Final Environmental Impact Statement
Dollar General Retail Store
240 & 248 Buffalo Street, Gowanda, New York

Lead Agency:
Village of Gowanda Board of Trustees
27 East Main Street
Gowanda, New York 14070

Sponsor/Applicant:
The Broadway Group, LLC
Contact: Melissa Ballard
P.O. Box 18968
Huntsville, Alabama 35804
(256) 533-7287

Prepared by:
Fisher Associates
325 Delaware Avenue, Suite 200
Buffalo, New York 14202
(716) 858-1234

April 2, 2021

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APPENDICES

1.0 INTRODUCTION

This Final Environmental Impact Statement (FEIS) is intended to analyze and address public and agency comments received by the Village of Gowanda Board of Trustees, as Lead Agency ("Board" or "Lead Agency"), pursuant to the State Environmental Quality Review Act ("SEQRA"), on the Draft Environmental Impact Statement ("DEIS"). The DEIS assessed the potential impacts that may be associated with siting and construction of a small (9,100 SF) Dollar General retail store and associated parking and site improvements at 240 & 248 Buffalo Street in the village of Gowanda, New York. The Proposed Action will provide convenient neighborhood retail within the current Buffalo Street mixed-use corridor and within walking distance to residential areas along and adjacent to Buffalo Street. 240 & 248 Buffalo Street (the "Project Site") totals approximately 1.28 acres and is currently developed with two small residential structures.

This FEIS has been prepared in accordance with Article 8 of the New York State Environmental Conservation Law (State Environmental Quality Review Act or SEQRA) and its implementing regulations found in 6 NYCRR Part 617, including the specific provisions that relate to the content of final environmental impact statements contained in 6 NYCRR §617.9(b)(8).

On March 12, 2019, the Board classified the proposed action as "Unlisted" and declared itself Lead Agency pursuant to § 617.6 of the State Environmental Quality Review Act ("SEQRA") implementing regulations. On April 9, 2019, the Board issued a Positive Declaration in accordance with 6 NYCRR part 617, §§ 617.7 and 617.12 of SEQRA. The Board also determined that scoping for the DEIS be focused on five categories of impacts as identified in the Positive Declaration (land including stormwater runoff and drainage, traffic, noise and light, zoning and parking, and community character). Thereafter, the Village initiated a scoping process that focused on the five categories detailed in the Positive Declaration and a Public Scoping meeting was held on September 8, 2020. A DEIS dated October 21, 2020, revised January 7, 2021, was subsequently prepared for the Proposed Action and submitted to the Village.

At its meeting on February 9, 2021, the Board accepted the DEIS as complete for the purpose of commencing public review, in accordance with 6 NYCRR §617.9(a)(2). The Board also determined that the public comment period to receive comments on the DEIS would open on February 16 and extend for 30 days, ending on March 17, 2021 and no public hearing would be held. The DEIS was circulated for review to solicit comments from involved and interested agencies and the public, pursuant to 6 NYCRR §617.12, and a Notice of Acceptance of DEIS was subsequently posted in the Environmental Notice Bulletin. The Notice and DEIS were also distributed to the Village Clerk's Office (27 East Main Street, Gowanda, NY 14070) and posted on the Village's website, in conformance with SEQRA requirements. The Lead Agency's Notice of Acceptance is provided in **Appendix "A"** of this FEIS. The DEIS is incorporated, in its entirety, in this FEIS by reference.

Following its official acceptance by the Board, this FEIS will be circulated in accordance with the requirements of 6 NYCRR §617.12. It will also be posted on the Village's website and a hard copy will be placed in the Village Clerk's Office. In accordance with 6 NYCRR §617.12, the Lead Agency will afford agencies and the public not less than 10 days in which to consider this FEIS before issuing a written Findings Statement on the Proposed Action.

2.0 SUMMARY OF THE PROPOSED ACTION

The Proposed Action consists of the siting and construction of a small (9,100 SF) Dollar General retail store and associated parking and site improvements at 240 & 248 Buffalo Street in the village of Gowanda, New York. The Proposed Action will provide convenient neighborhood retail within the current Buffalo Street mixed-use corridor and within walking distance to residential areas along and adjacent to Buffalo Street. 240 & 248 Buffalo Street (the "Project Site") totals approximately 1.28 acres and is currently developed with two small residential structures.

3.0 DESCRIPTION OF REVISIONS TO THE DEIS

Based on comments received on the DEIS (see **Appendix "B"** of this FEIS for written comments received), the Drainage Report and selected Civil Engineering Site Development Plans were revised to reflect such comments. The revised documents are included in **Appendix "C"** of this FEIS. The DEIS is incorporated, in its entirety, in this FEIS by reference.

Stormwater and Drainage
Drainage Report (Appendix "G" of the DEIS) and Civil Engineering Site Development Plans (Appendix "K" of the DEIS)

Based on comments from the Village of Gowanda's consulting engineer (Wendel), the following revisions were made to the Drainage Report and Civil Engineering Site Development Plans (see also Section 4.0, Response to Comments **Appendix "B"** and **Appendix "C"**):

- Channel Protection Volume (Cpv) calculations have been added to the Drainage Report (Appendix "G" of the DEIS).
- The depth of bioretention soils has been revised to 30" (reflected in revisions to the Grading Plan, Sheet C3 and bioretention basin detail, Detail Sheet, Sheet C8 (Appendix "K" of the DEIS).
- The sediment forebay for bioretention basin A has been revised to be located on the east end of the basin and the inflow from the roof drains, which connect to the basin, have been revised to enter the basin on the east end to enter the forebay and be treated prior to entering the main portion of the bioretention basin (Appendix "K" of the DEIS).

The revised Drainage Report and Civil Engineering Site Development Plans are included in **Appendix "C**" of this FEIS.

Traffic (State Right-of-Way)
Civil Engineering Site Development Plans ("Appendix K" of the DEIS)

Based on comments from the New York State Department of Transportation, the following revisions were made to the Civil Engineering Site Development Plans (see also Section 4.0, Response to Comments, **Appendix "B"** and **Appendix "C"**):

- C-2, Site and Utility Plan. Revisions were made to correct markings, add Work Zone Traffic Control note and NYSDOT standard sheets, moving the stop bar and stop sign behind the sidewalk west of the sidewalk, adding detectable warning surfaces where the sidewalk crosses the stop-controlled driveway, and adding pedestrian detour or diversion.
- L-1 – Landscape Plan. Revisions were made to compensate for the removal of one (1) Oak tree in the NYSDOT ROW by adding one (1) new Northern Red Oak or similar tree (2.0" caliper) between 'maple 13' and 'tree 8' on the landscape plan.

The revised Civil Engineering Site Development Plans are included in **Appendix "C**" of this FEIS.

4.0 RESPONSE TO COMMENTS

4.1 Introduction

This section addresses the substantive comments on the DEIS that were received prior to or during the DEIS comment period, which closed at the close of business day on March 17, 2020. Table 1 below lists the sources and dates of all of the written and verbal comments received on the DEIS. These comments are addressed in section 4.2 of this FEIS. Written comments received on the DEIS are provided in **Appendix "B"** of this FEIS.

Table 1: Index of Comments and Responses

Comment #	Author	Comment Source	Date (sorted oldest to newest)
1	NYSDOT, Hydraulic Unit	Email	December 30, 2020
2.a.	NYSDOT, Minor Commercial Unit	Email	December 30, 2020
2.b.	NYSDOT, Minor Commercial Unit	Email	December 30, 2020
2.c.	NYSDOT, Minor Commercial Unit	Email	December 30, 2020
3.a.	NYSDOT, Landscape Architecture/Environmental Unit	Email	December 30, 2020
3.b.	NYSDOT, Landscape Architecture/Environmental Unit	Email	December 30, 2020
3.c.	NYSDOT, Landscape Architecture/Environmental Unit	Email	December 30, 2020
3.d.	NYSDOT, Landscape Architecture/Environmental Unit	Email	December 30, 2020
3.e.	NYSDOT, Landscape Architecture/Environmental Unit	Email	December 30, 2020
4.a.	Scott Rybarczyk, Wendel	Memo	January 25, 2021
4.b.	Scott Rybarczyk, Wendel	Memo	January 25, 2021
4.c.	Scott Rybarczyk, Wendel	Memo	January 25, 2021
5.a.	Village of Gowanda	Verbal	March 30, 2021
5.b.	Village of Gowanda	Verbal	March 30, 2021

4.2 Comments on the Draft Environmental Impact Statement

The following subsections present each comment, after which the corresponding response is provided. The subsections follow the same titles and sequence as were presented in the DEIS, for convenient reference back to that prior document.

4.2.1 Comments on Section "3.1 Stormwater and Drainage" of the DEIS

Comment 1
The proposed site plans show runoff from the retail building being collected by a series of catch basins and storm pipes and being discharged to a stormwater detention basin located on the Western edge of the property. The basin discharges to the West away from Buffalo Street (Route 62). There is no connection/impact to the State drainage system on Route 62. We find the proposed Storm Drainage Plans and Calculations consistent with our current storm water drainage requirements.

Response to Comment 1
Comment noted.

Comment 4.a.
The Notice of Intent (NOI) submitted as part of their SWPPP in Appendix G of the DEIS now matches the answers provided in the runoff reduction sheets. A value for Channel Protection Volumes (Cpv) has also been provided, but no documentation of how this required and provided Cpv was calculated is given in the DEIS. This information shall

be included in the drainage report (Appendix "U" of the DEIS) and must follow the guidance provided by the NYS DEC in the 2015 Stormwater Design Manual. We highly recommend reviewing the example in Chapter 8 and Appendix B for an understanding of Cpv.

Response to Comment 4.a.
Channel Protection Volume (Cpv) calculations have been added to the Drainage Report (see **Appendix "C"** of this FEIS. Specifically, calculations were added to the report narrative under an added section titled Channel Protection Volume, starting on Page 5 of the report narrative. Channel Protection Volume determined is provided within the proposed stormwater management pond.

Comment 4.b.
The drainage details for the detention basin outfall structure and the bioretention basin have now been provided in Appendix K (dated 7/15/20). The previous version of the DEIS had drawings from 6/16/20 which did not include this information. Upon review of these details, the following elements of the design do not meet NYS requirements for stormwater treatment.

- *The depth of bioretention soils provided is insufficient. 30" of soil depth must be provided at a minimum (see figure 6.19 of the NYS Stormwater Design Manual) versus the 22" shown in the detail on Sheet C8 of Appendix K.*

Response to Comment 4.b.
The depth of bioretention soils has been revised to 30" both on the Grading Plan, Sheet C3 and in the bioretention basin detail on the Detail Sheet, Sheet C8 (see **Appendix "C"** of this FEIS).

Comment 4.c.
The sediment forebay for Bioretention Basin A is not acceptable. The forebay is located at the west edge of the bioretention basin, while all the inflows to the basin are located at the east side. The forebay will not treat the inflows before they enter the main portion of the bioretention area.

Response to Comment 4.c.
The sediment forebay for bioretention basin A has been revised to be located on the east end of the basin and the inflow from the roof drains, which connect to the basin, have been revised to enter the basin on the east end to enter the forebay and be treated prior to entering the main portion of the bioretention basin.

Comment 5.a.
How will the proposed stormwater management system mitigate or eliminate flood-related impacts to neighboring properties during storm events?

Response to Comment 5.a.
To mitigate flood related impacts to neighboring properties, the proposed stormwater management system provides bioretention ponds for water quality treatment and provides a detention pond to reduce the peak storm water runoff leaving the site to below existing, pre-project site development runoff rates. Specifically, the following design points are noted:

- The current and proposed infiltration rates are unchanged. Per Geotechnical Engineer testing, the existing soils have an infiltration rate of approximately 0.20 inches per hour. A rate of 0.10 inches per hour, or 50% of the tested rate, was used in design.
- Flow rates out of the pond are controlled with an outlet control structure that results in reduction of flow rates from the site when compared to existing conditions. Comparison of flow rates from the site are as follows:

STORMWATER SUMMARY

STORM EVENT	1 YR	2 YR	10 YR	100 YR
PRE-DEVELOPED	0.00 CFS	0.00CFS	0.16 CFS	1.90 CFS
POST-DEVELOPED	0.00 CFS	0.00 CFS	0.01 CFS	0.21 CFS
DIFFERENCE	0.00 CFS	0.00 CFS	-0.15 CFS	-1.69 CFS
POND WSE	766.53	767.02	767.87	768.64
POND VOLUME	1,948 CF	2,900 CF	6,039 CF	10,065 CF

- The stormwater management pond emergency overflow elevation is approximately 7 inches above the water surface elevation in the pond for the maximum storm event of 100 years.
- The total available volume in the stormwater management pond is approximately 15,500 cubic feet, which is approximately 5,000 cubic feet of additional volume over what is needed for the maximum storm event of 100 years.

Revised plans for the proposed stormwater management system are provided in **Appendix "C"** of this FEIS.

4.2.2 Comments on Section "3.2 Traffic" of the DEIS

Comment 2.a.
Move stop bar and arrows markings back so that they are off of New York State's right-of-way (Site and Utility Plan, C-2)

Response to Comment 2.a.
Comment noted; C-2, Site and Utility Plan has been revised and is included in **Appendix "C"** of this FEIS.

Comment 2.b.
With respect to work zone traffic control, add the following note:
"All Work Zone Traffic Controls shall conform to the 2009 Manual of Uniform Traffic Control Devices (MUTCD), the current New York State Supplement, NYSDOT Standard Specifications, NYSDOT Standard Sheets and NYSDOT Work Zone Traffic Control Manual dated January 2012."

Response to Comment 2.b.
Comment noted; C-2, Site and Utility Plan has been revised and is included in **Appendix "C"** of this FEIS.

Comment 2.c.
With respect to work zone traffic control, add the following:
NYSDOT Standard Sheets 619-20 and 619-63. NYSDOT Standard Sheet 619-63 shall be implemented when the minimum lane width of 10' cannot be maintained due to a shoulder closure.

Response to Comment 2.c.
Comment noted; C-2, Site and Utility Plan has been revised and is included in **Appendix "C"** of this FEIS.

Comment 3.a.
With respect to the Site and Utility Plan, General Site Notes G (Sheet C-2), recommend adding the following:
'… and shall conform to NYSDOT Standard Sheet 608-03 – Residential and Minor Commercial Driveways'.

Response to Comment 3.a.
Comment noted; C-2, Site and Utility Plan has been revised and is included in **Appendix "C"** of this FEIS.

Comment 3.b.
With respect to the Site and Utility Plan (Sheet C-2), recommend moving the stop bar and stop sign behind the sidewalk west of the sidewalk.

Response to Comment 3.b.
Comment noted; C-2, Site and Utility Plan has been revised and is included in **Appendix "C"** of this FEIS.

Comment 3.c.
With respect to the Site and Utility Plan (Sheet C-2), detectable warning surfaces are required where the sidewalk crosses a stop controlled driveway. Please refer to NYSDOT Standard Sheet 608-01, Sheet 1, note 31 and specify on the plans.

Response to Comment 3.c.
Comment noted; C-2, Site and Utility Plan has been revised and is included in **Appendix "C"** of this FEIS.

Comment 3.d.
With respect to the Site and Utility Plan (Sheet C-2), sections of the existing sidewalk are to be removed and replaced during construction. The contractor shall provide and maintain, at all times, a safe pedestrian route by installing a pedestrian detour or diversion. This pedestrian detour or diversion should be shown on the plans. Refer to 619-3.02C of NYSDOT Standard Specifications and NYSDOT Standard Sheet 619-50 for additional information and details.

Response to Comment 3.d.
Comment noted; C-2, Site and Utility Plan has been revised and is included in **Appendix "C"** of this FEIS.

Comment 3.e.
With respect to the Landscape Plan (Sheet L-1), to compensate for the removal of one (1) Oak tree in the NYSDOT ROW, please include one (1) new Northern Red Oak or similar tree (2.0" caliper) between 'maple 13' and 'tree 8' on the landscape plan.

Response to Comment 3.e.
Comment noted; L-1, Landscape Plan has been revised accordingly.

4.2.3 Comments on Section "3.3 Noise and Light" of the DEIS

Comment 5.b.
Where will outdoor lighting be located, and will it result in any light spillover to neighboring properties?

Response to Comment 5.b.
As indicated in the DEIS (see section 3.3.2), the Proposed Action includes artificial safety and security lighting which will be shielded and downward directing. Building-mounted lighting is proposed for the north and east facades. A ground-mounted light directed downward is proposed for the eastern edge of the parking lot. The Proposed Action includes the installation of a berm along the south and east property lines (to prevent light spillover from the Project Site and/or vehicles moving within the Project Site), additional tree plantings along the north and south property lines, and the construction of a privacy fence bordering the north, west, and south edges of the Project Site.

According to the Photometric Plans (included in Appendix "J" of the DEIS), the proposed lighting design uses a limited number of lighting fixtures for parking and safety, and all fixtures will be shielded and downward directed. The design also includes the lesser wattage options for luminaires which will produce less lumens which will reduce the potential for causing glare. A privacy fence will also be installed along the perimeter of the Project Site. The Photometric Plan accounts for this privacy fence as a light barrier which will minimize light spillage onto neighboring properties. Also, as indicated in the Photometric Plan, light from the proposed site lighting does not reach Buffalo Street /State Route 62. The Proposed Action does not include the use of up-lighting or site lighting to illuminate signs or accessory structures.

5.0 APPENDICES

Appendix A
SEQRA Documentation

14-12-8 (3/99)-9c

SEQR

State Environmental Quality Review
Notice of Completion of Draft / Final EIS

Project Number _____ **Date:** March 8, 2021

This notice is issued pursuant to Part 617 of the implementing regulations pertaining to Article 8 (State Environmental Quality Review Act) of the Environmental Conservation Law.

A ☑ Draft or ☐ Final (check one) Environmental Impact Statement has been completed and accepted by the Village of Gowanda Board of Trustees as lead agency, for the proposed action described below.

If a Draft EIS: Comments on the Draft EIS are requested and will be accepted by the contact person until March 17, 2021

Name of Action:

Gowanda, New York Dollar General

Description of Action:

Demolition of existing residential home to construct new ~9,100 sf. retail store with associated parking.

Location: (Include street address and the name of the municipality/county. A location map of appropriate scale is also recommended.)

240 & 248 Buffalo, Street, Gowanda, NY 14070

Potential Environmental Impacts:

1. The proposed Project may have impacts on the land and/or water, most notably potential drainage impacts and impacts upon adjacent properties from the loss of flora.

2, The proposed Project has the potential to have an adverse impact on traffic. Degradation of levels of service will be permanent, not temporary or limited to construction period.

3. The location of the proposed Project is adjacent to residential homes which may be adversely impacted by both noise levels and lighting.

4. The proposed Project is inconsistent with the municipalitys plan to have a central business district separate from the residential areas of the Village. The proposed Project will require acquisition and demolition of existing residential homes in a predominantly residential area. . A similar retail store is located less than ½ mile from the proposed Project, which has the potential to adversely impact existing local businesses and result in closures and abandoned buildings.

5. The proposed Project is not consistent with Community Character. There is significant community opposition to the Project, particularly its location. The Village of Gowanda is approximately 1.6 square miles and has a population of approx. 2,200 people and is considered a small village in an otherwise rural area. The proposed Project has the potential to adversely impact the quality of the residential areas surrounding it and degrade the property values of adjacent residences, potentially creating a domino effect of homes transitioning to non-owner occupied rental units.

A copy of the Draft / Final EIS may be obtained from:

Contact Person: Danielle Wagner, Village Clerk

Address: 27 E. Main Street Gowanda NY 14070

Telephone Number: 716-532-3353

A copy of this notice must be sent to:

Department of Environmental Conservation, 625 Broadway, Albany, New York 12233-1750

Chief Executive Officer, Town/City/Village of Gowanda

Any person who has requested a copy of the Draft / Final EIS

Any other involved agencies

Environmental Notice Bulletin, 625 Broadway, Albany, NY 12233-1750

Copies of the Draft/Final EIS must be distributed according to 6NYCRR 617.12(b).

Appendix B
Written Comments on the DEIS

From: Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
Sent: Monday, March 15, 2021 12:58 PM
To: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Cc: Frei, Ronald A (DOT) <Ronald.Frei@dot.ny.gov>
Subject: Minor Commercial #78755- Dollar General, 240 Buffalo St., Gowanda

Hello Melissa,

We have reviewed your revisions for the proposed Minor Commercial #78755- Dollar General, 240 Buffalo St., Gowanda. All of the Landscape Architecture / Environmental Unit & Minor Commercial Unit concerns were addressed, while The Hydraulic Unit had no concerns. You may proceed with the Final Submission of the PERM 33- COM Highway Work Permit application. Review application instructions to determine what is required for final submission. Submit the final application with all Stages completed. Plan sheets can be 11" x 17" and stamped by a PE, The contractor should be a Joint Applicant on the application and sign it. Send in *Four* copies of all documents.

- $550 Check for Permit Fee
- $30,000 Performance Bond
- SEQR Determination document
- All required insurance documents
- All required insurance documents from contractor hired to perform the actual work on site.
- No Utility HWP applications will be processed until the Minor Commercial HWP has been issued.

Note that this e-mail does not constitute approval to perform any work within the State Highway Right-of-Way, nor guarantee the issuance of a permit until all the Department requirements are satisfied and the required State Highway Permit has been issued.

Contact me with any questions.

Thanks.

Leon E Pieczynski
Assistant Resident Engineer

New York State Department of Transportation, Region 5
South Erie Maintenance Residency
3754 Lakeview Rd, Hamburg, NY 14075
(716) 649-2157 | leon.pieczynski@dot.ny.gov
www.dot.ny.gov

From: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Sent: Tuesday, February 23, 2021 3:24 PM
To: Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
Subject: Gowanda Plans
Importance: High

Hey Leon,

I wanted to check and make sure you received the plans I emailed. Those are the final plans we submitted to the Village to go along with the environmental impact study. I understand even if the plans are approved by your office, you can't issue a permit until the SEQR receives negative declaration by the Village. We expect to have that by their meeting mid-May. What we would like to be able to tell them at their April 13 meeting is that the plans you have are approved pending and permit is ready for issuance upon the Village's approval of the SEQR documents. Is that possible?

Thanks!

Melissa Ballard
Development Manager
The Broadway Group, LLC.
P. O. Box 18968
Huntsville, Alabama USA 35804
P: 256.533.7287 Ext. 119
C: 256.424.2567

The Broadway Group
Commercial Real Estate Development

From: Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
Sent: Wednesday, December 30, 2020 1:17:19 PM
To: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Subject: Control # 78755 Minor Commercial -Dollar General-240 Buffalo St. Gowanda- updated APPLICATION

Good Afternoon Melissa,

Boy, sorry to hear about your family getting COVID, hopefully soon things will get back to normal. I'm doing good up here.
Have a Healthy & Safe 2021.

The Regional Minor Commercial Unit, Landscape Architecture/Environmental Unit and Hydraulic Unit have reviewed the plans and documents for the proposed Dollar General, 240 Buffalo St., Village of Gowanda and offer the following comments:

Minor Commercial Unit

SITE AND UTILITY PLAN (C2)

- Move stop bar and arrows markings back so that they are off of New York State's right-of-way.

WORK ZONE TRAFFIC CONTROL

- Add the following note:
  - "All Work Zone Traffic Controls shall conform to the 2009 Manual of Uniform Traffic Control Devices (MUTCD), the current New York State Supplement, NYSDOT Standard Specifications, NYSDOT Standard Sheets and NYSDOT Work Zone Traffic Control Manual dated January 2012."
- Add NYSDOT Standard Sheets 619-20 and 619-63.
  - NYSODT Standard Sheet 619-63 shall be implemented when the minimum lane width of 10' cannot be maintained due to a shoulder closure."

Landscape Architecture/ Environmental Unit

Plan Review

1. C-2 – Site and Utility Plan
   a. General Site Notes G – We recommend adding the following '… and shall conform to NYSDOT Standard Sheet 608-03 – Residential and Minor Commercial Driveways'.
   b. We recommend moving the stop bar and stop sign behind the sidewalk west of the sidewalk
   c. Detectable warning Surfaces are required where the sidewalk crosses a stop controlled driveway. Please refer to NYSDOT Standard Sheet 608-01, Sheet 1, note 31 and specify on the plans.

2. Sections of the existing sidewalk are to be removed and replaced during construction. The contractor shall provide and maintain, at all times, a safe pedestrian route by installing a pedestrian detour or diversion. This pedestrian detour or diversion should be shown on the plans. Refer to 619-3.02C of NYSDOT Standard Specifications and NYSDOT Standard Sheet 619-50 for additional information and details.

3. L-1 – Landscape Plan
   a. To compensate for the removal of one (1) Oak tree in the NYSDOT ROW, please include one (1) new Northern Red Oak or similar tree (2.0" caliper) between 'maple 13' and 'tree 8' on the landscape plan.

Hydraulic Unit

A review of the attached Storm Water Drainage Plans and Calculations for the subject project has been completed. The following comments are based on our review of the hydraulic aspect of this project.

> The proposed site plans show runoff from the retail building being collected by a series of catch basins and storm pipes and being discharged to a stormwater detention basin located on the Western edge of the property. The basin discharges to the West away from Buffalo Street (Route 62). There is no connection/impact to the State drainage system on Route 62.
>
> We find the proposed Storm Drainage Plans and Calculations consistent with our current storm water drainage requirements.

At your earliest convenience, please e-mail a revised set of plans addressing these items.

This e-mail does not constitute approval for the purpose of the Highway Work Permit.

Let me know if you have any questions.

Thanks,

Leon E Pieczynski
Assistant Resident Engineer

New York State Department of Transportation, Region 5
South Erie Maintenance Residency
3754 Lakeview Rd, Hamburg, NY 14075
(716) 649-2157 | leon.pieczynski@dot.ny.gov
www.dot.ny.gov

> **From:** Melissa Ballard <melissa.ballard@broadwaygroup.net>
> **Sent:** Wednesday, December 30, 2020 11:16 AM
> **To:** Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
> **Subject:** RE: Gowanda NY - Stage 2 Submittal
> **Importance:** High
>
>
>
> Good morning Leon,
>
> I hope this email finds you well and that you and your family have had a wonderful Christmas holiday season! We have had some pretty mild weather here but my husband and I have both

had covid and our two grandsons have also had it. Thankfully, our symptoms were not terrible and our grandsons only had mild stomach and headaches; so all had gone fairly well.

I'm following up on the review for the driveway application in Gowanda. Can you please check with the reviewers and update me on the status of the plans? I would really appreciate it! We have submitted the environmental study and the Village has reviewed that and provided comments to us (which are being done now).

Please let me know when we may receive comments from your office so we can update the Village also.

Thank you and I hope you have a safe and HEALTH New Year!!!

Melissa Ballard
Development Manager
The Broadway Group, LLC.
P. O. Box 18968
Huntsville, Alabama USA 35804
P: 256.533.7287 Ext. 119
C: 256.424.2567

The Broadway Group
Commercial Real Estate Development

From: Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
Sent: Friday, August 14, 2020 2:05 PM
To: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Subject: RE: Gowanda NY - Stage 2 Submittal

Melissa,

Ok, I'll let our Minor Commercial Unit know.

Thanks.

Leon E Pieczynski
Assistant Resident Engineer

New York State Department of Transportation, Region 5
South Erie Maintenance Residency
3754 Lakeview Rd, Hamburg, NY 14075
(716) 649-2157 | leon.pieczynski@dot.ny.gov
www.dot.ny.gov

NEW YORK STATE OF OPPORTUNITY | Department of Transportation

From: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Sent: Friday, August 14, 2020 2:30 PM
To: Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
Subject: Gowanda NY - Stage 2 Submittal

Leon,

Please see comment below from our engineer. None of the plans changed anything in the driveway or right of way.

Thanks!

Melissa Ballard
Development Manager
The Broadway Group, LLC.
P. O. Box 18968
Huntsville, Alabama USA 35804
P: 256.533.7287 Ext. 119
C: 256.424.2567

The Broadway Group
Commercial Real Estate Development

From: Rado K. Nedkov [mailto:rnedkov@ceieng.com]
Sent: Friday, August 14, 2020 12:51 PM
To: Melissa Ballard
Cc: Ivan Jankun; Ben A. Powell
Subject: RE: Gowanda NY - Stage 2 Submittal

Melissa,

I compared the last 2 revisions on file and nothing has changed at the entrance near the ROW from January 2019. All revisions were related to the pond which is on the far end of the side to the west.

Thank you

RADOSLAV NEDKOV
Program Manager

Philadelphia, PA
Office: 479.254.1423 | Cell: 610.329.5772
ceieng.com

CEI Solutions for Land and Life

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From: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Sent: Friday, August 14, 2020 11:55 AM
To: Rado K. Nedkov <rnedkov@ceieng.com>
Cc: Ivan Jankun <ijankun@ceieng.com>; Ben A. Powell <bpowell@ceieng.com>
Subject: Gowanda NY - Stage 2 Submittal

Rado,

Last year, I sent plans to DOT (maybe in June of 2019) but never received any feedback them that I can find record of. So I resubmitted a Stage 2 permit application along with the revised plans from June of this year; just because it had been so long since the DOT guy and I had talked about the project.

See his email below. Can you tell me all that may have changed from the first submittal in 2019 until now that would have affected the driveway, ROW work, etc.?

Thank you!

Melissa Ballard
Development Manager
The Broadway Group, LLC.
P. O. Box 18968
Huntsville, Alabama USA 35804
P: 256.533.7287 Ext. 119
C: 256.424.2567

The Broadway Group
Commercial Real Estate Development

From: Pieczynski, Leon (DOT) [mailto:Leon.Pieczynski@dot.ny.gov]
Sent: Friday, August 14, 2020 10:18 AM
To: Melissa Ballard
Subject: RE: Gowanda NY - Stage 2 Submittal

Hi Melissa,

Were these plans the same ones submitted last year or have there been revisions to them?

Thanks.

Leon E Pieczynski
Assistant Resident Engineer

New York State Department of Transportation, Region 5
South Erie Maintenance Residency
3754 Lakeview Rd, Hamburg, NY 14075
(716) 649-2157 | leon.pieczynski@dot.ny.gov
www.dot.ny.gov

From: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Sent: Thursday, August 13, 2020 4:18 PM
To: Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
Subject: RE: Gowanda NY - Stage 2 Submittal

Hi Leon,

I'm just checking in to see how the plan review is going. Can you please give me an update on it?

Thank you and I hope you are staying well!

Melissa Ballard
Development Manager
The Broadway Group, LLC.
P. O. Box 18968
Huntsville, Alabama USA 35804
P: 256.533.7287 Ext. 119
C: 256.424.2567

From: Pieczynski, Leon (DOT) [mailto:Leon.Pieczynski@dot.ny.gov]
Sent: Tuesday, July 21, 2020 11:35 AM
To: Melissa Ballard
Subject: RE: Gowanda NY - Stage 2 Submittal

Got it now.

> **From:** Melissa Ballard <melissa.ballard@broadwaygroup.net>
> **Sent:** Tuesday, July 21, 2020 11:51 AM
> **To:** Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
> **Subject:** RE: Gowanda NY - Stage 2 Submittal
>
>
>
> Let me just try sending it as an attachment.
>
> Melissa Ballard
> Development Manager
> The Broadway Group, LLC.
> P. O. Box 18968
> Huntsville, Alabama USA 35804
> P: 256.533.7287 Ext. 119
> C: 256.424.2567
>
> The Broadway Group
> Commercial Real Estate Development
>
> **From:** Pieczynski, Leon (DOT) [mailto:Leon.Pieczynski@dot.ny.gov]
> **Sent:** Tuesday, July 21, 2020 10:37 AM
> **To:** Melissa Ballard
> **Subject:** RE: Gowanda NY - Stage 2 Submittal
>
> Hi Melissa,
>
> I'm not able to open the dropbox link. We are blocked from opening it.
>
> **Leon E Pieczynski**
> Assistant Resident Engineer
>
> **New York State Department of Transportation, Region 5**
> **South Erie Maintenance Residency**
> 3754 Lakeview Rd, Hamburg, NY 14075
> (716) 649-2157 | leon.pieczynski@dot.ny.gov
> www.dot.ny.gov

From: Melissa Ballard <melissa.ballard@broadwaygroup.net>
Sent: Tuesday, July 21, 2020 9:59 AM
To: Pieczynski, Leon (DOT) <Leon.Pieczynski@dot.ny.gov>
Subject: Gowanda NY - Stage 2 Submittal
Importance: High

Thank you again for your time on the phone this morning. Attached is the permit application and SWPPP for your review. Below is the link to the full plan set; let me know if you have trouble with the link.

https://www.dropbox.com/s/vkxuuhoqhf6gfhk/Gowanda%20NY%20-%20Civils%20-%206-18-2020.pdf?dl=0

Just let me know if you need anything further. Have a great week!

Melissa Ballard
Development Manager
The Broadway Group, LLC.
P. O. Box 18968
Huntsville, Alabama USA 35804
P: 256.533.7287 Ext. 119
C: 256.424.2567

Disclaimer

MEMO

To:	Village of Gowanda
From:	Scott Rybarczyk
Date:	January 25th, 2021
RE:	Broadway Group, LLC Draft Environmental Impact Statement (DEIS) Second Review of Drainage, Lighting, and Traffic Impacts
WDPN:	394017

Wendel has completed their second review of the DEIS for the proposed construction of a 9,000 square foot retail building, parking lot, drive aisles, sidewalk, and other associated site features near the intersection of Bader Avenue and Buffalo Street in the Village of Gowanda. This review focused on stormwater, traffic, and site lighting impacts described in the DEIS. We have the following concerns after reviewing the response memo from Marc Romanowski (dated 1/11/20) and the latest version of the DEIS (dated 1/7/2021):

- The Notice of Intent (NOI) submitted as part of their SWPPP in Appendix G of the DEIS now matches the answers provided in the runoff reduction sheets. A value for Channel protection volume (Cpv) has also been provided, but no documentation of how this required and provided Cpv was calculated is given in the DEIS. This information shall be included in the drainage report (Appendix "U" of the DEIS) and must follow the guidance provided by the NYS DEC in the 2015 Stormwater Design Manual. We highly recommend reviewing the example in Chapter 8 and Appendix B for an understanding of Cpv.
- The drainage details for the detention basin outfall structure and the bioretention basin have now been provided in Appendix K (dated 7/15/20). The previous version of the DEIS had drawings from 6/16/20 which did not include this information. Upon review of these details, the following elements of the design do not meet NYS requirements for stormwater treatment:
    - The depth of bioretention soils provided is insufficient. 30" of soil depth must be provided at a minimum (see Figure 6.19 of the NYS Stormwater Design Manual) versus the 22" shown in the detail on Sheet C8 of Appendix K.
    - The sediment forebay for Bioretention Basin A is not acceptable. The forebay is located at the west edge of the bioretention basin, while all the inflows to the basin are located at the east side. The forebay will not treat the inflows before they enter the main portion of the bioretention area.

If you have any questions, please feel free to contact me.

FISHER ASSOCIATES

Transportation
Land Development
Energy

March 8, 2021

Via E-Mail
Scott Rybarczyk
Wendel Companies, Inc.
237 Main Street, Suite 500
Buffalo, NY 14203

RE: Proposed Dollar General, Gowanda, NY
Wendel Stormwater/Drainage Comments

Dear Scott:

In response to your comments dated January 25, 2021, CEI Engineering Associates, Inc. (CEI) has updated the previously submitted site development plans and drainage report for the proposed Dollar General project in Gowanda, New York.

On behalf of CEI and The Broadway Group, LLC, Fisher Associates is transmitting the following documents for your review:

- CEI's Comment Responses to Wendel's memo dated 1/25/2021
- CEI's Site Development Plans, Revision 3, dated 2/17/2021
- CEI's Project Drainage Report, dated 2/18/2021

Please let us know if you have questions or have any final comments.

Sincerely,

Fisher Associates, P.E., L.S., L.A., D.P.C.

Frank Armento, AICP CEP
Planning Group Manager

farmento@fisherassoc.com

CC: Melissa Ballard, The Broadway Group, LLC
Rado Nedkov, CEI
Bill Anterline, Fisher Associates
Marc Romanowski, Rupp Baase

Comments from Wendel Engineering

January 25, 2021 comments

1) The Notice of Intent (NOI) submitted as part of their SWPPP in Appendix G of the DEIS now matches the answers provided in the runoff reduction sheets. A value for Channel Protection Volumes (Cpv) has also been provided, but no documentation of how this required and provided Cpv was calculated is given in the DEIS. This information shall be included in the drainage report (Appendix "U" of the DEIS) and must follow the guidance provided by the NYS DEC in the 2015 Stormwater Design Manual. We highly recommend reviewing the example in Chapter 8 and Appendix B for an understanding of Cpv.

   Response: Channel Protection Volume (Cpv) calculations have been added to the Drainage Report in Appendix "U", specifically calculations were added to the report narrative under an added section titled Channel Protection Volume, starting on Page 5 of the report narrative. Channel Protection Volume determined is provided within the proposed stormwater management pond.

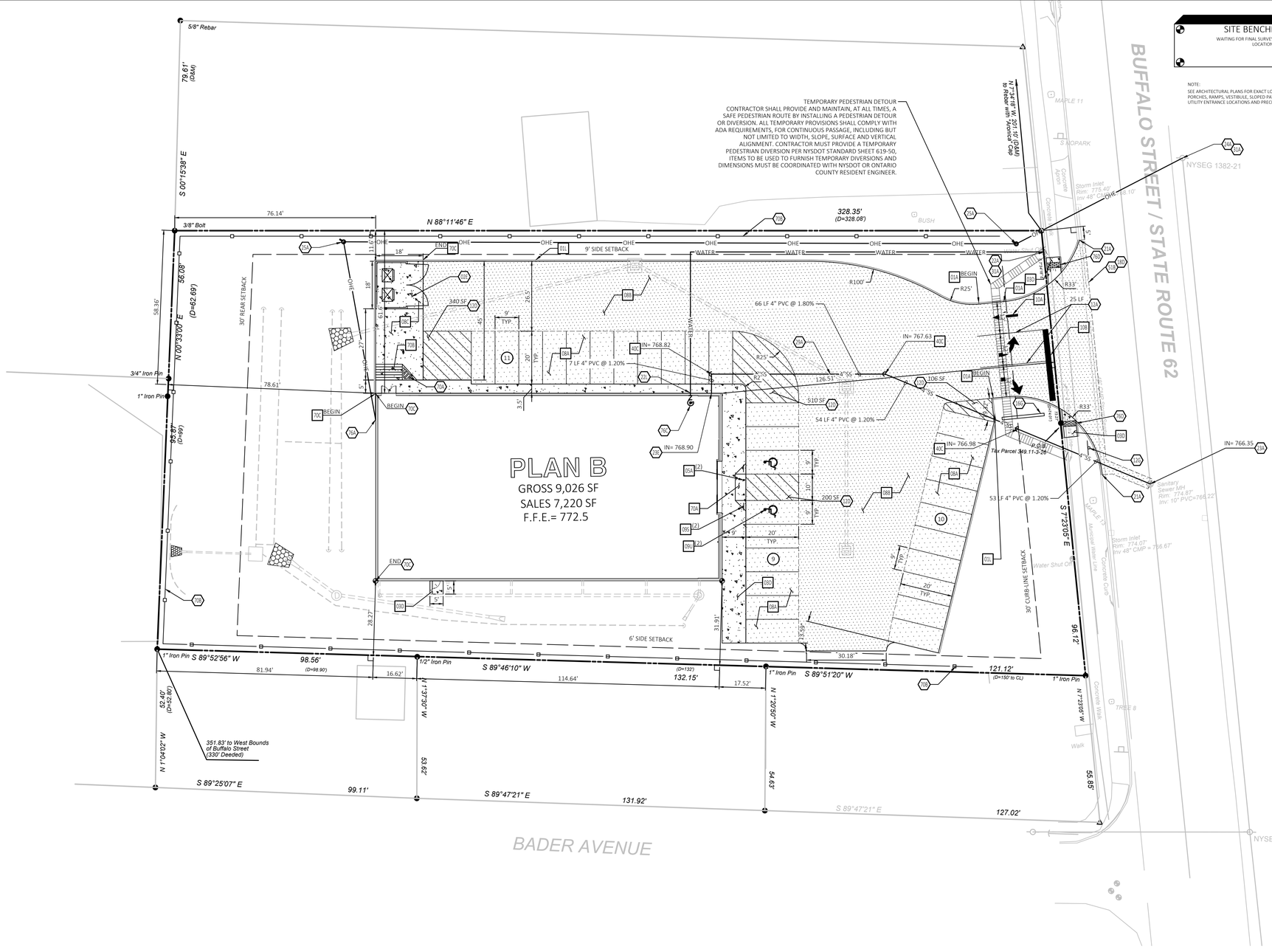
2) The drainage details for the detention basin outfall structure and the bioretention basin have now been provided in Appendix K (dated 7/15/20). The previous version of the DEIS had drawings from 6/16/20 which did not include this information. Upon review of these details, the following elements of the design do not meet NYS requirements for stormwater treatment.
   a. The depth of bioretention soils provided is insufficient. 30" of soil depth must be provided at a minimum (see figure 6.19 of the NYS Stormwater Design Manual) vesus the 22" shown in the detail on Sheet C8 of Appendix K.

      Response: The depth of bioretention soils has been revised to 30" both on the Grading Plan, Sheet C3 and in the bioretention basin detail on the Detail Sheet, Sheet C8, of Appendix K.

   b. The sediment forebay for Bioretention Basin A is not acceptable. The forebay is located at the west edge of the bioretention basin, while all the inflows to the basin are located at the east side. The forebay will not treat the inflows before they enter the main portion of the bioretention area.

      Response: The sediment forebay for bioretention basin A has been revised to be located on the east end of the basin and the inflow from the roof drains, which connect to the basin, have been revised to enter the basin on the east end to enter the forebay and be treated prior to entering the main portion of the bioretention basin.

Appendix C
Revised Supporting Documentation and Supplemental Information



SITE BENCHMARK

WAITING FOR FINAL SURVEY FOR BENCHMARK LOCATION

NOTE:
SEE ARCHITECTURAL PLANS FOR EXACT LOCATIONS AND DIMENSIONS OF PORCHES, RAMPS, VESTIBULE, SLOPED PAVING, TRUCK DOCKS, BUILDING UTILITY ENTRANCE LOCATIONS AND PRECISE BUILDING DIMENSIONS.

811 Know what's **below.** **Call** before you dig.

N

0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- FOUND IRON STAKE
- SET 3/4" REBAR WITH CAP
- POINT OR ANGLE POINT
- WATER VALVE
- POWER POLE
- MM MILE MARKER
- P.O.B. POINT OF BEGINNING

PROPOSED

- PROPERTY LINE/RIGHT OF WAY LINE
- (#) PROPOSED PARKING SPACES
- STORM DRAIN
- OHE OVERHEAD ELECTRIC SERVICE
- X"W WATER SERVICE
- SS" SANITARY SEWER SERVICE
- TEMPORARY PEDESTRIAN DETOUR

GENERAL SITE NOTES

A. ALL DIMENSIONS SHOWN ARE TO THE EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.

B. ALL CURB RETURN RADII SHALL BE 3' OR 10', AS SHOWN TYPICAL ON THIS PLAN, UNLESS OTHERWISE NOTED.

C. PAVEMENT SHALL BE INSTALLED IN ACCORDANCE WITH DETAIL 08A OVER THE ENTIRE CUSTOMER PARKING LOT AREA AND 08B OVER ALL TRUCK AND DELIVERY APPROACH DRIVES.

D. ALL PARKING LOT SIGN BASE SUPPORTS SHALL BE INSTALLED PER DETAIL 12F.

E. ALL ACCESSIBLE PARKING STALLS SHALL HAVE SIGNAGE INSTALLED PER DETAIL 09S.

F. GENERAL CONTRACTOR IS RESPONSIBLE FOR VERIFYING POSTAL DELIVERY METHOD WITH LOCAL JURISDICTION IF A PHYSICAL MAILBOX IS REQUIRED. GENERAL CONTRACTOR IS RESPONSIBLE FOR THE PURCHASE, LOCATION, PLACEMENT, AND INSTALLATION.

G. DRIVEWAY CONSTRUCTION WITHIN ROAD RIGHT-OF-WAY SHALL MEET VILLAGE OF GOWANDA REQUIREMENTS AND SHALL CONFORM TO NYSDOT STANDARD SHEET 608-03 - RESIDENTIAL AND MINOR COMMERCIAL DRIVEWAYS.

H. CONTRACTOR CHOICE FOR BITUMINOUS OR CONCRETE PARKING SURFACING WITH OWNER APPROVAL. SURFACING MUST MEET PAVEMENT SECTION REQUIREMENTS PER DETAILS 08A, 08B, AND 08C.

I. ALL WORK ZONE TRAFFIC CONTROLS SHALL CONFORM TO THE 2009 MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), THE CURRENT NEW YORK STATE SUPPLEMENT, NYSDOT STANDARD SPECIFICATIONS, NYSDOT STANDARD SHEETS AND NYSDOT WORK ZONE TRAFFIC CONTROL MANUAL DATED JANUARY 2012.

J. NYSDOT STANDARD SHEETS 619-63 SHALL BE IMPLEMENTED WHEN THE MINIMUM LANE WIDTH OF 10' CANNOT BE MAINTAINED DUE TO SHOULDER CLOSURE.

SITE NOTES

02E TRASH DUMPSTER ENCLOSURE (PER ARCH. PLANS).
12A 4 INCH TRAFFIC YELLOW LANE STRIPE (SEE LENGTH INDICATED AT SYMBOL).
12D 4 INCH WIDE PAINTED YELLOW STRIPES. 2.0 FOOT O.C. @ 45 DEGREES (SEE SIZE INDICATED AT SYMBOL).
12G STOP SIGN.
16G PROPOSED BUSINESS SIGN.
18D MATCH EXISTING PAVEMENT ELEVATIONS.
21A TAPER CURB TO MATCH EXISTING CURB.
21B TAPER CURB FROM 6 INCHES TO 0 INCHES OVER 2 FEET
22A POINT OF CONNECTION - WATER SERVICE (PER LOCAL CODES).
22L DOMESTIC WATER SERVICE ENTRY PER ARCH. PLANS (SEE SIZES THIS SHEET).
23A POINT OF CONNECTION - SANITARY SEWER SERVICE (PER LOCAL CODES).
23E SANITARY SEWER SERVICE ENTRY (PER ARCH. PLANS).
24A POINT OF CONNECTION FOR ELECTRICAL SERVICE (PER ELECTRIC COMPANY REQUIREMENTS).
25A PROPOSED POWER POLE.
29A MAINTAIN MIN. 18 INCHES VERTICAL SEPARATION.
31A LOCATION FOR THIS UTILITY AS SHOWN IS FOR DRAWING PURPOSES ONLY. CONTRACTOR SHALL VERIFY THE EXACT LOCATION IN FIELD PRIOR TO THE CONSTRUCTION OF THE PROPOSED UTILITY LINE TO BE CONNECTED. CONTRACTOR SHALL NOTIFY CEI ENGINEERING IF THE DESIGN AS SHOWN IS NOT ACHIEVABLE.
51B LIMITS OF SAWCUT AND PAVEMENT REMOVAL
70A 4" WIDE SAFETY YELLOW ON ALL SIDEWALK EDGES ABUTTING SAME COLORED PAVEMENT
70B PRIVACY FENCE (PER ARCH. PLANS).
76A ELECTRICAL SERVICE ENTRY (PER ARCH. PLANS)
76C WATER METER (PER ARCH. PLANS)
76D DETECTABLE WARNING SURFACE

DETECTABLE WARNING SURFACES SHALL BE PROVIDED WHERE THE PREDESTRIAN ACCESS ROUTE CROSSE DRIVEWAYS WITH SIGNAL, YIELD, OR STOP CONTROL. DETECTABLE WARNING SURFACES SHALL NOT BE PROVIDED AT CROSSINGS OF UNCONTROLLED DRIVEWAYS.

SITE DATA TABLE

		%
SITE AREA	55,584 SF / 1.28 AC±	100
PROPOSED BUILDING AREA	9,026 SF	16.24

ACCESSIBLE PARKING

VAN PARKING	1	REQUIRED	1	PROVIDED
ACCESSIBLE PARKING	1	REQUIRED	1	PROVIDED
TOTAL	2	REQUIRED	2	PROVIDED

PARKING RATIO

	BUILDING SQ.FT.	REQUIRED	PROVIDED
TOTAL	9,100	46	30
REQUIRED PARKING RATIO	1 SPACE PER 200 SF		

STRIPING LEGEND

YELLOW CURBING & BOLLARDS - PARKING LOT	SURFACES SHOULD BE CLEAN, DRY, AND METAL SURFACES FREE OF HEAVY RUST. TWO (2) COATS OF SHERWIN WILLIAMS - KEM 4000 ACRYLIC ALKYD ENAMEL SAFETY YELLOW B55Y300
STRIPING - PARKING LOT	SURFACES SHOULD BE CLEAN AND DRY. TOP COAT SHERWIN WILLIAMS - PRO MAR TRAFFIC MARKING PAINT YELLOW TM5495.
HANDICAP PARKING - PARKING LOT	SURFACES SHOULD BE CLEAN AND DRY. TOP COAT SHERWIN WILLIAMS - PRO MAR TRAFFIC MARKING PAINT "HC" BLUE.

ESTIMATED SITE QUANTITIES

DESCRIPTION	QUANTITY	UNIT
CONCRETE CURB & GUTTER	54	LF
REINFORCED REVERSED CURB	38	LF
ASPHALT CURB	99	LF
CONCRETE SIDEWALK	2,270	SF
STANDARD DUTY ASPHALT PAVING	6555	SF
HEAVY DUTY ASPHALT PAVING	12,325	SF
HEAVY DUTY CONCRETE PAVING	810	SF

ESTIMATED ROW QUANTITIES

DESCRIPTION	QUANTITY	UNIT
CONCRETE CURB & GUTTER	66	LF
CONCRETE SIDEWALK	85	SF
HEAVY DUTY ASPHALT PAVING	1015	SF

SITE DETAILS

01A CONCRETE CURB & GUTTER
01L ASPHALT CURB
03D CONCRETE SIDEWALK
05A GUARD POST
08A STANDARD DUTY ASPHALT PAVING
08B HEAVY DUTY ASPHALT PAVING
08C HEAVY DUTY CONCRETE PAVING
09S ACCESSIBLE / VAN ACCESSIBLE PARKING SIGN
09U ACCESSIBLE PARKING SYMBOL
10A TRAFFIC FLOW ARROW
10B STOP BAR
40C SANITARY SEWER CLEAN-OUT
70A 90° PARKING, ACCESSIBLE PARKING AND PEDESTRIAN RAMP IN SIDEWALK
70B CONCRETE RAMP AT STOCK ROOM DOOR.
70C REINFORCED REVERSED CURB

STATE OF NEW YORK ★ ANDREW D. SLYTER ★ LICENSED PROFESSIONAL ENGINEER 091378
02/18/2021

31140	2/11/21	ADS	RKN	IVJ	IVJ
CEI PROJECT NO.	INITIAL DATE	DPOR	PM	DES	DRW

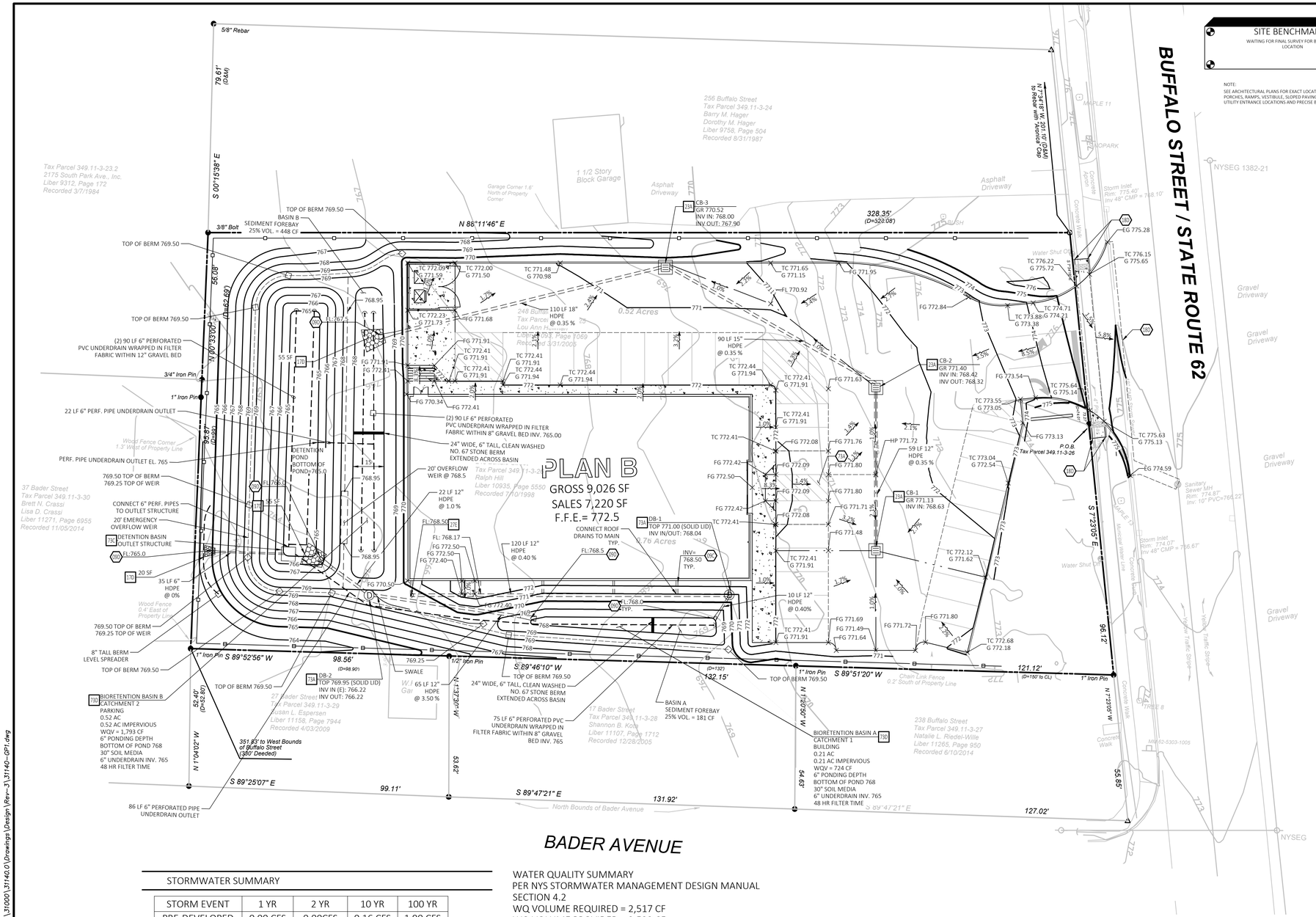
CEI Engineering Associates, Inc.
ENGINEERS • PLANNERS • SURVEYORS
LANDSCAPE ARCHITECTS
3108 SW Regency Parkway, Suite 2
Bentonville, AR 72712
(479) 273 - 9472
(479) 273-0844

THE BROADWAY GROUP, LLC
BUFFALO STREET
GOWANDA NY

SITE AND UTILITY PLAN

REV. DATE	SHEET NO.
2/11/21 REV-3	C2

JOB # 31140 DRAWING: 31140-SP.dwg LAST SAVED BY: IJANKUN LOCATION: P:\31000\31140.0\Drawings\Design\Rev-3\31140-SP.dwg



SITE BENCHMARK

WAITING FOR FINAL SURVEY FOR BENCHMARK LOCATION

NOTE:
SEE ARCHITECTURAL PLANS FOR EXACT LOCATIONS AND DIMENSIONS OF PORCHES, RAMPS, VESTIBULE, SLOPED PAVING, TRUCK DOCKS, BUILDING UTILITY ENTRANCE LOCATIONS AND PRECISE BUILDING DIMENSIONS.

811 Know what's **below.** **Call** before you dig.

N

0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- FOUND IRON STAKE
- SET 3/4" REBAR WITH CAP
- POINT OR ANGLE POINT
- WATER VALVE
- POWER POLE
- MM MILE MARKER
- P.O.B. POINT OF BEGINNING

PROPOSED

- PROPERTY LINE/RIGHT OF WAY LINE
- GRADE BREAK
- FLOW LINE
- XXX CONTOUR ELEVATIONS
- STORM DRAIN
- x XX.XX SPOT ELEVATIONS: TC = TOP OF CURB, G = GUTTER, FL = FLOW, INV = INVERT

GENERAL GRADING NOTES

A. PRIOR TO INSTALLATION OF STORM OR SANITARY SEWER, THE CONTRACTOR SHALL EXCAVATE, VERIFY, AND CALCULATE ALL CROSSINGS AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS PRIOR TO CONSTRUCTION. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT THE ENGINEER IS NOT NOTIFIED OF DESIGN CONFLICTS.

B. ALL SLOPES AND AREAS DISTURBED BY CONSTRUCTION SHALL BE GRADED SMOOTH AND 4" OF TOPSOIL APPLIED. IF ADEQUATE TOPSOIL IS NOT AVAILABLE ON SITE, THE CONTRACTOR SHALL PROVIDE TOPSOIL, APPROVED BY THE OWNER, AS NEEDED. THE AREA SHALL THEN BE SEEDED, FERTILIZED, MULCHED, WATERED AND MAINTAINED UNTIL HARDY GRASS GROWTH IS ESTABLISHED IN ALL AREAS (SEE LANDSCAPE PLAN FOR SEED MIX AND PROPER APPLICATION RATE). ANY AREAS DISTURBED FOR ANY REASON PRIOR TO FINAL ACCEPTANCE OF THE PROJECT SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

C. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES.

D. UNLESS OTHERWISE SHOWN, CALLED OUT OR SPECIFIED HEREON OR WITHIN THE SPECIFICATIONS: ALL STORM DRAIN PIPE BEDDING SHALL BE INSTALLED PER DETAIL 28A. ALL STORM DRAIN PIPES ARE MEASURED FROM CENTER OF STRUCTURES AND ENDS OF FLARED END SECTIONS.

GRADING NOTES

09C CONNECT DOWN SPOUTS TO DRAIN PIPE. (SEE ARCH. PLANS FOR EXACT NO. AND LOCATION OF DOWN SPOUTS).
09D FLARED END SECTION.
18D MATCH EXISTING PAVEMENT ELEVATIONS.
73A ADA AREA. NO MORE THAN 2% SLOPE IN ANY DIRECTION.

GRADING DETAILS

17D RIP RAP PAD
23A GRATE INLET
27E STORM DRAIN CLEAN OUT
73A SOLID LID DRAIN BASIN (NYLOPLAST)
73B DOME GRATE DRAIN BASIN (NYLOPLAST)
73C DETENTION BASIN OUTFALL STRUCTURE
73D BIORETENTION BASIN

STORMWATER SUMMARY

STORM EVENT	1 YR	2 YR	10 YR	100 YR
PRE-DEVELOPED	0.00 CFS	0.00CFS	0.16 CFS	1.90 CFS
POST-DEVELOPED	0.00 CFS	0.00 CFS	0.01 CFS	0.21 CFS
DIFFERENCE	0.00 CFS	0.00 CFS	-0.15 CFS	-1.69 CFS
POND WSE	766.53	767.02	767.87	768.64
POND VOLUME	1,948 CF	2,900 CF	6,039 CF	10,065 CF

WATER QUALITY SUMMARY
PER NYS STORMWATER MANAGEMENT DESIGN MANUAL
SECTION 4.2
WQ VOLUME REQUIRED = 2,517 CF
WQ VOLUME PROVIDED = 2,532 CF

TOP OF DETENTION BASIN = 769.50
EMERGENCY OVERFLOW WEIR = 769.25
POND VOLUME AVAILABLE = 13,838 CF (EL. 769.25)
15,496 CF (EL. 769.50)
100 YR WSE = 768.82
OUTLET ELEV = 4" ORIFICE OUTLET @ 768.25 (FOR 100 YEAR)
POND BOTTOM = 765.00

APPROXIMATE GROUNDWATER ELEVATION = 762.00

STATE OF NEW YORK
ANDREW D. SLYTER
LICENSED PROFESSIONAL ENGINEER
093378-1
02/18/2021

31140	2/17/21	ADS	RKN	IVJ	IVJ
CEI PROJECT NO.	INITIAL DATE	DPOR	PM	DES	DRW

Engineering Associates, Inc.
ENGINEERS • PLANNERS • SURVEYORS
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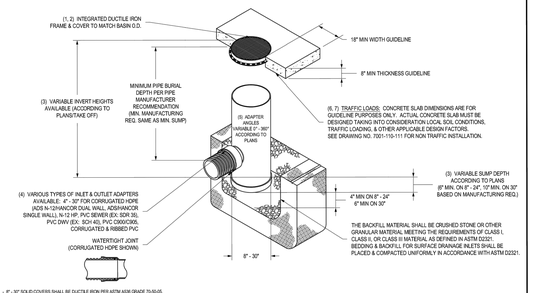
3108 SW Regency Parkway, Suite 2
Bentonville, AR 72712
(479) 273 - 9472
(479) 273-0844

THE BROADWAY GROUP, LLC
BUFFALO STREET
GOWANDA NY

GRADING PLAN

REV. DATE	SHEET NO.
2/17/21 REV-3	C3

NYLOPLAST DRAIN BASIN WITH SOLID COVER



1 - 8" - 30" SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - 12" - 30" FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. WEBS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), ASTM F477 FOR PVC DWV.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.
6 - 12" - 30" SOLID COVERS SHALL MEET H-20 LOAD RATING.
7 - 8" & 10" SOLID COVERS ARE RATED FOR LIGHT DUTY APPLICATIONS ONLY; NO CONCRETE COLLAR NEEDED FOR LIGHT DUTY RATING.

DRAWN BY	EBC	MATERIAL	
DATE	09-14-07		
REVISED BY	MBH	PROJECT NO./NAME	
DATE	03-11-15		
DWG SIZE	A	SCALE 1:40	SHEET 1 OF 1

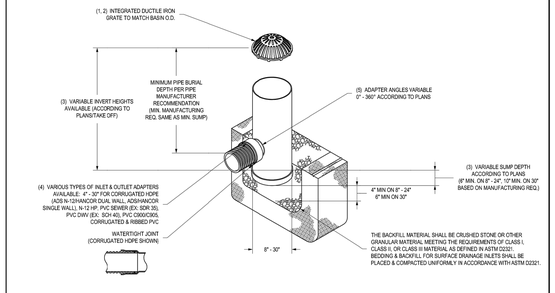
Nyloplast — 3128 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2449 www.nyloplast-us.com

TITLE: DRAIN BASIN WITH SOLID COVER QUICK SPEC INSTALLATION DETAIL

DWG NO. 7001-110-206 REV D

8001105.DWG

NYLOPLAST DRAIN BASIN WITH DOME GRATE



1 - 8" - 30" DOME GRATES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - 8" & 10" DOME GRATES FIT ONTO THE DRAIN BASINS WITH THE USE OF A 12" DOME GRATE TOP - SEE DRAWING NO. 7001-110-065.
3 - DRAIN BASINS TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. WEBS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), ASTM F477 FOR PVC DWV.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.
6 - 8" - 30" DOME GRATES HAVE NO LOAD RATING.

DRAWN BY	ESC	MATERIAL	
DATE	03-25-15		
REVISED BY	MBH	PROJECT NO./NAME	
DATE	03-11-16		
DWG SIZE	A	SCALE 1:40	SHEET 1 OF 1

Nyloplast — 3128 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2449 www.nyloplast-us.com

TITLE: DRAIN BASIN WITH DOME GRATE QUICK SPEC INSTALLATION DETAIL

DWG NO. 7001-110-207 REV D

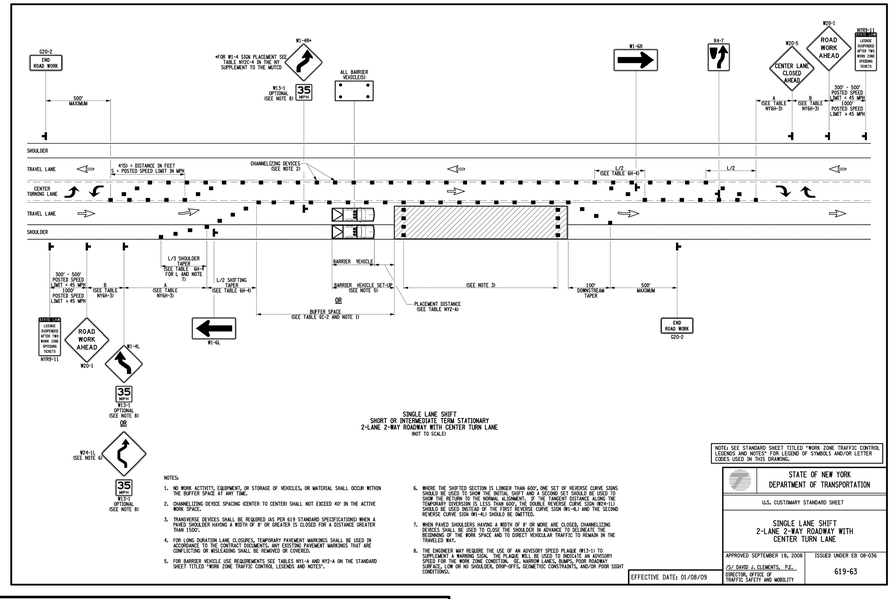
8001105.DWG

24" SOLID LID DRAIN BASIN

N.T.S. 734

24" DOME GRATE DRAIN BASIN

N.T.S. 734



SINGLE LANE SHIFT
SHORT OR INTERMEDIATE TERM STATIONARY
2-LANE 2-WAY ROADWAY WITH CENTER TURN LANE
(NOT TO SCALE)

NOTES:
1. NO WORK ACTIVITY, EQUIPMENT, OR STORAGE OF VEHICLES, OR MATERIAL SHALL OCCUR WITHIN THE BUFFER SPACE AT ANY TIME.
2. CHANNELIZING DEVICE SPACING (CENTER TO CENTER) SHALL NOT EXCEED 40' IN THE ACTIVE WORK SPACE.
3. TRANSVERSE DEVICES SHALL BE REQUIRED AS PER 619 STANDARD SPECIFICATIONS WHEN A PAVED SHOULDER HAVING A WIDTH OF 8' OR GREATER IS CLOSED FOR A DISTANCE GREATER THAN 1500'.
4. FOR LONG DURATION LANE CLOSURES, TEMPORARY PAVEMENT MARKINGS SHALL BE USED IN ACCORDANCE TO THE CONTRACT DOCUMENTS. ANY EXISTING PAVEMENT MARKINGS THAT ARE CONFLICTING OR MISLEADING SHALL BE REMOVED OR COVERED.
5. FOR BARRIER VEHICLE USE REQUIREMENTS SEE TABLES WH1-4 AND WH2-4 ON THE STANDARD SHEET TITLED "WORK ZONE TRAFFIC CONTROL LEGENDS AND NOTES".
6. WHERE THE SHIFTED SECTION IS LONGER THAN 600', ONE SET OF REVERSE CURVE SIGNS SHOULD BE USED TO SHOW THE INITIAL SHIFT AND A SECOND SET SHOULD BE USED TO SHOW THE RETURN TO THE NORMAL ALIGNMENT. FOR LONGER DISTANCE, ALONG THE TEMPORARY DIVERSION, THE SPACING OF THE DOUBLE REVERSE CURVE SIGNS SHOULD BE USED INSTEAD OF THE FIRST REVERSE CURVE SIGN (W1-4L) AND THE SECOND REVERSE CURVE SIGN (W1-4R) SHOULD BE OMITTED.
7. WHEN PAVED SHOULDERS HAVING A WIDTH OF 8' OR MORE ARE CLOSED, CHANNELIZING DEVICES SHALL BE USED TO CLOSE THE SHOULDER IN ADVANCE TO DELINEATE THE BEGINNING OF THE WORK SPACE AND TO DIRECT VEHICULAR TRAFFIC TO REMAIN IN THE TRAVELED WAY.
8. THE ENGINEER MAY REQUIRE THE USE OF AN ADVISORY SPEED PLAQUE (W13-1) TO SUPPLEMENT A WARNING SIGN. THE PLAQUE WILL BE USED TO INDICATE AN ADVISORY SPEED FOR CONDITIONS ON THE ZONE SUCH AS SHARP CURVES, LIMITED SIGHT DISTANCE, SLIPPERY SURFACE, LOW OR NO SHOULDER, DROP-OFFS, GEOMETRIC CONSTRAINTS, AND/OR POOR SIGHT CONDITIONS.

NOTES SEE STANDARD SHEET TITLED "WORK ZONE TRAFFIC CONTROL LEGENDS AND NOTES" FOR LEGEND OF SYMBOLS AND/OR LETTER CODES USED IN THIS DRAWING.

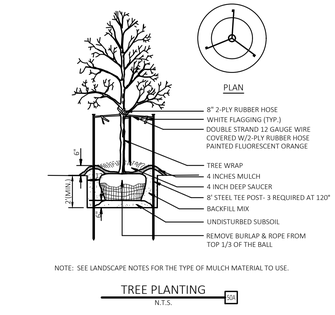
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

U.S. CUSTOMARY STANDARD SHEET

SINGLE LANE SHIFT
2-LANE 2-WAY ROADWAY WITH CENTER TURN LANE

APPROVED SEPTEMBER 19, 2008	ISSUED UNDER EB 08-036
/S/ DAVID J. CLEMENTS, P.E. DIRECTOR, OFFICE OF TRAFFIC SAFETY AND MOBILITY	619-63

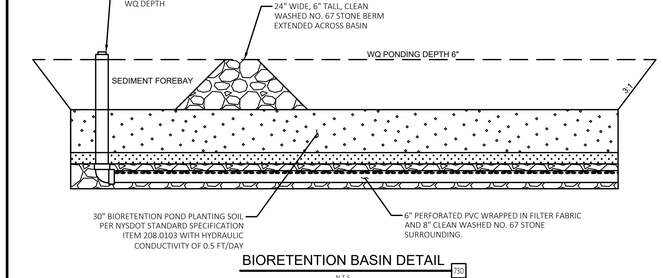
EFFECTIVE DATE: 01/08/09



NOTE: SEE LANDSCAPE NOTES FOR THE TYPE OF MULCH MATERIAL TO USE.

TREE PLANTING

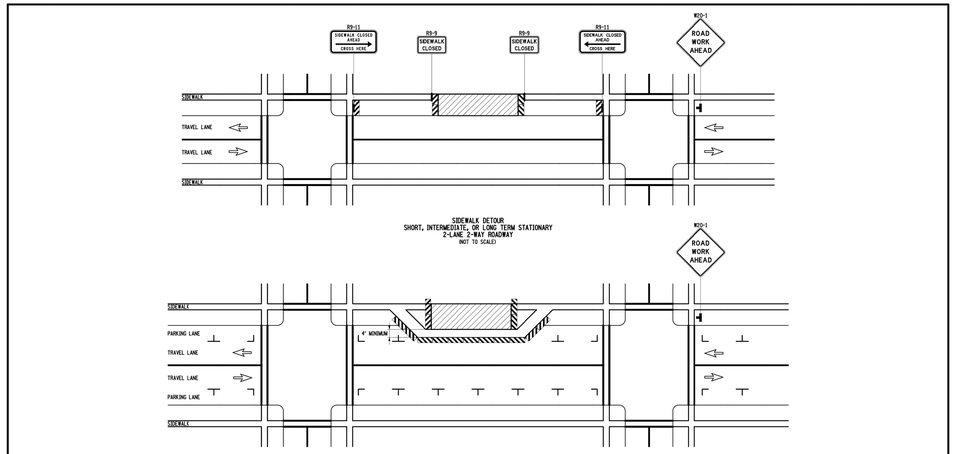
N.T.S. 50



BIORETENTION BASIN DETAIL

N.T.S. 260

NOTES:
ELEVATIONS AND DIMENSIONS PER PLAN
SEE PLAN FOR NUMBER AND LOCATION OF UNDERDRAINS AND CLEANOUTS.
SEE PLAN FOR LOCATION OF SEDIMENT FOREBAY.



NOTES:
1. WHEN CROSSWALKS OR OTHER PEDESTRIAN FACILITIES ARE CLOSED OR RELOCATED, TEMPORARY FACILITIES SHALL BE DETECTABLE AND SHALL INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING FACILITY.
2. WHERE HIGH SPEEDS ARE ANTICIPATED, A TEMPORARY TRAFFIC BARRIER AND TEMPORARY IMPACT ATTENUATOR SHOULD BE USED TO SEPARATE THE TEMPORARY SIDEWALKS FROM VEHICULAR TRAFFIC.
3. ONLY THE WORK ZONE TRAFFIC CONTROL DEVICES RELATED TO PEDESTRIANS ARE SHOWN. OTHER DEVICES, SUCH AS LANE CLOSURE SIGNING OR ROAD NARROWS SIGNS (W5-4), MAY BE USED TO CONTROL VEHICULAR TRAFFIC.
4. FOR NIGHTTIME CLOSURES, FLASHING WARNING LIGHTS SHALL BE USED ON BARRICADES SUPPORTING SIGNS AND CLOSING SIDEWALKS.
5. SIGNS SUCH AS KEEP RIGHT (LEFT) SHALL BE PLACED ALONG A TEMPORARY SIDEWALK, WHERE APPLICABLE AND ACCORDING TO AMERICAN WITH DISABILITIES STANDARDS, TO GUIDE OR DIRECT PEDESTRIANS.
6. TYPE II BARRICADES MAY BE SUBSTITUTED FOR TYPE III BARRICADES AS PER 619 STANDARD SPECIFICATIONS.

NOTE: SEE STANDARD SHEET TITLED "WORK ZONE TRAFFIC CONTROL LEGENDS AND NOTES" FOR LEGEND OF SYMBOLS AND/OR LETTER CODES USED IN THIS DRAWING.

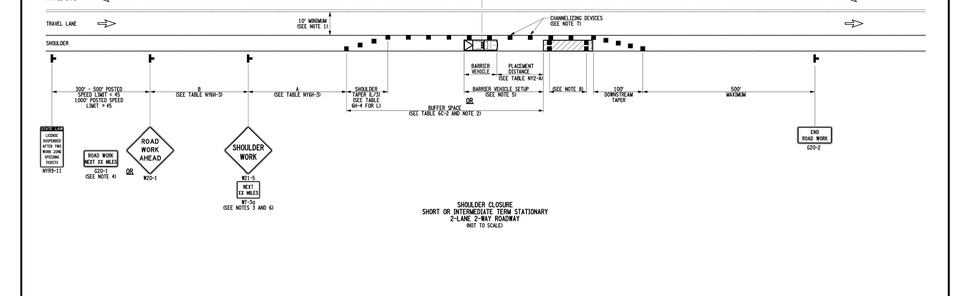
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

U.S. CUSTOMARY STANDARD SHEET

SIDEWALK DETOUR OR DIVERSION

APPROVED SEPTEMBER 15, 2009	ISSUED UNDER EB 09-025
/S/ DAVID J. CLEMENTS, P.E. DIRECTOR, OFFICE OF TRAFFIC SAFETY AND MOBILITY	619-50

EFFECTIVE DATE: 01/07/10



SHOULDER CLOSURE
SHORT OR INTERMEDIATE TERM STATIONARY
2-LANE 2-WAY ROADWAY
(NOT TO SCALE)

NOTES:
1. WHEN THE WINDOWM LANE WIDTH OF 10' CANNOT BE MAINTAINED DUE TO A SHOULDER CLOSURE, USE THE DETAIL FOR SHORT OR INTERMEDIATE TERM STATIONARY FLAGGING OPERATION.
2. NO WORK ACTIVITY OR STORAGE OF EQUIPMENT, VEHICLES, OR MATERIAL SHOULD OCCUR WITHIN A BUFFER SPACE.
3. WHEN THE DISTANCE BETWEEN THE ADVANCE WARNING SIGNS AND WORK IS 2 MILES TO 5 MILES, A SUPPLEMENTAL DISTANCE PLAQUE (W7-5D) SHOULD BE USED WITH THE SHOULDER WORK SIGN (W21-5).
4. THE ROAD WORK NEXT XX MILES SIGN (G20-1) MAY BE USED INSTEAD OF THE ROAD WORK AHEAD SIGN (W20-1) IF WORK LOCATIONS OCCUR OVER A DISTANCE OF MORE THAN 2 MILES.
5. FOR BARRIER VEHICLE USE REQUIREMENTS SEE TABLES WY1-4 AND WY2-4 ON THE STANDARD SHEET TITLED "WORK ZONE TRAFFIC CONTROL LEGENDS AND NOTES".
6. IN THOSE SITUATIONS WHERE MULTIPLE WORK LOCATIONS EXIST WITHIN A LIMITED DISTANCE MAKE IT PRACTICAL TO PLACE STATIONARY SIGNS, THE DISTANCE BETWEEN THE ADVANCE WARNING SIGN AND WORK SHALL NOT EXCEED 5 MILES.
7. CHANNELIZING DEVICE SPACING (CENTER TO CENTER) SHALL NOT EXCEED 40' IN THE ACTIVE WORK SPACE.
8. TRANSVERSE DEVICES SHALL BE REQUIRED AS PER 619 STANDARD SPECIFICATIONS WHEN A PAVED SHOULDER HAVING A WIDTH OF 8' OR GREATER IS CLOSED FOR A DISTANCE GREATER THAN 1500'.

NOTE: SEE STANDARD SHEET TITLED "WORK ZONE TRAFFIC CONTROL LEGENDS AND NOTES" FOR LEGEND OF SYMBOLS AND/OR LETTER CODES USED IN THIS DRAWING.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

U.S. CUSTOMARY STANDARD SHEET

SHOULDER CLOSURE
2-LANE 2-WAY ROADWAY

APPROVED SEPTEMBER 15, 2009	ISSUED UNDER EB 09-025
/S/ DAVID J. CLEMENTS, P.E. DIRECTOR, OFFICE OF TRAFFIC SAFETY AND MOBILITY	619-20

EFFECTIVE DATE: 01/07/10

STATE OF NEW YORK
ANDREW D. SLYTER
LICENSED PROFESSIONAL ENGINEER
098437
02/18/2021

31140	2/11/21	ADS	RKN	IVJ	IVJ
CEI PROJECT NO.	INITIAL DATE	DPOR	PM	DES	DRW

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3108 SW Regency Parkway, Suite 2
Bentonville, AR 72712
(479) 273 - 9472
(479) 273-0844

THE BROADWAY GROUP, LLC
BUFFALO STREET
GOWANDA NY

DETAIL SHEET 3

REV. DATE	SHEET NO.
2/11/21 REV-3	C8

JOB # 31140 DRAWING: 31140 CS.dwg LAST SAVED BY: IJANKUN LOCATION: P:\31000\31140.0\Drawings\Design\Rev-3\31140 CS.dwg

DRAINAGE REPORT

The Broadway Group, LLC
Village of Gowanda, NY
(Erie County)
240 & 248 Buffalo Street

Developer:
The Broadway Group, LLC
216 Westside Square
Huntsville, AL 35801
(256) 533-7287

BY:
CEI Engineering Associates, Inc.
550 Township Line Road, Suite 450
Blue Bell, PA 19422
(479) 273-9472

CEI Project No. 31140.0

July 13, 2020
Revised February 16, 2021

The Broadway Group, LLC – Village of Gowanda, NY

Introduction:

The project site is approximately 1.28 acres of undeveloped land and is located at 240 & 248 Buffalo Street, approximately 50 feet north of Bader Ave. in the Village of Gowanda, Eric County, NY.

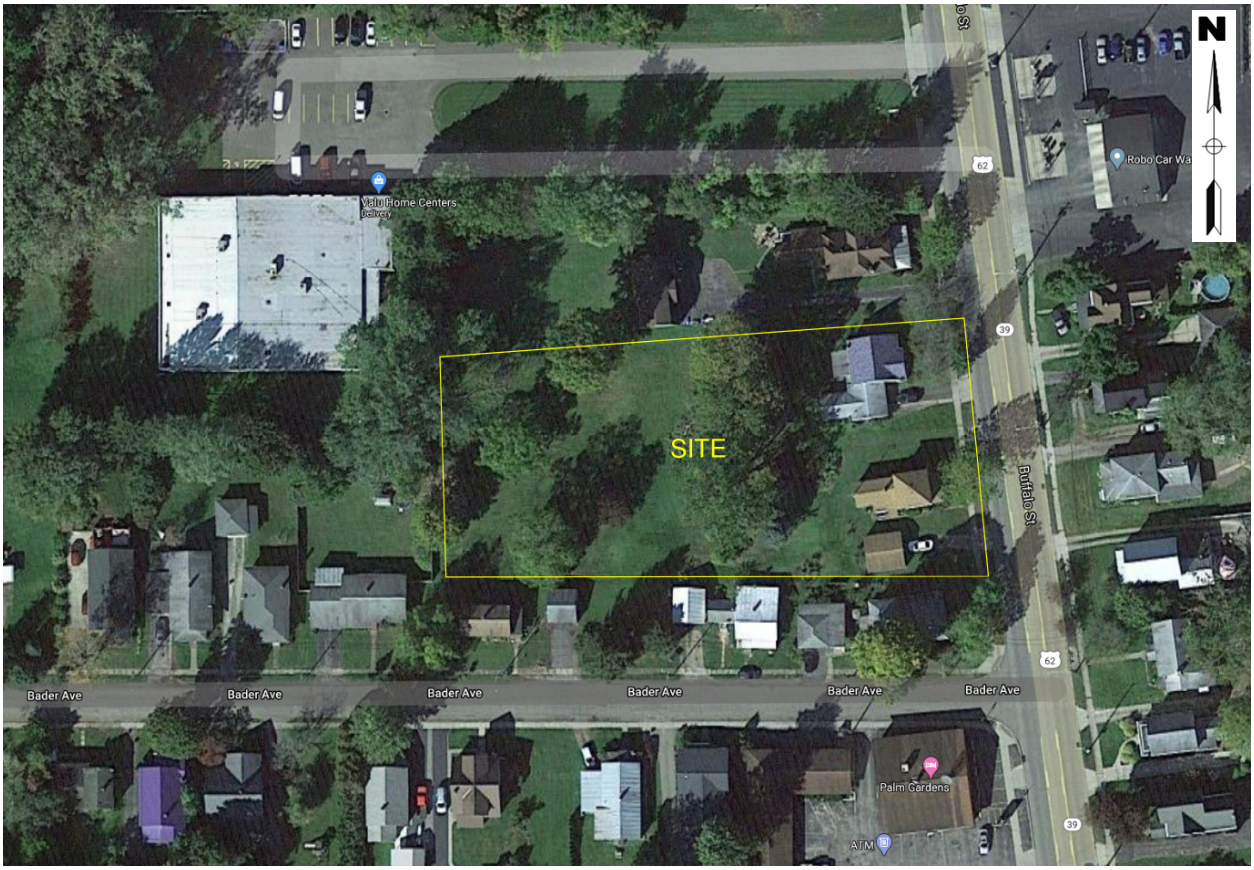


Figure 1. Location Map

This development will not increase water flow onto the roadway system. Runoff from site improvements is proposed to discharge west to proposed bioretention basins and proposed detention basin, with release from the detention basin to the west similar to existing conditions. A detention pond is proposed at the west side of the development that will reduce post-development runoff rates from the site to below existing, pre-development runoff rates, ensuring no adverse impact to the existing drainage conditions and receiving areas. In addition, bioretention ponds are proposed to provide water quality treatment of impervious surfaces per the New York State Stormwater Management Design Manual.

Background Information / Project Description:

The proposed project involves commercial development disturbing approximately 1.23 acres and generating approximately 0.73 acres of impervious surface consisting of the construction of a 1-story retail building (approx. 9,000 SF) and related parking and drive areas. The project will also include installation of an on-site above ground stormwater management ponds with related storm sewer pipes and inlets.

Construction includes bioretention and detention ponds for on-site stormwater management, located at the rear of the development. Runoff from all new impervious surfaces will be collected by proposed inlets and pipes carrying runoff to the ponds. The detention pond outlet will be to the west meeting existing site conditions. Runoff rates from the development will be below existing, pre-development, site condition runoff rates.

On-site soils primarily consist of Chenango Gravelly Loam, 3 to 8 percent slopes, poorly drained and stratified per results from the NRCS USDA Web Soils Survey search (Appendix B). Subsoils were characterized as HSG A. HSG D was the classification used conservatively for the silty gravel subbase for design of the proposed detention BMP.

A Geotechnical Engineering Report was prepared by Terracon for the site (Appendix B). The Report indicates soils on the site are Silt and Poorly Graded Sand with Silt, with Highly Weathered Siltstone below. Part of the investigation, Terracon performed infiltration testing in the area of the proposed stormwater ponds. Based upon the analysis, soils on the site have very low infiltration potential. Therefore, underdrains are proposed beneath the proposed stormwater ponds and stormwater drainage has been analyzed with no infiltration benefit from underlying soils. The Report also indicated groundwater was encountered and determined approximate elevations. The lowest elevations of the proposed stormwater management ponds are proposed to be at least 2 feet above the determined groundwater elevations.

Methodology:

Design was based on the standards set forth by the Village of Gowanda, Erie County, and New York state regulations as found in the New York State Stormwater Management Design Manual. Above ground bioretention ponds were selected for stormwater quality site BMP and a detention pond is proposed to manage the peak flows from the 1-, 2-, 10-, and 100-year, 24-hour rainfall events to less than existing conditions. The system was also designed for water quality to provide storage volumes meeting SPDES requirements as outlined in Chapter 4 of the New York State Stormwater Management Design Manual.

The soil conservation service (SCS) unit hydrograph method was employed to determine runoff and for routing of storms through the detention system. Type II (24-hr) rainfall distribution was used and data was selected from regional rainfall depths for the Village of Gowanda.

Existing Condition:
The site is currently a residential use with two houses and vegetative cover, brush and gravel drives. Stormwater runoff from the site travels overland to the southwest and west property line of the site. The site is bordered by residential properties to the south and Valu Home Center to the north, with residential to the northeast. The total property is approximately 1.28 acres.

Total Tributary Area = 1.28 ac.
Pervious Area = 1.17 ac.
Impervious Area = 0.11 ac.

Please reference Appendix A for the Drainage Plan.

Proposed Condition:
The proposed site conditions include a 1-story retail building (approx. 9,000 SF), related bituminous pavement parking and drive areas, concrete sidewalk and loading area pavement, and a landscaped perimeter to be restored with sod over the disturbance limits. All on-site impervious area is proposed to drain to the proposed bioretention basins and the detention basin. The roof runoff is collected with downspouts on the south side of the building which are connected to a bioretention basin. The detention pond outlet will be to the west meeting existing site conditions. Runoff rates from the development will be below existing, pre-development, site condition runoff rates.

Total Tributary Area = 1.28 ac.
Pervious Area = 0.55 ac.
Impervious Area = 0.73 ac.

Please reference Appendix A for the Drainage Map.

Results of Analysis:
The table below summarizes the comparison of peak discharge rates from pre-development to post-development conditions for the runoff from the total site disturbance area. No off-site area was accounted for as each adjacent property drains away from the project area.

Total Site - Peak Runoff Rates (CFS)		
Storm Event (24-hr)	Pre	Post
1-year	0.00	0.00
2-year	0.00	0.00
10-year	0.16	0.01
100-year	1.90	0.21

Channel Protection Volume:
Per the New York State Stormwater Management Design Manual, Channel Protection Volume (Cpv) is required to be the 24 hour extended detention of post-developed 1 year, 24 hour storm event, after runoff reduction. The SCS TR-55 method has been used to determine Cpv with the criteria and results shown in the following table.

CHANNEL PROTECTION VOLUME CALCULATIONS

CN	77	
Ia	0.597	Ia = 200/CN-2
P	1.99 inches	Precipitation
Ia/P	0.30	
Tc	5 minutes	
qu	950 csm/in	Ex. 4-II from TR-55
qo/qi	0.035	NYS Manual Ch. 8, Fig. 8.5
Vs/Vr	0.634925	
Q	0.66 inches	
Site Area	1.28 acres	
Vs	0.0447 ac-ft	
Vs	1,948 cubic feet	
24 hr release rate	0.02 cfs	

$Vs/Vr = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$ (from Appendix B)
Where Vs equals channel protection storage (Cp_v) and Vr equals the volume of runoff in inches.

Volume provide in the proposed stormwater management pond for 1 year 24 hour = 1,948 cf
Pond outlet orifice is above the 1 year water surface elevation, therefore the release rate for the 1 year 24 hour storm is 0 cfs.

Summary/Conclusions:

On-site drainage improvements include: collection of surface runoff in parking lot with a series of inlet structures, collection of roof runoff with a pipe connection, and an on-site above ground stormwater management ponds. These improvements will adequately convey all runoff through the site to the proposed retention / detention pond and provide runoff volume reduction and reduce post-developed runoff to less than pre-developed runoff for all design storms.

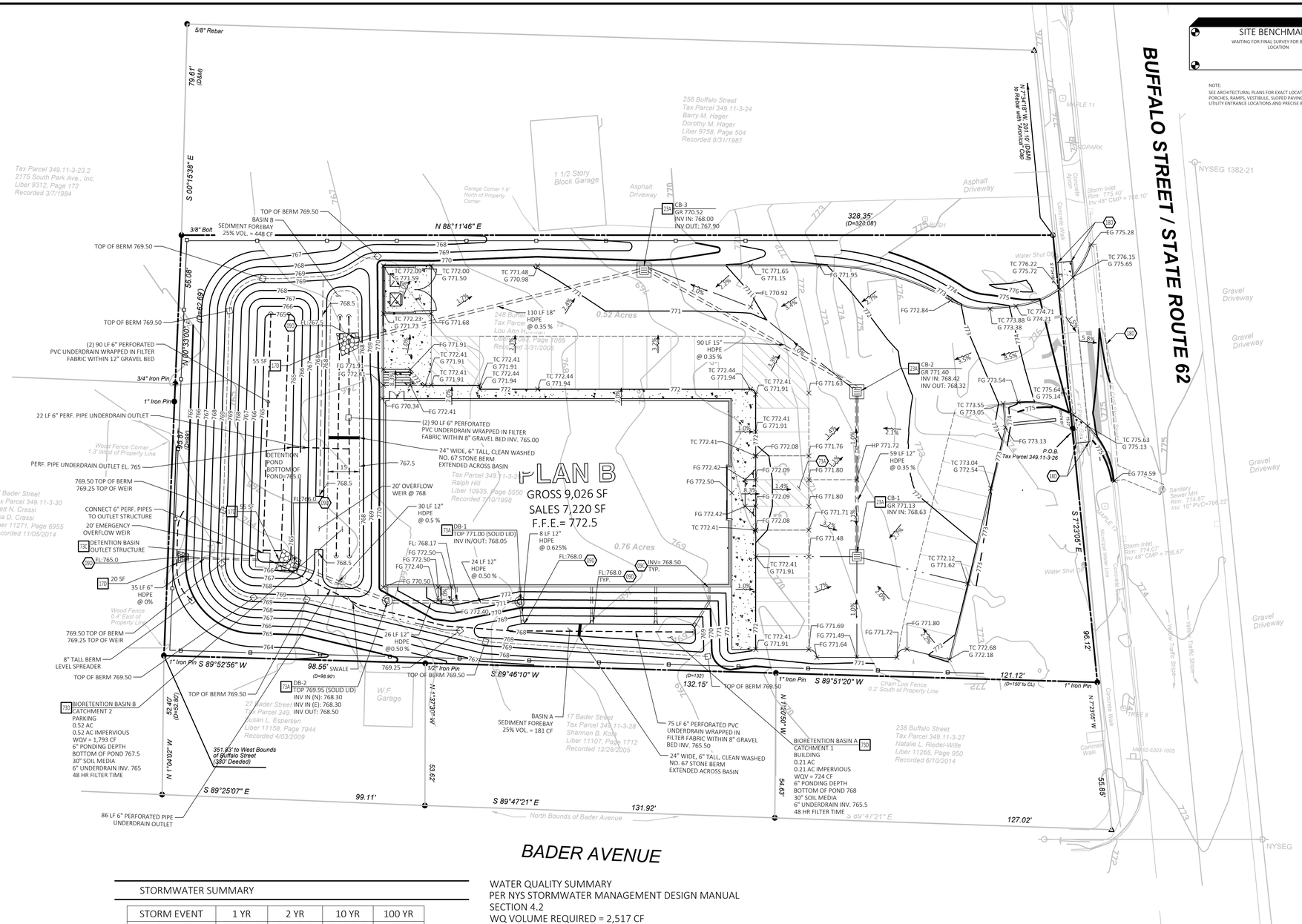
Drainage improvements as outlined in this report and depicted on the design drawings will not increase the risk of endangerment to life or have negative impacts on adjacent or downstream property or watersheds.

This drainage report has been prepared in general accordance with the current requirements of the applicable storm water jurisdictions and approving agencies. In addition, storm events/frequencies, run-off calculations, discharge criteria, pipe hydraulics, evaluation methods (including computer software applications), etc., have been based on the guidelines/requirements of these permitting entities and also reflect the application of generally accepted standard of engineering practice. This design is based on, and limited by, the weather data, the analysis and their applicability as presented herein.

Respectfully Submitted,
CEI Engineering Associates

Andrew Slyter, P.E.
Senior Project Engineer

APPENDIX A
Drainage Map



SITE BENCHMARK

WAITING FOR FINAL SURVEY FOR BENCHMARK LOCATION

NOTE:
SEE ARCHITECTURAL PLANS FOR EXACT LOCATIONS AND DIMENSIONS OF PORCHES, RAMPS, VESTIBULE, SLOPED PAVING, TRUCK DOCKS, BUILDING UTILITY ENTRANCE LOCATIONS AND PRECISE BUILDING DIMENSIONS.

811 Know what's **below.** **Call** before you dig.

N

0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- FOUND IRON STAKE
- SET 3/4" REBAR WITH CAP
- POINT OR ANGLE POINT
- WATER VALVE
- POWER POLE
- MM MILE MARKER
- P.O.B. POINT OF BEGINNING

PROPOSED

- PROPERTY LINE/RIGHT OF WAY LINE
- GRADE BREAK
- FLOW LINE
- XXX CONTOUR ELEVATIONS
- STORM DRAIN
- x XX.XX SPOT ELEVATIONS: TC = TOP OF CURB, G = GUTTER, FL = FLOW, INV = INVERT

GENERAL GRADING NOTES

A. PRIOR TO INSTALLATION OF STORM OR SANITARY SEWER, THE CONTRACTOR SHALL EXCAVATE, VERIFY, AND CALCULATE ALL CROSSINGS AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS PRIOR TO CONSTRUCTION. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT THE ENGINEER IS NOT NOTIFIED OF DESIGN CONFLICTS.

B. ALL SLOPES AND AREAS DISTURBED BY CONSTRUCTION SHALL BE GRADED SMOOTH AND 4" OF TOPSOIL APPLIED. IF ADEQUATE TOPSOIL IS NOT AVAILABLE ON SITE, THE CONTRACTOR SHALL PROVIDE TOPSOIL, APPROVED BY THE OWNER, AS NEEDED. THE AREA SHALL THEN BE SEEDED, FERTILIZED, MULCHED, WATERED AND MAINTAINED UNTIL HARDY GRASS GROWTH IS ESTABLISHED IN ALL AREAS (SEE LANDSCAPE PLAN FOR SEED MIX AND PROPER APPLICATION RATE). ANY AREAS DISTURBED FOR ANY REASON PRIOR TO FINAL ACCEPTANCE OF THE PROJECT SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

C. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES.

D. UNLESS OTHERWISE SHOWN, CALLED OUT OR SPECIFIED HEREON OR WITHIN THE SPECIFICATIONS: ALL STORM DRAIN PIPE BEDDING SHALL BE INSTALLED PER DETAIL 28A. ALL STORM DRAIN PIPES ARE MEASURED FROM CENTER OF STRUCTURES AND ENDS OF FLARED END SECTIONS.

GRADING NOTES

09C CONNECT DOWN SPOUTS TO DRAIN PIPE. (SEE ARCH. PLANS FOR EXACT NO. AND LOCATION OF DOWN SPOUTS).
09D FLARED END SECTION.
18D MATCH EXISTING PAVEMENT ELEVATIONS.
73A ADA AREA. NO MORE THAN 2% SLOPE IN ANY DIRECTION.

GRADING DETAILS

17D RIP RAP PAD
23A GRATE INLET
27E STORM DRAIN CLEAN OUT
73A SOLID LID DRAIN BASIN (NYLOPLAST)
73B DOME GRATE DRAIN BASIN (NYLOPLAST)
73C DETENTION BASIN OUTFALL STRUCTURE
73D BIORETENTION BASIN

STORMWATER SUMMARY

STORM EVENT	1 YR	2 YR	10 YR	100 YR
PRE-DEVELOPED	0.00 CFS	0.00CFS	0.16 CFS	1.90 CFS
POST-DEVELOPED	0.00 CFS	0.00 CFS	0.01 CFS	0.21 CFS
DIFFERENCE	0.00 CFS	0.00 CFS	-0.15 CFS	-1.69 CFS
POND WSE	766.53	767.02	767.87	768.64
POND VOLUME	1,948 CF	2,900 CF	6,039 CF	10,065 CF

WATER QUALITY SUMMARY
PER NYS STORMWATER MANAGEMENT DESIGN MANUAL
SECTION 4.2
WQ VOLUME REQUIRED = 2,517 CF
WQ VOLUME PROVIDED = 2,532 CF

TOP OF DETENTION BASIN = 769.50
EMERGENCY OVERFLOW WEIR = 769.25
POND VOLUME AVAILABLE = 13,838 CF (EL. 769.25)
15,496 CF (EL. 769.50)
100 YR WSE = 768.82
OUTLET ELEV = 4" ORIFICE OUTLET @ 768.25 (FOR 100 YEAR)
POND BOTTOM = 765.00

APPROXIMATE GROUNDWATER ELEVATION = 762.00

STATE OF NEW YORK ★ ANDREW D. SLYTER ★ LICENSED PROFESSIONAL ENGINEER 086379 ★ 07/15/2020

31140	7/13/20	ADS	RKN	IVJ	IVJ
CEI PROJECT NO.	INITIAL DATE	DPOR	PM	DES	DRW

Engineering Associates, Inc.
ENGINEERS • PLANNERS • SURVEYORS
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(479) 273 - 9472
(479) 273-0844

THE BROADWAY GROUP, LLC
BUFFALO STREET
GOWANDA NY

GRADING PLAN

REV. DATE	SHEET NO.
7/13/20 REV-2	C3

JOB # 31140 DRAWING: 31140-GP.dwg LAST SAVED BY: IANKUN LOCATION: P:\31000\31140.0\Drawings\Design\Rev-2\31140-GP.dwg

APPENDIX B
Web Soil Survey Results & Geotechnical Investigation Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Erie County, New York

January 25, 2019

Custom Soil Resource Report
Soil Map

Map Scale: 1:735 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Erie County, New York
Survey Area Data: Version 18, Sep 2, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Apr 17, 2017

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
CkB	Chenango gravelly loam, 3 to 8 percent slopes	2.8	100.0%
Totals for Area of Interest		**2.8**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

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

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

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

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

Erie County, New York

CkB—Chenango gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rkq
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Chenango and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chenango

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from sandstone, shale, and siltstone

Typical profile

H1 - 0 to 8 inches: gravelly loam
H2 - 8 to 30 inches: very gravelly loam
H3 - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Valois

Percent of map unit: 5 percent
Hydric soil rating: No

Allard

Percent of map unit: 5 percent
Hydric soil rating: No

Alton

Percent of map unit: 5 percent
Hydric soil rating: No

Castile

Percent of map unit: 5 percent
Hydric soil rating: No

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

Geotechnical Engineering Report

Dollar General Store
Gowanda, New York
June 5, 2020
Terracon Project No. J5195141

Prepared for:
The Broadway Group, LLC
Huntsville, Alabama

Prepared by:
Terracon Consultants-NY, Inc.
Buffalo, New York

June 5, 2020

The Broadway Group, LLC
216 West Side Square
Huntsville, Alabama 35804

Attn: Ms. Melissa Ballard, Development Manager
P: (256) 533-7287
E: Melissa.ballard@broadwaygroup.net

Re: Geotechnical Engineering Report
Dollar General Store
240 and 248 Buffalo Street
Gowanda, New York
Terracon Project No. J5195141

Dear Ms. Ballard:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. DG190099/PT2195-PJ5195141 dated July 24, 2019. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants-NY, Inc.

Zeru B. Kiffle, E.I.T.
Staff Engineer

Michele A. Fiorillo, P.E.
Geotechnical Department Manager

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

Dollar General Store
240 and 248 Buffalo Street
Gowanda, New York

Terracon Project No. J5195141

June 5, 2020

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Dollar General Store to be located at 240 and 248 Buffalo Street in Gowanda, New York. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Demolition considerations
- Excavation considerations
- Dewatering considerations
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per IBC
- Frost considerations
- Pavement design and construction
- Infiltration considerations

The geotechnical engineering Scope of Services for this project included the advancement of 5 test borings within the proposed building, 3 borings in proposed pavement areas, and 1 boring within the footprint of the stormwater management areas (SMA). The borings designated as B-1 through B-5, P-1 through P-3, and SW-1, were advanced to depths ranging from approximately 6 to 16 feet below existing site grades. Three PVC pipes were installed for infiltration testing at three locations (IT-1, IT-2 and SW-1a) located in proximity to the test boring SW-1.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The boring logs and infiltration test results are included in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at 240 and 248 Buffalo Street in Gowanda, New York. The center of the site is located at approximate latitude 42.4708° N and longitude 78.9362° W. See **Site Location**
Existing Improvements	Approximate 1.26-acre tract of residential-use property improved with two separate residential homes.  (Aerial Image from Google Earth Pro.)
Current Ground Cover	Open grass-covered and lightly- wooded lot.
Existing Topography (Based on ALTA Survey)	The site slopes down gently from eastern portion to the western portion, with ground surface elevations (El.) of approximately 764 to 776 feet (NADV 88).
Geology[1]	The project is located within the Erie Lowlands physiographic province. Geological mapping identifies surficial deposits at the project site as alluvium deposits and lacustrine silt and clay and the underlain bedrock as shale or siltstone of Machias Formation in the Upper Devonian unit age.

1. References: Fisher, D.W., Isachsen, Y.W., and Rickard, L.V., 1970, Geologic Map of New York State, consisting of 5 sheets: Niagara, Finger Lakes, Hudson-Mohawk, Adirondack, and Lower Hudson, New York State Museum and Science Service, Map and Chart Series No. 15, scale 1: 250,000.

We also collected photographs at the time of our field exploration program. Representative photos are provided in our **Photography Log**.

PROJECT DESCRIPTION

Our understanding of the project conditions is as follows:

Item	Description
Information Provided	The following information was provided to our office: ■ Preliminary Site Plan dated August 27, 2018 ■ Grading Plan (Sheet No. C3, Revision date January 01, 2019. ■ Site-Aerial ■ Civil Plans dated 1/31/2019 (3 pages) ■ Alta Survey dated 1/24/2019
Project Description	Construction of a Dollar General Store with associated paved parking and drive areas. A stormwater management area is proposed for the western quadrant of the site.
Proposed Structure	Approximate 9,026-square foot one-story building with associated paved parking and drive areas.
Building Construction	■ Steel frame ■ Reinforced concrete foundation ■ Slab-on-grade
Finished Floor Elevation (FFE)	El. 772.5 feet
Maximum Loads[1] (assumed)	■ Columns: 20 to 50 kips ■ Continuous Load-Bearing Walls: less than 3 kips per linear foot (klf) ■ Max. Uniform Slabs: less than 250 pounds per square foot (psf)
Grading/Slopes	■ The new building finished floor elevation (FFE) is expected to be at El. 772.5 feet. Existing grades within the proposed building footprint range from El. 766 to 770 feet. We anticipate up to 6 feet of earthwork fill may be required within the building footprint to attain the proposed FFE. ■ The bottom of the stormwater management area (SMA) is expected to be at El.763. Existing grades within the footprint of the SMA range from about El. 764 to 765 feet. An approximately 4-foot high berm is proposed around the SMA. Final slope angles of as steep as 3H:1V (Horizontal: Vertical) are expected.
Pavements (assumed)	Assumed traffic is as follows: ■ Car Parking: 1.54 equivalent Single Axle Loads (ESALs) per day ■ Drive Areas: 4.20 ESALs per day

1. Please contact our office if structural loads are significantly higher than the loads reported above.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name[1]	General Description
1	**Surface**	Topsoil
2	**Native Soil**	Mixtures of clay, silt, sand with gravel (CL-ML, ML, SM); brown, orange-brown to gray; soft to stiff or very loose to very dense
3	**Weathered bedrock**[2]	Highly weathered siltstone and/or shale, gray or black

1. The dimensions of the sampling equipment may preclude sampling particles larger than 2-inch in any dimension
2. Highly weathered bedrock was encountered in B-2 through B-5 and SW-1 at depths of about 7 to 13 feet below the existing grades. The drillers were able to sample and/or auger several feet within the highly weathered bedrock.

Groundwater Conditions

We monitored the boreholes for the presence and level of groundwater at completion of sampling and/or a while after completion of sampling. The groundwater levels at each exploration location can be found on the boring in **Exploration Results**. Summary of the groundwater table at the exploration locations are presented below.

Boring No.	Groundwater level at 1st observation (ft.)	Groundwater level at 2nd observation (ft)	Groundwater level at 3rd observation (while drilling) (ft.)
B-1	4.5 ft. at completion of sampling	---	---
B-2	7 ft. at completion of sampling on 5/21/20	7 ft. at 4 pm on 5/21/20	8 ft. at 9 am on 5/22/20 (after 1 day)

Boring No.	Groundwater level at 1st observation (ft.)	Groundwater level at 2nd observation (ft)	Groundwater level at 3rd observation (while drilling) (ft.)
B-3	3.5 ft. at completion of sampling on 5/21/20	4 ft. at 9 am on 5/22/20	---
B-4	6 ft. at completion of sampling on 5/21/20	6 ft. at 9 am on 5/22/20	---
B-5	13.5 ft. at completion of sampling on 5/21/20	4.5 ft. at 4 pm on 5/21/20	4.5 ft. at 9 am on 5/22/20 (after 1 day)
SW-1	4 ft. at completion of sampling	---	---

Note: Groundwater was not encountered at the time of drilling or upon completion in the remainder of the borings.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Water may also become temporarily perched over low permeability layers or bedrock. Groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

In general, the site is suitable for the proposed construction based upon geotechnical conditions encountered during the exploration program. The proposed building may be supported on shallow foundation bearing upon compacted Structural Fill placed upon stable native soil.

Fill was not encountered at the location of the borings. It should be noted that the observations are based solely upon the results of borings completed at discrete locations. If fill and soft soils are encountered during construction, this material should be removed and replaced with compacted Structural Fill within the foundation bearing zone, which is defined as the volume below 2/3 horizontal (H) to 1 vertical (V) lines extending outward and downward from the lower edges of the footing.

The **Shallow Foundations** section addresses support of the building bearing upon compacted Structural Fill placed upon stable native soil. The **Floor Slabs** section addresses slab-on-grade support of the building. The **Pavements** section addresses recommendation for support of pavement.

Filled slopes composed of compacted Structural soils should be no steeper than one (1) vertical on three (3) horizontal. To reduce erosion potential, we recommend a diversion swale at the top of the slope to prevent off-site drainage from running onto the slope. Slopes should be vegetated as soon as possible after grading and protected from erosion until vegetation is established. Erosion control matting may be required until vegetation is established. Slope planting should consist of ground vegetation that possess deep, dense root structures that require minimum irrigation. It is the responsibility of the owner to maintain such planting.

We recommend the Geotechnical Engineer be retained to evaluate soil bearing subgrades exposed after excavation to confirm they are suitable for footing, slab, or pavement support. Subsurface conditions in the explorations have been reviewed and evaluated with respect to the proposed construction plans known to us at this time.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork will include clearing and grubbing, removal of topsoil and any unsuitable soft soil, excavations, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria as necessary to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs and pavements.

Demolition

Although the borings did not encounter remains of buried structures (i.e. slabs; foundations; pavements; sidewalks; abandoned underground utilities and/or storage tanks; etc.), it is possible that such elements may be found during construction. Recommendations for buried structures are presented below:

- Existing structures and utilities (if encountered) beneath proposed foundations should be removed in their entirety; utilities relocated, if needed.
- Existing structures should be removed from proposed pavement or floor slab areas to a minimum depth of 3 feet below of the subgrade. Existing floor slabs (if left in place at a minimum depth of 3 feet below the bottom of the pavement or floor slab subgrade) should be broken up to promote drainage and minimize the potential for trapped water.
- The void created from removal of existing structure should be backfilled with approved Structural Fill placed and compacted in accordance with recommendations presented herein.
- Existing underground pipes may remain in-place if the top of the pipe is at least 2 ft below pavement subgrade or floor slab bottom and filled with Flowable Fill with a compressive strength between 100 and 200 psi.

- Existing piping/structures should be disconnected from other existing piping intended to be left in place and functioning, and properly capped prior to placing Flowable Fill.

Site Preparation

Prior to placing new fill, any vegetation, root mat, stumps, and soft soils should be removed. Complete stripping of the topsoil should be performed in the proposed building and new pavement areas.

Subgrades should be proof-rolled with a minimum 10-ton (static weight) smooth drum roller compactor. We recommend a minimum of two overlapping passes in one direction, followed by two overlapping passes in a direction perpendicular to the first set of passes. The intent is to compact areas with relatively loose surficial soil, to re-compact areas loosened by stripping operations, and to identify unacceptable subgrade areas. As an alternative, proof-rolling can also be performed with an adequately loaded vehicle such as a fully loaded tandem axle dump truck or other heavy, rubber-tired construction equipment weighing at least 20 tons.

Areas that exhibit excessive pumping, waving, or rutting during proof rolling should be scarified, dried, and recompacted, or undercut and replaced with compacted Structural Fill as recommended by the Geotechnical Engineer. Unstable subgrades, as identified by the Geotechnical Engineer, should be over-excavated from the building footprint, foundation bearing zones, and pavement areas to competent material and replaced with compacted Structural Fill. When excavation of unsuitable materials is required, it should be performed in a manner to limit disturbance of the underlying suitable material. The excavation should be performed under the observation of the Geotechnical Engineer to evaluate required excavation depths.

Fill Material Types

Fill material should meet the following material property requirements:

Type [1,2,3]	NYSDOT Item Number	Acceptable Location for Placement
General Fill	Embankment in Place, Item 203.03	For general site grading or as embankment fill where finished grade is no steeper than 3H:1V. General Fill should not be placed within the foundation bearing zone of settlement sensitive structures.
Underdrain Filter Material	Underdrain Filter Material, ■ Item No. 733-2001, Type 1 ■ Item 733-2002, Type 2	Generally used in drainage systems

Type [1,2,3]	NYSDOT Item Number	Acceptable Location for Placement
Structural Fill	Subbase Course Type 2, Item 304.12	Beneath foundations
Subgrade Fill	Select Granular Fill, Item 733-1101 (with the percent passing the No. 200 sieve adjusted to less than 25 percent)	Below Aggregate Base/Subbase Course in pavement and building areas.
Aggregate Base/ Subbase Course	Subbase Course Type 2, Item 304.12	Below floor slabs or pavements as aggregate base course
Crushed Stone	Crushed Stone, Item 703-0201	Generally used to level subgrades at the bottom of pipe trenches and to facilitate dewatering.
Non-Frost Susceptible (NFS) Fill	■ Select Granular Fill, Item 203.07 (with the percent passing the No. 200 sieve adjusted to 0-5 percent); ■ Stone Size Designation #2, 3, 3A, and 4A (Table 703-4 of NYSDOT Standard Specifications) [4]	Exterior slabs, sidewalks.
Lean Concrete	Not applicable	Lean Concrete should be self-compacting concrete with a compressive strength between 750 and 2,000 psi.
Flowable Fill	Controlled Low Strength Material (CLSM), NYSDOT Item 204.01	With a compressive strength between 100 and 200 psi.

1. Fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. Crushed Stone should be uniform ¾-inch angular Crushed Stone wrapped in a separation geotextile (Mirafi 140N, or approved equivalent).
3. NFS Fill should contain less than 5 percent material passing No. 200 sieve size and have a maximum particle size of 3 inches. NFS Fill should wrapped in a separation geotextile (Mirafi 140N, or approved equivalent).

Excavated on-site soils are anticipated to consist primarily of fine sand, silt, clay and gravel mixtures. We do not recommend reusing excavated soils as Structural Fill. It is our opinion that excavated non-organic soils (free of roots, oversized particles, large fragments of debris, and vegetation and other deleterious materials) may be suitable for reuse as General Fill to attain proposed subgrade elevation, provided material larger than 6 inches in size is removed, and that during construction proper compaction and optimum moisture content can be achieved. If construction is performed during the wet season, it is possible the moisture content of the excavated soils is in excess of the optimum moisture content required to achieve proper compaction, and that proper compaction of the on-site soils may be very difficult to achieve. Saturated soils which cannot achieve compaction should be removed or used in non-structural areas where significant post construction settlement is acceptable. The contractor is ultimately responsible for moisture conditioning of fill/backfill materials to achieve proper compaction.

Fill Compaction Requirements

Structural and General fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	12 inches or less in loose thickness when heavy, self-propelled compaction equipment is used. 6 to 8 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used.	Same as Structural fill
Minimum Compaction Requirements [1, 2, 3]	95% of maximum dry density below foundations and within 1 foot of finished pavement subgrade 92% of max. above foundations, below floor slabs, and more than 1 foot below finished pavement subgrade	85% of max.
Water Content Range [1]	Workable moisture levels	As required to achieve min. compaction requirements

Item	Structural Fill	General Fill

1. Maximum density and optimum water content as determined by the modified Proctor test (ASTM D 1557).
2. We recommend testing fill for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested, as required, until the specified moisture and compaction requirements are achieved. The zone of fill compacted to meet this criterion should extend at least 5 feet horizontally beyond the building footprint.
3. For NFS fill material (with less than 5 percent fines), compaction testing is typically not feasible. We recommend that NFS fill be thoroughly tamped in place in horizontal lifts not to exceed 6 inches loose thickness. Compaction should be by uniform passes of compaction equipment in sufficient number, but not less than four passes, such that no further consolidation is evident. The NFS fill should not be dumped into place but should be distributed in horizontal lifts by blading and dozing in such a manner as to ensure proper placement into final position.

Utility Trench Backfill

Trench excavations should be wide enough to permit construction including backfill placement and compaction. Trenches should be backfilled with material that approximately matches the permeability characteristics of the surrounding soil to reduce the infiltration and preferential conveyance of surface water through the trench backfill. Fill placed as backfill for utilities located below the slab should consist of compacted Structural Fill or suitable bedding material.

Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the building. The trench backfill should incorporate an effective trench plug that extends at least 5 feet out from the face of the building exterior. The plug material should consist of cementitious flowable fill or low permeability clay. The trench plug material should be placed to surround the utility line. If used, the clay trench plug material should be placed and compacted to comply with the water content and compaction recommendations for Structural Fill stated previously in this report.

Grading and Drainage

Grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation settlements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts discharging onto splash blocks at a distance of at least 10 feet from the buildings.

Exposed ground should be sloped and maintained at a minimum 5 percent away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After buildings construction and landscaping,

final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted as necessary as part of the structure's maintenance program. Where paving or flatwork abuts the structure a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations, for the proposed structure, should be feasible with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of foundations and floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over, or adjacent to, construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted, prior to floor slab construction.

The groundwater table could affect over-excavation efforts, especially for over-excavation and replacement of lower strength soils (if required). Dewatering, if required, can likely be accomplished using filtered pumps placed in sump pits filled with crushed stone. If ¾-inch crushed stone is used, a geotextile separation fabric (Mirafi 140N, or approved equivalent) should be placed between the crushed stone and on-site soil.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed OSHA guidelines. OSHA guidelines are strictly enforced and if they are not followed, the owner, contractor, and/or earthwork and utility subcontractor could be liable and subject to substantial penalties.

The contractor must evaluate soil conditions during excavations since variations in the soil can occur across the site. We recommend that the excavations be monitored continuously for signs of deterioration such as seepage of water or sloughing of soil into the excavation. Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information and recommendations provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of unsuitable fill, proofrolling and mitigation of areas delineated by the proof-roll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. One density and water content test for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

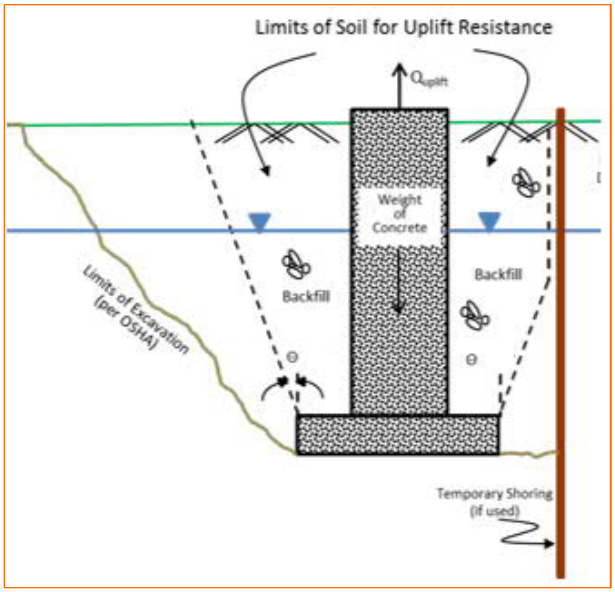
Item	Description
Maximum Net Allowable Bearing Pressure [1, 2]	2,500 psf
Required Bearing Stratum [3]	Minimum 18 inches compacted Structural Fill placed upon stable proofrolled/compacted stable subgrades The Structural Fill should be placed in two, 9-inch thick compacted lifts, and should extend a minimum lateral distance of 18 inches from the edge of the foundations.
Minimum Foundation Dimensions	Columns: 30 inches Continuous: 18 inches
Ultimate Passive Resistance [4] **(equivalent fluid pressures)**	390 pcf (compacted Structural Fill)

Item	Description
Ultimate Coefficient of Sliding Friction [5]	0.50 (Footing on compacted Structural Fill)
Minimum Embedment below Finished Grade [6]	Exterior footings in unheated areas: 48 inches Exterior footings in heated areas: 48 inches Interior footings in heated areas: 18 inches
Estimated Total Settlement from Structural Loads [2]	Less than about 1 inch
Estimated Differential Settlement [2, 7]	About 2/3 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the **Earthwork**.
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted Structural Fill be placed against the vertical footing face. The Structural Fill must extend out and up from the base of the foundation at an angle of at least 60 degrees from vertical for the passive case.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. Differential settlements are as measured over a span of 50 feet.

Design Parameters - Uplift Loads

Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils. As illustrated on the subsequent figure, the effective weight of the soil prism defined by diagonal planes extending up from the top of the perimeter of the foundation to the ground surface at an angle, θ, of 20 degrees from the vertical can be included in uplift resistance. The maximum allowable uplift capacity should be taken as a sum of the effective weight of soil plus the dead weight of the foundation, divided by an appropriate factor of safety. A maximum total unit weight of 120 pcf should be used for the backfill. This unit weight should be reduced to 60 pcf for portions of the backfill or natural soils below the groundwater elevation.

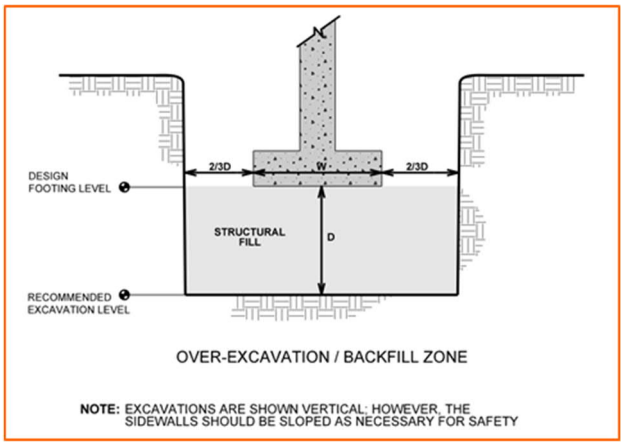


Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer. Prior to placing concrete, the base of all foundation excavations should be free of water and loose soil. Any large cobbles and/or boulders encountered beneath the proposed foundations at the bearing grade elevation should be removed from the bearing surface, as necessary to prevent hard points, and then backfilled with properly compacted Structural Fill.

Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material, or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

Over-excavation for removal of unsuitable soils below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with imported Structural Fill placed, as recommended in the **Earthwork** section.



As an alternative, if unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the over-excavation should be backfilled up to the footing base elevation footings with Lean Concrete backfill placed in the excavations. The Lean Concrete should extend a minimum lateral distance of 3 inches beyond the edges of the foundation.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil or rock properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification** is **D**. Subsurface explorations at this site were extended to a maximum depth of 16 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

FLOOR SLABS

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Special attention should be given to positive drainage away from the structure and positive drainage of the Aggregate Base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support [1]	Minimum 15 inches of Aggregate Base material compacted to at least 95% of Modified Proctor (ASTM D 1557) placed directly upon proofrolled stable on-site subgrade soils.
Estimated Modulus of Subgrade Reaction [2]	80 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade within and for at least 10 feet beyond the floor slab should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and Structural Fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel and concrete. Attention should

be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

PAVEMENTS

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs, noted in this section, must be applied to the site, which has been prepared as recommended in the **Earthwork** section.

Pavement Design Parameters

Pavement designs were based on *AASHTO Guide for Design of Pavement Structures (1993)* and our experience with similar projects. The thickness of each course is a function of subgrade strength, traffic, design life, serviceability factors, and frost susceptibility.

A subgrade CBR of 3 was used for the AC pavement designs, and a modulus of subgrade reaction of 100 pci was use for the PCC pavement designs. The values were empirically derived based upon our experience with the on-site soils and our understanding of the quality of the subgrade as prescribed by the **Site Preparation** conditions as outlined in **Earthwork**. A modulus of rupture of 600 psi was used for pavement concrete.

Pavement Section Thicknesses

Frost susceptibility is a major factor in the overall pavement section thickness. The total pavement structural sections presented in this report are based also upon the expected depth of freeze, which for the project site is anticipated at 48 inches.

Because of the fine-grained nature of the in-situ soil, and possible variations across the site of subgrade material (i.e., existing fill, native soils, and compacted Structural Fill), we recommend a separation high-strength woven geotextile (such as HP270 or approved equivalent), be placed upon all new approved flexible and rigid pavement subgrades prior to placing the subbase course materials. All underground utilities should be installed prior to geotextile placement. The geotextile will provide separation (i.e., mitigate migration of fines into the overlying subbase course material, which may contribute to its degradation and loss of strength), filtration (i.e., allow for movement of water across the plane of the geotextile with limited soil loss), confinement (i.e., restrain lateral movement of the aggregate), and reinforcement.

The following tables provide options for Asphaltic Concrete and for Portland Cement Sections:

Asphaltic Concrete Design		
Layer	**Thickness (inches)**	
	Light Duty [1]	**Heavy Duty** [1]
Asphalt Top Course [2]	1.5	1.5
Asphalt Binder Course [2]	2.5	3.5
Aggregate Base Course [2]	12.0	12.0

1. See **Project Description** for more specifics regarding pavement type.
2. All materials should meet the current NYSDOT Department of Transportation (NYSDOT) Standard Specifications.
   - Asphalt Top Course – NYSDOT Section 402 for Type 12.5 F2 Top Course HMA, Item No. 402.127202
   - Asphalt Binder Course – NYSDOT Section 402 for Type 19 F9 Binder Course HMA, Item No. 402.197902
   - Aggregate Base Course – NYSDOT Section 304 for Type 2 Subbase Course, Item No. 304.12

Portland Cement Concrete Design		
Layer	**Thickness (inches)**	
	Light Duty [2,3]	**Heavy Duty** [2,3,4]
PCC [1]	6.0	8.0
Aggregate Base [1]	12.0	12.0

1. All materials should meet the current State, County, and City Department of Transportation (NYSDOT) Standard Specifications for Highway and Bridge Construction.
   - Concrete Pavement, NYSDOT Portland Cement Concrete Section 502, with a minimum compressive strength of 4,000 psi at 28 days.
   - Aggregate Base Course, NYSDOT Section 304 for Type 2 Subbase Course, Item No. 304.12
2. Proper joint spacing will be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer.
3. Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its "green" state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.
4. In areas of anticipated heavy traffic, fire trucks, delivery trucks, or concentrated loads (e.g. dumpster pads), and areas with repeated turning or maneuvering of heavy vehicles.

The estimated pavement sections provided in this report are minimums for the assumed design criteria, and as such, periodic maintenance should be expected. Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles. A maintenance program that includes surface sealing, joint cleaning and sealing, and timely repair of cracks and deteriorated areas will increase the pavement's service life. As an option, thicker sections could be constructed to decrease future maintenance.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase. Subdrains (if any) should be sloped to provide positive gravity drainage to reliable discharge points. Periodic maintenance of subdrains is required for long-term proper performance.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. This is especially applicable for islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils. The civil design for the pavements with these conditions should include features to restrict or to collect and discharge excess water from the islands. Examples of features are edge drains connected to the storm water collection system, longitudinal subdrains, or other suitable outlet and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%
- Subgrade and pavement surfaces should be properly sloped to promote proper surface drainage
- Drainage systems should be installed below pavements where surrounding areas are anticipated to be wet frequently
- Joint sealant and seal cracks should be installed immediately
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils

STORMWATER MANAGEMENT

We understand that a stormwater management area is proposed at the site. Soil samples recovered from boring SW-1 were observed by our geologist for redoximorphic features to estimate the seasonal high-water table level in the vicinity of the proposed stormwater management area. Redoximorphic features (a gray or bluish-gray colored soil matrix) and mottling are formed by the process of reduction, translocation, and/or oxidation of iron and manganese oxides as the water table fluctuates. A soil layer exhibiting redoximorphic features can be representative of the seasonal high-water table level. Based on our observations during sampling, possible redoximorphic features were observed beginning at a depth of approximately 3 to 4 feet below existing grades. This observation, combined with groundwater measured at a depth of approximately 4 feet deep, indicates that the seasonal high-water table in the vicinity of boring SW-1 is at approximately 3 feet below existing grades.

Three PVC pipes were installed for infiltration testing (IT-1, IT-2 and SW-1a) in proximity test boring SW-1 for infiltration testing. Infiltration testing results are included in the **Exploration Results** section.

FROST CONSIDERATIONS

The soils on this site are frost susceptible, and small amounts of water can affect the performance of the slabs on-grade, sidewalks, and pavements. Exterior slabs should be anticipated to heave during winter months. If frost action needs to be eliminated in critical areas, we recommend the use of non-frost susceptible (NFS) fill or structural slabs (for instance, structural stoops in front of building doors). Placement of NFS material in large areas may not be feasible; however, the following recommendations are provided to help reduce potential frost heave:

- Provide surface drainage away from the building and slabs, and toward the site storm drainage system.
- Install drains around the perimeter of the building, stoops, below exterior slabs, and connect them to the storm drainage system.
- Grade clayey subgrades, so groundwater potentially perched in overlying more permeable subgrades, such as sand or aggregate base, slope toward a site drainage system.
- Place NFS fill as backfill beneath slabs and pavements critical to the project.
- Place a 3 horizontal to 1 vertical (3H:1V) transition zone between NFS fill and other soils.
- Place NFS materials in critical sidewalk areas.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing.

Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

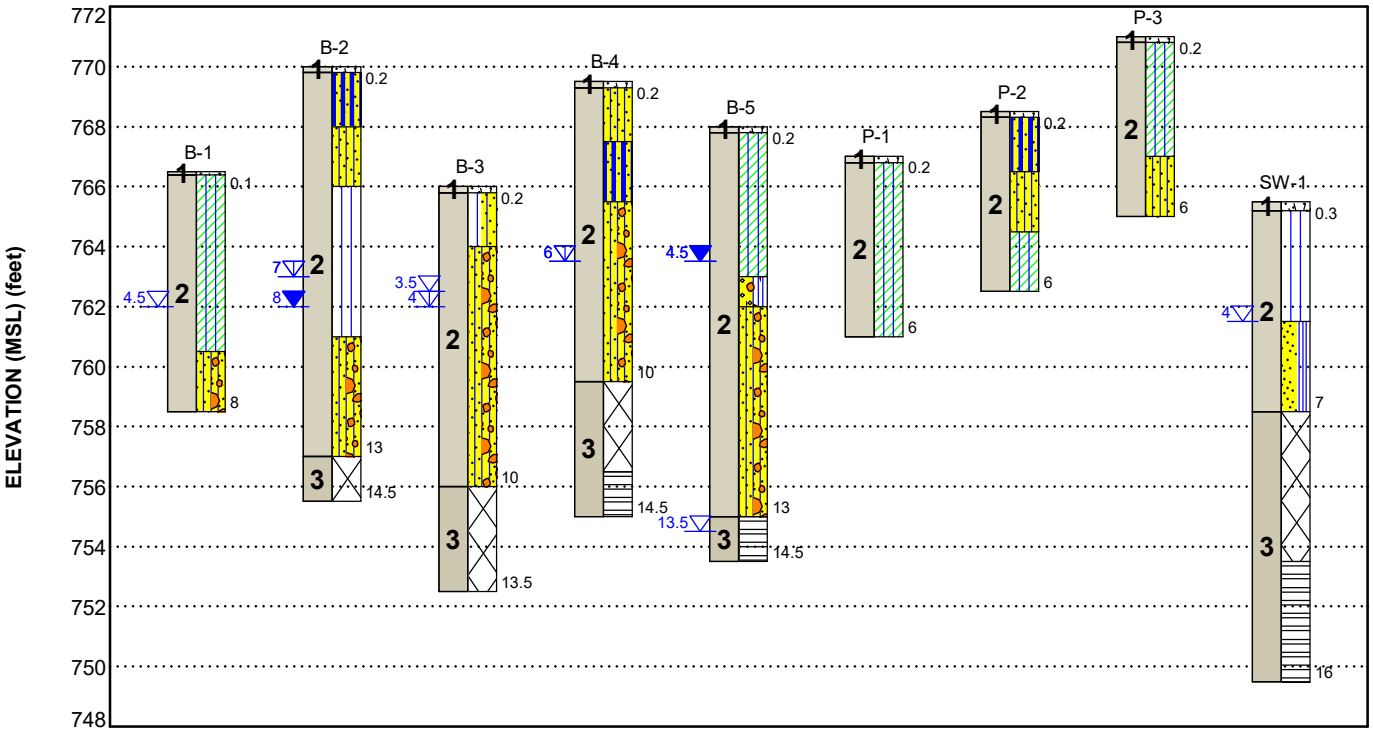
FIGURES

Contents:

GEOMODEL

Dollar General Store ■ Gowanda, NY
Terracon Project No. J5195141

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surface	Topsoil
2	Native Soil	Mixtures of clay, silt, sand with gravel (CL-ML, ML, SM); brown, orange-brown to gray; soft to stiff or very loose to very dense
3	Weathered bedrock	Highly weathered siltstone and/or shale, gray or black

LEGEND

- Topsoil
- Silty Clay
- Silty Sand with Gravel
- Sandy Silt
- Silty Sand
- Silt
- Weathered Rock
- Silt with Sand
- Highly Weathered Shale
- Well-graded Sand with Silt and Gravel
- Poorly-graded Sand with Silt

- First Water Observation
- Second Water Observation
- Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Explorations	Depth (feet)	Location
4 borings (B-1 through B-4)	8 to 14.5	Proposed building corners
1 boring (B-5)	14.5	Proposed building center
3 borings (P-1 through P-3)	6	Pavement Area
1 boring (SW-1)	16	Stormwater Management Area

Boring Layout and Elevations: Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±20 feet) and approximate elevations were obtained from the ALTA Survey plan provided by The Broadway Group. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drill rig using continuous hollow stem flight augers. Soil sampling was completed using a split-spoon sampler, as indicated in the boring logs. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the middle 12 inches of a normal 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Infiltration Testing

Three PVC pipes were installed for infiltration testing (IT-1, IT-2 and SW-1a) in proximity to SW-1 at depths ranging from approximately 3.5 to 5 feet below the existing surface. The infiltration test at each location was performed in general accordance with NYDEC Stormwater Management Design Manual - Appendix D. Infiltration Testing Requirements. The infiltration testing was performed as follow:

- Upon reaching the planned boring depth, a solid, 4-inch diameter PVC pipe was firmly seated into the bottom of the borehole.
- The pipe was filled with water to a depth of 24 inches above the bottom of the borehole and allowed to pre-soak for 24 hours to simulate saturated conditions.
- After 24 hours, water was added to the casing, as necessary, to bring the water level to a depth of 24 inches above the bottom of the borehole and the drop in the water level was monitored and measured after 1 hour.
- The monitoring process was repeated a total of four times.

Upon completion of the field testing, the pipes were removed, and the boreholes were backfilled with the soil cuttings. Infiltration test results are included in the **Exploration Results** section.

Photo 1: Facing west from eastern portion of site (between the existing homes)

Photo 2: Facing south from the northwestern corner of the site

Photo 3: Facing southeast from the northwestern corner of the site

Photo 4: Facing northwest from the eastern edge of the site (between the existing homes)

Photo 5: Facing east from the northwestern corner of the site

Photo 6: Facing southwest from the eastern edge of the site (between the existing homes)

SITE LOCATION AND EXPLORATION PLANS

Contents:

Note: All attachments are one page unless noted above.

SITE LOCATION

Dollar General ■ Gowanda, NY
Terracon Project No. J5195141

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: GOWANDA, NY (1/1/1976).

EXPLORATION PLAN WITH AERIAL IMAGE

Dollar General ■ Gowanda, NY

Terracon Project No. J5195141

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN WITH PROJECT OVERLAY

Dollar General ■ Gowanda, NY

Terracon Project No. J5195141

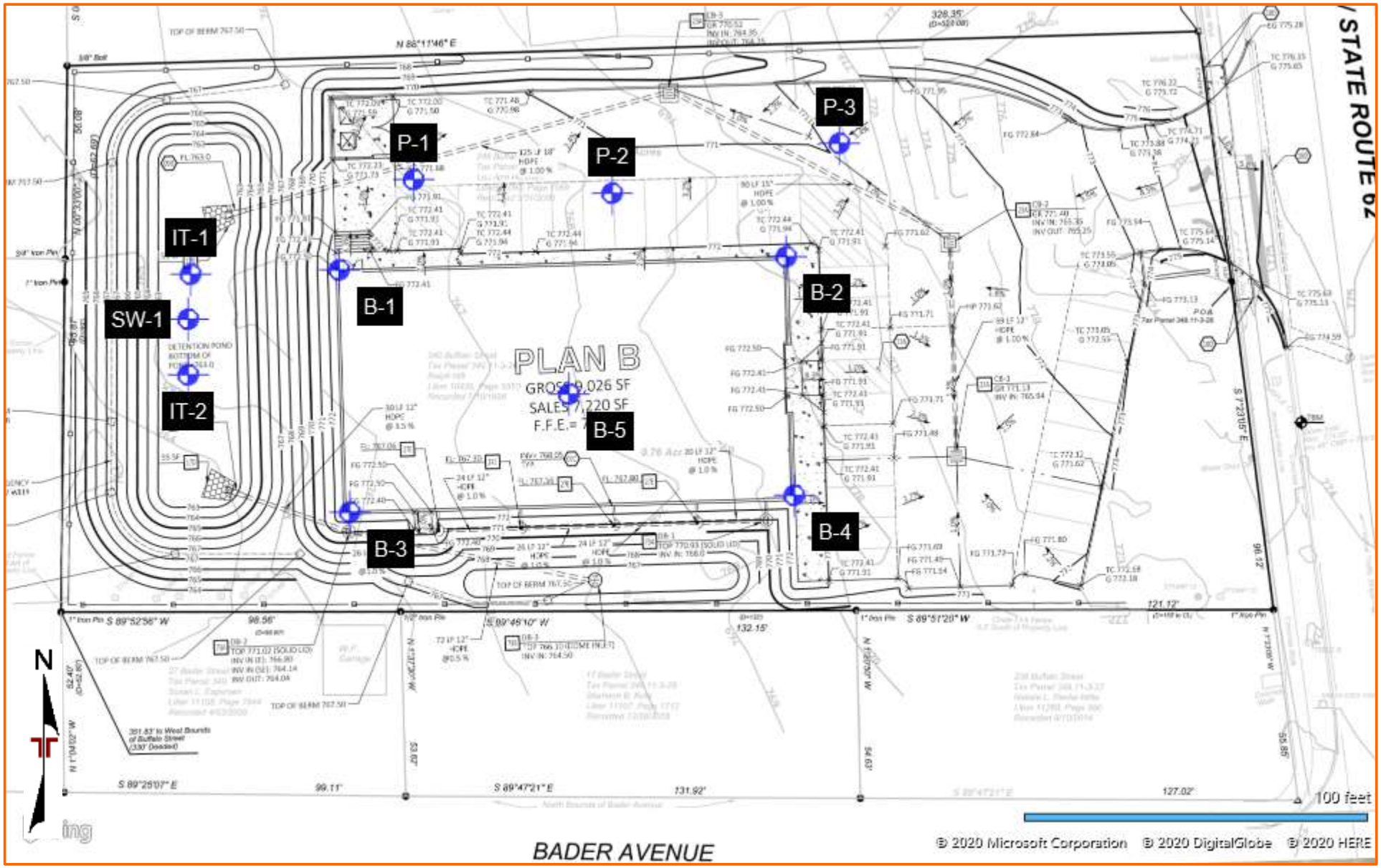


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (9 pages)
Infiltration Test Results

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.4709° Longitude: -78.9364°

Approximate Surface Elev.: 766.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1		0.1	766.5+/-					
			TOPSOIL					
			SILTY CLAY (CL-ML), trace sand, orange-brown, soft				12	1-2-1-3 N=3
			Becomes orange-brown and gray, stiff				13	2-5-6-7 N=11
2			Becomes medium stiff	5	▽		11	3-2-2-1 N=4
		6.0	760.5+/-					
			SILTY SAND WITH GRAVEL (SM), numerous weathered siltstone fragments, gray, very dense				10	16-17-50/5"
		8.0	758.5+/-					
			Sample Spoon Penetration refusal encountered at 7.4' BGS. Auger Penetration Refusal encountered at 8 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

▽ *4.5' BGS at completion of sampling*

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-22-2020	Boring Completed: 05-22-2020
Drill Rig: CME-550X	Driller: B. Duffey
Project No.: J5195141	

BORING LOG NO. B-2

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.4709° Longitude: -78.9359°

Approximate Surface Elev.: 770 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1	0.2	770+/-	**TOPSOIL**					
			SANDY SILT (ML), trace clay, brown, soft				11	1-2-2-2 N=4
	2.0	768+/-						
			SILTY SAND (SM), trace clay, orange brown, loose				15	2-3-4-4 N=7
	4.0	766+/-						
2			**SILT (ML)**, trace sand, trace clay, orange brown and gray, medium stiff	5			14	1-1-3-4 N=4
			Becomes brown gray		▽		14	3-3-4-5 N=7
	9.0	761+/-			▼			
			SILTY SAND WITH GRAVEL (SM), trace siltstone fragments, brown gray, very dense				0	WOH/1.0-4-5 N=4
				10			8	10-50-50/1"
	13.0	757+/-						
3			**HIGHLY WEATHERED SILTSTONE**, gray				12	25-48-50/2"
	14.5	755.5+/-						
			Sample spoon Penetration Refusal encountered at 14.5 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:
WOH = Weight of Hammer and Rods

WATER LEVEL OBSERVATIONS

▽ *7' BGS at completion of sampling*

▽ *7' BGS at end of day*

▼ *8' BGS at 0900 on 5/22/20*

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-21-2020 | Boring Completed: 05-21-2020

Drill Rig: CME-550X | Driller: B. Duffey

Project No.: J5195141

BORING LOG NO. B-3

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.4707° Longitude: -78.9364°

Approximate Surface Elev.: 766 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1	0.2	766+/-	**TOPSOIL**					
			SILT WITH SAND (ML), trace clay, orange brown, soft				9	2-1-3-4 N=4
	2.0	764+/-						
2			**SILTY SAND WITH GRAVEL (SM)**, brown, loose to medium dense		▽		13	4-8-8-7 N=16
			saturated		▽			
				5			6	3-3-4-4 N=7
							0	2-2-2-1 N=4
			Becomes gray, contains occasional cobble fragments, very dense				2	14-50/2"
	10.0	756+/-		10				
3			**HIGHLY WEATHERED SILTSTONE**, gray				9	2-17-23-20 N=40
							2	50/4"
	13.5	752.5+/-						
			Sample spoon Penetration Refusal encountered at 13.5 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:

WATER LEVEL OBSERVATIONS

▽ *3.5' BGS at completion of sampling*

▽ *4' BGS at 0900 on 5/22/20*

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-21-2020 | Boring Completed: 05-21-2020

Drill Rig: CME-550X | Driller: B. Duffey

Project No.: J5195141

BORING LOG NO. B-4

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.4707° Longitude: -78.9359°

Approximate Surface Elev.: 769.5 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1	0.2	769.5+/-	**TOPSOIL**					
			SILTY SAND (SM), trace gravel, trace clay, orange brown, loose				15	2-2-2-2 N=4
	2.0	767.5+/-						
			SANDY SILT (ML), trace gravel, occasional clay partings, orange brown, medium stiff				14	2-3-4-5 N=7
	4.0	765.5+/-						
2			**SILTY SAND WITH GRAVEL (SM)**, trace clay, brown, loose to medium dense	5	▽		15	4-4-8-5 N=12
							7	5-5-3-3 N=8
			Becomes brown gray, very loose				7	2-1-2-2 N=3
	10.0	759.5+/-		10				
3			**HIGHLY WEATHERED SILTSTONE**, olive gray				6	4-8-8-15 N=16
	13.0	756.5+/-						
			HIGHLY WEATHERED SHALE, gray					
	14.5	755+/-					5	35-50/1"
			Sample spoon Penetration Refusal encountered at 14.5 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

▽ *6' BGS at completion of sampling*

▽ *6' BGS at 0900 on 5/22/20*

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-21-2020 | Boring Completed: 05-21-2020

Drill Rig: CME-550X | Driller: B. Duffey

Project No.: J5195141

BORING LOG NO. B-5

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.4708° Longitude: -78.9362°

Surface Elev.: 768 (Ft.)

MODEL LAYER	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1	0.2	768	**TOPSOIL**					
			SILTY CLAY (CL-ML), trace sand, brown gray, very soft				10	WOH/1.0-1-3 N=1
			Becomes orange brown, stiff				14	2-3-6-5 N=9
	5.0	763		5	▼		15	5-6-4-5 N=10
			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), brown, medium dense					
	6.0	762						
2			**SILTY SAND WITH GRAVEL (SM)**, orange brown, loose to medium dense				7	6-5-4-6 N=9
							6	3-3-2-1 N=5
			Contains occasional siltstone fragments	10			4	1-8-8-5 N=16
	13.0	755			▽			
3			**HIGHLY WEATHERED SHALE**, gray				2	50/4"
	14.5	753.5						
			Sample spoon Penetration Refusal encountered at 14.5 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:
WOH = Weight of Hammer and Rods

WATER LEVEL OBSERVATIONS

▽ *13.5' BGS at completion of sampling*

▽ *4.5' BGS at end of day*

▼ *4.5' BGS at 0900 on 5/22/20*

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-21-2020 | Boring Completed: 05-21-2020

Drill Rig: CME-550X | Driller: B. Duffey

Project No.: J5195141

BORING LOG NO. P-1

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.471° Longitude: -78.9363°

Surface Elev.: 767 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1		0.2	767					
		TOPSOIL						
2		**SILTY CLAY (CL-ML)**, trace sand, brown gray, very soft					11	1-1-1-1 N=2
		Becomes orange brown and gray, medium stiff					16	4-4-4-4 N=8
		Becomes brown gray		5			17	4-4-4-3 N=8
		6.0	761					
		Boring Terminated at 6 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

None encountered at completion of sampling

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-22-2020	Boring Completed: 05-22-2020
Drill Rig: CME-550X	Driller: B. Duffey
Project No.: J5195141	

BORING LOG NO. P-2

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.4709° Longitude: -78.9361°

Surface Elev.: 768.5 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1		0.2	768.5					
		TOPSOIL						
		SANDY SILT (ML), trace clay, brown gray, very soft					13	1-1-1-1 N=2
		2.0	766.5					
2		**SILTY SAND (SM)**, trace clay, brown gray, loose					11	3-4-4-3 N=8
		4.0	764.5					
		SILTY CLAY (CL-ML), trace sand, orange brown and gray, medium stiff		5			14	3-3-2-3 N=5
		6.0	762.5					
		Boring Terminated at 6 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:

WATER LEVEL OBSERVATIONS

None encountered at completion of sampling

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-22-2020 | Boring Completed: 05-22-2020

Drill Rig: CME-550X | Driller: B. Duffey

Project No.: J5195141

BORING LOG NO. P-3

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.471° Longitude: -78.9359°

Surface Elev.: 771 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
1		0.2	771					
		TOPSOIL						
2		**SILTY CLAY (CL-ML)**, trace sand, brown gray, soft to medium stiff					12	1-1-1-1 N=2
							17	2-3-4-4 N=7
		4.0	767					
		SILTY SAND (SM), trace clay, brown, loose		5			16	4-3-3-4 N=6
		6.0	765					
		Boring Terminated at 6 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:

WATER LEVEL OBSERVATIONS

None encountered at completion of sampling

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-21-2020 | Boring Completed: 05-21-2020

Drill Rig: CME-550X | Driller: B. Duffey

Project No.: J5195141

BORING LOG NO. SW-1

PROJECT: Dollar General Store

CLIENT: The Broadway Group LLC
Huntsville, AL

SITE: 240 and 248 Buffalo Street
Gowanda, NY

LOCATION See Exploration Plan

Latitude: 42.4708° Longitude: -78.9366°

Surface Elev.: 765.5 (Ft.)

MODEL LAYER	DEPTH	ELEVATION (Ft.)		RECOVERY (In.)	FIELD TEST RESULTS
1	0.3	765	**TOPSOIL**		
2	4.0	761.5	**SILT (ML)**, trace sand, trace clay, orange brown, soft to stiff	10	1-1-2-3 N=3
				14	5-4-5-4 N=9
	7.0	758.5	**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, fine grained, dark gray, very loose	6	2-1-1-1 N=2
3	12.0	753.5	**HIGHLY WEATHERED SILTSTONE**, with sand, gray	13	4-17-19-13 N=36
				6	13-10-12-19 N=22
				10	5-8-13-21 N=21
	16.0	749.5	**HIGHLY WEATHERED SHALE**, black	14	50-40-50/5"
				16	10-24-37-50 N=61
			Boring Terminated at 16 Feet		

DEPTH (Ft.): 5, 10, 15

WATER LEVEL OBSERVATIONS: ▽ 4' BGS at completion of sampling

SAMPLE TYPE

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from the ALTA survey plan provide by the Broadway Group.

Notes:

WATER LEVEL OBSERVATIONS

▽ *4' BGS at completion of sampling*

Terracon
15 Marway Cir, Ste 2B
Rochester, NY

Boring Started: 05-22-2020 | Boring Completed: 05-22-2020

Drill Rig: CME-550X | Driller: B. Duffey

Project No.: J5195141

INFILTRATION TEST DATA SUMMARY

Project: Dollar General - Gowanda, NY
Weather: Mostly Cloudy
Presoak Date: 5/22/20

Terracon Project No.:J5195141
Tester : Blake Pilarski
Test Date: 5/27/2020

Test Location	Test Depth (Feet)	Soil Classification	Trial Number	Water Drop (inches)	Elapsed Time (hours)	Infiltration Rate (inches/hour)
SW-1a (installed at a distance of about 5 feet from SW-1)	5.5	Silt	1	0.0	1	0.0
			2	0.2	1	0.2
			3	0.1	1	0.1
			4	0.1	1	0.1
			Average infiltration rate for the four trials was 0.1 inches per hour. Infiltration rate of the final trial was 0.1 inches per hour.			
IT-1	3.0	Silt	1	0.4	1	0.4
			2	0.4	1	0.4
			3	0.2	1	0.2
			4	0.4	1	0.4
			Average infiltration rate for the four trials was 0.4 inches per hour. Infiltration rate of the final trial was 0.3 inches per hour.			
IT-2	3.5	Silt	1	0	1	0
			2	0	1	0
			3	0	1	0
			4	0	1	0
			Average infiltration rate for the four trials was 0.00 inches per hour. Infiltration rate of the final trial was 0.00 inches per hour.			

Testing was conducted in general accordance with Appendix D of the New York State Storm Water Management Design Manual.

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
Dollar General Store ■ Gowanda, NY
Terracon Project No. J5195141

SAMPLING	WATER LEVEL	FIELD TESTS
Standard Penetration Test	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Terracon GeoReport

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

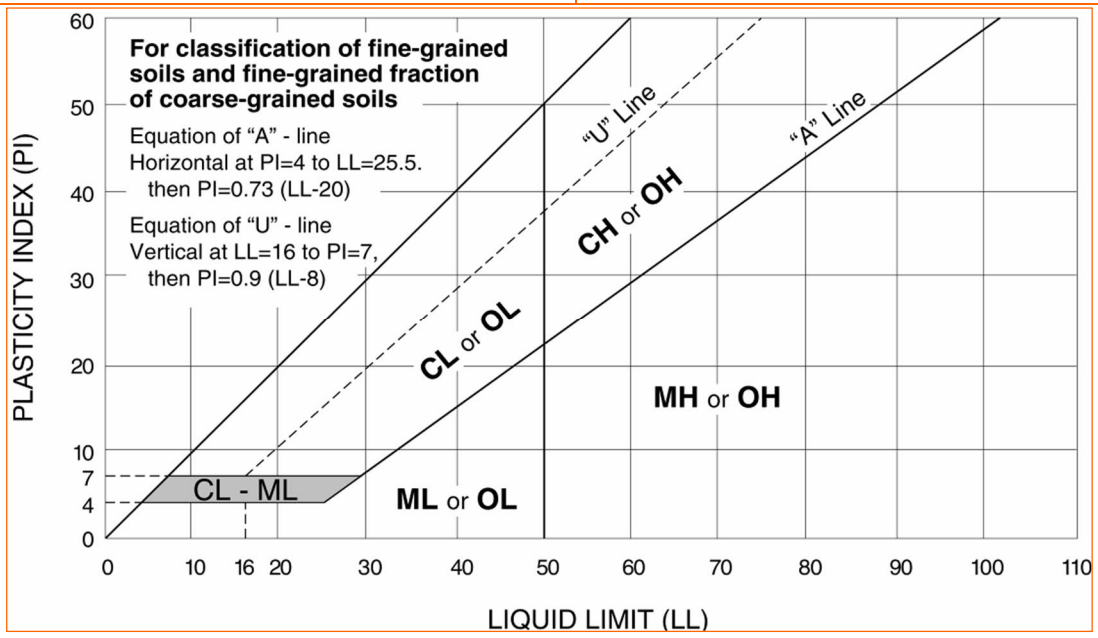
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



DESCRIPTION OF ROCK PROPERTIES

WEATHERING	
Term	**Description**
Unweathered	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.
Slightly weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than in its fresh condition.
Moderately weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as corestones.
Highly weathered	More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
Completely weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.
Residual soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported.

STRENGTH OR HARDNESS		
Description	**Field Identification**	**Uniaxial Compressive Strength, psi (MPa)**
Extremely weak	Indented by thumbnail	40-150 (0.3-1)
Very weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife	150-700 (1-5)
Weak rock	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer	700-4,000 (5-30)
Medium strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer	4,000-7,000 (30-50)
Strong rock	Specimen requires more than one blow of geological hammer to fracture it	7,000-15,000 (50-100)
Very strong	Specimen requires many blows of geological hammer to fracture it	15,000-36,000 (100-250)
Extremely strong	Specimen can only be chipped with geological hammer	>36,000 (>250)

DISCONTINUITY DESCRIPTION			
Fracture Spacing (Joints, Faults, Other Fractures)		**Bedding Spacing (May Include Foliation or Banding)**	
Description	**Spacing**	**Description**	**Spacing**
Extremely close	< ¾ in (<19 mm)	**Laminated**	< ½ in (<12 mm)
Very close	¾ in – 2-1/2 in (19 - 60 mm)	**Very thin**	½ in – 2 in (12 – 50 mm)
Close	2-1/2 in – 8 in (60 – 200 mm)	**Thin**	2 in – 1 ft. (50 – 300 mm)
Moderate	8 in – 2 ft. (200 – 600 mm)	**Medium**	1 ft. – 3 ft. (300 – 900 mm)
Wide	2 ft. – 6 ft. (600 mm – 2.0 m)	**Thick**	3 ft. – 10 ft. (900 mm – 3 m)
Very Wide	6 ft. – 20 ft. (2.0 – 6 m)	**Massive**	> 10 ft. (3 m)

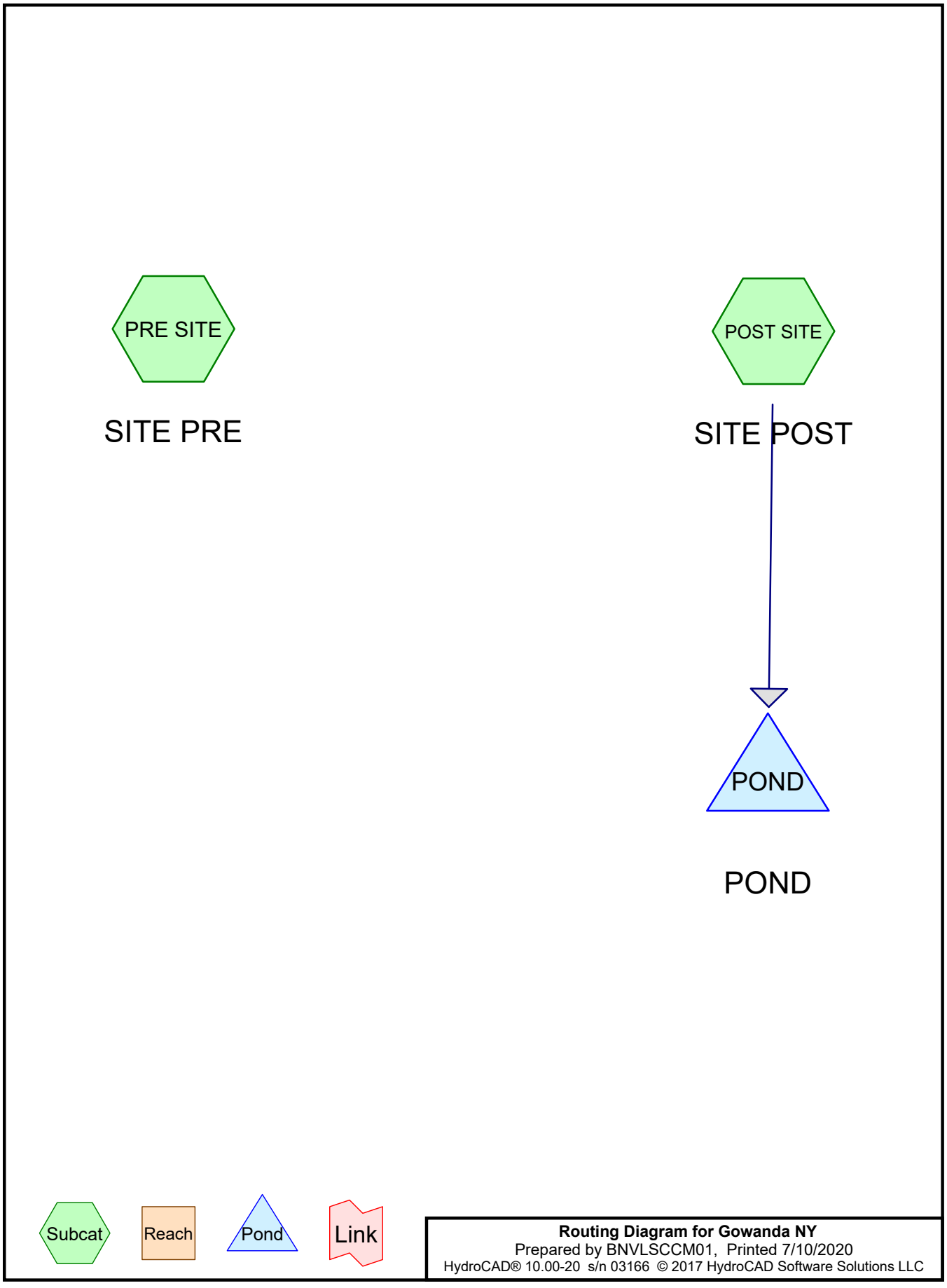
Discontinuity Orientation (Angle): Measure the angle of discontinuity relative to a plane perpendicular to the longitudinal axis of the core. (For most cases, the core axis is vertical; therefore, the plane perpendicular to the core axis is horizontal.) For example, a horizontal bedding plane would have a 0-degree angle.

ROCK QUALITY DESIGNATION (RQD) [1]	
Description	**RQD Value (%)**
Very Poor	0 - 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 - 100

1. The combined length of all sound and intact core segments equal to or greater than 4 inches in length, expressed as a percentage of the total core run length.

Reference: U.S. Department of Transportation, Federal Highway Administration, Publication No FHWA-NHI-10-034, December 2009
Technical Manual for Design and Construction of Road Tunnels – Civil Elements

APPENDIX C
HydroCAD Reports: Existing and Proposed Runoff Conditions



Routing Diagram for Gowanda NY
Prepared by BNVLSCCM01, Printed 7/10/2020

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST SITE: SITE POST Runoff Area=55,700 sf 57.09% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=77 Runoff=1.00 cfs 0.047 af

Subcatchment PRE SITE: SITE PRE Runoff Area=55,634 sf 8.99% Impervious Runoff Depth=0.01"
Flow Length=380' Slope=0.0200 '/' Tc=13.4 min CN=53 Runoff=0.00 cfs 0.001 af

Pond POND: POND Peak Elev=766.53' Storage=1,948 cf Inflow=1.00 cfs 0.047 af
Discarded=0.00 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.010 af

Summary for Subcatchment POST SITE: SITE POST

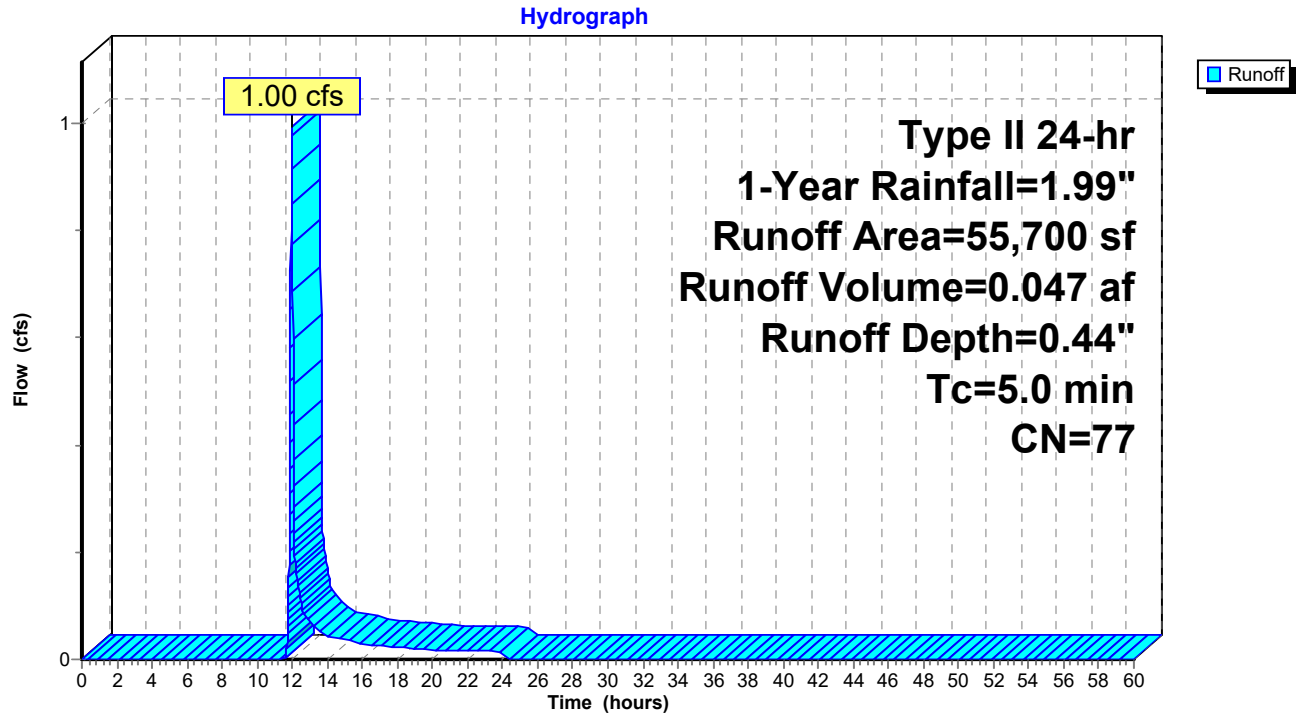
Runoff = 1.00 cfs @ 11.97 hrs, Volume= 0.047 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.99"

Area (sf)	CN	Description
31,800	98	Paved parking, HSG A
23,900	49	50-75% Grass cover, Fair, HSG A
55,700	77	Weighted Average
23,900		42.91% Pervious Area
31,800		57.09% Impervious Area

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

Subcatchment POST SITE: SITE POST



Hydrograph for Subcatchment POST SITE: SITE POST

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.02	0.00	0.00
2.00	0.04	0.00	0.00
3.00	0.07	0.00	0.00
4.00	0.10	0.00	0.00
5.00	0.13	0.00	0.00
6.00	0.16	0.00	0.00
7.00	0.20	0.00	0.00
8.00	0.24	0.00	0.00
9.00	0.29	0.00	0.00
10.00	0.36	0.00	0.00
11.00	0.47	0.00	**0.00**
12.00	1.32	0.14	**0.92**
13.00	1.54	0.22	0.07
14.00	1.63	0.27	0.04
15.00	1.70	0.30	0.04
16.00	1.75	0.32	0.03
17.00	1.79	0.34	0.03
18.00	1.83	0.36	0.02
19.00	1.87	0.38	0.02
20.00	1.89	0.39	0.02
21.00	1.92	0.41	0.02
22.00	1.94	0.42	0.02
23.00	1.97	0.43	0.02
24.00	**1.99**	**0.44**	0.02
25.00	1.99	0.44	0.00
26.00	1.99	0.44	0.00
27.00	1.99	0.44	0.00
28.00	1.99	0.44	0.00
29.00	1.99	0.44	0.00
30.00	1.99	0.44	0.00
31.00	1.99	0.44	0.00
32.00	1.99	0.44	0.00
33.00	1.99	0.44	0.00
34.00	1.99	0.44	0.00
35.00	1.99	0.44	0.00
36.00	1.99	0.44	0.00
37.00	1.99	0.44	0.00
38.00	1.99	0.44	0.00
39.00	1.99	0.44	0.00
40.00	1.99	0.44	0.00
41.00	1.99	0.44	0.00
42.00	1.99	0.44	0.00
43.00	1.99	0.44	0.00
44.00	1.99	0.44	0.00
45.00	1.99	0.44	0.00
46.00	1.99	0.44	0.00
47.00	1.99	0.44	0.00
48.00	1.99	0.44	0.00
49.00	1.99	0.44	0.00
50.00	1.99	0.44	0.00
51.00	1.99	0.44	0.00
52.00	1.99	0.44	0.00
53.00	1.99	0.44	0.00
54.00	1.99	0.44	0.00
55.00	1.99	0.44	0.00
56.00	1.99	0.44	0.00
57.00	1.99	0.44	0.00
58.00	1.99	0.44	0.00
59.00	1.99	0.44	0.00
60.00	1.99	0.44	0.00

Summary for Subcatchment PRE SITE: SITE PRE

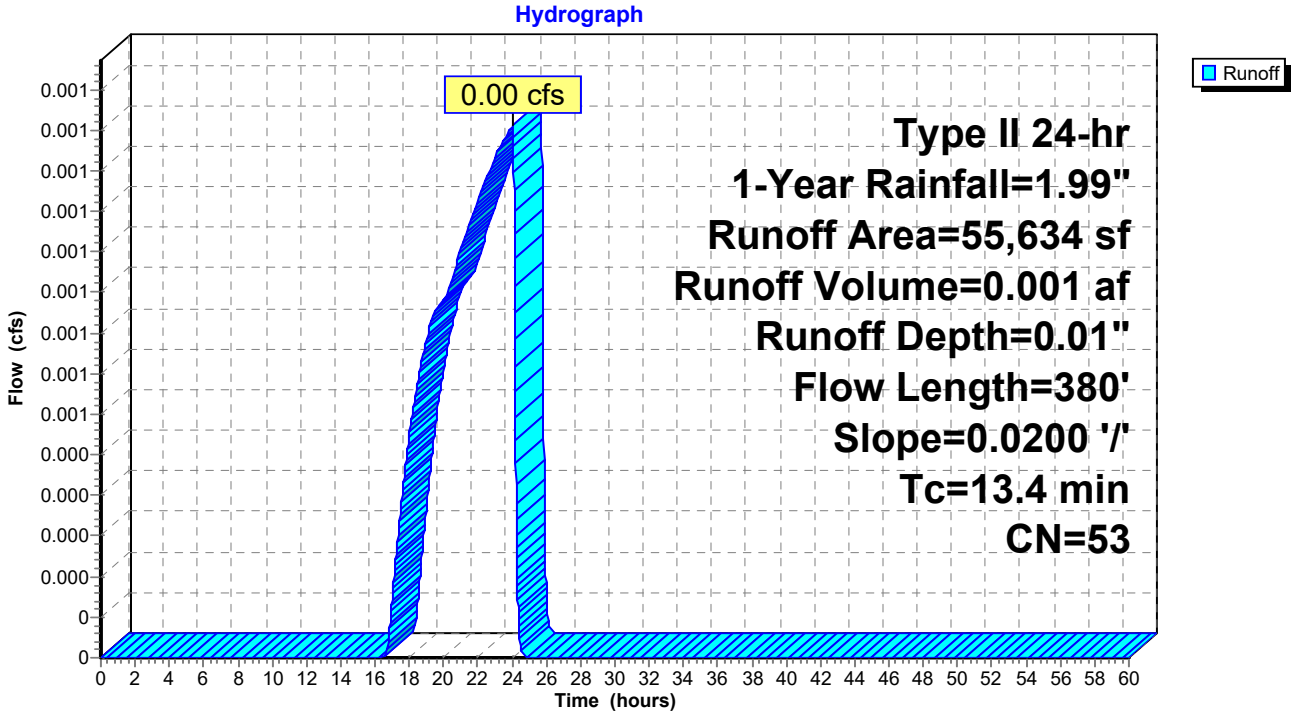
Runoff = 0.00 cfs @ 24.02 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.99"

Area (sf)	CN	Description
5,000	98	Paved parking, HSG A
50,634	49	50-75% Grass cover, Fair, HSG A
55,634	53	Weighted Average
50,634		91.01% Pervious Area
5,000		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0200	0.15		**Sheet Flow, Sheet flow grass** Grass: Short n= 0.150 P2= 2.36"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
13.4	380	Total			

Subcatchment PRE SITE: SITE PRE



Hydrograph for Subcatchment PRE SITE: SITE PRE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.02	0.00	0.00
2.00	0.04	0.00	0.00
3.00	0.07	0.00	0.00
4.00	0.10	0.00	0.00
5.00	0.13	0.00	0.00
6.00	0.16	0.00	0.00
7.00	0.20	0.00	0.00
8.00	0.24	0.00	0.00
9.00	0.29	0.00	0.00
10.00	0.36	0.00	0.00
11.00	0.47	0.00	0.00
12.00	1.32	0.00	0.00
13.00	1.54	0.00	0.00
14.00	1.63	0.00	0.00
15.00	1.70	0.00	0.00
16.00	1.75	0.00	0.00
17.00	1.79	0.00	0.00
18.00	1.83	0.00	0.00
19.00	1.87	0.00	0.00
20.00	1.89	0.00	0.00
21.00	1.92	0.00	0.00
22.00	1.94	0.00	0.00
23.00	1.97	0.00	0.00
24.00	**1.99**	**0.01**	**0.00**
25.00	1.99	0.01	**0.00**
26.00	1.99	0.01	0.00
27.00	1.99	0.01	0.00
28.00	1.99	0.01	0.00
29.00	1.99	0.01	0.00
30.00	1.99	0.01	0.00
31.00	1.99	0.01	0.00
32.00	1.99	0.01	0.00
33.00	1.99	0.01	0.00
34.00	1.99	0.01	0.00
35.00	1.99	0.01	0.00
36.00	1.99	0.01	0.00
37.00	1.99	0.01	0.00
38.00	1.99	0.01	0.00
39.00	1.99	0.01	0.00
40.00	1.99	0.01	0.00
41.00	1.99	0.01	0.00
42.00	1.99	0.01	0.00
43.00	1.99	0.01	0.00
44.00	1.99	0.01	0.00
45.00	1.99	0.01	0.00
46.00	1.99	0.01	0.00
47.00	1.99	0.01	0.00
48.00	1.99	0.01	0.00
49.00	1.99	0.01	0.00
50.00	1.99	0.01	0.00
51.00	1.99	0.01	0.00
52.00	1.99	0.01	0.00
53.00	1.99	0.01	0.00
54.00	1.99	0.01	0.00
55.00	1.99	0.01	0.00
56.00	1.99	0.01	0.00
57.00	1.99	0.01	0.00
58.00	1.99	0.01	0.00
59.00	1.99	0.01	0.00
60.00	1.99	0.01	0.00

Summary for Pond POND: POND

Inflow Area = 1.279 ac, 57.09% Impervious, Inflow Depth = 0.44" for 1-Year event
Inflow = 1.00 cfs @ 11.97 hrs, Volume= 0.047 af
Outflow = 0.00 cfs @ 24.11 hrs, Volume= 0.010 af, Atten= 100%, Lag= 727.9 min
Discarded = 0.00 cfs @ 24.11 hrs, Volume= 0.010 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 766.53' @ 24.11 hrs Surf.Area= 1,797 sf Storage= 1,948 cf

Plug-Flow detention time= 1,453.9 min calculated for 0.010 af (22% of inflow)
Center-of-Mass det. time= 1,287.7 min (2,168.8 - 881.1)

Volume	Invert	Avail.Storage	Storage Description
#1	765.00'	15,496 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

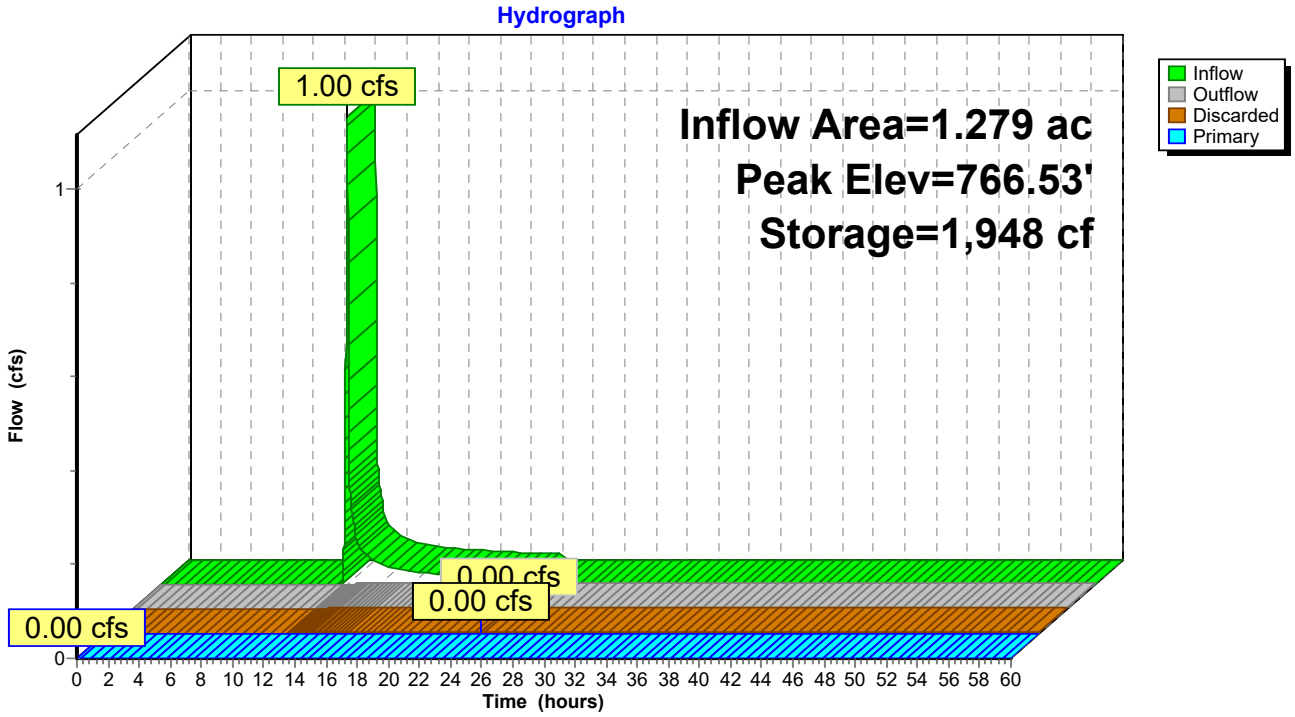
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
765.00	755	0	0
766.00	1,420	1,088	1,088
767.00	2,125	1,773	2,860
767.50	4,100	1,556	4,416
768.00	4,900	2,250	6,666
769.00	6,250	5,575	12,241
769.25	6,510	1,595	13,836
769.50	6,770	1,660	15,496

Device	Routing	Invert	Outlet Devices
#1	Discarded	765.00'	**0.050 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 762.00'
#2	Primary	768.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 24.11 hrs HW=766.53' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=765.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond POND: POND



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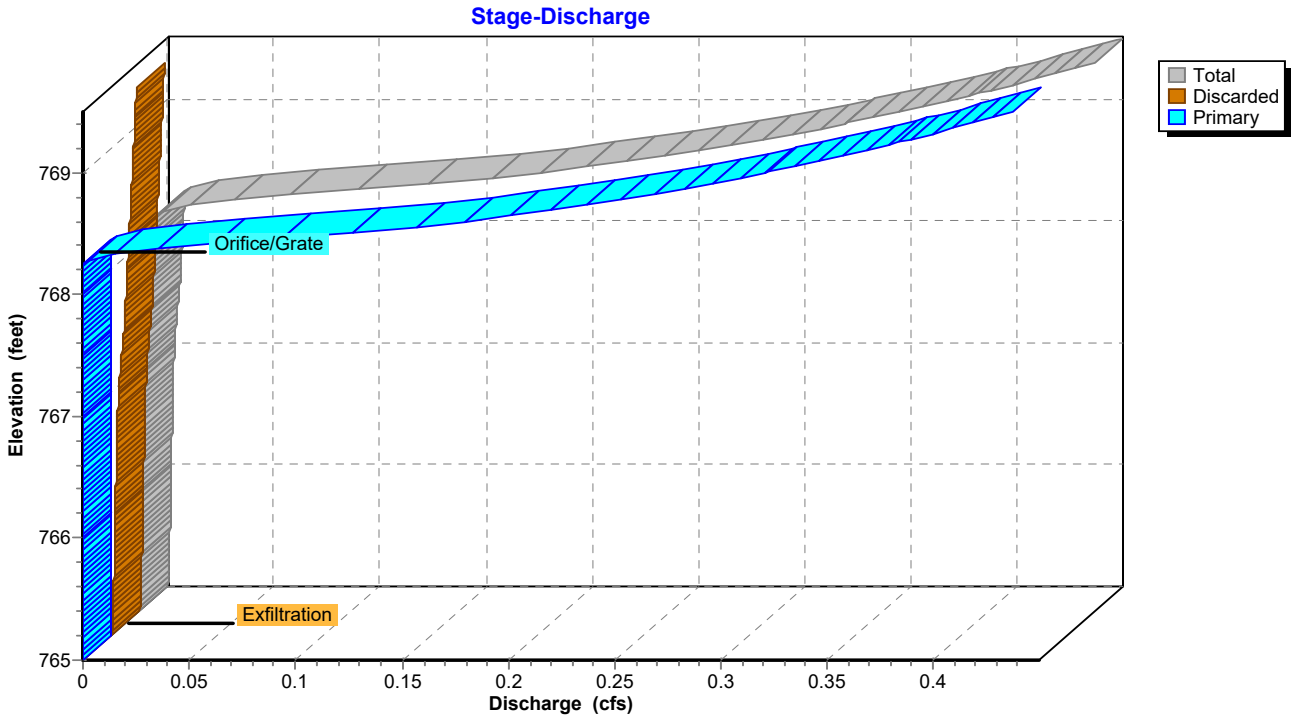
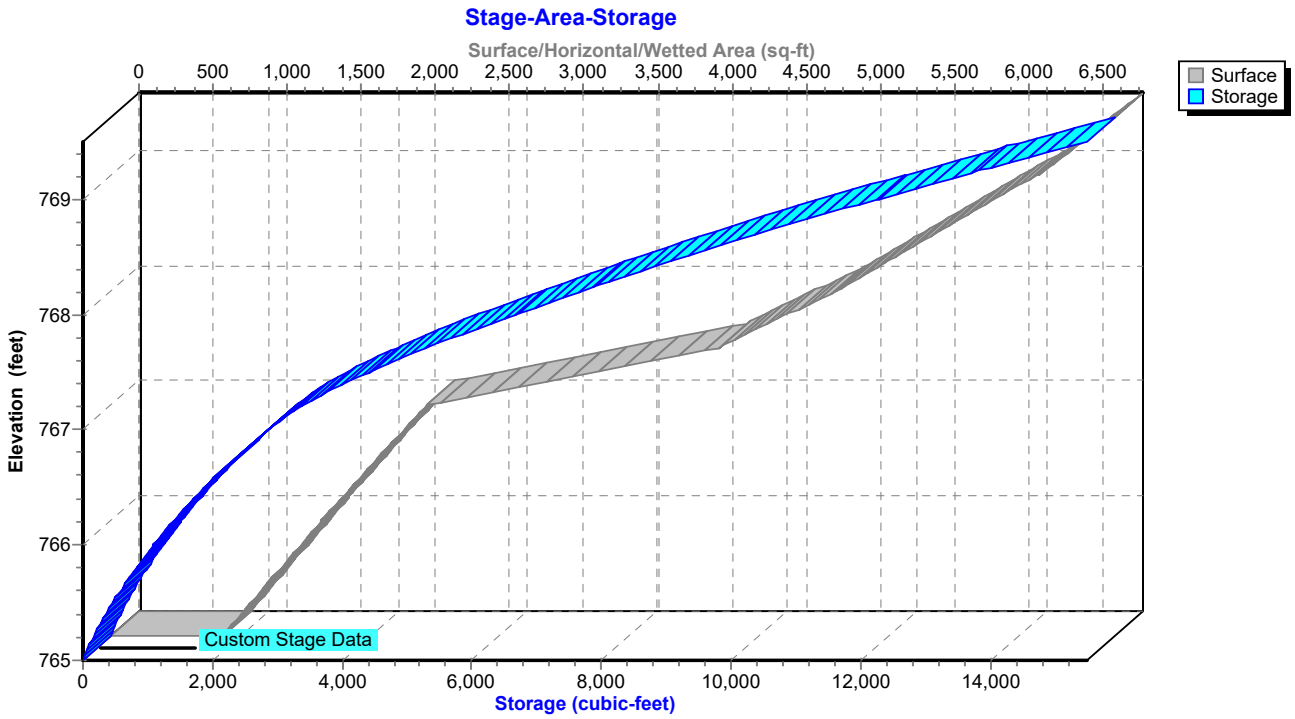


Pond POND: POND



Hydrograph for Pond POND: POND

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	765.00	0.00	0.00	**0.00**
2.00	0.00	0	765.00	0.00	0.00	0.00
4.00	0.00	0	765.00	0.00	0.00	0.00
6.00	0.00	0	765.00	0.00	0.00	0.00
8.00	0.00	0	765.00	0.00	0.00	0.00
10.00	**0.00**	0	765.00	0.00	0.00	0.00
12.00	**0.92**	461	765.50	0.00	0.00	0.00
14.00	0.04	1,208	766.08	0.00	0.00	0.00
16.00	0.03	1,453	766.24	0.00	0.00	0.00
18.00	0.02	1,622	766.35	0.00	0.00	0.00
20.00	0.02	1,751	766.42	0.00	0.00	0.00
22.00	0.02	1,852	766.48	0.00	0.00	0.00
24.00	0.02	**1,945**	**766.53**	**0.00**	**0.00**	0.00
26.00	0.00	**1,929**	**766.52**	**0.00**	**0.00**	0.00
28.00	0.00	1,909	766.51	0.00	0.00	0.00
30.00	0.00	1,889	766.50	0.00	0.00	0.00
32.00	0.00	1,870	766.49	0.00	0.00	0.00
34.00	0.00	1,850	766.48	0.00	0.00	0.00
36.00	0.00	1,831	766.47	0.00	0.00	0.00
38.00	0.00	1,812	766.46	0.00	0.00	0.00
40.00	0.00	1,792	766.45	0.00	0.00	0.00
42.00	0.00	1,773	766.44	0.00	0.00	0.00
44.00	0.00	1,754	766.42	0.00	0.00	0.00
46.00	0.00	1,736	766.41	0.00	0.00	0.00
48.00	0.00	1,717	766.40	0.00	0.00	0.00
50.00	0.00	1,698	766.39	0.00	0.00	0.00
52.00	0.00	1,680	766.38	0.00	0.00	0.00
54.00	0.00	1,661	766.37	0.00	0.00	0.00
56.00	0.00	1,643	766.36	0.00	0.00	0.00
58.00	0.00	1,625	766.35	0.00	0.00	0.00
60.00	0.00	1,607	766.34	0.00	0.00	0.00

Stage-Discharge for Pond POND: POND

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
765.00	0.00	0.00	0.00
765.05	0.00	0.00	0.00
765.10	0.00	0.00	0.00
765.15	0.00	0.00	0.00
765.20	0.00	0.00	0.00
765.25	0.00	0.00	0.00
765.30	0.00	0.00	0.00
765.35	0.00	0.00	0.00
765.40	0.00	0.00	0.00
765.45	0.00	0.00	0.00
765.50	0.00	0.00	0.00
765.55	0.00	0.00	0.00
765.60	0.00	0.00	0.00
765.65	0.00	0.00	0.00
765.70	0.00	0.00	0.00
765.75	0.00	0.00	0.00
765.80	0.00	0.00	0.00
765.85	0.00	0.00	0.00
765.90	0.00	0.00	0.00
765.95	0.00	0.00	0.00
766.00	0.00	0.00	0.00
766.05	0.00	0.00	0.00
766.10	0.00	0.00	0.00
766.15	0.00	0.00	0.00
766.20	0.00	0.00	0.00
766.25	0.00	0.00	0.00
766.30	0.00	0.00	0.00
766.35	0.00	0.00	0.00
766.40	0.00	0.00	0.00
766.45	0.00	0.00	0.00
766.50	0.00	0.00	0.00
766.55	0.00	0.00	0.00
766.60	0.00	0.00	0.00
766.65	0.00	0.00	0.00
766.70	0.00	0.00	0.00
766.75	0.00	0.00	0.00
766.80	0.00	0.00	0.00
766.85	0.00	0.00	0.00
766.90	0.00	0.00	0.00
766.95	0.00	0.00	0.00
767.00	0.00	0.00	0.00
767.05	0.00	0.00	0.00
767.10	0.00	0.00	0.00
767.15	0.00	0.00	0.00
767.20	0.00	0.00	0.00
767.25	0.00	0.00	0.00
767.30	0.01	0.01	0.00
767.35	0.01	0.01	0.00
767.40	0.01	0.01	0.00
767.45	0.01	0.01	0.00
767.50	0.01	0.01	0.00
767.55	0.01	0.01	0.00
767.60	0.01	0.01	0.00
767.65	0.01	0.01	0.00
767.70	0.01	0.01	0.00
767.75	0.01	0.01	0.00
767.80	0.01	0.01	0.00
767.85	0.01	0.01	0.00
767.90	0.01	0.01	0.00
767.95	0.01	0.01	0.00
768.00	0.01	0.01	0.00
768.05	0.01	0.01	0.00
768.10	0.01	0.01	0.00
768.15	0.01	0.01	0.00
768.20	0.01	0.01	0.00
768.25	0.01	0.01	0.00
768.30	0.01	0.01	0.01
768.35	0.03	0.01	0.02
768.40	0.06	0.01	0.05
768.45	0.09	0.01	0.08
768.50	0.13	0.01	0.12
768.55	0.16	0.01	0.15
768.60	0.19	0.01	0.18
768.65	0.21	0.01	0.20
768.70	0.23	0.01	0.22
768.75	0.25	0.01	0.24
768.80	0.27	0.01	0.26
768.85	0.29	0.01	0.28
768.90	0.30	0.01	0.29
768.95	0.32	0.01	0.31
769.00	0.33	0.01	0.32
769.05	0.35	0.01	0.33
769.10	0.36	0.01	0.35
769.15	0.37	0.01	0.36
769.20	0.38	0.01	0.37
769.25	0.39	0.01	0.38
769.30	0.41	0.01	0.39
769.35	0.42	0.01	0.41
769.40	0.43	0.01	0.42
769.45	0.44	0.01	0.43
769.50	**0.45**	**0.01**	**0.44**

Stage-Area-Storage for Pond POND: POND

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
765.00	755	0
765.05	788	39
765.10	822	79
765.15	855	121
765.20	888	164
765.25	921	210
765.30	954	256
765.35	988	305
765.40	1,021	355
765.45	1,054	407
765.50	1,088	461
765.55	1,121	516
765.60	1,154	573
765.65	1,187	631
765.70	1,221	691
765.75	1,254	753
765.80	1,287	817
765.85	1,320	882
765.90	1,353	949
765.95	1,387	1,017
766.00	1,420	1,088
766.05	1,455	1,159
766.10	1,491	1,233
766.15	1,526	1,308
766.20	1,561	1,386
766.25	1,596	1,465
766.30	1,631	1,545
766.35	1,667	1,628
766.40	1,702	1,712
766.45	1,737	1,798
766.50	1,773	1,886
766.55	1,808	1,975
766.60	1,843	2,066
766.65	1,878	2,159
766.70	1,914	2,254
766.75	1,949	2,351
766.80	1,984	2,449
766.85	2,019	2,549
766.90	2,054	2,651
766.95	2,090	2,755
767.00	2,125	2,860
767.05	2,322	2,971
767.10	2,520	3,092
767.15	2,717	3,223
767.20	2,915	3,364
767.25	3,113	3,515
767.30	3,310	3,675
767.35	3,508	3,846
767.40	3,705	4,026
767.45	3,903	4,216
767.50	4,100	4,416
767.55	4,180	4,623
767.60	4,260	4,834
767.65	4,340	5,049
767.70	4,420	5,268
767.75	4,500	5,491
767.80	4,580	5,718
767.85	4,660	5,949
767.90	4,740	6,184
767.95	4,820	6,423
768.00	4,900	6,666
768.05	4,967	6,913
768.10	5,035	7,163
768.15	5,102	7,416
768.20	5,170	7,673
768.25	5,238	7,933
768.30	5,305	8,197
768.35	5,373	8,464
768.40	5,440	8,734
768.45	5,508	9,008
768.50	5,575	9,285
768.55	5,642	9,565
768.60	5,710	9,849
768.65	5,777	10,136
768.70	5,845	10,427
768.75	5,913	10,721
768.80	5,980	11,018
768.85	6,048	11,319
768.90	6,115	11,623
768.95	6,183	11,930
769.00	6,250	12,241
769.05	6,302	12,555
769.10	6,354	12,871
769.15	6,406	13,190
769.20	6,458	13,512
769.25	6,510	13,836
769.30	6,562	14,163
769.35	6,614	14,492
769.40	6,666	14,824
769.45	6,718	15,159
769.50	**6,770**	**15,496**

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST SITE: SITE POST Runoff Area=55,700 sf 57.09% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=77 Runoff=1.52 cfs 0.070 af

Subcatchment PRE SITE: SITE PRE Runoff Area=55,634 sf 8.99% Impervious Runoff Depth=0.04"
Flow Length=380' Slope=0.0200 '/' Tc=13.4 min CN=53 Runoff=0.00 cfs 0.004 af

Pond POND: POND Peak Elev=767.02' Storage=2,900 cf Inflow=1.52 cfs 0.070 af
Discarded=0.00 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.013 af

Summary for Subcatchment POST SITE: SITE POST

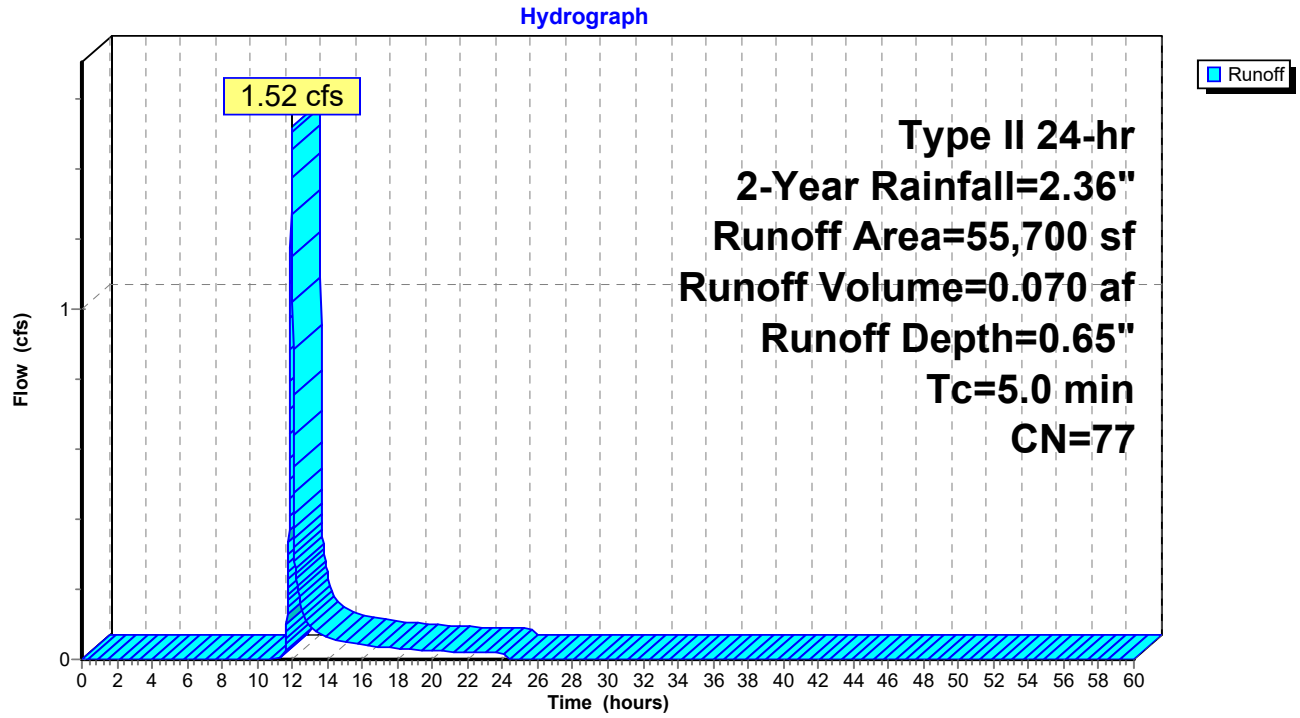
Runoff = 1.52 cfs @ 11.97 hrs, Volume= 0.070 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-Year Rainfall=2.36"

Area (sf)	CN	Description
31,800	98	Paved parking, HSG A
23,900	49	50-75% Grass cover, Fair, HSG A
55,700	77	Weighted Average
23,900		42.91% Pervious Area
31,800		57.09% Impervious Area

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

Subcatchment POST SITE: SITE POST



Hydrograph for Subcatchment POST SITE: SITE POST

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.02	0.00	0.00
2.00	0.05	0.00	0.00
3.00	0.08	0.00	0.00
4.00	0.11	0.00	0.00
5.00	0.15	0.00	0.00
6.00	0.19	0.00	0.00
7.00	0.23	0.00	0.00
8.00	0.28	0.00	0.00
9.00	0.35	0.00	0.00
10.00	0.43	0.00	0.00
11.00	0.55	0.00	**0.00**
12.00	1.56	0.24	**1.37**
13.00	1.82	0.36	0.10
14.00	1.94	0.41	0.06
15.00	2.01	0.46	0.05
16.00	2.08	0.49	0.04
17.00	2.13	0.52	0.04
18.00	2.17	0.54	0.03
19.00	2.21	0.57	0.03
20.00	2.25	0.59	0.02
21.00	2.28	0.60	0.02
22.00	2.31	0.62	0.02
23.00	2.33	0.64	0.02
24.00	**2.36**	**0.65**	0.02
25.00	2.36	0.65	0.00
26.00	2.36	0.65	0.00
27.00	2.36	0.65	0.00
28.00	2.36	0.65	0.00
29.00	2.36	0.65	0.00
30.00	2.36	0.65	0.00
31.00	2.36	0.65	0.00
32.00	2.36	0.65	0.00
33.00	2.36	0.65	0.00
34.00	2.36	0.65	0.00
35.00	2.36	0.65	0.00
36.00	2.36	0.65	0.00
37.00	2.36	0.65	0.00
38.00	2.36	0.65	0.00
39.00	2.36	0.65	0.00
40.00	2.36	0.65	0.00
41.00	2.36	0.65	0.00
42.00	2.36	0.65	0.00
43.00	2.36	0.65	0.00
44.00	2.36	0.65	0.00
45.00	2.36	0.65	0.00
46.00	2.36	0.65	0.00
47.00	2.36	0.65	0.00
48.00	2.36	0.65	0.00
49.00	2.36	0.65	0.00
50.00	2.36	0.65	0.00
51.00	2.36	0.65	0.00
52.00	2.36	0.65	0.00
53.00	2.36	0.65	0.00
54.00	2.36	0.65	0.00
55.00	2.36	0.65	0.00
56.00	2.36	0.65	0.00
57.00	2.36	0.65	0.00
58.00	2.36	0.65	0.00
59.00	2.36	0.65	0.00
60.00	2.36	0.65	0.00

Summary for Subcatchment PRE SITE: SITE PRE

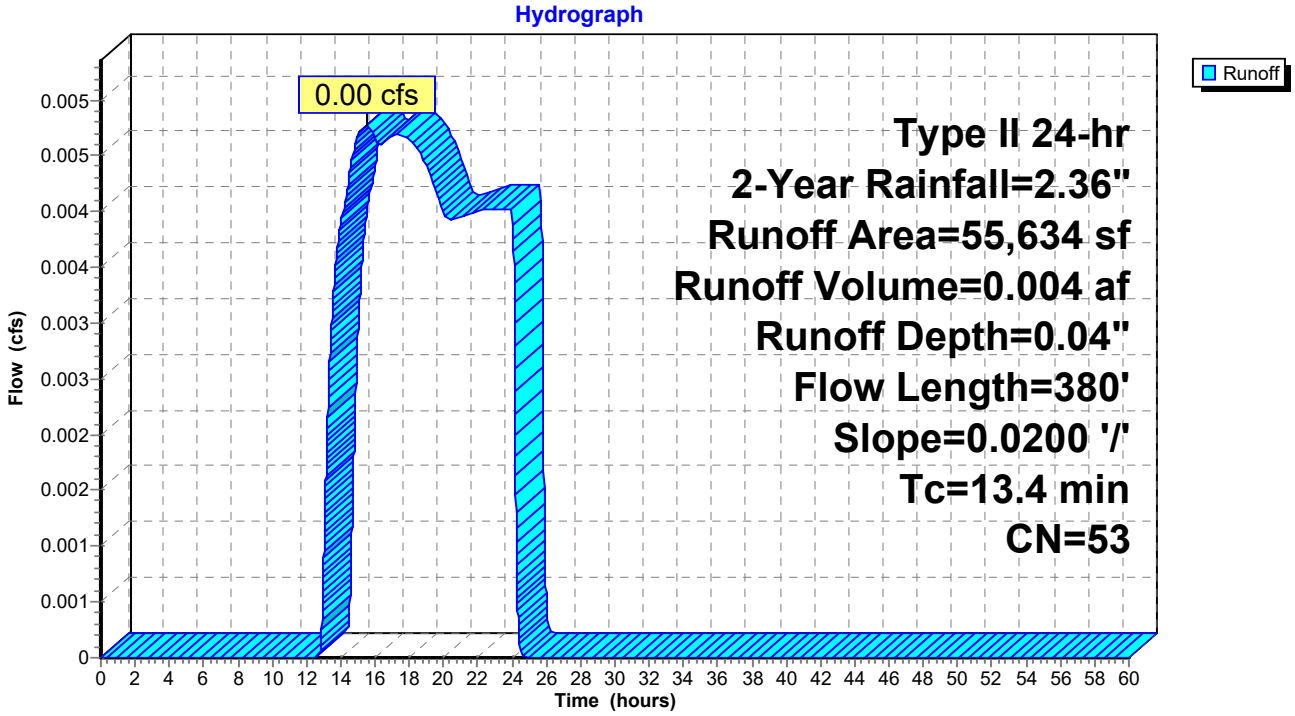
Runoff = 0.00 cfs @ 15.47 hrs, Volume= 0.004 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-Year Rainfall=2.36"

Area (sf)	CN	Description
5,000	98	Paved parking, HSG A
50,634	49	50-75% Grass cover, Fair, HSG A
55,634	53	Weighted Average
50,634		91.01% Pervious Area
5,000		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0200	0.15		**Sheet Flow, Sheet flow grass** Grass: Short n= 0.150 P2= 2.36"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
13.4	380	Total			

Subcatchment PRE SITE: SITE PRE



Hydrograph for Subcatchment PRE SITE: SITE PRE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.02	0.00	0.00
2.00	0.05	0.00	0.00
3.00	0.08	0.00	0.00
4.00	0.11	0.00	0.00
5.00	0.15	0.00	0.00
6.00	0.19	0.00	0.00
7.00	0.23	0.00	0.00
8.00	0.28	0.00	0.00
9.00	0.35	0.00	0.00
10.00	0.43	0.00	0.00
11.00	0.55	0.00	0.00
12.00	1.56	0.00	0.00
13.00	1.82	0.00	0.00
14.00	1.94	0.00	0.00
15.00	2.01	0.01	**0.00**
16.00	2.08	0.01	**0.00**
17.00	2.13	0.01	0.00
18.00	2.17	0.02	0.00
19.00	2.21	0.02	0.00
20.00	2.25	0.02	0.00
21.00	2.28	0.03	0.00
22.00	2.31	0.03	0.00
23.00	2.33	0.03	0.00
24.00	**2.36**	**0.04**	0.00
25.00	2.36	0.04	0.00
26.00	2.36	0.04	0.00
27.00	2.36	0.04	0.00
28.00	2.36	0.04	0.00
29.00	2.36	0.04	0.00
30.00	2.36	0.04	0.00
31.00	2.36	0.04	0.00
32.00	2.36	0.04	0.00
33.00	2.36	0.04	0.00
34.00	2.36	0.04	0.00
35.00	2.36	0.04	0.00
36.00	2.36	0.04	0.00
37.00	2.36	0.04	0.00
38.00	2.36	0.04	0.00
39.00	2.36	0.04	0.00
40.00	2.36	0.04	0.00
41.00	2.36	0.04	0.00
42.00	2.36	0.04	0.00
43.00	2.36	0.04	0.00
44.00	2.36	0.04	0.00
45.00	2.36	0.04	0.00
46.00	2.36	0.04	0.00
47.00	2.36	0.04	0.00
48.00	2.36	0.04	0.00
49.00	2.36	0.04	0.00
50.00	2.36	0.04	0.00
51.00	2.36	0.04	0.00
52.00	2.36	0.04	0.00
53.00	2.36	0.04	0.00
54.00	2.36	0.04	0.00
55.00	2.36	0.04	0.00
56.00	2.36	0.04	0.00
57.00	2.36	0.04	0.00
58.00	2.36	0.04	0.00
59.00	2.36	0.04	0.00
60.00	2.36	0.04	0.00

Summary for Pond POND: POND

Inflow Area = 1.279 ac, 57.09% Impervious, Inflow Depth = 0.65" for 2-Year event
Inflow = 1.52 cfs @ 11.97 hrs, Volume= 0.070 af
Outflow = 0.00 cfs @ 24.11 hrs, Volume= 0.013 af, Atten= 100%, Lag= 728.2 min
Discarded = 0.00 cfs @ 24.11 hrs, Volume= 0.013 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 767.02' @ 24.11 hrs Surf.Area= 2,197 sf Storage= 2,900 cf

Plug-Flow detention time= 1,457.3 min calculated for 0.013 af (19% of inflow)
Center-of-Mass det. time= 1,301.6 min (2,169.1 - 867.5)

Volume	Invert	Avail.Storage	Storage Description
#1	765.00'	15,496 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

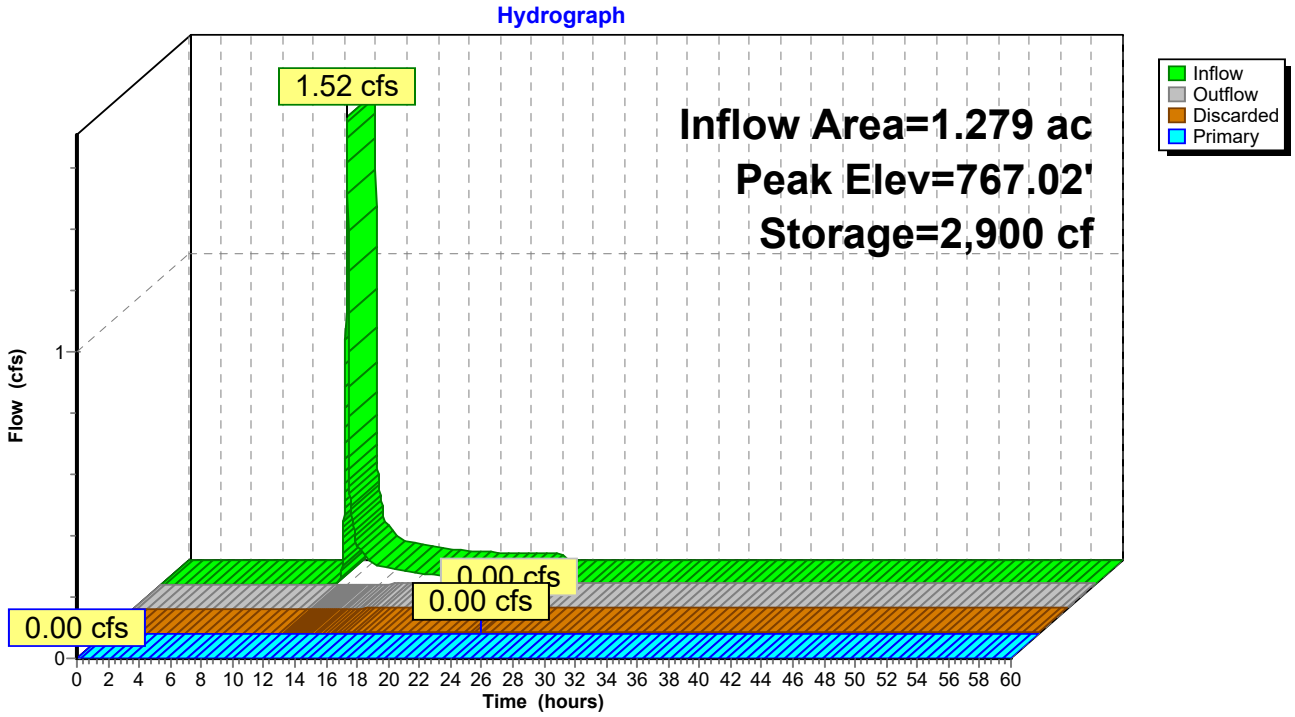
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
765.00	755	0	0
766.00	1,420	1,088	1,088
767.00	2,125	1,773	2,860
767.50	4,100	1,556	4,416
768.00	4,900	2,250	6,666
769.00	6,250	5,575	12,241
769.25	6,510	1,595	13,836
769.50	6,770	1,660	15,496

Device	Routing	Invert	Outlet Devices
#1	Discarded	765.00'	**0.050 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 762.00'
#2	Primary	768.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 24.11 hrs HW=767.02' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=765.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond POND: POND



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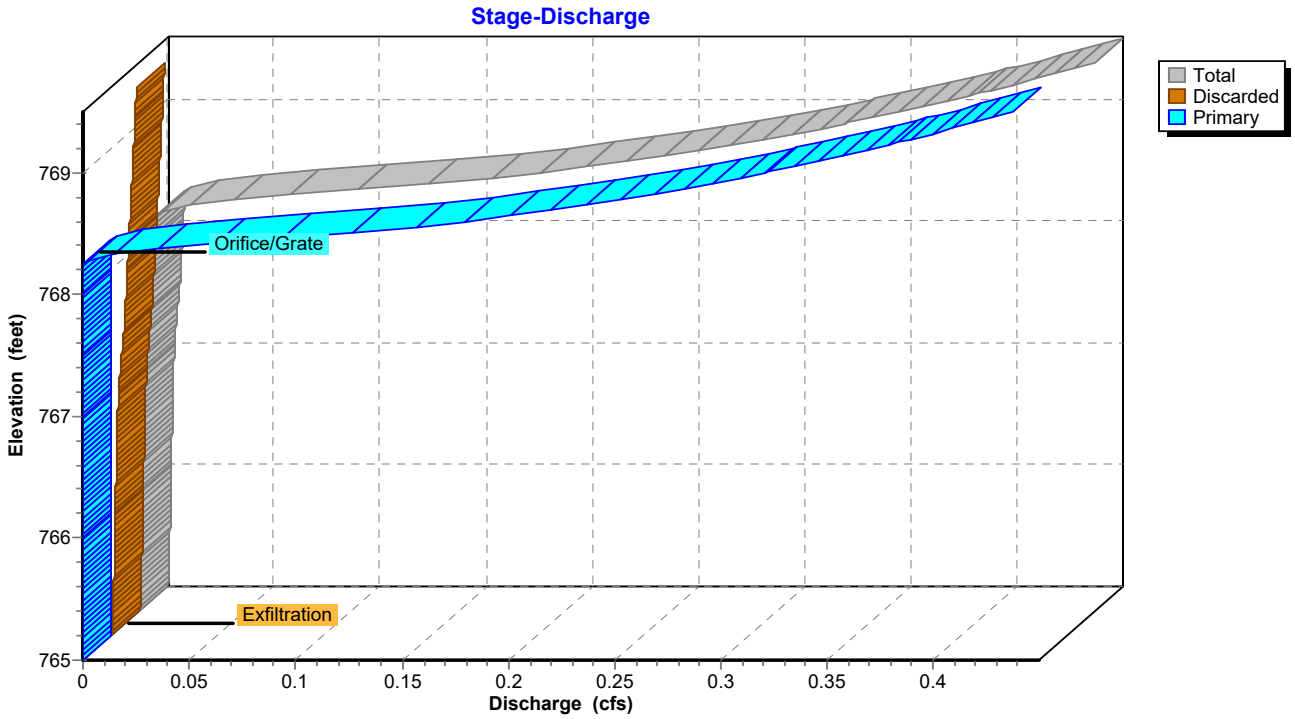
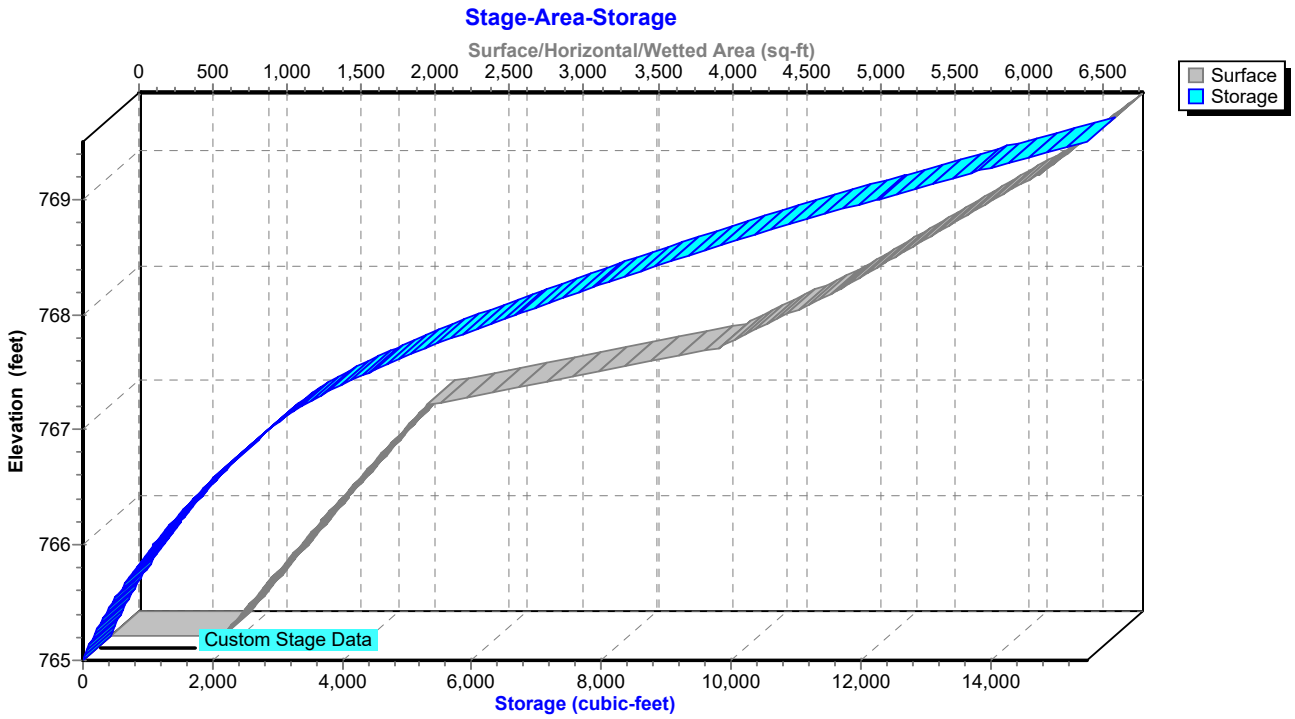


Pond POND: POND



Hydrograph for Pond POND: POND

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	765.00	0.00	0.00	**0.00**
2.00	0.00	0	765.00	0.00	0.00	0.00
4.00	0.00	0	765.00	0.00	0.00	0.00
6.00	0.00	0	765.00	0.00	0.00	0.00
8.00	0.00	0	765.00	0.00	0.00	0.00
10.00	**0.00**	0	765.00	0.00	0.00	0.00
12.00	**1.37**	814	765.80	0.00	0.00	0.00
14.00	0.06	1,885	766.50	0.00	0.00	0.00
16.00	0.04	2,224	766.68	0.00	0.00	0.00
18.00	0.03	2,456	766.80	0.00	0.00	0.00
20.00	0.02	2,631	766.89	0.00	0.00	0.00
22.00	0.02	2,769	766.96	0.00	0.00	0.00
24.00	0.02	**2,896**	**767.02**	**0.00**	**0.00**	0.00
26.00	0.00	**2,876**	**767.01**	**0.00**	**0.00**	0.00
28.00	0.00	2,851	767.00	0.00	0.00	0.00
30.00	0.00	2,826	766.98	0.00	0.00	0.00
32.00	0.00	2,802	766.97	0.00	0.00	0.00
34.00	0.00	2,777	766.96	0.00	0.00	0.00
36.00	0.00	2,753	766.95	0.00	0.00	0.00
38.00	0.00	2,728	766.94	0.00	0.00	0.00
40.00	0.00	2,704	766.93	0.00	0.00	0.00
42.00	0.00	2,680	766.91	0.00	0.00	0.00
44.00	0.00	2,656	766.90	0.00	0.00	0.00
46.00	0.00	2,632	766.89	0.00	0.00	0.00
48.00	0.00	2,609	766.88	0.00	0.00	0.00
50.00	0.00	2,585	766.87	0.00	0.00	0.00
52.00	0.00	2,562	766.86	0.00	0.00	0.00
54.00	0.00	2,538	766.84	0.00	0.00	0.00
56.00	0.00	2,515	766.83	0.00	0.00	0.00
58.00	0.00	2,492	766.82	0.00	0.00	0.00
60.00	0.00	2,469	766.81	0.00	0.00	0.00

Stage-Discharge for Pond POND: POND

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
765.00	0.00	0.00	0.00
765.05	0.00	0.00	0.00
765.10	0.00	0.00	0.00
765.15	0.00	0.00	0.00
765.20	0.00	0.00	0.00
765.25	0.00	0.00	0.00
765.30	0.00	0.00	0.00
765.35	0.00	0.00	0.00
765.40	0.00	0.00	0.00
765.45	0.00	0.00	0.00
765.50	0.00	0.00	0.00
765.55	0.00	0.00	0.00
765.60	0.00	0.00	0.00
765.65	0.00	0.00	0.00
765.70	0.00	0.00	0.00
765.75	0.00	0.00	0.00
765.80	0.00	0.00	0.00
765.85	0.00	0.00	0.00
765.90	0.00	0.00	0.00
765.95	0.00	0.00	0.00
766.00	0.00	0.00	0.00
766.05	0.00	0.00	0.00
766.10	0.00	0.00	0.00
766.15	0.00	0.00	0.00
766.20	0.00	0.00	0.00
766.25	0.00	0.00	0.00
766.30	0.00	0.00	0.00
766.35	0.00	0.00	0.00
766.40	0.00	0.00	0.00
766.45	0.00	0.00	0.00
766.50	0.00	0.00	0.00
766.55	0.00	0.00	0.00
766.60	0.00	0.00	0.00
766.65	0.00	0.00	0.00
766.70	0.00	0.00	0.00
766.75	0.00	0.00	0.00
766.80	0.00	0.00	0.00
766.85	0.00	0.00	0.00
766.90	0.00	0.00	0.00
766.95	0.00	0.00	0.00
767.00	0.00	0.00	0.00
767.05	0.00	0.00	0.00
767.10	0.00	0.00	0.00
767.15	0.00	0.00	0.00
767.20	0.00	0.00	0.00
767.25	0.00	0.00	0.00
767.30	0.01	0.01	0.00
767.35	0.01	0.01	0.00
767.40	0.01	0.01	0.00
767.45	0.01	0.01	0.00
767.50	0.01	0.01	0.00
767.55	0.01	0.01	0.00
767.60	0.01	0.01	0.00
767.65	0.01	0.01	0.00
767.70	0.01	0.01	0.00
767.75	0.01	0.01	0.00
767.80	0.01	0.01	0.00
767.85	0.01	0.01	0.00
767.90	0.01	0.01	0.00
767.95	0.01	0.01	0.00
768.00	0.01	0.01	0.00
768.05	0.01	0.01	0.00
768.10	0.01	0.01	0.00
768.15	0.01	0.01	0.00
768.20	0.01	0.01	0.00
768.25	0.01	0.01	0.00
768.30	0.01	0.01	0.01
768.35	0.03	0.01	0.02
768.40	0.06	0.01	0.05
768.45	0.09	0.01	0.08
768.50	0.13	0.01	0.12
768.55	0.16	0.01	0.15
768.60	0.19	0.01	0.18
768.65	0.21	0.01	0.20
768.70	0.23	0.01	0.22
768.75	0.25	0.01	0.24
768.80	0.27	0.01	0.26
768.85	0.29	0.01	0.28
768.90	0.30	0.01	0.29
768.95	0.32	0.01	0.31
769.00	0.33	0.01	0.32
769.05	0.35	0.01	0.33
769.10	0.36	0.01	0.35
769.15	0.37	0.01	0.36
769.20	0.38	0.01	0.37
769.25	0.39	0.01	0.38
769.30	0.41	0.01	0.39
769.35	0.42	0.01	0.41
769.40	0.43	0.01	0.42
769.45	0.44	0.01	0.43
769.50	**0.45**	**0.01**	**0.44**

Stage-Area-Storage for Pond POND: POND

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
765.00	755	0
765.05	788	39
765.10	822	79
765.15	855	121
765.20	888	164
765.25	921	210
765.30	954	256
765.35	988	305
765.40	1,021	355
765.45	1,054	407
765.50	1,088	461
765.55	1,121	516
765.60	1,154	573
765.65	1,187	631
765.70	1,221	691
765.75	1,254	753
765.80	1,287	817
765.85	1,320	882
765.90	1,353	949
765.95	1,387	1,017
766.00	1,420	1,088
766.05	1,455	1,159
766.10	1,491	1,233
766.15	1,526	1,308
766.20	1,561	1,386
766.25	1,596	1,465
766.30	1,631	1,545
766.35	1,667	1,628
766.40	1,702	1,712
766.45	1,737	1,798
766.50	1,773	1,886
766.55	1,808	1,975
766.60	1,843	2,066
766.65	1,878	2,159
766.70	1,914	2,254
766.75	1,949	2,351
766.80	1,984	2,449
766.85	2,019	2,549
766.90	2,054	2,651
766.95	2,090	2,755
767.00	2,125	2,860
767.05	2,322	2,971
767.10	2,520	3,092
767.15	2,717	3,223
767.20	2,915	3,364
767.25	3,113	3,515
767.30	3,310	3,675
767.35	3,508	3,846
767.40	3,705	4,026
767.45	3,903	4,216
767.50	4,100	4,416
767.55	4,180	4,623
767.60	4,260	4,834
767.65	4,340	5,049
767.70	4,420	5,268
767.75	4,500	5,491
767.80	4,580	5,718
767.85	4,660	5,949
767.90	4,740	6,184
767.95	4,820	6,423
768.00	4,900	6,666
768.05	4,967	6,913
768.10	5,035	7,163
768.15	5,102	7,416
768.20	5,170	7,673
768.25	5,238	7,933
768.30	5,305	8,197
768.35	5,373	8,464
768.40	5,440	8,734
768.45	5,508	9,008
768.50	5,575	9,285
768.55	5,642	9,565
768.60	5,710	9,849
768.65	5,777	10,136
768.70	5,845	10,427
768.75	5,913	10,721
768.80	5,980	11,018
768.85	6,048	11,319
768.90	6,115	11,623
768.95	6,183	11,930
769.00	6,250	12,241
769.05	6,302	12,555
769.10	6,354	12,871
769.15	6,406	13,190
769.20	6,458	13,512
769.25	6,510	13,836
769.30	6,562	14,163
769.35	6,614	14,492
769.40	6,666	14,824
769.45	6,718	15,159
769.50	**6,770**	**15,496**

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST SITE: SITE POST Runoff Area=55,700 sf 57.09% Impervious Runoff Depth=1.36"
Tc=5.0 min CN=77 Runoff=3.25 cfs 0.145 af

Subcatchment PRE SITE: SITE PRE Runoff Area=55,634 sf 8.99% Impervious Runoff Depth=0.25"
Flow Length=380' Slope=0.0200 '/' Tc=13.4 min CN=53 Runoff=0.16 cfs 0.027 af

Pond POND: POND Peak Elev=767.87' Storage=6,039 cf Inflow=3.25 cfs 0.145 af
Discarded=0.01 cfs 0.027 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.027 af

Summary for Subcatchment POST SITE: SITE POST

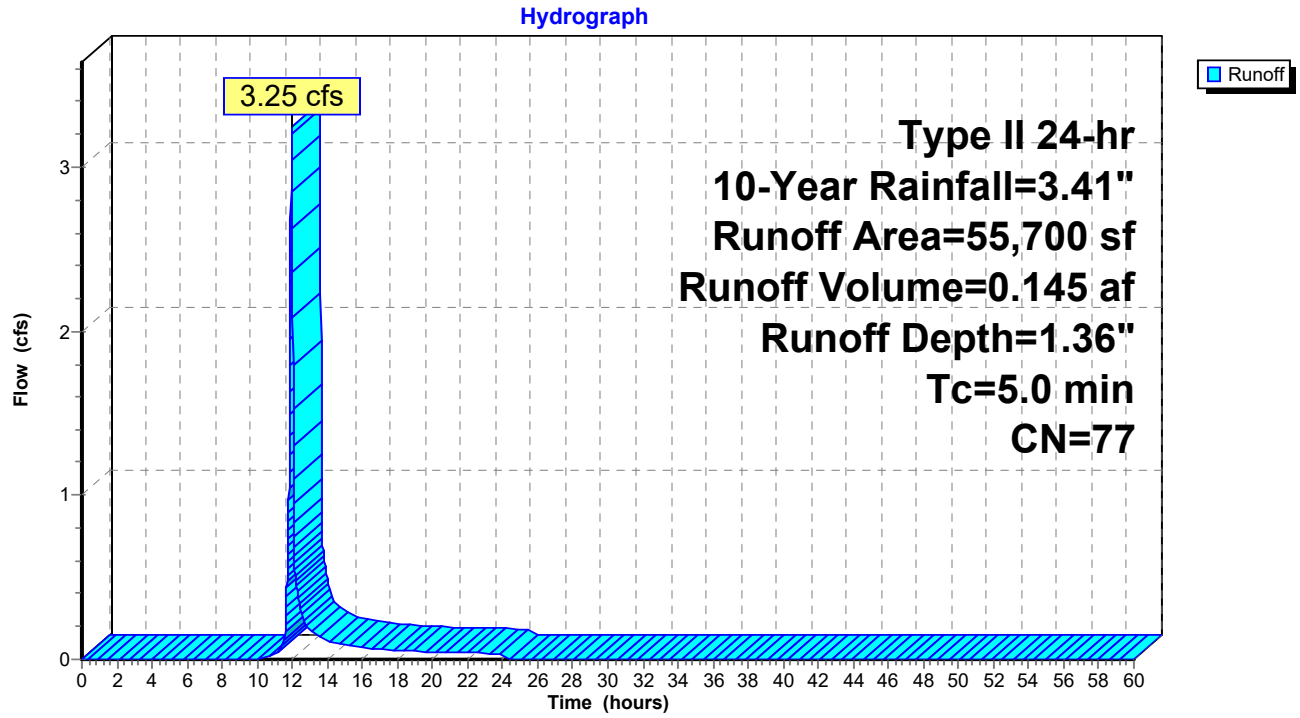
Runoff = 3.25 cfs @ 11.97 hrs, Volume= 0.145 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.41"

Area (sf)	CN	Description
31,800	98	Paved parking, HSG A
23,900	49	50-75% Grass cover, Fair, HSG A
55,700	77	Weighted Average
23,900		42.91% Pervious Area
31,800		57.09% Impervious Area

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

Subcatchment POST SITE: SITE POST



Hydrograph for Subcatchment POST SITE: SITE POST

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.08	0.00	0.00
3.00	0.12	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.41	0.00	0.00
9.00	0.50	0.00	0.00
10.00	0.62	0.00	0.00
11.00	0.80	0.01	**0.03**
12.00	2.26	0.59	**2.85**
13.00	2.63	0.82	0.18
14.00	2.80	0.93	0.11
15.00	2.91	1.01	0.09
16.00	3.00	1.07	0.07
17.00	3.07	1.12	0.06
18.00	3.14	1.17	0.06
19.00	3.20	1.21	0.05
20.00	3.25	1.25	0.04
21.00	3.29	1.28	0.04
22.00	3.33	1.31	0.04
23.00	3.37	1.34	0.04
24.00	**3.41**	**1.36**	0.04
25.00	3.41	1.36	0.00
26.00	3.41	1.36	0.00
27.00	3.41	1.36	0.00
28.00	3.41	1.36	0.00
29.00	3.41	1.36	0.00
30.00	3.41	1.36	0.00
31.00	3.41	1.36	0.00
32.00	3.41	1.36	0.00
33.00	3.41	1.36	0.00
34.00	3.41	1.36	0.00
35.00	3.41	1.36	0.00
36.00	3.41	1.36	0.00
37.00	3.41	1.36	0.00
38.00	3.41	1.36	0.00
39.00	3.41	1.36	0.00
40.00	3.41	1.36	0.00
41.00	3.41	1.36	0.00
42.00	3.41	1.36	0.00
43.00	3.41	1.36	0.00
44.00	3.41	1.36	0.00
45.00	3.41	1.36	0.00
46.00	3.41	1.36	0.00
47.00	3.41	1.36	0.00
48.00	3.41	1.36	0.00
49.00	3.41	1.36	0.00
50.00	3.41	1.36	0.00
51.00	3.41	1.36	0.00
52.00	3.41	1.36	0.00
53.00	3.41	1.36	0.00
54.00	3.41	1.36	0.00
55.00	3.41	1.36	0.00
56.00	3.41	1.36	0.00
57.00	3.41	1.36	0.00
58.00	3.41	1.36	0.00
59.00	3.41	1.36	0.00
60.00	3.41	1.36	0.00

Summary for Subcatchment PRE SITE: SITE PRE

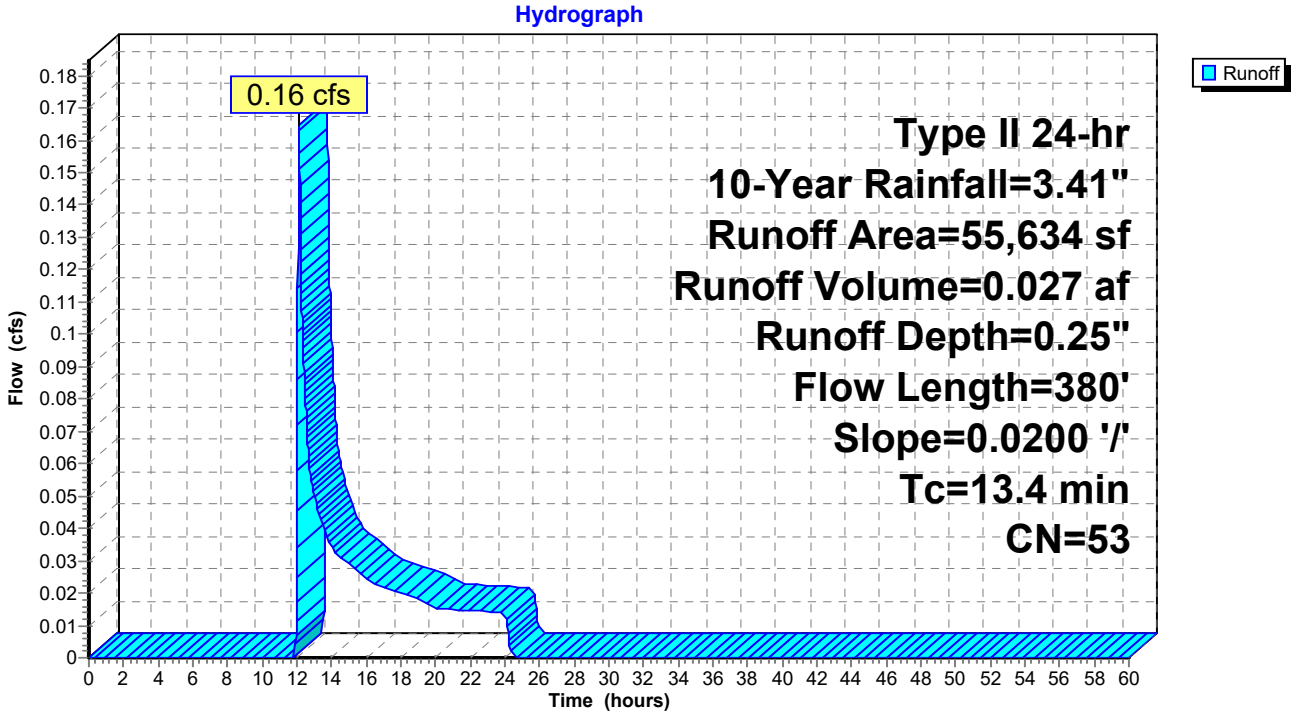
Runoff = 0.16 cfs @ 12.12 hrs, Volume= 0.027 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.41"

Area (sf)	CN	Description
5,000	98	Paved parking, HSG A
50,634	49	50-75% Grass cover, Fair, HSG A
55,634	53	Weighted Average
50,634		91.01% Pervious Area
5,000		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0200	0.15		**Sheet Flow, Sheet flow grass** Grass: Short n= 0.150 P2= 2.36"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
13.4	380	Total			

Subcatchment PRE SITE: SITE PRE



Hydrograph for Subcatchment PRE SITE: SITE PRE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.08	0.00	0.00
3.00	0.12	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.41	0.00	0.00
9.00	0.50	0.00	0.00
10.00	0.62	0.00	0.00
11.00	0.80	0.00	0.00
12.00	2.26	0.03	**0.05**
13.00	2.63	0.08	**0.05**
14.00	2.80	0.11	0.03
15.00	2.91	0.13	0.03
16.00	3.00	0.15	0.02
17.00	3.07	0.17	0.02
18.00	3.14	0.18	0.02
19.00	3.20	0.20	0.02
20.00	3.25	0.21	0.02
21.00	3.29	0.22	0.01
22.00	3.33	0.23	0.01
23.00	3.37	0.24	0.01
24.00	**3.41**	**0.25**	0.01
25.00	3.41	0.25	0.00
26.00	3.41	0.25	0.00
27.00	3.41	0.25	0.00
28.00	3.41	0.25	0.00
29.00	3.41	0.25	0.00
30.00	3.41	0.25	0.00
31.00	3.41	0.25	0.00
32.00	3.41	0.25	0.00
33.00	3.41	0.25	0.00
34.00	3.41	0.25	0.00
35.00	3.41	0.25	0.00
36.00	3.41	0.25	0.00
37.00	3.41	0.25	0.00
38.00	3.41	0.25	0.00
39.00	3.41	0.25	0.00
40.00	3.41	0.25	0.00
41.00	3.41	0.25	0.00
42.00	3.41	0.25	0.00
43.00	3.41	0.25	0.00
44.00	3.41	0.25	0.00
45.00	3.41	0.25	0.00
46.00	3.41	0.25	0.00
47.00	3.41	0.25	0.00
48.00	3.41	0.25	0.00
49.00	3.41	0.25	0.00
50.00	3.41	0.25	0.00
51.00	3.41	0.25	0.00
52.00	3.41	0.25	0.00
53.00	3.41	0.25	0.00
54.00	3.41	0.25	0.00
55.00	3.41	0.25	0.00
56.00	3.41	0.25	0.00
57.00	3.41	0.25	0.00
58.00	3.41	0.25	0.00
59.00	3.41	0.25	0.00
60.00	3.41	0.25	0.00

Summary for Pond POND: POND

Inflow Area = 1.279 ac, 57.09% Impervious, Inflow Depth = 1.36" for 10-Year event
Inflow = 3.25 cfs @ 11.97 hrs, Volume= 0.145 af
Outflow = 0.01 cfs @ 24.10 hrs, Volume= 0.027 af, Atten= 100%, Lag= 728.2 min
Discarded = 0.01 cfs @ 24.10 hrs, Volume= 0.027 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 767.87' @ 24.10 hrs Surf.Area= 4,691 sf Storage= 6,039 cf

Plug-Flow detention time= 1,461.9 min calculated for 0.027 af (19% of inflow)
Center-of-Mass det. time= 1,319.8 min (2,164.4 - 844.6)

Volume	Invert	Avail.Storage	Storage Description
#1	765.00'	15,496 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

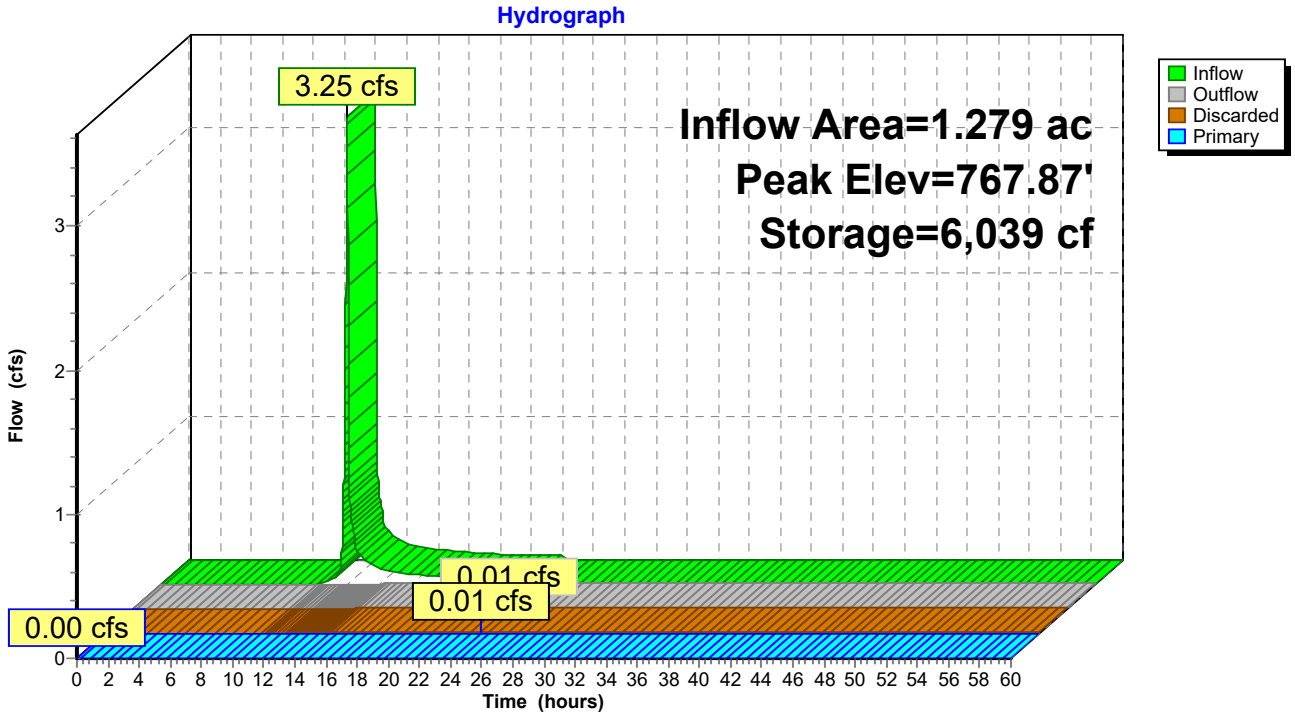
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
765.00	755	0	0
766.00	1,420	1,088	1,088
767.00	2,125	1,773	2,860
767.50	4,100	1,556	4,416
768.00	4,900	2,250	6,666
769.00	6,250	5,575	12,241
769.25	6,510	1,595	13,836
769.50	6,770	1,660	15,496

Device	Routing	Invert	Outlet Devices
#1	Discarded	765.00'	**0.050 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 762.00'
#2	Primary	768.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 24.10 hrs HW=767.87' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=765.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond POND: POND



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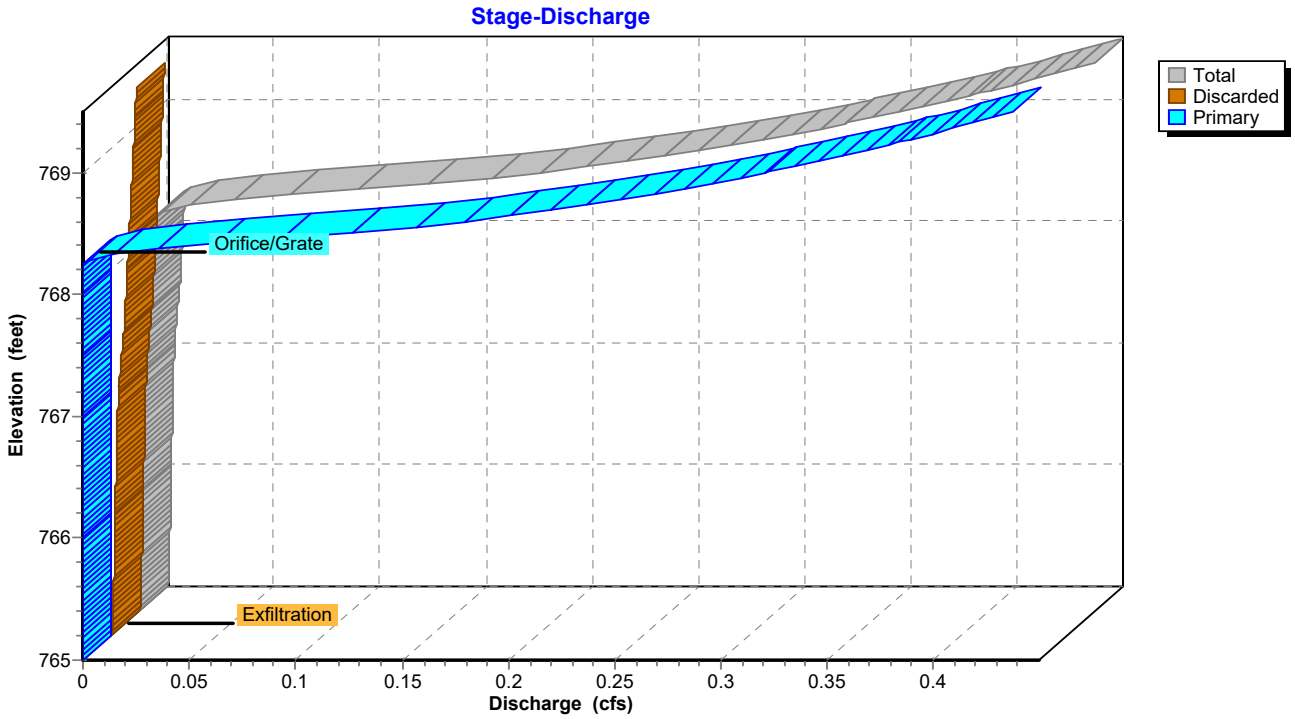
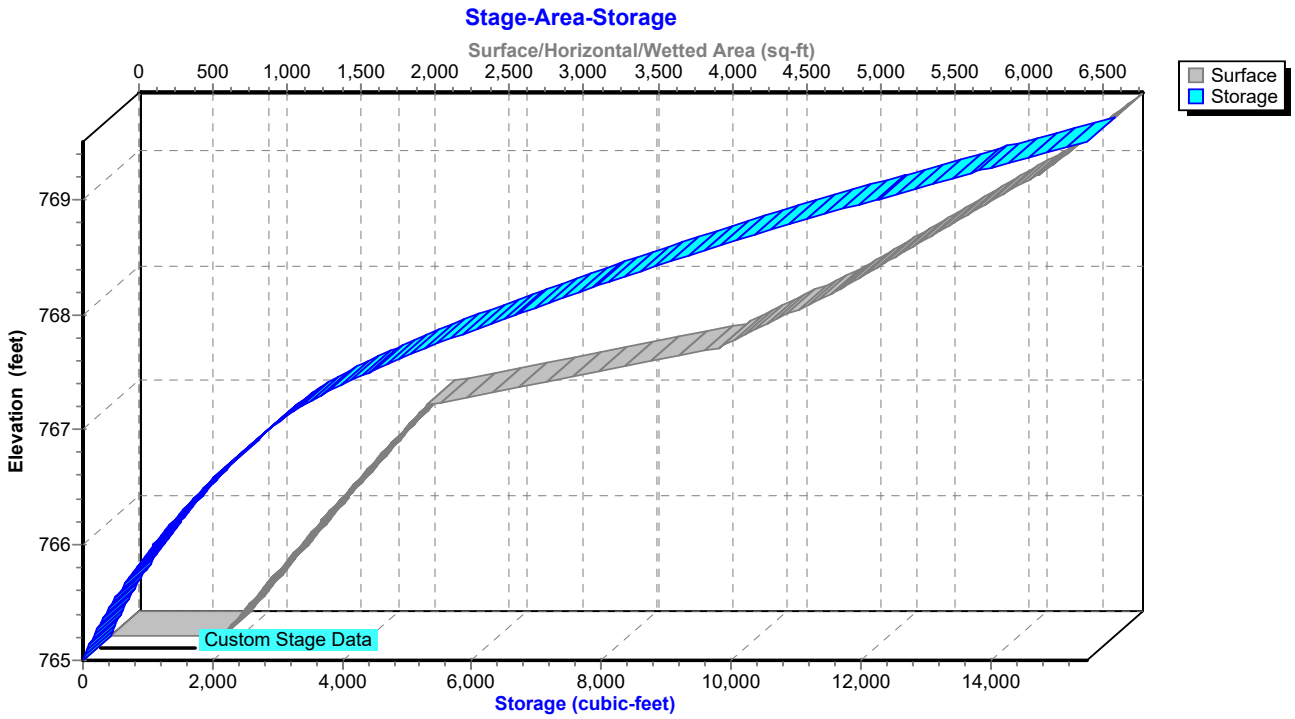


Pond POND: POND



Hydrograph for Pond POND: POND

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	765.00	0.00	0.00	**0.00**
2.00	0.00	0	765.00	0.00	0.00	0.00
4.00	0.00	0	765.00	0.00	0.00	0.00
6.00	0.00	0	765.00	0.00	0.00	0.00
8.00	0.00	0	765.00	0.00	0.00	0.00
10.00	**0.00**	0	765.00	0.00	0.00	0.00
12.00	**2.85**	2,179	766.66	0.00	0.00	0.00
14.00	0.11	4,254	767.46	0.01	0.01	0.00
16.00	0.07	4,867	767.61	0.01	0.01	0.00
18.00	0.06	5,278	767.70	0.01	0.01	0.00
20.00	0.04	5,582	767.77	0.01	0.01	0.00
22.00	0.04	5,818	767.82	0.01	0.01	0.00
24.00	0.04	**6,033**	**767.87**	**0.01**	**0.01**	0.00
26.00	0.00	**5,990**	**767.86**	**0.01**	**0.01**	0.00
28.00	0.00	5,938	767.85	0.01	0.01	0.00
30.00	0.00	5,886	767.84	0.01	0.01	0.00
32.00	0.00	5,834	767.83	0.01	0.01	0.00
34.00	0.00	5,783	767.81	0.01	0.01	0.00
36.00	0.00	5,731	767.80	0.01	0.01	0.00
38.00	0.00	5,680	767.79	0.01	0.01	0.00
40.00	0.00	5,629	767.78	0.01	0.01	0.00
42.00	0.00	5,579	767.77	0.01	0.01	0.00
44.00	0.00	5,529	767.76	0.01	0.01	0.00
46.00	0.00	5,478	767.75	0.01	0.01	0.00
48.00	0.00	5,429	767.74	0.01	0.01	0.00
50.00	0.00	5,379	767.72	0.01	0.01	0.00
52.00	0.00	5,330	767.71	0.01	0.01	0.00
54.00	0.00	5,281	767.70	0.01	0.01	0.00
56.00	0.00	5,232	767.69	0.01	0.01	0.00
58.00	0.00	5,183	767.68	0.01	0.01	0.00
60.00	0.00	5,135	767.67	0.01	0.01	0.00

Stage-Discharge for Pond POND: POND

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
765.00	0.00	0.00	0.00
765.05	0.00	0.00	0.00
765.10	0.00	0.00	0.00
765.15	0.00	0.00	0.00
765.20	0.00	0.00	0.00
765.25	0.00	0.00	0.00
765.30	0.00	0.00	0.00
765.35	0.00	0.00	0.00
765.40	0.00	0.00	0.00
765.45	0.00	0.00	0.00
765.50	0.00	0.00	0.00
765.55	0.00	0.00	0.00
765.60	0.00	0.00	0.00
765.65	0.00	0.00	0.00
765.70	0.00	0.00	0.00
765.75	0.00	0.00	0.00
765.80	0.00	0.00	0.00
765.85	0.00	0.00	0.00
765.90	0.00	0.00	0.00
765.95	0.00	0.00	0.00
766.00	0.00	0.00	0.00
766.05	0.00	0.00	0.00
766.10	0.00	0.00	0.00
766.15	0.00	0.00	0.00
766.20	0.00	0.00	0.00
766.25	0.00	0.00	0.00
766.30	0.00	0.00	0.00
766.35	0.00	0.00	0.00
766.40	0.00	0.00	0.00
766.45	0.00	0.00	0.00
766.50	0.00	0.00	0.00
766.55	0.00	0.00	0.00
766.60	0.00	0.00	0.00
766.65	0.00	0.00	0.00
766.70	0.00	0.00	0.00
766.75	0.00	0.00	0.00
766.80	0.00	0.00	0.00
766.85	0.00	0.00	0.00
766.90	0.00	0.00	0.00
766.95	0.00	0.00	0.00
767.00	0.00	0.00	0.00
767.05	0.00	0.00	0.00
767.10	0.00	0.00	0.00
767.15	0.00	0.00	0.00
767.20	0.00	0.00	0.00
767.25	0.00	0.00	0.00
767.30	0.01	0.01	0.00
767.35	0.01	0.01	0.00
767.40	0.01	0.01	0.00
767.45	0.01	0.01	0.00
767.50	0.01	0.01	0.00
767.55	0.01	0.01	0.00
767.60	0.01	0.01	0.00
767.65	0.01	0.01	0.00
767.70	0.01	0.01	0.00
767.75	0.01	0.01	0.00
767.80	0.01	0.01	0.00
767.85	0.01	0.01	0.00
767.90	0.01	0.01	0.00
767.95	0.01	0.01	0.00
768.00	0.01	0.01	0.00
768.05	0.01	0.01	0.00
768.10	0.01	0.01	0.00
768.15	0.01	0.01	0.00
768.20	0.01	0.01	0.00
768.25	0.01	0.01	0.00
768.30	0.01	0.01	0.01
768.35	0.03	0.01	0.02
768.40	0.06	0.01	0.05
768.45	0.09	0.01	0.08
768.50	0.13	0.01	0.12
768.55	0.16	0.01	0.15
768.60	0.19	0.01	0.18
768.65	0.21	0.01	0.20
768.70	0.23	0.01	0.22
768.75	0.25	0.01	0.24
768.80	0.27	0.01	0.26
768.85	0.29	0.01	0.28
768.90	0.30	0.01	0.29
768.95	0.32	0.01	0.31
769.00	0.33	0.01	0.32
769.05	0.35	0.01	0.33
769.10	0.36	0.01	0.35
769.15	0.37	0.01	0.36
769.20	0.38	0.01	0.37
769.25	0.39	0.01	0.38
769.30	0.41	0.01	0.39
769.35	0.42	0.01	0.41
769.40	0.43	0.01	0.42
769.45	0.44	0.01	0.43
769.50	**0.45**	**0.01**	**0.44**

Stage-Area-Storage for Pond POND: POND

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
765.00	755	0
765.05	788	39
765.10	822	79
765.15	855	121
765.20	888	164
765.25	921	210
765.30	954	256
765.35	988	305
765.40	1,021	355
765.45	1,054	407
765.50	1,088	461
765.55	1,121	516
765.60	1,154	573
765.65	1,187	631
765.70	1,221	691
765.75	1,254	753
765.80	1,287	817
765.85	1,320	882
765.90	1,353	949
765.95	1,387	1,017
766.00	1,420	1,088
766.05	1,455	1,159
766.10	1,491	1,233
766.15	1,526	1,308
766.20	1,561	1,386
766.25	1,596	1,465
766.30	1,631	1,545
766.35	1,667	1,628
766.40	1,702	1,712
766.45	1,737	1,798
766.50	1,773	1,886
766.55	1,808	1,975
766.60	1,843	2,066
766.65	1,878	2,159
766.70	1,914	2,254
766.75	1,949	2,351
766.80	1,984	2,449
766.85	2,019	2,549
766.90	2,054	2,651
766.95	2,090	2,755
767.00	2,125	2,860
767.05	2,322	2,971
767.10	2,520	3,092
767.15	2,717	3,223
767.20	2,915	3,364
767.25	3,113	3,515
767.30	3,310	3,675
767.35	3,508	3,846
767.40	3,705	4,026
767.45	3,903	4,216
767.50	4,100	4,416
767.55	4,180	4,623
767.60	4,260	4,834
767.65	4,340	5,049
767.70	4,420	5,268
767.75	4,500	5,491
767.80	4,580	5,718
767.85	4,660	5,949
767.90	4,740	6,184
767.95	4,820	6,423
768.00	4,900	6,666
768.05	4,967	6,913
768.10	5,035	7,163
768.15	5,102	7,416
768.20	5,170	7,673
768.25	5,238	7,933
768.30	5,305	8,197
768.35	5,373	8,464
768.40	5,440	8,734
768.45	5,508	9,008
768.50	5,575	9,285
768.55	5,642	9,565
768.60	5,710	9,849
768.65	5,777	10,136
768.70	5,845	10,427
768.75	5,913	10,721
768.80	5,980	11,018
768.85	6,048	11,319
768.90	6,115	11,623
768.95	6,183	11,930
769.00	6,250	12,241
769.05	6,302	12,555
769.10	6,354	12,871
769.15	6,406	13,190
769.20	6,458	13,512
769.25	6,510	13,836
769.30	6,562	14,163
769.35	6,614	14,492
769.40	6,666	14,824
769.45	6,718	15,159
769.50	**6,770**	**15,496**

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST SITE: SITE POST Runoff Area=55,700 sf 57.09% Impervious Runoff Depth=3.28"
Tc=5.0 min CN=77 Runoff=7.69 cfs 0.349 af

Subcatchment PRE SITE: SITE PRE Runoff Area=55,634 sf 8.99% Impervious Runoff Depth=1.24"
Flow Length=380' Slope=0.0200 '/' Tc=13.4 min CN=53 Runoff=1.90 cfs 0.132 af

Pond POND: POND Peak Elev=768.64' Storage=10,065 cf Inflow=7.69 cfs 0.349 af
Discarded=0.01 cfs 0.035 af Primary=0.20 cfs 0.149 af Outflow=0.21 cfs 0.183 af

Summary for Subcatchment POST SITE: SITE POST

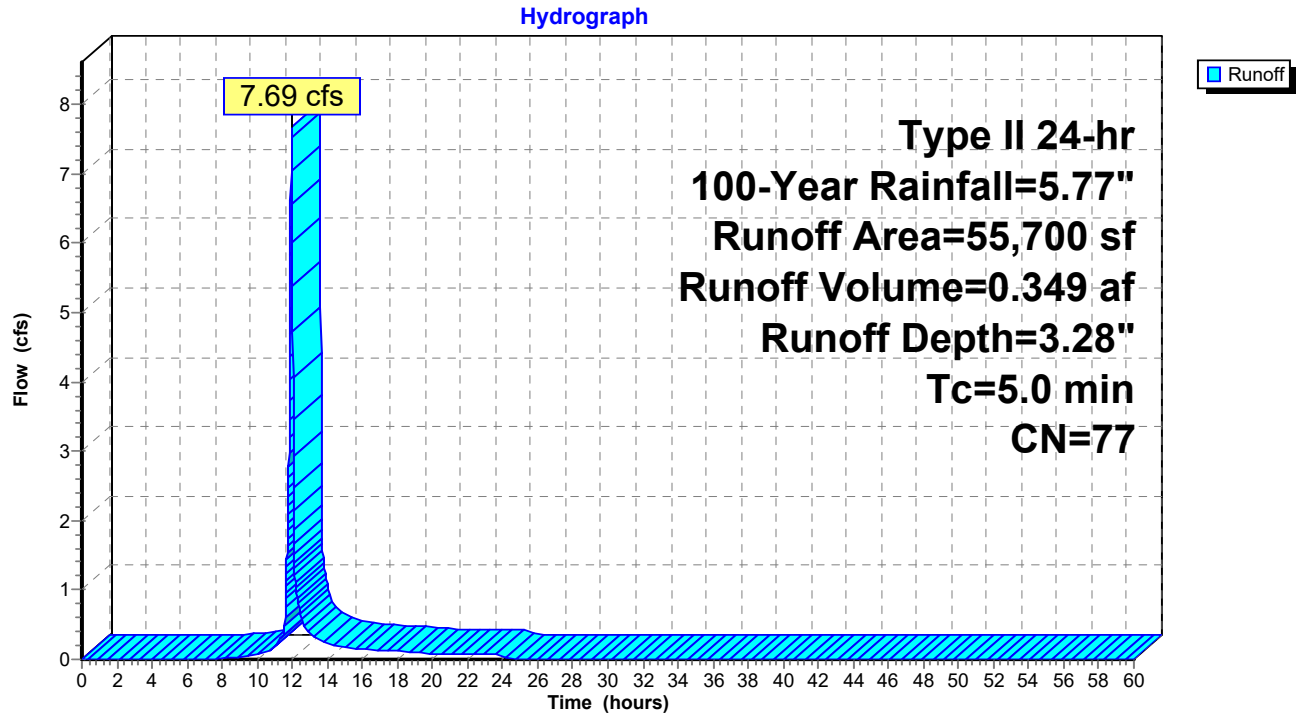
Runoff = 7.69 cfs @ 11.96 hrs, Volume= 0.349 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.77"

Area (sf)	CN	Description
31,800	98	Paved parking, HSG A
23,900	49	50-75% Grass cover, Fair, HSG A
55,700	77	Weighted Average
23,900		42.91% Pervious Area
31,800		57.09% Impervious Area

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

Subcatchment POST SITE: SITE POST



Hydrograph for Subcatchment POST SITE: SITE POST

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.13	0.00	0.00
3.00	0.20	0.00	0.00
4.00	0.28	0.00	0.00
5.00	0.36	0.00	0.00
6.00	0.46	0.00	0.00
7.00	0.57	0.00	0.00
8.00	0.69	0.00	0.01
9.00	0.85	0.02	0.03
10.00	1.04	0.06	0.07
11.00	1.36	0.15	**0.18**
12.00	3.83	1.68	**6.58**
13.00	4.45	2.17	0.39
14.00	4.73	2.40	0.24
15.00	4.92	2.56	0.19
16.00	5.08	2.69	0.15
17.00	5.20	2.79	0.13
18.00	5.31	2.89	0.11
19.00	5.41	2.97	0.10
20.00	5.49	3.04	0.08
21.00	5.57	3.10	0.08
22.00	5.64	3.16	0.08
23.00	5.71	3.22	0.07
24.00	**5.77**	**3.28**	0.07
25.00	5.77	3.28	0.00
26.00	5.77	3.28	0.00
27.00	5.77	3.28	0.00
28.00	5.77	3.28	0.00
29.00	5.77	3.28	0.00
30.00	5.77	3.28	0.00
31.00	5.77	3.28	0.00
32.00	5.77	3.28	0.00
33.00	5.77	3.28	0.00
34.00	5.77	3.28	0.00
35.00	5.77	3.28	0.00
36.00	5.77	3.28	0.00
37.00	5.77	3.28	0.00
38.00	5.77	3.28	0.00
39.00	5.77	3.28	0.00
40.00	5.77	3.28	0.00
41.00	5.77	3.28	0.00
42.00	5.77	3.28	0.00
43.00	5.77	3.28	0.00
44.00	5.77	3.28	0.00
45.00	5.77	3.28	0.00
46.00	5.77	3.28	0.00
47.00	5.77	3.28	0.00
48.00	5.77	3.28	0.00
49.00	5.77	3.28	0.00
50.00	5.77	3.28	0.00
51.00	5.77	3.28	0.00
52.00	5.77	3.28	0.00
53.00	5.77	3.28	0.00
54.00	5.77	3.28	0.00
55.00	5.77	3.28	0.00
56.00	5.77	3.28	0.00
57.00	5.77	3.28	0.00
58.00	5.77	3.28	0.00
59.00	5.77	3.28	0.00
60.00	5.77	3.28	0.00

Summary for Subcatchment PRE SITE: SITE PRE

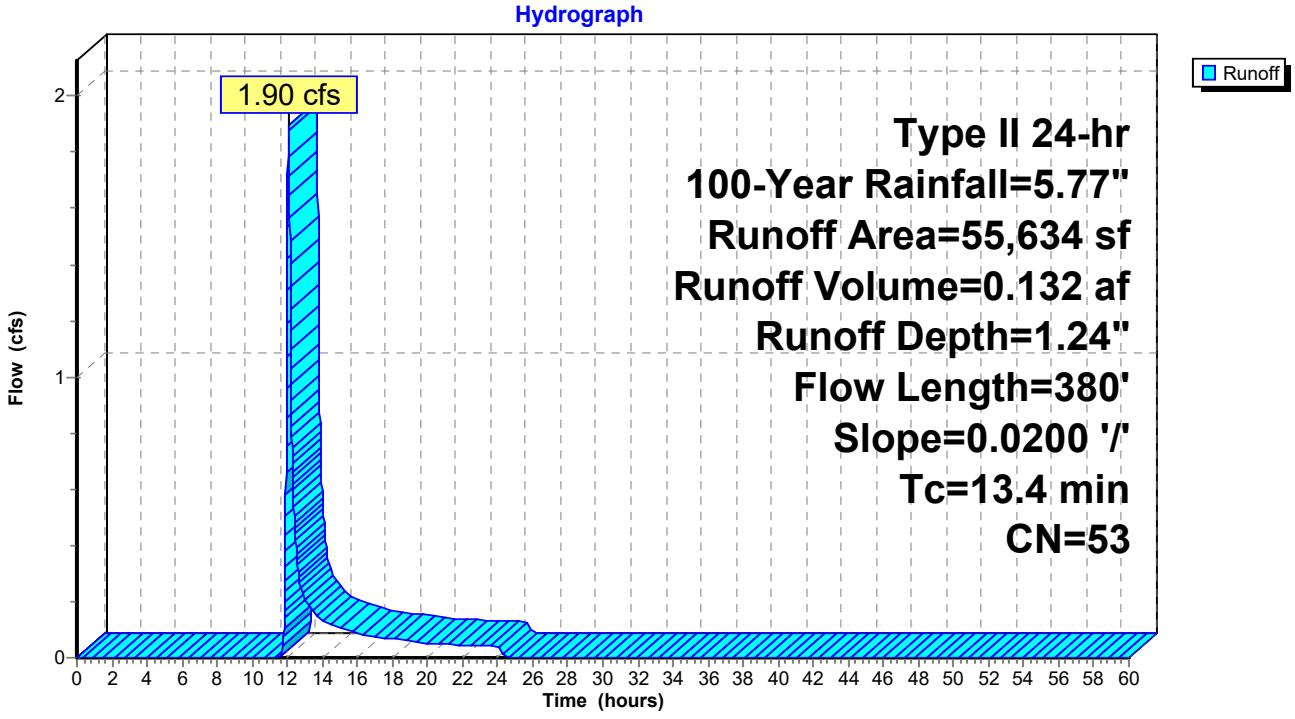
Runoff = 1.90 cfs @ 12.07 hrs, Volume= 0.132 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.77"

Area (sf)	CN	Description
5,000	98	Paved parking, HSG A
50,634	49	50-75% Grass cover, Fair, HSG A
55,634	53	Weighted Average
50,634		91.01% Pervious Area
5,000		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0200	0.15		**Sheet Flow, Sheet flow grass** Grass: Short n= 0.150 P2= 2.36"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
13.4	380	Total			

Subcatchment PRE SITE: SITE PRE



Hydrograph for Subcatchment PRE SITE: SITE PRE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.13	0.00	0.00
3.00	0.20	0.00	0.00
4.00	0.28	0.00	0.00
5.00	0.36	0.00	0.00
6.00	0.46	0.00	0.00
7.00	0.57	0.00	0.00
8.00	0.69	0.00	0.00
9.00	0.85	0.00	0.00
10.00	1.04	0.00	0.00
11.00	1.36	0.00	0.00
12.00	3.83	0.39	**1.42**
13.00	4.45	0.62	**0.21**
14.00	4.73	0.74	0.13
15.00	4.92	0.83	0.11
16.00	5.08	0.90	0.08
17.00	5.20	0.96	0.07
18.00	5.31	1.01	0.07
19.00	5.41	1.06	0.06
20.00	5.49	1.10	0.05
21.00	5.57	1.14	0.05
22.00	5.64	1.17	0.05
23.00	5.71	1.21	0.04
24.00	**5.77**	**1.24**	0.04
25.00	5.77	1.24	0.00
26.00	5.77	1.24	0.00
27.00	5.77	1.24	0.00
28.00	5.77	1.24	0.00
29.00	5.77	1.24	0.00
30.00	5.77	1.24	0.00
31.00	5.77	1.24	0.00
32.00	5.77	1.24	0.00
33.00	5.77	1.24	0.00
34.00	5.77	1.24	0.00
35.00	5.77	1.24	0.00
36.00	5.77	1.24	0.00
37.00	5.77	1.24	0.00
38.00	5.77	1.24	0.00
39.00	5.77	1.24	0.00
40.00	5.77	1.24	0.00
41.00	5.77	1.24	0.00
42.00	5.77	1.24	0.00
43.00	5.77	1.24	0.00
44.00	5.77	1.24	0.00
45.00	5.77	1.24	0.00
46.00	5.77	1.24	0.00
47.00	5.77	1.24	0.00
48.00	5.77	1.24	0.00
49.00	5.77	1.24	0.00
50.00	5.77	1.24	0.00
51.00	5.77	1.24	0.00
52.00	5.77	1.24	0.00
53.00	5.77	1.24	0.00
54.00	5.77	1.24	0.00
55.00	5.77	1.24	0.00
56.00	5.77	1.24	0.00
57.00	5.77	1.24	0.00
58.00	5.77	1.24	0.00
59.00	5.77	1.24	0.00
60.00	5.77	1.24	0.00

Summary for Pond POND: POND

Inflow Area = 1.279 ac, 57.09% Impervious, Inflow Depth = 3.28" for 100-Year event
Inflow = 7.69 cfs @ 11.96 hrs, Volume= 0.349 af
Outflow = 0.21 cfs @ 14.57 hrs, Volume= 0.183 af, Atten= 97%, Lag= 156.4 min
Discarded = 0.01 cfs @ 14.57 hrs, Volume= 0.035 af
Primary = 0.20 cfs @ 14.57 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 768.64' @ 14.57 hrs Surf.Area= 5,761 sf Storage= 10,065 cf

Plug-Flow detention time= 578.7 min calculated for 0.183 af (52% of inflow)
Center-of-Mass det. time= 462.4 min (1,281.6 - 819.3)

Volume	Invert	Avail.Storage	Storage Description
#1	765.00'	15,496 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

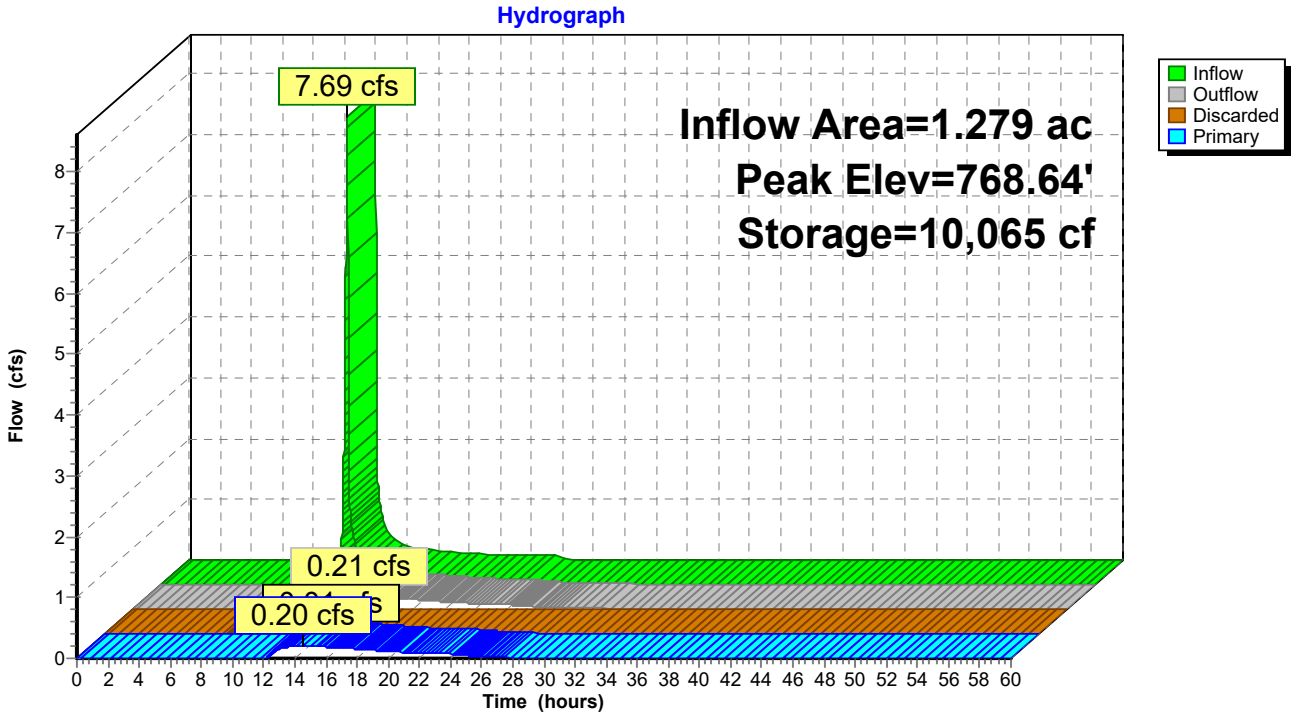
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
765.00	755	0	0
766.00	1,420	1,088	1,088
767.00	2,125	1,773	2,860
767.50	4,100	1,556	4,416
768.00	4,900	2,250	6,666
769.00	6,250	5,575	12,241
769.25	6,510	1,595	13,836
769.50	6,770	1,660	15,496

Device	Routing	Invert	Outlet Devices
#1	Discarded	765.00'	**0.050 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 762.00'
#2	Primary	768.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 14.57 hrs HW=768.64' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.20 cfs @ 14.57 hrs HW=768.64' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 2.26 fps)

Pond POND: POND



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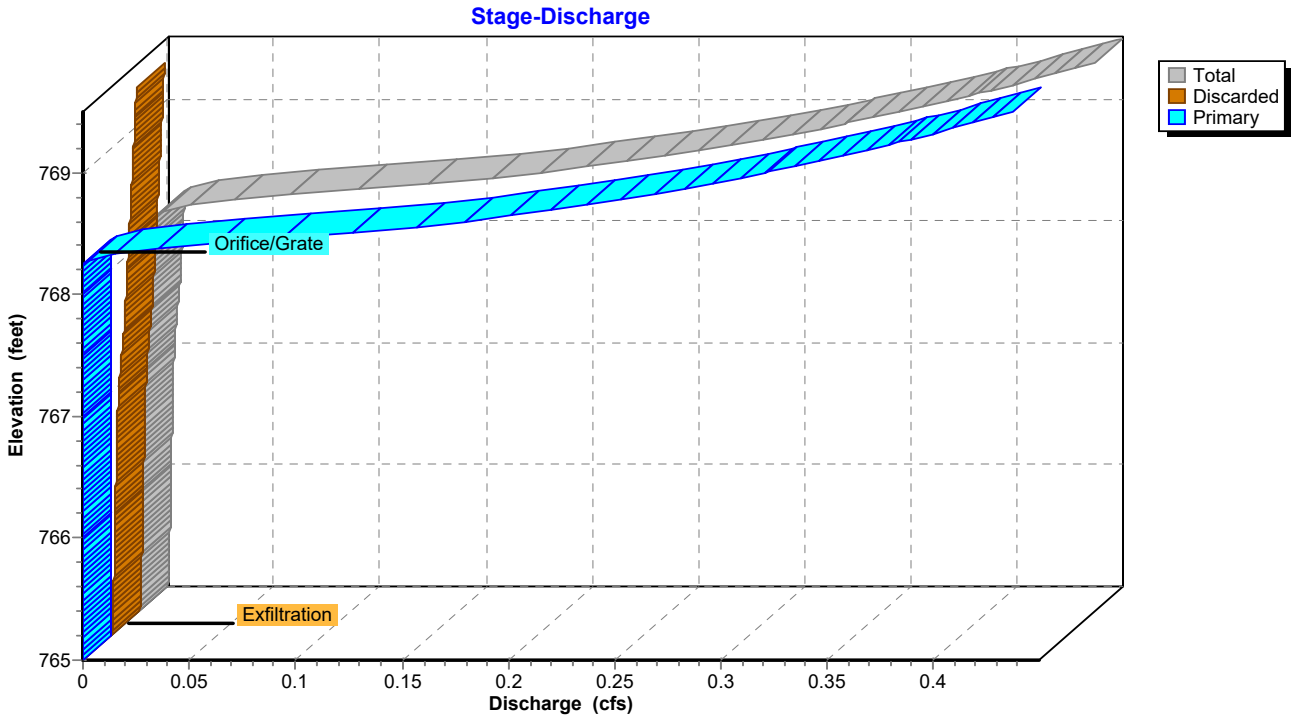
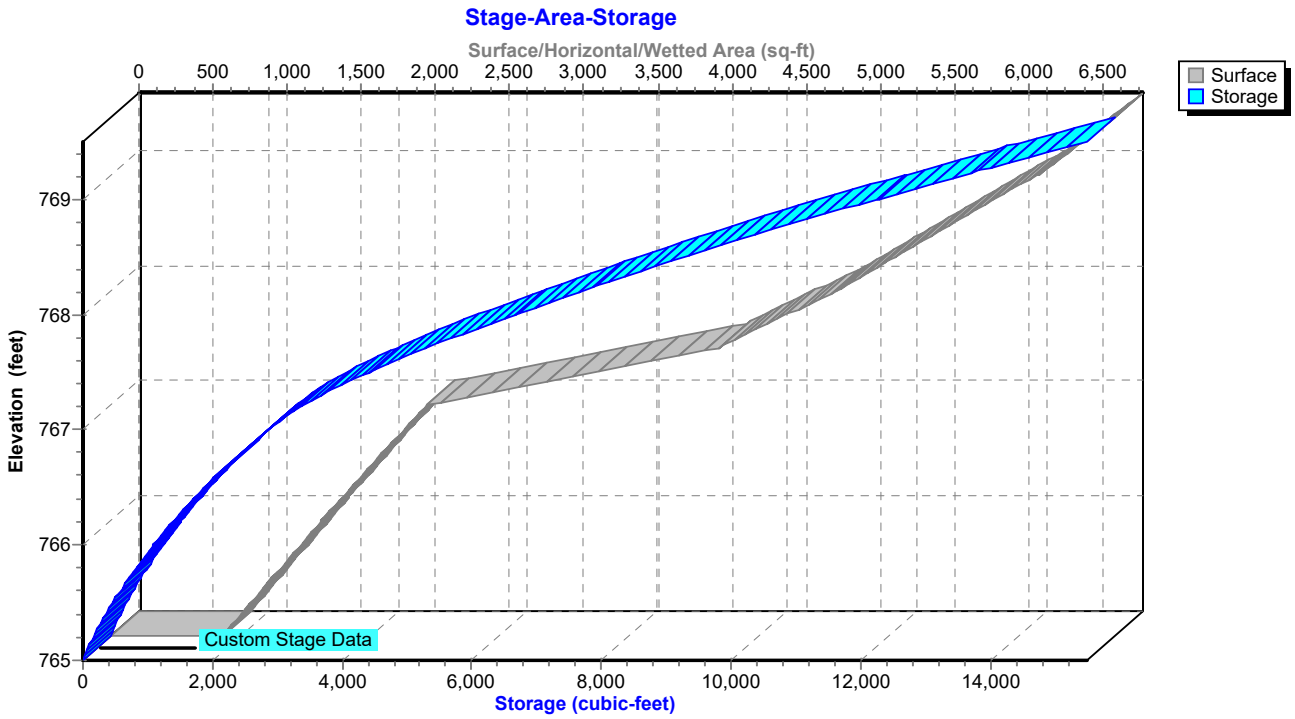


Pond POND: POND



Hydrograph for Pond POND: POND

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	765.00	0.00	0.00	0.00
2.00	0.00	0	765.00	0.00	0.00	0.00
4.00	0.00	0	765.00	0.00	0.00	0.00
6.00	0.00	0	765.00	0.00	0.00	0.00
8.00	0.01	11	765.01	0.00	0.00	0.00
10.00	**0.07**	244	765.29	0.00	0.00	0.00
12.00	**6.58**	6,448	767.96	0.01	0.01	0.00
14.00	0.24	**10,039**	**768.63**	**0.20**	**0.01**	**0.20**
16.00	0.15	**9,931**	**768.61**	**0.20**	**0.01**	**0.19**
18.00	0.11	9,569	768.55	0.16	0.01	0.15
20.00	0.08	9,251	768.49	0.12	0.01	0.12
22.00	0.08	9,044	768.46	0.10	0.01	0.09
24.00	0.07	8,933	768.44	0.08	0.01	0.07
26.00	0.00	8,535	768.36	0.04	0.01	0.03
28.00	0.00	8,322	768.32	0.02	0.01	0.01
30.00	0.00	8,188	768.30	0.02	0.01	0.01
32.00	0.00	8,095	768.28	0.01	0.01	0.00
34.00	0.00	8,019	768.27	0.01	0.01	0.00
36.00	0.00	7,952	768.25	0.01	0.01	0.00
38.00	0.00	7,891	768.24	0.01	0.01	0.00
40.00	0.00	7,830	768.23	0.01	0.01	0.00
42.00	0.00	7,770	768.22	0.01	0.01	0.00
44.00	0.00	7,710	768.21	0.01	0.01	0.00
46.00	0.00	7,650	768.20	0.01	0.01	0.00
48.00	0.00	7,591	768.18	0.01	0.01	0.00
50.00	0.00	7,532	768.17	0.01	0.01	0.00
52.00	0.00	7,473	768.16	0.01	0.01	0.00
54.00	0.00	7,414	768.15	0.01	0.01	0.00
56.00	0.00	7,355	768.14	0.01	0.01	0.00
58.00	0.00	7,297	768.13	0.01	0.01	0.00
60.00	0.00	7,239	768.11	0.01	0.01	0.00

Stage-Discharge for Pond POND: POND

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
765.00	0.00	0.00	0.00
765.05	0.00	0.00	0.00
765.10	0.00	0.00	0.00
765.15	0.00	0.00	0.00
765.20	0.00	0.00	0.00
765.25	0.00	0.00	0.00
765.30	0.00	0.00	0.00
765.35	0.00	0.00	0.00
765.40	0.00	0.00	0.00
765.45	0.00	0.00	0.00
765.50	0.00	0.00	0.00
765.55	0.00	0.00	0.00
765.60	0.00	0.00	0.00
765.65	0.00	0.00	0.00
765.70	0.00	0.00	0.00
765.75	0.00	0.00	0.00
765.80	0.00	0.00	0.00
765.85	0.00	0.00	0.00
765.90	0.00	0.00	0.00
765.95	0.00	0.00	0.00
766.00	0.00	0.00	0.00
766.05	0.00	0.00	0.00
766.10	0.00	0.00	0.00
766.15	0.00	0.00	0.00
766.20	0.00	0.00	0.00
766.25	0.00	0.00	0.00
766.30	0.00	0.00	0.00
766.35	0.00	0.00	0.00
766.40	0.00	0.00	0.00
766.45	0.00	0.00	0.00
766.50	0.00	0.00	0.00
766.55	0.00	0.00	0.00
766.60	0.00	0.00	0.00
766.65	0.00	0.00	0.00
766.70	0.00	0.00	0.00
766.75	0.00	0.00	0.00
766.80	0.00	0.00	0.00
766.85	0.00	0.00	0.00
766.90	0.00	0.00	0.00
766.95	0.00	0.00	0.00
767.00	0.00	0.00	0.00
767.05	0.00	0.00	0.00
767.10	0.00	0.00	0.00
767.15	0.00	0.00	0.00
767.20	0.00	0.00	0.00
767.25	0.00	0.00	0.00
767.30	0.01	0.01	0.00
767.35	0.01	0.01	0.00
767.40	0.01	0.01	0.00
767.45	0.01	0.01	0.00
767.50	0.01	0.01	0.00
767.55	0.01	0.01	0.00
767.60	0.01	0.01	0.00
767.65	0.01	0.01	0.00
767.70	0.01	0.01	0.00
767.75	0.01	0.01	0.00
767.80	0.01	0.01	0.00
767.85	0.01	0.01	0.00
767.90	0.01	0.01	0.00
767.95	0.01	0.01	0.00
768.00	0.01	0.01	0.00
768.05	0.01	0.01	0.00
768.10	0.01	0.01	0.00
768.15	0.01	0.01	0.00
768.20	0.01	0.01	0.00
768.25	0.01	0.01	0.00
768.30	0.01	0.01	0.01
768.35	0.03	0.01	0.02
768.40	0.06	0.01	0.05
768.45	0.09	0.01	0.08
768.50	0.13	0.01	0.12
768.55	0.16	0.01	0.15
768.60	0.19	0.01	0.18
768.65	0.21	0.01	0.20
768.70	0.23	0.01	0.22
768.75	0.25	0.01	0.24
768.80	0.27	0.01	0.26
768.85	0.29	0.01	0.28
768.90	0.30	0.01	0.29
768.95	0.32	0.01	0.31
769.00	0.33	0.01	0.32
769.05	0.35	0.01	0.33
769.10	0.36	0.01	0.35
769.15	0.37	0.01	0.36
769.20	0.38	0.01	0.37
769.25	0.39	0.01	0.38
769.30	0.41	0.01	0.39
769.35	0.42	0.01	0.41
769.40	0.43	0.01	0.42
769.45	0.44	0.01	0.43
769.50	**0.45**	**0.01**	**0.44**

Stage-Area-Storage for Pond POND: POND

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
765.00	755	0
765.05	788	39
765.10	822	79
765.15	855	121
765.20	888	164
765.25	921	210
765.30	954	256
765.35	988	305
765.40	1,021	355
765.45	1,054	407
765.50	1,088	461
765.55	1,121	516
765.60	1,154	573
765.65	1,187	631
765.70	1,221	691
765.75	1,254	753
765.80	1,287	817
765.85	1,320	882
765.90	1,353	949
765.95	1,387	1,017
766.00	1,420	1,088
766.05	1,455	1,159
766.10	1,491	1,233
766.15	1,526	1,308
766.20	1,561	1,386
766.25	1,596	1,465
766.30	1,631	1,545
766.35	1,667	1,628
766.40	1,702	1,712
766.45	1,737	1,798
766.50	1,773	1,886
766.55	1,808	1,975
766.60	1,843	2,066
766.65	1,878	2,159
766.70	1,914	2,254
766.75	1,949	2,351
766.80	1,984	2,449
766.85	2,019	2,549
766.90	2,054	2,651
766.95	2,090	2,755
767.00	2,125	2,860
767.05	2,322	2,971
767.10	2,520	3,092
767.15	2,717	3,223
767.20	2,915	3,364
767.25	3,113	3,515
767.30	3,310	3,675
767.35	3,508	3,846
767.40	3,705	4,026
767.45	3,903	4,216
767.50	4,100	4,416
767.55	4,180	4,623
767.60	4,260	4,834
767.65	4,340	5,049
767.70	4,420	5,268
767.75	4,500	5,491
767.80	4,580	5,718
767.85	4,660	5,949
767.90	4,740	6,184
767.95	4,820	6,423
768.00	4,900	6,666
768.05	4,967	6,913
768.10	5,035	7,163
768.15	5,102	7,416
768.20	5,170	7,673
768.25	5,238	7,933
768.30	5,305	8,197
768.35	5,373	8,464
768.40	5,440	8,734
768.45	5,508	9,008
768.50	5,575	9,285
768.55	5,642	9,565
768.60	5,710	9,849
768.65	5,777	10,136
768.70	5,845	10,427
768.75	5,913	10,721
768.80	5,980	11,018
768.85	6,048	11,319
768.90	6,115	11,623
768.95	6,183	11,930
769.00	6,250	12,241
769.05	6,302	12,555
769.10	6,354	12,871
769.15	6,406	13,190
769.20	6,458	13,512
769.25	6,510	13,836
769.30	6,562	14,163
769.35	6,614	14,492
769.40	6,666	14,824
769.45	6,718	15,159
769.50	**6,770**	**15,496**

APPENDIX D
Water Quality Calculations
NYSDEC Runoff Reduction Sheets (RRv)

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C		30%
D	**1.28**	20%
Total Area	1.28	
Calculate the Minimum RRv		
S =	**0.20**	
Impervious =	0.73	*acre*
Precipitation	1	*in*
Rv	0.95	
Minimum RRv	**503**	***ft3***
	0.01	af

Version 1.8
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Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.....	No

Design Point:	Site	
P=	1.00	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Description
1	0.21	0.21	100%	0.95	724	Bioretention
2	0.52	0.52	100%	0.95	1,793	Bioretention
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	0.73	0.73	100%	0.95	**2,517**	**Subtotal 1**
Total	0.73	0.73	100%	0.95	**2,517**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft^3)*
"<<Initial WQv"	0.73	0.73	100%	0.95	2,517
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**0.73**	**0.73**	100%	0.95	2,517
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	0.73	0.73	100%	0.95	**2,517**
WQv reduced by Area Reduction techniques					0

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4				
	Bioretention & Infiltration Bioretention	F-5	0.73	0.73	1013	1505
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction →			0.00	0.00	0	
Totals by Volume Reduction →			0.00	0.00	0	
Totals by Standard SMP w/RRV →			0.73	0.73	1013	1505
Totals by Standard SMP →			0.00	0.00		0
Totals (Area + Volume + all SMPs) →			0.73	0.73	1,013	1,505
	Impervious Cover √	okay				

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**Site**

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.21	0.21	1.00	0.95	724.19	1.00	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops			100%	0.95	724	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	

Soil Information			
Soil Group	D		
Soil Infiltration Rate	0.05	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		724	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**603**	***ft^2***	

Determine Actual Bio-Retention Area			
Filter Width	10	*ft*	
Filter Length	61	*ft*	
Filter Area	610	*ft^2*	
Actual Volume Provided	732	*ft^3*	

Determine Runoff Reduction				
Is the Bioretention contributing flow to another practice?		No	Select Practice	
RRv	293			
RRv applied	**293**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***	
Volume Treated	431	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*	
Volume Directed	0	*ft^3*	This volume is directed another practice	
Sizing √	OK		*Check to be sure Area provided ≥ Af*	

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor & Schueler, 1996)

Design Point:	**Site**

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	0.52	0.52	1.00	0.95	1793.22	1.00	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops			100%	0.95	1,793	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	

Soil Information			
Soil Group	D		
Soil Infiltration Rate	0.05	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		1,793	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**1494**	***ft^2***	

Determine Actual Bio-Retention Area			
Filter Width	15	*ft*	
Filter Length	100	*ft*	
Filter Area	1500	*ft^2*	
Actual Volume Provided	1800	*ft^3*	

Determine Runoff Reduction				
Is the Bioretention contributing flow to another practice?			Select Practice	
RRv	720			
RRv applied	**720**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***	
Volume Treated	1,073	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*	
Volume Directed	0	*ft^3*	This volume is directed another practice	
Sizing √	OK		*Check to be sure Area provided ≥ Af*	

Bioretention Worksheet

Total RRv Applied	1,012.80
Total Area	0.73
Total Impervious Area	0.73
Total Volume Treated	1,504.61
Rooftop Disconnect Impervious Area Total	0.00

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	2517	*0.058*
30	Total RRV Provided	1013	*0.023*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	503	*0.012*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	1505	*0.035*
34	Sum of Volume Reduced & Treated	2517	*0.058*
34	Sum of Volume Reduced and Treated	2517	*0.058*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?		