd S	t/Colum	bia II						
Time Analyzed	PM P	eak Hou	- No-B	uild			Peak	Hour Fa	ctor		0.90								
Intersection Orientation	East-	West					Analysis Time Period (hrs) 0.25												
Project Description	20-00)2 Carpe	nters Ur	nion Cen	ter														
Lanes	1										:			-					
					ENA	J.													
Vehicle Volumes and Adj	ustme	ents				of ageet to							. '						
Approach	,	Eastb	ound		<u> </u>	West	bound			North	bound		Southbound						
Movement	υ	L	Т	R	U	L	Т	R	υ	L	Т	R	υ	L	Т	R			
Priority	10	1	2	3	4U	4	5	6	1	7	8	9		10	11	12			
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	1	0			
Configuration		LT	Т	<u> </u>			т	TR	1						LR				
Volume (veh/h)		8	492				594	7		<u> </u>				1		3			
Percent Heavy Vehicles (%)		0									<u> </u>			0		0			
Proportion Time Blocked						<u> </u>								1					
Percent Grade (%)		<u> </u>		<u> </u>			1			 _		•			0	<u></u>			
Right Turn Channelized					<u> </u>														
Median Type Storage				Und	ivided														
Critical and Follow-up He	adwa	ys							<u> </u>	_									
Base Critical Headway (sec)		4.1			\Box									7,5		6.9			
Critical Headway (sec)		4.10												6.80		6.90			
Base Follow-Up Headway (sec)	1	2,2												3.5		3.3			
Follow-Up Headway (sec)		2.20												3.50		3.30			
Delay, Queue Length, and	d Leve	el of S	ervice	è					-							-			
Flow Rate, v (veh/h)		9		Г											4				
Capacity, c (veh/h)	1-	932			Ľ										477				
v/c Ratio		0.01													0,01				
95% Queue Length, Q ₉₅ (veh)	1	0.0			1										0.0				
Control Delay (s/veh)		8.9		T											12.6				
Level of Service (LOS)	1	A		1											В				
Approach Delay (s/veh)	1	- 0	.2			-								1	2.6				
Approach LOS	1		_				-								В				

		H	CS7 1	ſwo-'	Way	Stop	o-Cor	ntrol	Rep	ort									
General Information		•			· · ·		Site I	nforn	natior	1 ·									
Analyst	 DHH						Intersection Rt 30/2)/2nd St/Mazzas						
	Horne	er & Canl	ter Assoc	;			Jurisdi	ction			Mullica Twp								
Date Performed	4/23/2	2020		·		ł	East/V	Vest Stre	et		S. White Horse Pk (Rt 30)								
Anabusis Year	2022		_				North,	/South S	treet		2nd St	/Mazzas	Floorin	g					
Time Analyzed	AM P	eak Hour	- No-Bu	uild .			Peak H	lour Fac	tor		0.93								
Intersection Orientation	East-V	Vest					Analys	is Time	Period (hrs)	0.25								
Project Description	20-00	2 Carper	nters Uni	on Cente	er														
			1 A		· · · .	2				1.									
					Mair	n Street Fax	tWest												
Vehicle Volumes and Ad	justme	ents								-									
Approach		Eastb	ound			West	bound North			North	bound			Southbound					
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L,	T	R			
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0			
Configuration		LT	<u> </u>	TR		LT		ŤR			LTR				LTR				
Volume (veh/h)		0	555	2		2	380	0		1	0	1		0	0	0			
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0			
Proportion Time Blocked	1		 																
Percent Grade (%)				-					0 0						0				
Right Turn Channelized																			
Median Type Storage	_			Undi	vided				_	_									
Critical and Follow-up H	leadwa	iys 🚊						·							r=				
Base Critical Headway (sec)		4.1				4.1			L	7.5	6.5	6.9		7.5	6.5	6.9			
Critical Headway (sec)		4.10				4.10			<u> </u>	7.50	6.50	6.90	<u> </u>	7.50	6.50	6.90			
Base Follow-Up Headway (sec)		2.2				2.2			<u> </u>	3.5	4.0	3.3	<u> </u>	3.5	4.0	3.3			
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30			
Delay, Queue Length, a	nd Leve	el of S	ervice	• ·· ·				÷.,							·				
Flow Rate, v (veh/h)		0				2					2		_		0	┣—			
Capacity, c (veh/h)		1161				988					396	<u> </u>	<u> </u>	<u> </u>		<u> </u>			
v/c Ratio		0.00				0.00					0.01		 		 	<u> </u>			
95% Queue Length, Q ₉₅ (veh)		0.0				0.0					0.0	<u> </u>	ļ	┣	 	_			
Control Delay (s/veh)		8.1				8.7					14.1	<u> </u>	<u> </u>	_	┣	<u> </u>			
Level of Service (LOS)		Α				Α					В	<u> _</u>	<u> </u>	<u> </u>					
Approach Delay (s/veh)			0.0			(0.1			1	4.1		1						
Approach LOS	-		<u> </u>								В								

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		НС	CS7 T	wo-	Way	Stop	-Cor	ntrol	Repo	ort									
General Information							Site I	nform	nation										
	рнн	<u> </u>			<u> </u>		Interse	ction			Rt 30/2nd St/Mazzas								
	Horner	& Cant	er Assoc				Jurisdie	ction			Mullica Twp								
Agency/co.	4/23/2	020					East/W	/est Stre	et		S. White Horse Pk (Rt 30)								
	2022						North/	South S	treet		2nd St/	Mazzas	Flooring]					
	PM Pe	ak Hour	- No-Bu	ild			Peak H	lour Fac	tor		0.97								
Intersection Orientation	East-W	/est					Analysis Time Period (hrs) 0.25												
Project Description	20-002	Carpen	ters Uni	on Cente	er														
															· · ·				
				1 P			t-West												
Vehicle Volumes and Ac	ljustme	nts			мар				·										
Approach		Eastb	ound			West	ound		<u> </u>	North	oound			South					
Movement	U	L	Т	R	U	L	<u> </u>	R_				<u></u>				12			
Priority	10	1	2	3	4U	4	5	6	<u> </u>	7	8	9							
Number of Lanes	0	0	2	0	0	0	2	0		0	1			<u> </u>					
Configuration		LT		TR		LŤ		TR			LTR		┣───			0			
Volume (veh/h)		0	538	0		0	547	0	<u> </u>	2	0	0			0				
Percent Heavy Vehicles (%)		0				0		L	<u> </u>	0	0	0	┨	0					
Proportion Time Blocked								<u> </u>	<u> </u>				<u> </u>						
Percent Grade (%)									<u> </u>		0								
Right Turn Channelized					<u> </u>				<u> </u>										
Median Type Storage				Und	ivided														
Critical and Follow-up	leadwa	ys		5. T		· :	-							· ·	r				
Base Critical Headway (sec)		4.1	T	T		4.1				7.5	6.5	6.9	<u> </u>	7.5	6.5	6.9			
Critical Headway (sec)		4.10				4.10				7.50	6.50	6.90	┞—	7.50	6.50	6.9			
Base Follow-Up Headway (sec)		2,2				2.2			\downarrow	3.5	4.0	3.3	L	3,5	4.0	3.3			
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.3			
Delay, Queue Length, a	nd Leve	el of S	ervice	е –		· · ·									· · ·				
Flow Rate, v (veh/h)		0	T		Τ	0					2				0	1			
Capacity, c (veh/h)		1018	†	1	1	1026	T				263		<u> </u>		<u> </u>	1			
v/c Ratio	+	0.00	+		1	0.00					0.01		<u> </u>			\vdash			
95% Queue Lenath. Oss (veh)		0.0		1	†	0.0		T			0.0				<u> </u>	<u> </u>			
Control Delay (s/yeh)		8.5	1	1	1	8.5	\top				18.8			<u> </u>	<u> </u>				
Level of Service (LOS)		А	<u>†</u>	\mathbf{T}	1	А					С								
Approach Delay (s/veh)	-+	<u> </u>	0.0			<u> </u>	0.0			1	.8.8			<u>.</u>					
Approach LOS					+-						с					_			
, pproduction				_	_			_				_			000 D.E.A.	10.11			

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APPENDIX G

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Capacity/LOS Analysis Worksheets – Build Conditions

		H	CS7 1	[wo-'	Way	Stop	o-Coi	ntrol	Rep	ort						
General Information				,			Site I	nforn	natior	1	· .		· ·			
Analyst	DHH				-		Interse	ection			Rt 30/	2nd St/C	Columbia	3		
Agency/Co.	Horne	r & Cant	ter Assoc				Jurisdi	iction			Mullic	а Тwp				
Date Performed	4/23/2	2020					East/V	Vest Stre	et		S. Wh	ite Horse	e Pk (Rt S	30)		
Analysis Vear	2022		-				North	/South S	Street		2nd S	t/Colum	bia II			
Time Analyzed	AM Pe	eak Hour	- Build				Peak I	Hour Fac	tor		0,94					
Intersection Orientation	East-V	Vest					Analy	sis Time	Period (hrs)	0.25					
Project Description	20-00	2 Carper	nters Uni	ion Cente	ег											
	. ·										-		-			
				Dictional and the second second second second second second second second second second second second second s			ast-West									
Vehicle Volumes and Ad	justme	ents														
Approach	1	Eastbound Westbound Northbound												South	bound	
Movement	U	L	Т	R	υ	L	Тт	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		LT	т				Т	TR					_		LR	
Volume (veh/h)	-	4	564				391	8					<u> </u>	0		0
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked		1	[1		1								_		
Percent Grade (%)															0	
Right Turn Channelized																
Median Type Storage	1			Undi	ivided								_			
Critical and Follow-up H	leadwa	ys			1								· · ·			
Base Critical Headway (sec)		4.1							<u> </u>	Ļ.	╄		<u> </u>	7.5	 	6.9
Critical Headway (sec)		4.10								1	<u> </u>	↓	1	6,80	<u> </u>	6.90
Base Follow-Up Headway (sec)		2.2							<u> </u>		<u> </u>	↓	↓	3.5	<u> </u>	3.3
Follow-Up Headway (sec)		2.20								<u> </u>		<u> </u>		3.50		3.30
Delay, Queue Length, a	nd Leve	el of S	ervic	e				-		· ·	·		· · ·	·		—
Flow Rate, v (veh/h)		4							<u> </u>	1		 		<u> </u>	0	⊢
Capacity, c (veh/h)		1146							1				┣—	<u> </u>	<u> </u>	╄
v/c Ratio		0.00											_	<u> </u>		╂
95% Queue Length, Q ₉₅ (veh)		0.0									<u> </u>		_	—	 	┢
Control Delay (s/veh)		8.2										<u> </u>	<u> </u>			┺
Level of Service (LOS)	_	A														
Approach Delay (s/veh)			0.1							_	_					
Approach LOS																

		HC	CS7 T	wo-	Way	Stop	-Cor	ntrol	Repo	ort						
General Information				· .			Site I	nform	nation				* 			
	рня					-+	Interse	ction			Rt 30/2	2nd St/C	olumbia			
	Homer	r & Cante	er Assoc				Jurisdi	ction			Mullica	s Twp				
Agency/Co.	4/23/2	020					East/W	lest Stre	et		S. Whit	te Horse	Pk (Rt 3	0)		_
Applyris Veet	2022					-1	North	South S	treet		2nd St	/Columt	pia II			
	PM Pe	ak Hour	- Build				Peak H	lour Fac	tor		0.90					
Intersection Orientation	East-W	/est		_			Analys	is Time	Period (hrs)	0.25					
Project Description	20-002	2 Carpen	ters Uni	on Cente	er											
		_		•		••										
					Majo	or Street: Ea	st-West		, <u> </u>	· .						
Vehicle Volumes and Ad	justine					West	hound		<u> </u>	North	bound		<u> </u>	Southt	ound	
Approach	<u> </u>		т	R	<u> </u>		Τ	R	U	L	Т	R	U	L	Т	R
Movement	111		2		40	4	5	6		7	8	9		10	11	12
Priority			2	0	0	0	2	0	<u> </u>	0	0	0		0	1	0
		т ТТ	т	-		┼──	T	TR	<u>†</u>						LR	
Configuration		8	494				604	7	†					1		3
Volume (Ven/h)		0			╀╼──		<u> </u>							0		0
Percent Heavy vehicles (%)		<u> </u>	<u>}</u>		┼───		<u> </u>									_
Proportion Time blocked		<u> </u>	<u> </u>	L		<u> </u>)	
Percent Grade (%)																
Median Type Storage				Und	livided											
Critical and Follow-up h	leadwa	nys						• •				· :				
Base Critical Headway (sec)		4.1									<u> </u>		<u> </u>	7.5		6.9
Critical Headway (sec)		4.10								4_				6.80		6.9
Base Follow-Up Headway (sec)		2.2									<u> </u>			3.5		3.3
Follow-Up Headway (sec)		2.20						<u> </u>				<u> </u>		3.50	L	3.3
Delay, Queue Length, a	nd Lev	el of S	Servic	e			· · ·					· .	". - F			
Flow Rate, v (veh/h)		9		Τ				<u> </u>			<u> </u>				4	┢──
Capacity, c (veh/h)		923		T_					1_	\downarrow	<u> </u>				471	╉──
v/c Ratio		0.01							<u> </u>	_	<u> </u>	<u> </u>			0.01	╇
95% Queue Length, Q ₉₅ (veh)		0.0						1_			<u> </u>	_	+		0.0	╁╼
Control Delay (s/veh)	_	8.9							_		<u> </u>	<u> </u>			12.7	┿━
Level of Service (LOS)		A							<u> </u>		<u> </u>			<u> </u>	<u> ^B</u>	1
Approach Delay (s/veh)			0.2										-∔	[.2.1	
Approach LOS					1								<u> </u>		8	

		H	CS7 1	wo-	Way	Stop	o-Cor	ntrol	Rep	ort						
General Information							Site I	nform	natior	3	· .	·.		·		
Analyst	DHH			· .			Interse	ection			Rt 30/2	2nd St/N	lazzas			
Agency/Co.	Horne	r & Cant	er Assoc			- 1	Jurisdi	ction			Mullica	a Twp				
Date Performed	4/23/2	2020			_		East/M	/est Stre	et		S. Whi	te Horse	Pk (Rt 3	30)		
Analysis Year	2022						North	/South S	treet		2nd St	/Mazzas	Floorin	g		
Time Analyzed	AM Pe	eak Hour	- Build				Peak F	lour Fac	tor		0.93					
Intersection Orientation	East-V	Vest		_			Analys	is Time	Period (hrs)	0.25					
Project Description	20-00	2 Carper	nters Uni	on Cent	er											
Lanes	•							•			•					
Vahicle Volumes and Ad	liustme	nts			Maj	or Street Eas	st-Wesl								<u> </u>	
		Facth	ound		-	West	ound		North	bound			South	bound		
Approach	+		÷т	R	U	L	т	R	U	L	т	R	U	L	т	R
Priority			2	3	40	4	5	6		7	8	9		10	11	12
Number of Lapes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		0	558	2	<u> </u>	2	397	0		1	0	1		0	0	0
Percent Heavy Vehicles (%)	-{	0	-			0				0	0	0		0	0	0
Proportion Time Blocked				-		<u> </u>				1						
Percent Grade (%)		<u> </u>			<u> </u>	•		<u> </u>			0				0	
Right Turn Channelized			_													
Median Type Storage	+	_		Undi	ivided					_			_			_
Critical and Follow-up H	leadwa	iys						·			:	<u> </u>	=			•
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6,9	<u> </u>	7.5	6.5	6.9
Critical Headway (sec)		4.10				4.10				7.50	6.50	6.90	L	7.50	6.50	6.90
Base Follow-Up Headway (sec)		2.2				2.2	<u> </u>			3.5	4.0	3.3	<u> </u>	3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20			<u> </u>	3,50	4.00	3.30		3,50	4.00	3,30
Delay, Queue Length, a	nd Leve	el of S	ervice	€ 					<u>.</u>			·				
Flow Rate, v (veh/h)		0				2			<u> </u>	<u> </u>	2	<u> </u>	<u> </u>		0	
Capacity, c (veh/h)		1143				985	<u> </u>	1	\vdash	_	390	 	<u> </u>	1	 	╂—
v/c Ratio		0.00				0.00		<u> </u>		<u> </u>	0.01	┣	<u> </u>		_	
95% Queue Length, Q ₉₅ (veh)		0.0				0.0					0.0		 		┞───	1
Control Delay (s/veh)		8.1				8.7			<u> </u>		14.3	<u> </u>	┞	<u> </u>	<u> </u>	_
Level of Service (LOS)		A				Α					В		 	<u> </u>	<u> </u>	<u> </u>
Approach Delay (s/veh)			0.0				0.1			1	4.3		_			
Approach LOS				-							В		1			

		HC	.S7 T	wo-'	Way	Stop	-Cor	trol	Repo	ort						
General Information							Site I	form	ation	•				*		
Δnah/st	DHH		-	_			Interse	ction			Rt 30/2	nd St/M	lazzas			
Agency/Co	Horner	r & Cante	er Assoc			- 1	Jurisdie	tion			Mullica	Тwp				
Date Performed	4/23/2	020					East/W	est Stre	et		S. Whit	e Horse	Pk (Rt 3	0)		
Analysis Year	2022			_			North/	South S	treet		2nd St	/Mazzas	Flooring	9		
Time Analyzed	PM Pe	ak Hour	- Build				Peak H	our Fac	tor		0.97					
Intersection Orientation	East-W	/est					Analys	is Time I	Period (h	ırs)	0.25					
Project Description	20-002	2 Carpen	ters Uni	on Cent	er											
	_ 		_													
Vehicle Volumes and Ad	justme	nts			Majo	or Street Las	t-West							· .		
Approach		Eastb	ound			West	ound			North	bound			South	ound	
Movement	υ	L	Ţ	R	U	L	T	R	U			R	<u> </u>		1	<u>к</u>
Priority	10	1	2	3	4U	4	5	6	L	7	8	9	 	10		12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0	<u> </u>	<u> </u>	1	0
Configuration		LT		TR		LT		TR	 		LTR					
Volume (veh/h)		0	547	0		0	549	0		2	0	0	<u> </u>	0	0	0
Percent Heavy Vehicles (%)		0				0			Ļ	0	0	0	<u> </u>	0	0	0
Proportion Time Blocked						<u> </u>			 				┣──-			
Percent Grade (%)											0		┣──		<u> </u>	
Right Turn Channelized					· ·							_	<u> </u>			_
Median Type Storage			_	Und	ivided				L							
Critical and Follow-up H	leadwa	ys	·. ·		14 A	• •		*.		· · ·				· · ·		
Base Critical Headway (sec)		4.1	1			4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)	_	4.10				4.10				7.50	6.50	6.90	L	7.50	6.50	6.90
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3	<u> </u>	3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30	<u> </u>	3.50	4.00	3.30
Delay, Queue Length, a	nd Leve	el of S	ervice	e					-				-			·.
Flow Rate, v (veh/h)		0	Γ	1		0		Ľ			2				0	
Capacity, c (veh/h)		1016	1	<u> </u>	1	1018					259			<u> </u>	<u> </u>	<u> </u>
v/c Ratio		0.00		1		0.00					0.01		1		<u> </u>	
95% Queue Length, Q ₉₅ (veh)	+	0.0	1	1		0.0					0.0			<u> </u>		∔
Control Delay (s/veh)	_	8.5	<u>†</u>	+		8.5					19.0				1	
Level of Service (LOS)		A	†	1-		Α					С					
Approach Delay (s/veh)		<u> </u>	0.0				0.0			1	.9.0	_				
Approach LOS						_					С			_		

		H	CS7 T	wo-`	Way	Stop	-Cor	trol	Repo	ort						
General Information							Site Iı	nform	nation							
Analyst	рнн					<u> </u> †	Interse	ction			Rt 30/V	Vest Site	e Acc			_
	Horne	r & Cant	ter Assoc				Jurisdia	tion		†	Mullica	Тwp				_
Date Performed	4/23/2	2020					East/W	est Stre	et		S. Whit	e Horse	Pk (Rt 3	30)		
Analysis Year	2022						North/	South S	treet		West S	ite Acce	55			
Time Analyzed	AM Pe	ak Hou	r - Build			-+	Peak H	our Fac	tor		0.94					
Intersection Orientation	East-V	Vest					Analys	is Time	Period (h	nrs)	0.25			_		
Project Description	20-00	2 Carper	nters Uni	on Cent	er											
						•	7								·**	
				arear area and the second second second second second second second second second second second second second s												
Vehicle Volumes and Ad	justme	ents		<u> </u>	Maj	or Street: Eas	st-West		· · ·	•				- 		
Approach	- T	East	oound		<u> </u>	West	pound		<u> </u>	North	ound			South	bound	
Movement	- U	Ŀ	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	0	0
Configuration	+	<u> </u>	Т	TR		LT	т				LR		<u> </u>		 	┞
Volume (veh/h)		<u> </u>	568	17		3	397			2		1	<u> </u>	┨	Ļ	┡
Percent Heavy Vehicles (%)	<u> </u>	†	1			3				3		3	 		 _	
Proportion Time Blocked	-		1										 		<u> </u>	
Percent Grade (%)	-										0		 			
Right Turn Channelized									<u> </u>				I			
Median Type Storage				Und	ivided			_	<u> </u>		_		. <u> </u>			
Critical and Follow-up H	leadwa	ys			50 - 5 21	· · · ·		r			·. ·.·	60		· · ·		т—
Base Critical Headway (sec)		<u> </u>	∔—	┦──		4.1	╂—	┨───		1.5	┣—	0.9	╄—-	+	╂	+-
Critical Headway (sec)			_	┣	<u> </u>	4.16	╄──-		<u> </u>	6.86	┨────-	0.90	┣──	╂──	┨───	+
Base Follow-Up Headway (sec)				<u> </u>	∔—	2.2	╄──-	<u> </u>	_−	3.5		3.3	╀──			┼──
Follow-Up Headway (sec)			<u> </u>		<u> </u>	2.23		L	<u> </u>	3.53	<u> </u>	3.55	<u> </u>		<u> </u>	<u> </u>
Delay, Queue Length, a	nd Lev	el of S	Servico	e . 		· ·		 T		<u> </u>	2	—	1		<u> </u>	T
Flow Rate, v (veh/h)						3	<u> </u>	—			3	┼──-				╆─
Capacity, c (veh/h)				 	4—	948			–	–	3/4	╂_──	╂	+		┢
v/c Ratio					4	0.00	<u> </u>		╂──	╂──-	0.01	╂╼──	╂───	+		+
95% Queue Length, Q ₉₅ (veh)				<u> </u>		0.0	<u> </u>				0,0	╂──	┦──		╂╼─	+
Control Delay (s/veh)				<u> </u>	<u> </u>	8.8	┣—	4	4	╂	14.7	╂──-	╉──╸	+		+
Level of Service (LOS)						A				<u> </u>	<u>В</u> _	<u> </u>		1		
Approach Delay (s/veh)					4—		0.1	<u> </u>		1	4.7		╂──			
Approach LOS				_							B					

		H	CS7 T	wo-	Way	Stop	-Cor	ntrol	Repo	ort						
Ganaral Information							Site Iı	nform	ation							
	лнн				<u> </u>	+	Interse	ction			Rt 30/V	Vest Site	Acc			
	Horner	8 Cani	er Assoc			-+	Jurisdie	tion		-	Mullica	Тwp				
Agency/co.	4/23/2	020				†	East/W	est Stre	et	Ť	S. Whit	e Horse	Pk (Rt 3	10)		
	2022					†	North/	South S	treet		West S	ite Acce	55			
	PM Pe	ak Hour	- Build				Peak H	lour Fac	tor		0.90					
Intersection Orientation	East-W	/est					Analys	is Time l	Period (h	nrs)	0.25					
Project Description	20-002	2 Carper	nters Uni	on Cente	er											
lanes	- L						· .				_		.'			
Vehicle Volumes and Ac	ljustme	nts	<u>_</u>		Majo	or Street Eas	st-West									
Approach	- 	East	bound	<u> </u>		West	ound			North	ound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	υ	L	Т	R	υ	<u> </u>	<u>т</u>	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	1.2
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0	L	0	0	0
Configuration		<u> </u>	Т	TR		LT	Т				LR		┞	┟	<u> </u>	┡—
Volume (veh/h)	+	1	493	2		0	603			8		2	 		 	┣—
Percent Heavy Vehicles (%)			1			3				3		3	 	┫		╄—-
Proportion Time Blocked	1	1		Ľ.									<u> </u>	<u> </u>	<u> </u>	<u> </u>
Percent Grade (%)	1-		<u> </u>							(00	_				
Right Turn Channelized									 				<u> </u>			<u> </u>
Median Type Storage				Und	ivided				1							
Critical and Follow-up I	leadwa	ys						·		-r		·	·	т—	<u> </u>	. –
Base Critical Headway (sec)						4.1	Į	 		7.5		6.9	┣_─		–−	╂━
Critical Headway (sec)						4.16	<u> </u>	↓	 	6,86	┣—	6.96	┨───	+	╂──	┢
Base Follow-Up Headway (sec)						2.2	<u> </u>	↓	. <u> </u>	3.5	<u> </u>	3.3		<u> </u>	╂—	┢
Follow-Up Headway (sec)						2.23		<u> </u>		3.53		3.33	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Delay, Queue Length, a	nd Leve	el of S	Servic	e .		·			·							
Flow Rate, v (veh/h)		Τ	T			0			1		11				╂_──	
Capacity, c (veh/h)		1				1009					322	 			∔	+
v/c Ratio						0.00				<u> </u>	0.03	┣	<u> </u>		+	╋
95% Queue Length, Q ₉₅ (veh)						0.0					0.1	<u> </u>	<u> </u>			╂
Control Delay (s/veh)						8.6		<u> </u>			16.6	<u> </u>				+
Level of Service (LOS)						А			<u> </u>		С	<u> </u>	_			
Approach Delay (s/veh)	Ť.						0.0			1	6.6		<u> </u>			
Approach LOS											C					

HCS™ TWSC Version 7.8.5 S. White Horse Pk_West Site Access_bp.xtw

Site InformationAnalysisDiffIntersectionR 30/tast Site ArAgency/CoHome R Canta AssocLurisdicitonMilike TopDana Periore2022Data MilitonEnd Site ArDana PerioreDifferenceDifferenceDifferenceDifferenceImmanceOther R Canta AssocPerioreDifferenceDifferenceDifferenceImmanceDifferenceDifferenceDifferenceDifferenceDifferenceDifferenceImmanceDifferenceDifferenceDifferenceDifferenceDifferenceDifferenceDifferenceImmanceDifferenceDifferenceDifferenceDifferenceDifferenceDifferenceDifferenceImmanceDifferenceDifferenceDifferenceDifferenceDifferenceDifferenceDifferenceVehicle Volumes and ActiveDifferenceDifferenceNonthernecNonthernecDifferenceDifferenceMeannantULTRULTRULTRMeannantULTRULTRULTRMeannantULTRULTRULTRMeannantULTRULTRULTRMeannantULTRULTRULTR <th></th> <th></th> <th>Н</th> <th>CS7</th> <th>Two-</th> <th>Way</th> <th>Stop</th> <th>o-Cor</th> <th>ntrol</th> <th>Rep</th> <th>ort</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>			Н	CS7	Two-	Way	Stop	o-Cor	ntrol	Rep	ort							
Angryf D11 Interret R Center Alco Interret R Center Alco Mullica Trop AgrenyfCo. Henret R Center Alco Mullica Trop Mullica Trop Mullica Trop AgrenyfCo. Eart/Wert Eart/Wert Bart/West Eart/West Eart/West <t< th=""><th>General Information</th><th></th><th></th><th></th><th>· .</th><th></th><th></th><th>Site I</th><th>nforn</th><th>natior</th><th>1</th><th>· · .</th><th></th><th></th><th></th><th>•</th><th></th></t<>	General Information				· .			Site I	nforn	natior	1	· · .				•		
Agency/Co.Home: & Curity AssockerisdetionMaile: TuryMaile:	Analvst	DHH		-	<u> </u>			Interse	ection			Rt 30/	East Site	Acc				
Data Performed 4/23/203/ User/West Street S. Write Hours PK (0: 30	Agency/Co.	Horne	r & Can	ter Asso				Jurisdi	ction			Mullic	a Twp					
Analysis Year Constraine Cons	Date Performed	4/23/2	2020					East/V	Vest Stre	et		S. Whi	ite Horse	e Pk (Rt i	30)		_	
mer. nam.gaad AMP Paak Hour - Build Peak Hour - Build Peak Hour - Build D94 interaction Orimation Este-West Analysis Time Period Ura 0.25	Analysis Year	2022			_			North,	/South S	treet		East S	ite Acces	s				
Intervection Orientation Fast-West Analysis Time Protoct (Protoct (P	Time Analyzed	AM Pe	eak Hou	r - Build				Peak H	lour Fac	tor		0.94						
24-02 Carpenters Luion Cartor Lanes SUBLERS WEERE SUBLERS WEERE<	Intersection Orientation	East-V	Vest					Analys	is Time	Period (hrs)	0.25						
Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lanes Lane	Project Description	20-00	2 Carpe	nters Un	ion Cent	er		_				-	_					
Substrate S	Lanes	<u> </u>																
Mage solutions with the solution of the sol																		
ApproachEast-sumUUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUITRUII <td>Vehicle Volumes and Ad</td> <td>justme</td> <td>nts</td> <td></td> <td></td> <td>Majo</td> <td>or Street Ea</td> <td>it-West</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Vehicle Volumes and Ad	justme	nts			Majo	or Street Ea	it-West										
Movement U I T R U I T R U I R U I R U I R U I R U I R U I R U I R U I R I R U I R I I R I <thi< th=""> I <thi< th=""> <thi< t<="" td=""><td>Approach</td><td></td><td>East</td><td>ound</td><td></td><td></td><td>West</td><td>ound</td><td></td><td></td><td>North</td><td>bound</td><td>_</td><td></td><td>South</td><td>bound</td><td></td></thi<></thi<></thi<>	Approach		East	ound			West	ound			North	bound	_		South	bound		
Priority 1U 1 2 3 4U 4 5 6 7 8 9 .10 10 12 12 Number of Lanes 0 0 2 0 0 0 2 0 0 1 0 1 0 10 10 10 10 10 0	Movement	U	1	Т	R	U	L	T	R	U	L	Т	R	U	<u> </u>	т	R	
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Configuration I T	Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	0	0	
Volume (veh/h) Image: Seff Model Mode	Configuration			Т	TR		LT	Т				LR						
Percent Heavy Vehicles (%) I <thi< th=""> I<!--</td--><td>Volume (veh/h)</td><td></td><td></td><td>565</td><td>4</td><td>Γ</td><td>14</td><td>399</td><td></td><td></td><td>1</td><td></td><td>2</td><td></td><td></td><td></td><td></td></thi<>	Volume (veh/h)			565	4	Γ	14	399			1		2					
Proportion Time Blocked I <td>Percent Heavy Vehicles (%)</td> <td></td> <td><u> </u></td> <td></td> <td></td> <td>1</td> <td>3</td> <td></td> <td></td> <td></td> <td>3</td> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td></td>	Percent Heavy Vehicles (%)		<u> </u>			1	3				3		3					
Percent Grade (%) Image td>Proportion Time Blocked</td> <td></td> <td>1</td> <td></td> <td></td>	Proportion Time Blocked		1													_		
Right Turn Channelized Image Ima	Percent Grade (%)			· · · ·								0					-	
Median Type Storage Undivided Gritical and Follow-up Headway (sec) I	Right Turn Channelized	+	<u> </u>						_									
Critical and Follow-up Headway (sec) I	Median Type Storage	-	-		Undi	ivided		_				_						
Base Critical Headway (sec) Image: Critical Headway (sec)	Critical and Follow-up H	leadwa	ys :		· .:												:	
Critical Headway (sec) Image: Second Sec	Base Critical Headway (sec)					T	4.1				7.5		6.9					
Base Follow-Up Headway (sec) Image: second sec	Critical Headway (sec)			<u> </u>		1	4.16				6.86		6.96					
Follow-Up Headway (sec) Image: Second Se	Base Follow-Up Headway (sec)	_	1	† —	1	1	2.2				3.5		3.3					
Delay, Queue Length, and Level of Service Flow Rate, v (veh/h) Image: Colspan="6">Image: Colspan="6" Service (LOS) Flow Rate, v (veh/h) Image: Colspan="6">Image: Colspan="6" Service (LOS) V/C Ratio Image: Colspan="6">Image: Colspan="6" Service (LOS) Mapproach Delay (s/veh) Image: Colspan="6">Image: Colspan="6" Service (LOS) Mapproach LOS Image: Colspan="6" Service (LOS) Image: Colspan="6" Service	Follow-Up Headway (sec)		1	†			2,23				3.53		3.33					
Flow Rate, v (veh/h) Image: sector of the sector of t	Delay, Queue Length, an	nd Leve	el of S	ervice	2													
Capacity, c (veh/h) Image: state integral of the state integral	Flow Rate, v (veh/h)		<u> </u>	-	T	Γ	15		Ι	T	Γ	3						
v/c Ratio Image: Second Se	Capacity, c (veh/h)	+	╀──	<u>├</u> ──	1	1	962	<u> </u>		1	1	476						
95% Queue Length, Q ₉₅ (veh) 0 0.0	v/c Ratio	-		<u> </u>	<u> </u>	-	0.02					0.01						
Control Delay (s/veh) 8.8 12.6 <td< td=""><td>95% Queue Lenath, O_{as} (veh)</td><td>+</td><td>1</td><td>†</td><td><u> </u></td><td>1-</td><td>0.0</td><td>1</td><td>1</td><td>1</td><td></td><td>0.0</td><td>Γ</td><td></td><td></td><td></td><td></td></td<>	95% Queue Lenath, O _{as} (veh)	+	1	†	<u> </u>	1-	0.0	1	1	1		0.0	Γ					
Level of Service (LOS) A B B B B C B C <thc< th=""> C <thc< th=""> <thc< th=""></thc<></thc<></thc<>	Control Delay (s/veh)	+	1	1	1	†	8.8	1	1	1		12.6						
Approach Delay (s/veh) 0.4 12.6 Approach LOS B	Level of Service (LOS)	+			1	†	A		1	†	1	В	1	1				
Approach LOS B	Approach Delay (s/veh)	+	<u> </u>	<u> </u>),4			- 1	2.6						
	Approach LOS		_			<u> </u>				1		В						

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S. White Horse Pk_East Site Access_ba.xtw

		Н	CS7	Two-	Way	Stop	o-Co	ntrol	Rep	ort						
General Information	· · · ·						Site I	Inform	natio	n	·	1 A. 				
Analvst	DHH						 Inters	ection			Rt 30/	/East Site	Acc			
Agency/Co.	Horne	er & Can	ter Asso	c			Jurisd	iction			Mullic	a Twp				
Date Performed	4/23/2	2020					East/	West Stre	eet		S. Wh	ite Horse	e Pk (Rt	30)		
Analysis Year	2022						North	/South S	Street		East S	ite Acce	\$S			
Time Analyzed	PM Pe	eak Hou	r - Build				Peak	Hour Fac	ctor		0.90					
Intersection Orientation	East-V	Vest					Analy	sis Time	Period (hrs)	0.25					
Project Description	20-00	2 Carpe	nters Un	ion Cent	er											
lanes						·	· .									
						or Street Ea	St-West									<u> </u>
Vehicle Volumes and Ad	justme	nts			:	· .				•						
Approach		Eastbound Westbound												South	bound	
Movement	U	L	Т	R	U	L	T	R	U	L	т	R	U	ι	Ţ	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	0	0
Configuration			Т	TR		LT	Т				LR					
Volume (veh/h)			495	0		2	601			2		7				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked					-											
Percent Grade (%)						<u>.</u>				-	0					
Right Turn Channelized													•			
Median Type Storage				Undi	vided	-				_						
Critical and Follow-up H	leadwa	ys.			-				• <u> </u>						· .	
Base Critical Headway (sec)		[4.1				7.5		6.9				
Critical Headway (sec)						4.16			-	6.86		6.96				
Base Follow-Up Headway (sec)						2.2			1	3.5		3.3				
Follow-Up Headway (sec)					<u> </u>	2.23				3.53		3.33				
Delay, Queue Length, a	nd Leve	l of S	ervice	• •	•	L	<u> </u>		<u> </u>		<u> </u>	•		•		
Flow Rate, v (veh/h)	,			<u> </u>		2			<u> </u>	1	10			ļ		
Capacity, c (veh/h)	+		<u> </u>	†	-	1009		<u> </u>	<u> </u>		534					
v/c Ratio			┠		<u> </u>	0.00	<u> </u>			†	0.02	†		<u> </u>		<u> </u>
95% Queue Length Qas (veh)					 	0.0	 		<u> </u>	†	0.1			<u> </u>		<u> </u>
Control Delay (s/veh)				<u> </u>		8.6			<u> </u>	1	11.9				<u> </u>	<u>† </u>
Level of Senice (LOS)		┣──	-	┝──		A	1				В	<u> </u>	<u> </u>			
			<u> </u>	I		<u> </u>	<u> </u>	l		1	1.9	<u>. </u>		<u> </u>		<u> </u>
Approach LOS					<u> </u>											
Approach LOS									<u> </u>		-		<u> </u>			

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APPENDIX H

Left-Turn Lane Warrant Analysis Worksheets

- Harmelink, M. D. Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections. Research Report RR 122, Department of Highways, Ontario, 1967.
- 4. Matson, T.M., Smith, W.S., and Hurd, F.W. Traffic Engineering. McGraw-Hill, 1955.
- 5. AASHO. A Policy on Geometric Design of Rural Highways. 1954.

Appendix

5. White Horse Ph (US Rt. 30) / West Site Access



8

 Harmelink, M.D. Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections. Research Report RR 122, Department of Highways, Ontario, 1967.

4. Matson, T.M., Smith, W.S., and Hurd, F.W. Traffic Engineering. McGraw-Hill, 1955.

5. AASHO. A Policy on Geometric Design of Rural Highways. 1954.

Appendix

5. White Horse PL (US Rt. 30) / East Site Acces



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