



October 15, 2019

VIA US MAIL

Village of Germantown WI  
Attn: Lori Johnson  
N112 W17001 Mequon Road  
Germantown, WI 53022

**Re: Menards Expansion Application Materials.**

Dear Ms. Johnson,

Please find enclosed the Menards application materials.

1. Site Plan Review Narrative Letter (1 Copy);
2. CUP Narrative Letter (1 Copy);
3. Site Plan Review Application (1 Copy);
4. Site Plan Review Fee (1 Copy);
5. CUP Application (1 Copy);
6. CUP Application Fee (1 Copy);
7. Access Easement Document (1 Copy);
8. DNR Wetland Permit (1 Copy);
9. ACOE Wetland Permit (1 Copy);
10. Stormwater Management Plan (1 Copy);
11. Site & Landscape Plan (17 Copies);
12. Elevation Plan (17 Copies);
13. Warehouse Elevation Plan (17 Copies);
14. Gate Elevation Plan (17 Copies);
15. Landscape Detail (17 Copies);
16. Photometric Plan (17 Copies);
17. Civil Engineering Plans (17 Copies);
18. Underground Detention Plans (17 Copies).

Please let me know if you need anything else. Thank you.

Sincerely,  
**Menard, Inc.**

Tyler Edwards

Real Estate Representative

Menard, Inc. 5101 Menard Drive Eau Claire, WI 54703

O: 715.876.2143 C: 715.579.6699 [tedwards@menard-inc.com](mailto:tedwards@menard-inc.com)

Enclosures



October 4, 2019

RE: Menard, Inc. Site Plan Review Application

Dear Members of the Planning Commission,

Menard, Inc. is submitting a site plan review application for the expansion of the Germantown Menards store. The proposed expansion will allow the Menards store the space needed to grow and add the materials, storage space, and amenities that all Menards stores across the country now have. This project primarily involves the expansion of the yard area and warehouse building within the yard and further described in the letter below.

The Menards yard will grow from 2.6 acres to 3.9 acres to allow four exterior changes to the property. One of those changes involves adding heated storage space between the loading dock and the garden center. This storage space will hold the orders for guests that order materials online and pick them up at the store. The elevations submitted with this application show the finish materials of green steel to match the existing building. This area is contained behind the store building and within the yard in a way that is not visible from outside the Menards yard.

There is an existing warehouse building in the northwest corner of the yard and that building is being extended to become a 50,317 sq ft building. The exterior finish of that building will match the existing building. The elevation plan for that has been included with this submittal. This will continue to be a drive through covered material storage building.

The yard fence surrounding the expanded yard will be a replacement of the existing 14 foot tall treated wood fence on the north side of the yard. The fencing facing west and the parking lot will be the same black wrought iron fence found on the site today.

The yard gate is being relocated to the south side of the property. Yard gates at all Menards stores are being expanded to add a 2<sup>nd</sup> entrance lane for online order pickups. Guests scan a barcode from their order and enter the yard to pick up their materials without waiting for the gate guard to let them in. the program allows guests to pick up their orders without parking. This lessens the parking needs at the store when guests no longer have to park in a space in the lot and get out to pick up their materials. This part of the project will reduce the number of parking stall by 75 spaces. 13 spaces will be created on the north end of the lot where the drive for the yard gate used to be. Overall the existing parking 531 stalls will be reduced to 461 parking stalls. Please note that this reduction will not have any adverse impact on available parking stalls at Menards. As a reference I have included a list of new store locations and the number of parking stalls that were provided. Because half of Menards traffic is contractors that shop during the daytime hours and the other half is home owners that shop on nights and weekends the demand at a Menards is about half of a general retailer or grocery store that tends to see the bulk of its traffic at one time in the evening and on weekends.

A portion of the stormwater pond is being filled with the yard expansion and the existing underground stormwater treatment area will be expanded to accommodate the additional stormwater runoff. The new underground detention will be placed in the parking lot and in the yard area in front of the new warehouse building. The Army Corps of Engineers and the Wisconsin DNR have already issued wetland fill permits for the expansion project. The project being submitted is the expansion plan that has the smallest impact on the wetlands while still expanding the Menards store to fit our needs.



Menards appreciates your consideration of this request to expand the store and serve the community long into the future. If you have any questions during your review please let me know. Thank you.

Sincerely,  
**Menard, Inc.**

A handwritten signature in black ink, appearing to read 'Tyler Edwards', written over a light blue horizontal line.

Tyler Edwards  
Real Estate Representative  
Menard, Inc. 5101 Menard Drive Eau Claire, WI 54703  
O: 715.876.2143 C: 715.579.6699 [tedwards@menard-inc.com](mailto:tedwards@menard-inc.com)



October 4, 2019

**RE: Menard, Inc. Conditional Use Permit Application**

Dear Members of the Planning Commission,

Menard, Inc. is submitting a conditional use permit application for the Germantown Menards store. Menards is in the process of updating and remodeling all Menards stores across the country to make sure that older stores offer the same services, products, and shopping experience as the new stores. In the competitive retail environment of today it is essential to invest in the store locations to remain successful.

The Menards store has operated in this location since it opened in 2003 and since that time there have been a couple of remodels and the proposed project is the next project that will expand the store into a store that matches all new Menards locations. This project will not change the purpose behind a Menards store. There will generally be the same number of employees, the same number of guests visiting the store and overall the same look to the store and yard.

There are three parts to the expansion of the yard and outdoor storage area. The first is an expansion of the overall footprint of the yard area. The yard will be increasing in size from 2.6 acres to 3.9 acres. This increase will allow the Germantown Menards to accommodate the second and third parts of this expansion and allow the creation of space to carry the same amount of materials that other Menards stores carry. The boundary of the yard will be expanded to the north and to the east. Menards has obtained wetland fill permits from both the DNR and the Army Corps for that expansion into the wetland area.

The second part of this project will be the expansion of the warehouse building. Along the north edge of the yard is a cold storage warehouse building that is not large enough to carry the full catalog of Menards materials. This building will be expanded to the east to create a 50,317 sq ft covered storage building. The exterior finish materials on the warehouse addition will match the existing warehouse building. Expanding the warehouse building will allow Menards to carry more materials and keep more materials onsite at any time to prevent running out or sending guests to other store locations to get what they need.

The third part of this yard expansion project is the relocation of the yard gate. Today the gate is located on the north side of the building between the garden center and the warehouse. This is not a good place to direct all of the heavy truck traffic for safety reasons. The garden center and warehouse is where the most people are walking around in the yard and all of the nearby heavy truck traffic can be dangerous. To fix that the gate will be relocated to the south side of the yard. The gate itself will be constructed using the same finish materials found on the existing gate. One additional entrance lane is being added to the gate for online order pickups. This is an automated entrance lane that allows guests to scan a barcode from their order and pick up their materials without waiting for the gate guard to let them in. There is a section of parking that will be removed as part of this project. Those 75 spaces are the least used spaces because they are tucked away from the front doors of the store. There is an access easement between Menards and the neighbor for use of the drive that connects the gate to Appleton Ave.

# MENARD, INC.

Menards does have a second CUP related to the size of the building. The existing Menards store is over 50,000 sq ft which requires a CUP in the ordinance. Menards will be adding a new overhang between the loading dock and garden center. This space will be heated storage space used to store online orders for guest pickup. The guest can enter through the order pickup lane at the new gate and pick up their order at this new section of the store. The exterior finishes of the building will match the existing building and those elevations are included in the submittal materials.

Thank you for your consideration of this request and the continued investment in the Germantown Menards store to ensure it is a successful part of the community long into the future. If you have any questions on the application and project please feel free to contact me directly.

Sincerely,  
**Menard, Inc.**



Tyler Edwards

Real Estate Representative

Menard, Inc. 5101 Menard Drive Eau Claire, WI 54703

O: 715.876.2143 C: 715.579.6699 [tedwards@menard-inc.com](mailto:tedwards@menard-inc.com)



# SITE PLAN REVIEW CHECKLIST

Pursuant to Section 17.43 of the Municipal Code

This checklist provides a summary of requirements found in the Municipal Code. It is intended purely as a guide for developers and should not substitute for a full review of the Code and applicable regulations. (Revised 1/02)

## GENERAL INFORMATION

- Provide Completed Checklist with submittal
- Names and addresses of owner/developer/designer
- Graphic scale, north arrow
- Location sketch
- Size of site (gross and net acreage)
- Existing zoning
- Adjacent zoning and uses
- Number of residents (subdivisions)
- Number of employees

## EXISTING SITE INFORMATION

- Dimensions of site and lot lines (pipes found, pipes set, monuments)
- Existing grades (2' contours minimum)
- Adjacent property grades (within 10' minimum of property lines)
- Adjacent structures (within 20' minimum of property lines)
- Drainage systems and structures
- Natural features (woods, streams, lakes, ponds, outcroppings)
- Wetland boundaries (provide date of staking)
- Floodplain elevation and boundaries
- Environmental concerns (underground tanks, etc)
- Roads, curbs, parking lots, pavement areas
- Structures (location, size)
- Rights-of-Way (existing/ultimate)
- Easements (drainage, utility)
- Existing utilities (sanitary, water, electric, gas, telephone)
- Benchmark locations and elevations
- Location of fences, wells, borings, etc.

## ARCHITECTURAL PLANS

- Existing building location
- Existing building elevations/materials
- Proposed use (use list from Section 17.45)
- Statement of design intent (narrative)
- Proposed floor plans (dimension)
- Square footage (total and individual rooms/stores)
- Proposed elevations (dimension)
- Proposed building height

- Proposed materials and colors (material sample board required for new construction)
- Proposed signage (elevations, color, square footage, height, construction material, lighting)
- Details of any special features

## PROPOSED SITE PLAN

- Grading and spot elevations
- Erosion control measures (silt fencing, hay bales, rip-rap, tracking mat, stockpile locations)
- Stormwater management
  - stormwater management design report
  - general drainage pattern
  - swales w/ arrows for direction of flow
  - pond design with outfalls
  - culverts (location/size)
- Utilities (size, invert elevations, length, slope, etc.)
  - sanitary
  - water
  - stormsewer
- Building location (dimension)
- Building elevation (finished grade)
- Location of proposed signage
- Details of outside storage (including trash receptacles)
- Setbacks (clearly marked and dimensioned)
- Vehicular entrances (dimension to centerline of nearest intersection)
- Streets (dimension and direction for one-ways)
- Curve radii
- Sidewalks (dimension)
- Parking areas (show striping/spot elevations)
- Parking setback from property line
- Loading areas (dimension)
- Lot coverage
  - Square footage total
  - Impervious surfaces total (%)
  - Green space total (%)
  - Percent permitted (over/under %)
- Municipal utility connections
  - Sanitary sewer (pipe size/elevations)
  - Water (size, valve location, elevations)
  - Location of hydrants
- Easement for public water mains

## LIGHTING PLAN

- ☐ Major improvements for context
- ☐ Location/nature of existing fixtures
- ☐ Location of proposed fixtures
- ☐ Photometric report (to scale on plan)
- ☐ Manufacturers cut-sheets of all fixtures
- ☐ Lighting schedule
  - key to plan
  - number/type of fixtures
  - output (wattage)
- ☐ Installation details as appropriate

## LANDSCAPING PLAN

- ☐ Major improvements for context (building, drives, walks)
- ☐ Proposed outdoor amenities (benches, paths, etc.)
- ☐ Existing vegetation
  - Species
  - Size
  - Approximate canopy in plan
- ☐ Vegetation to be destroyed
  - List and show location
- ☐ Proposed method of saving existing vegetation during construction
  
- ☐ Proposed landscape features (berms, fountains)
- ☐ Existing/proposed lighting
- ☐ Irrigation/watering systems (locate outlets)
- ☐ Plant lists or schedules
  - Keyed to plan
  - Number of each species
  - Size when planted (caliper)
- ☐ Installation details/staking

## MODEL SUBMITTAL INCLUDES THE FOLLOWING PLANS:

1. Cover / Title Page
2. Existing Conditions Survey
3. General Site Plan
4. Grading, Paving & Erosion Control Plan
5. Utility Plan
6. Site Details (curbing, catch basins, detention ponds, pavement, erosion control and sign details)
7. Landscape Plan
8. Landscape details (planting schedule, berming cross-sections, method of installation)
9. Lighting Plan
10. Floor Plan
11. Exterior Building Elevations
12. Building Material Sample Board

In addition to the items on this list, Village Staff and/or the Plan Commission may require additional drawings and data to be submitted for approval.

If any public improvements or work is to be done in the Public Right-of-Way, the Village will require that a Developer's Agreement be submitted and approved by the Village Board.



Village of



Germantown

Willkommen

Fee must accompany application

\$1460 Paid \_\_\_\_\_ Date \_\_\_\_\_

## CONDITIONAL USE PERMIT APPLICATION

Pursuant to Section 17.42 of the Municipal Code

Please read and complete this application carefully. All applications must be signed and dated.

### 1 APPLICANT OR AGENT

Menard, Inc.  
Tyler Edwards - Real Estate Rep  
5101 Menard Dr  
Eau Claire WI 54703  
Phone (715) 876-2143  
Fax ( )  
E-Mail tedwards@menard-inc.com

### PROPERTY OWNER

Menard, Inc.  
5101 Menard Dr  
Eau Claire WI 54703  
Phone (715) 876-2143

### 2 TO WHOM SHOULD THE PERMIT BE ISSUED?

Menard, Inc - owner

### 3 PROPERTY ADDRESS

W186N9754 Appleton Ave

### TAX KEY NUMBER

GTNV\_333963

### 4 DESCRIPTION OF EXISTING OPERATION

Briefly describe the use as it exists today, including use, size, number of employees, hours of operation, etc. If this permit involves new construction, describe the current status of the property, e.g. "vacant." Use additional pages as necessary.

Please see attached letter

### 5 DESCRIPTION OF PROPOSED OPERATION

Write the name of the proposed conditional use exactly as it appears in the Municipal Code.

Section 17.29 (3)(c) + Section 17.29 (3)(r)

Describe the proposed use, including size, number of employees, hours of operation and extent of any new construction/alterations.

Please see attached letter

**METES AND BOUNDS LEGAL DESCRIPTION OF PROPERTY — REQUIRED**

6

Attach pages as necessary.

**SUPPORTING DOCUMENTATION:**

7

- Site plan and elevations for new construction (can be conceptual)
- Photos of existing use and/or proposed use operating elsewhere
- Engineering Plans
- \_\_\_\_\_

**READ AND INITIAL THE FOLLOWING:**

8

- I understand that the Village is under no obligation to issue a Conditional Use Permit and will do so only if the applicant successfully demonstrates that the proposed use is harmonious with the neighborhood and the long range goals of the Village.
- I will notify the Village if any aspect of the conditional use changes. I understand that failure to do so may result in the revocation of the CUP.
- I understand that a Conditional Use Permit is valid only if the conditions and restrictions of the permit are met. I understand that failure to comply with any aspect of the permit may result in revocation.

**SIGNATURES — ALL APPLICATIONS MUST BE SIGNED BY OWNER!**

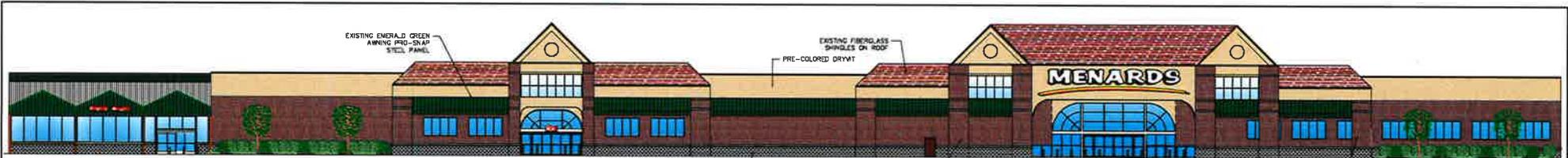
9

Applicant

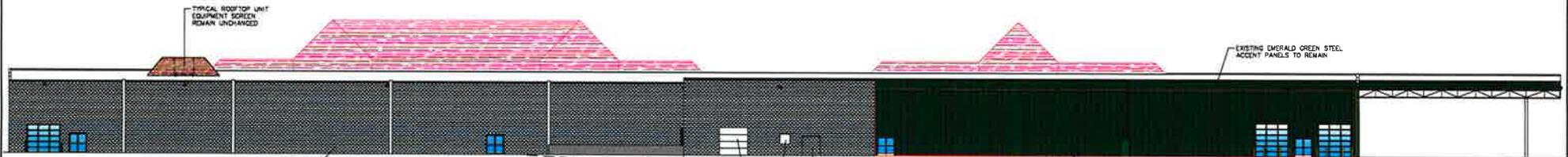
Date

[Signature] 10/15/19  
 Owner Real Estate Rep Date  
McNair, Inc.

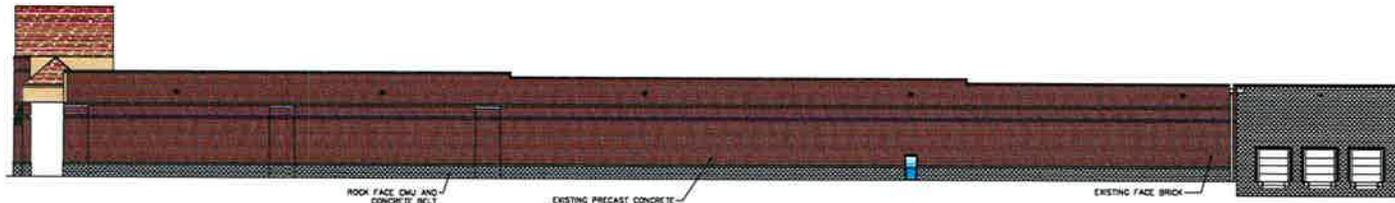




1 - EXISTING FRONT ELEVATION (TO REMAIN UNCHANGED)



2 - PROPOSED REAR ELEVATION



3 - EXISTING SIDE ELEVATION (TO REMAIN UNCHANGED)



4 - PROPOSED SIDE ELEVATION

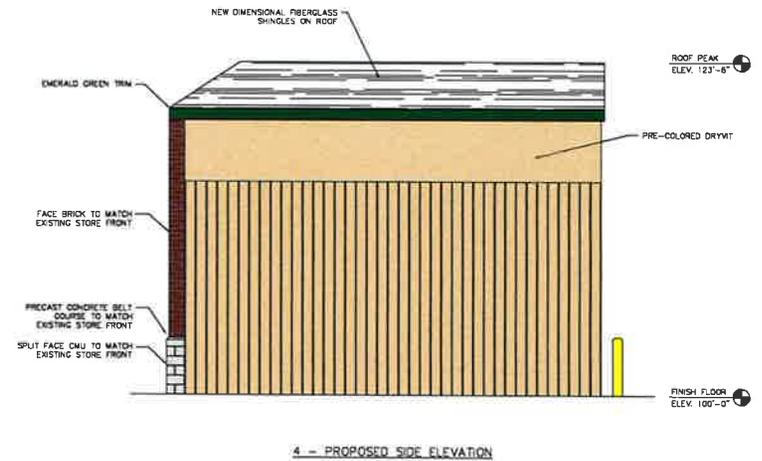
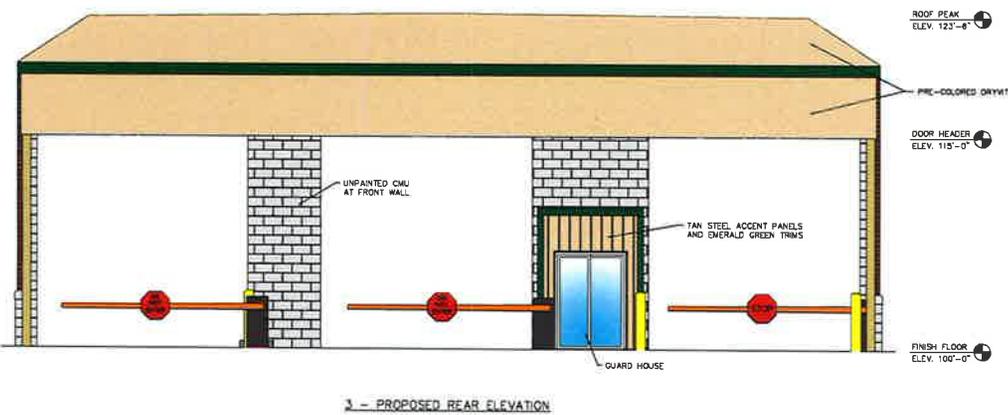
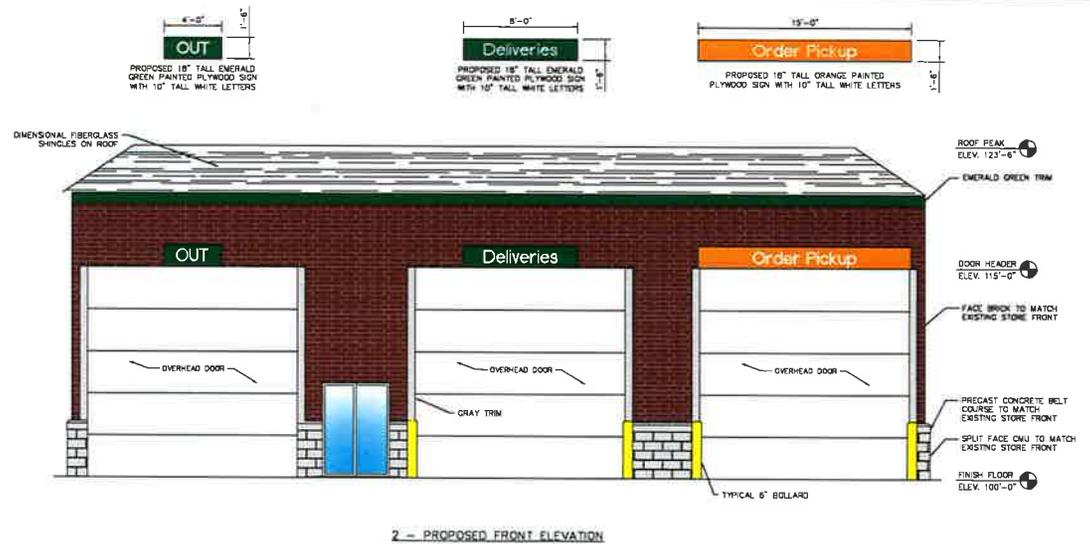
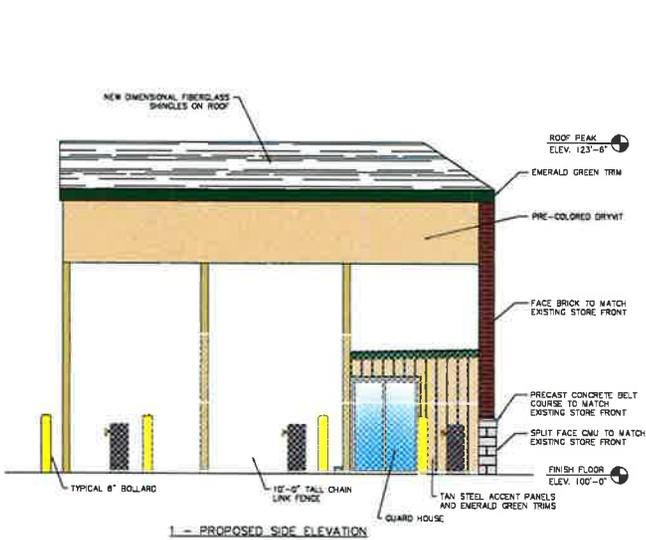
**MENARDS**

Tyler Edwards  
 Real Estate Representative  
 Menard, Inc.  
 5101 Menard Drive  
 Eau Claire, Wisconsin 54703

Cermantown, Wisconsin  
 Building Elevations  
 October 3, 2019  
 Scale: 1/16" = 1'-0"

CT2



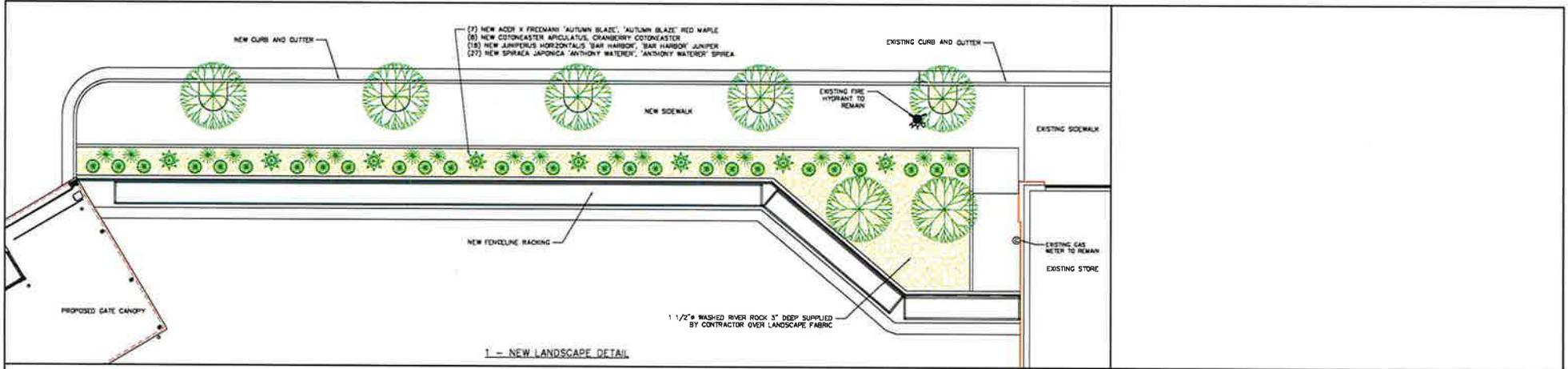


**MENARDS**

Tyler Edwards  
Real Estate Representative  
Menard, Inc.  
5101 Menard Drive  
Eau Claire, Wisconsin 54703

Germantown, Wisconsin  
Gate Canopy Elevations  
October 3, 2019  
Scale: 1/4" = 1'-0"

CT4

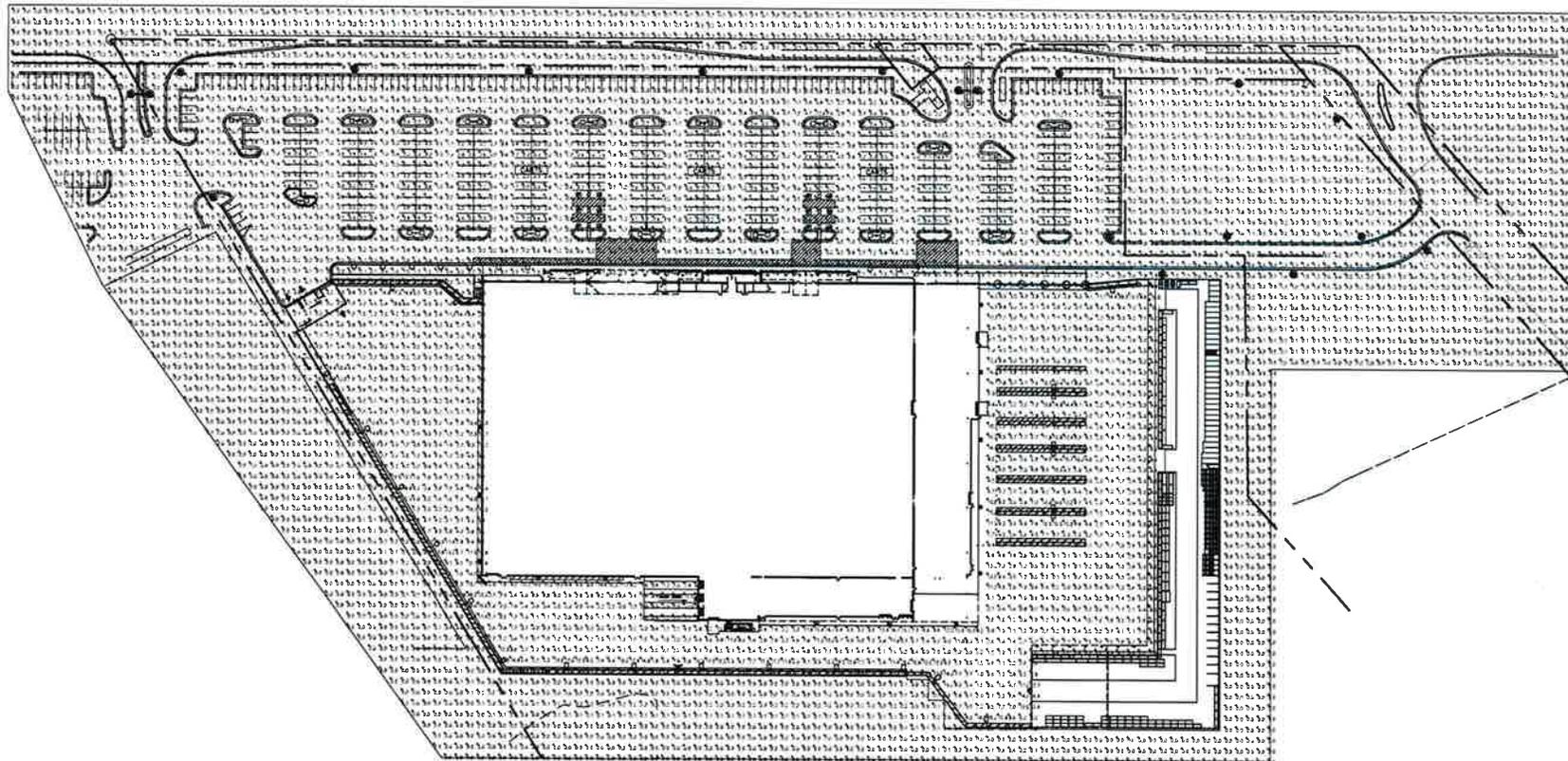


Tyler Edwards  
 Real Estate Representative  
 Menard, Inc.  
 5101 Menard Drive  
 Eau Claire, Wisconsin 54703



Germantown, Wisconsin  
 Detail Sheet  
 October 15, 2019  
 Scale: as shown

CTS



ELECTRICAL LEGEND	
●	15 ET18 WASHINGTON LUMINAIRE C/W #1 FINAL AND 45/48 CAPITAL 120W METAL HALIDE PULSE START BALLAST
○	5 ET18 WASHINGTON LUMINAIRE C/W #1 FINAL AND 45/48 CAPITAL 75W
●	2 ET18 WASHINGTON LUMINAIRE C/W #1 FINAL AND 45/48 CAPITAL 120W METAL HALIDE PULSE START BALLAST
□	15 200W 277V 40' CUTOFF LUMINAIRE PARKING LOT LIGHTING ON 35'-0" TALL POLES
■	11 200W 277V LED CUTOFF LUMINAIRE BUILDING LIGHTS
■	5 NEW 200W 277V LED CUTOFF LUMINAIRE BUILDING LIGHTS
□	4 EXISTING 400W 277V MH CUTOFF LUMINAIRE YARD LIGHTS LUMINAIRE YARD LIGHT NEW 200W 277V LED CUTOFF LUMINAIRE YARD LIGHT
□	15 NEW 200W 277V LED CUTOFF LUMINAIRE YARD LIGHTS
□	15 NEW 12' 300W 277V LED CUTOFF LUMINAIRE YARD LIGHTS MOUNTED ON 35'-0" TALL POLES
□	17 175W CANOPY LIGHTS (STORE CANOPY)
□	30 80 WATT LED 277V SOFFIT LIGHTS (WAREHOUSE OVERHANG)

STATISTICS					
DESCRIPTION	SUMMARY	MAX	MIN	MAX/MIN	AVERAGE
CALC ZONE 1	1	17	1	17	1



Tyler Edwards  
 Real Estate Representative  
 Menard, Inc.  
 5101 Menard Drive  
 Eau Claire, Wisconsin 54703

**MENARDS**

Germantown, Wisconsin  
 Menards Site Plan  
 October 15, 2019  
 Scale: 1" = 50'-0"

CT6

# SITE AND BUILDING ADDITION

## MENARDS, CITY GERMANTOWN

### W186N9754 APPLETON AVENUE GERMANTOWN, WI 53022

SHEET NO.	1403-B1
BOOK NO.	N/A
DRAWN BY	D B
CHECKED BY	R K
DATE	OCT. 2019
REVISIONS	
REFERENCE FILE	
DRAWING FILE	1403-B1-TS.dwg

Civil Engineer  
 Wisconsin License No. 1000000000  
 Cedar Corporation  
 715-221-2371  
 200-122-2371  
 800-732-2371  
 1000 Wisconsin Avenue  
 Eau Claire, WI 54601

OWNER:  
 MENARD Inc.  
 5101 MENARD DRIVE  
 EAU CLAIRE, WI 54703  
 715-876-2532

#### CIVIL INDEX

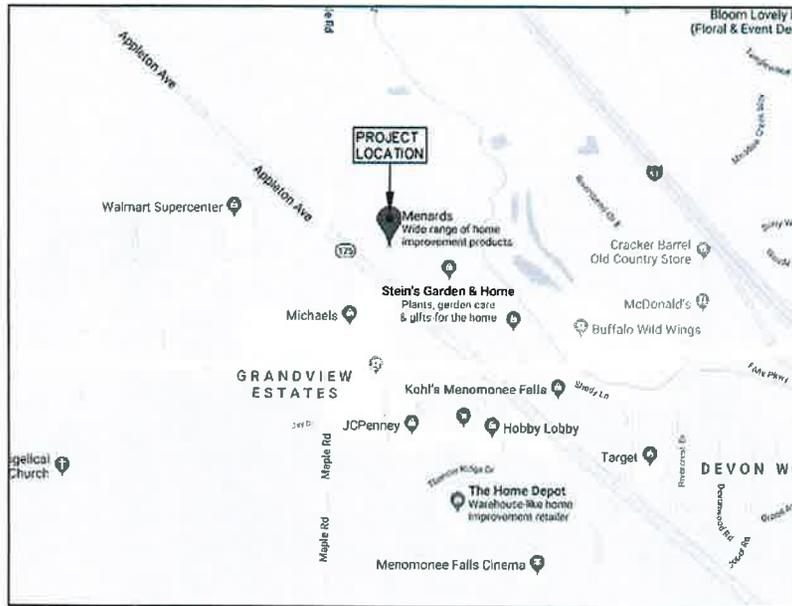
SHEET	SHEET DESCRIPTION
C1.0	TITLE SHEET
C1.1	EXISTING SITE CONDITIONS
C1.2	REMOVAL PLAN
C1.3	SITE PLAN
C1.4	GRADING PLAN
C1.5	EROSION CONTROL PLAN
C1.6	SITE DETAILS
C1.7	SITE DETAILS
1-6	MENARDS EXPANSION SYSTEM # 1
1-6	MENARDS EXPANSION SYSTEM # 2

**DIGGERS HOTLINE**  
 Dial 811 or (800) 242-8511  
 www.DiggersHotline.com

  
*Russell P. Kivihiemi*  
 10/19/2019  
 I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY PERSONAL DIRECTION AND CONTROL AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF WISCONSIN.

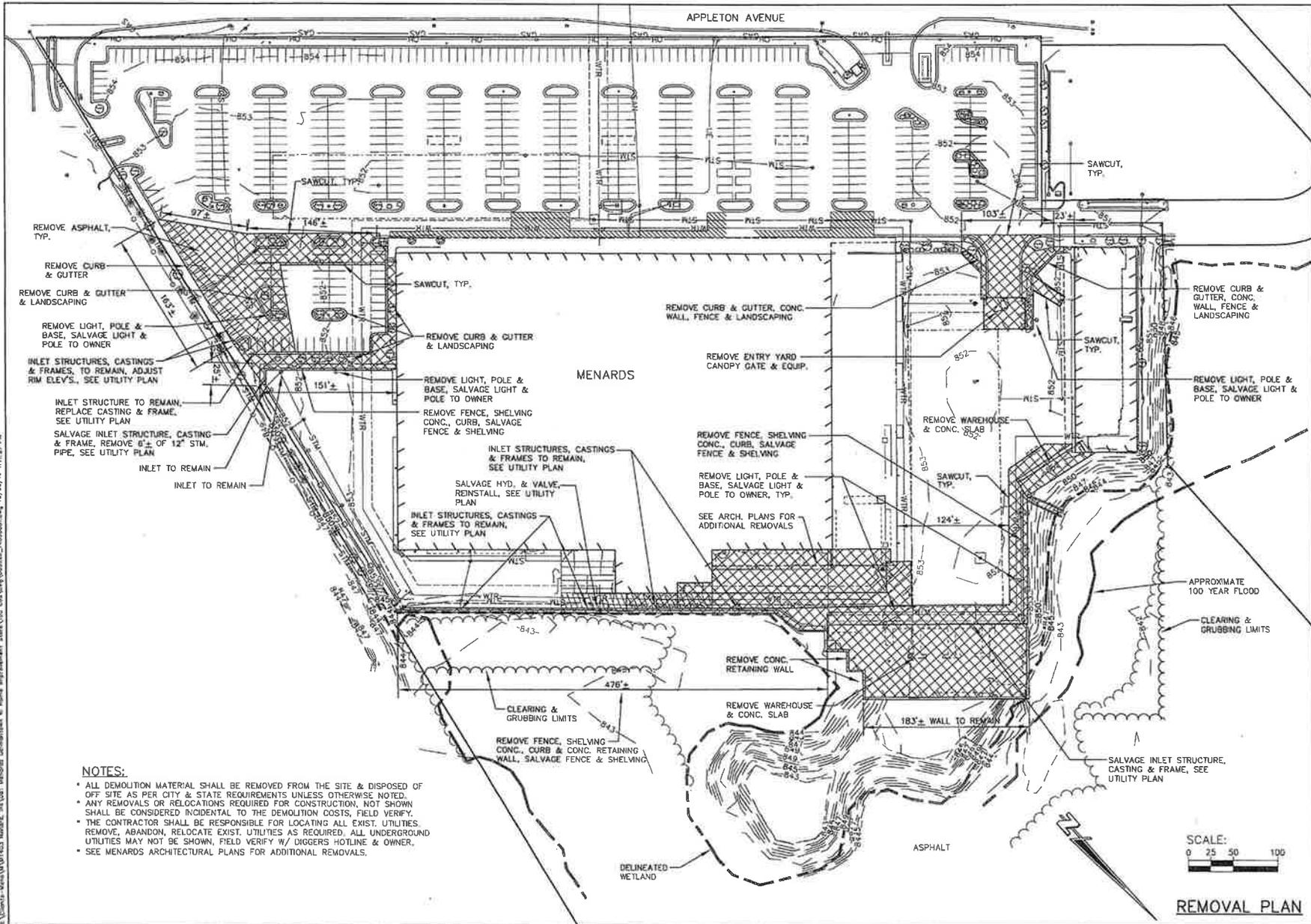
SITE AND BUILDING ADDITION  
 MENARDS, CITY GERMANTOWN  
 W186N9754 APPLETON AVENUE  
 GERMANTOWN, WI 53022

SHEET NO.  
**C1.0**



LOCATION MAP  
NO SCALE





**NOTES:**

- ALL DEMOLITION MATERIAL SHALL BE REMOVED FROM THE SITE & DISPOSED OF OFF SITE AS PER CITY & STATE REQUIREMENTS UNLESS OTHERWISE NOTED.
- ANY REMOVALS OR RELOCATIONS REQUIRED FOR CONSTRUCTION, NOT SHOWN SHALL BE CONSIDERED INCIDENTAL TO THE DEMOLITION COSTS, FIELD VERIFY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXIST. UTILITIES. REMOVE, ABANDON, RELOCATE EXIST. UTILITIES AS REQUIRED. ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN, FIELD VERIFY W/ DIGGERS HOTLINE & OWNER.
- SEE MENARDS ARCHITECTURAL PLANS FOR ADDITIONAL REMOVALS.

JOB NO.	1430-81
BOOK NO.	N/A
DRAWN BY	D B
CHECKED BY	R K
DATE	OCT. 2019
REVISED	
REFERENCE FILE	
DRAWING FILE	00Draw_14030081.dwg

www.cedarcorp.com  
800-477-7372

**Cedar Corporation**

1825 North Street  
Menards, WI 53021  
Tel: 920-227-4000  
Fax: 920-227-2127

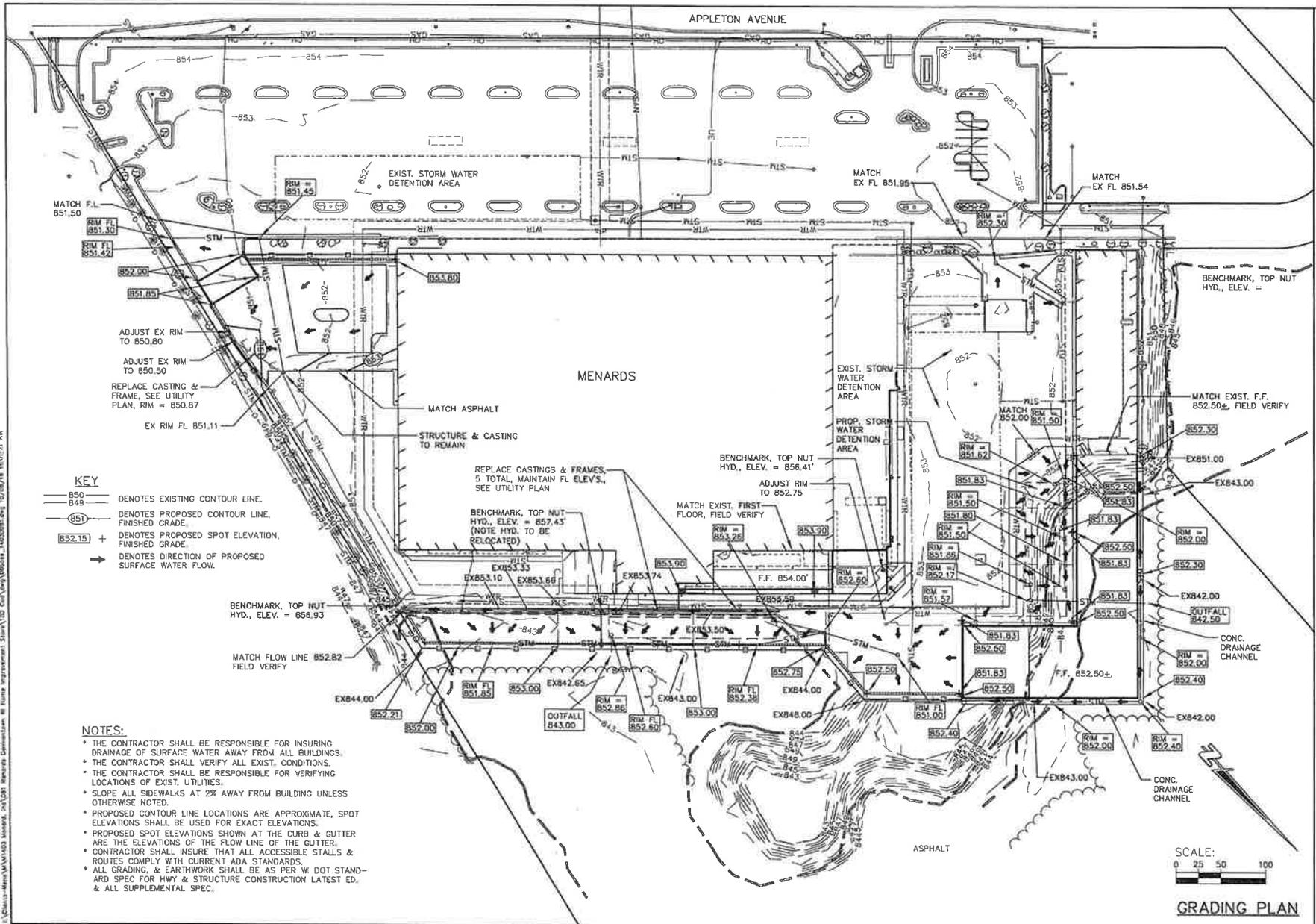
**SITE AND BUILDING ADDITION**  
MENARDS, CITY GERMANTOWN  
W18619754, APPLETON AVENUE  
GERMANTOWN, WI 53022

SHEET NO.  
**C1.2**



**REMOVAL PLAN**





- KEY**
- 850 — DENOTES EXISTING CONTOUR LINE.
  - 849 — DENOTES PROPOSED CONTOUR LINE.
  - 851.15 + DENOTES PROPOSED SPOT ELEVATION, FINISHED GRADE.
  - DENOTES DIRECTION OF PROPOSED SURFACE WATER FLOW.

- NOTES:**
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSURING DRAINAGE OF SURFACE WATER AWAY FROM ALL BUILDINGS.
  - THE CONTRACTOR SHALL VERIFY ALL EXIST. CONDITIONS.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING LOCATIONS OF EXIST. UTILITIES.
  - SLOPE ALL SIDEWALKS AT 2% AWAY FROM BUILDING UNLESS OTHERWISE NOTED.
  - PROPOSED CONTOUR LINE LOCATIONS ARE APPROXIMATE, SPOT ELEVATIONS SHALL BE USED FOR EXACT ELEVATIONS.
  - PROPOSED SPOT ELEVATIONS SHOWN AT THE CURB & GUTTER ARE THE ELEVATIONS OF THE FLOW LINE OF THE GUTTER.
  - CONTRACTOR SHALL INSURE THAT ALL ACCESSIBLE STALLS & ROUTES COMPLY WITH CURRENT ADA STANDARDS.
  - ALL GRADING, & EARTHWORK SHALL BE AS PER W. DOT STANDARD SPEC FOR HWY & STRUCTURE CONSTRUCTION LATEST ED. & ALL SUPPLEMENTAL SPEC.

JOB NO. 1430-B1  
 BOOK NO. N/A  
 DRAWN BY D.B.  
 CHECKED BY R.K.  
 DATE OCT. 2019  
 REVISIONS  
 REFERENCE FILE  
 DRAWING FILE 100base\_14030081.dwg

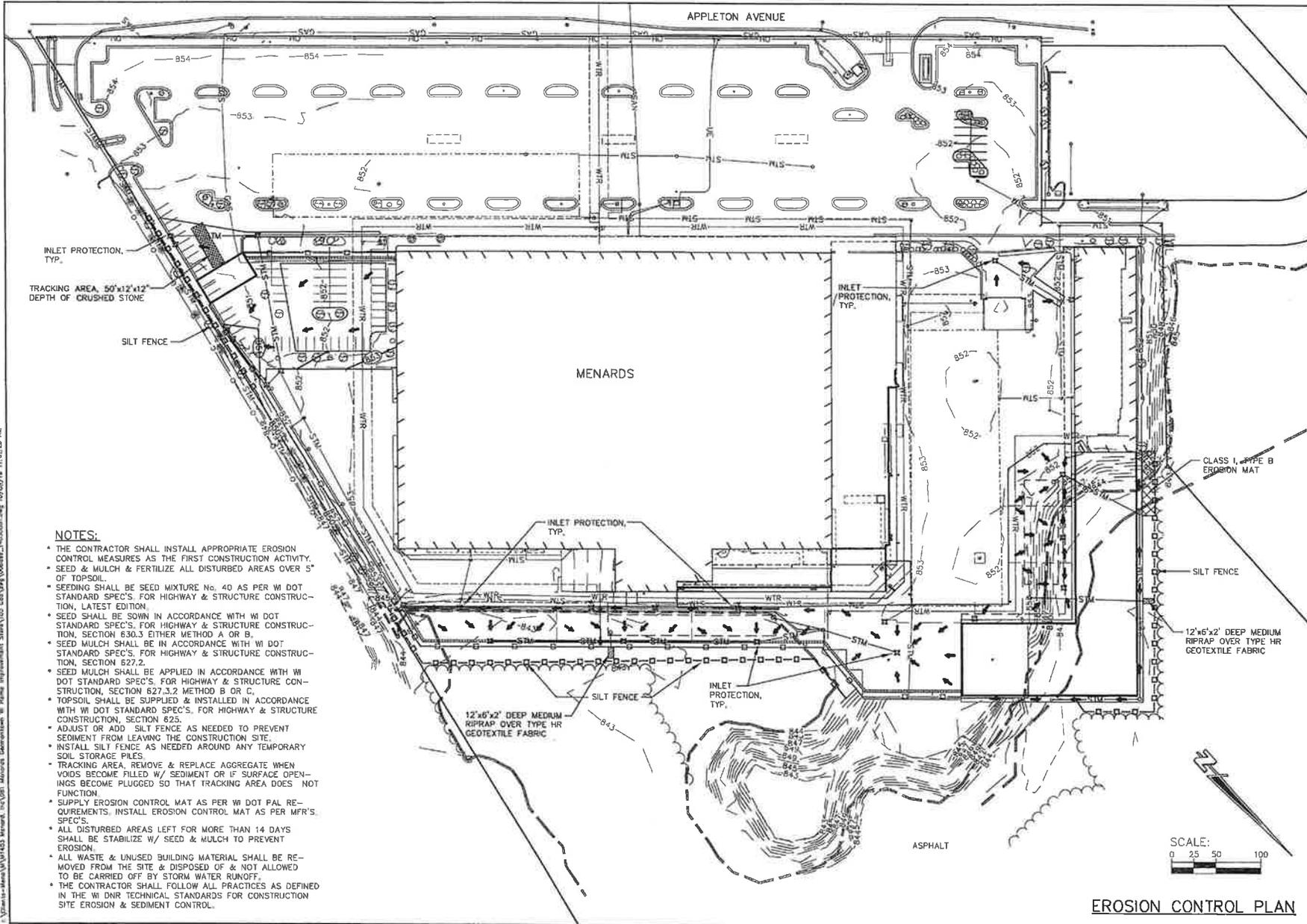
www.cedarcorp.com  
 800-472-7272  
  
 Cedar Corporation  
 2200 Midway Commerce W.  
 Germantown, WI 53032  
 262-252-2525  
 262-252-2525

**SITE AND BUILDING ADDITION**  
 MENARDS, CITY GERMANTOWN  
 W166N9754 APPLETON AVENUE  
 GERMANTOWN, WI 53022

SHEET NO.  
**C1.4**

SCALE:  
 0 25 50 100  
**GRADING PLAN**

P:\Client\menards\1430 Menards - Stormwater\1430 Menards - Stormwater.dwg 12/26/19 10:21:41



JOB NO.	1430-81
BOOK NO.	N/A
DRAWN BY	D B
CHECKED BY	R K
DATE	OCT. 2019
REVISIONS	
REFERENCE FILE	
DRAWING FILE	G0base_14030081.dwg

www.cedarcorp.com  
800-472-7372

**Cedar Corporation**

1000 North 10th Street  
Decorah, IA 52001  
Phone: 563-385-3200  
Fax: 563-385-3277

**SITE AND BUILDING ADDITION**  
MENARDS, CITY GERMANTOWN  
W186N9754 APPLETON AVENUE  
GERMANTOWN, WI 53022

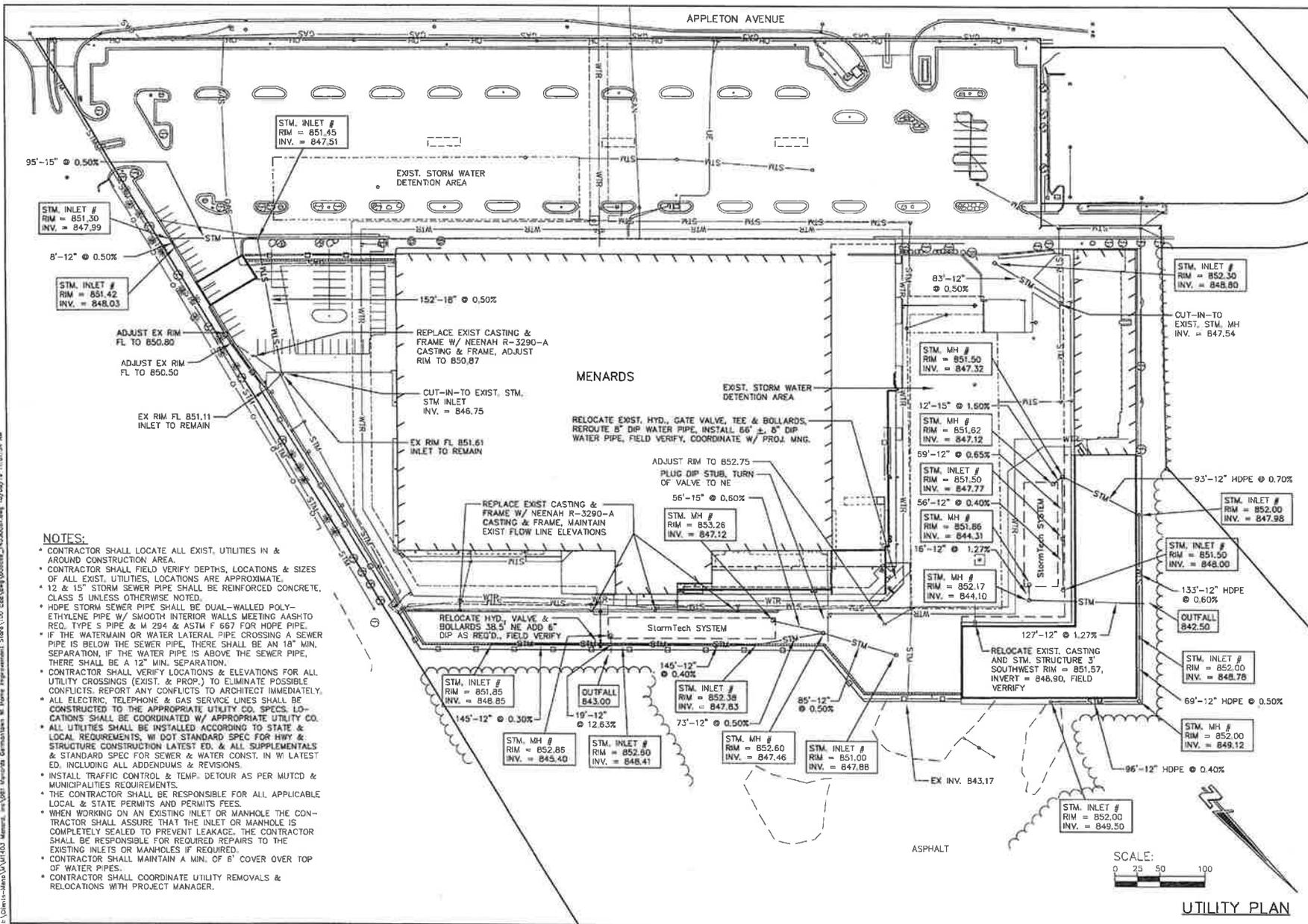
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**C1.5**

**EROSION CONTROL PLAN**

**NOTES:**

- THE CONTRACTOR SHALL INSTALL APPROPRIATE EROSION CONTROL MEASURES AS THE FIRST CONSTRUCTION ACTIVITY.
- SEED & MULCH & FERTILIZE ALL DISTURBED AREAS OVER 5" OF TOPSOIL.
- SEEDING SHALL BE SEED MIXTURE No. 40 AS PER WI DOT STANDARD SPEC'S. FOR HIGHWAY & STRUCTURE CONSTRUCTION, LATEST EDITION.
- SEED SHALL BE SOWN IN ACCORDANCE WITH WI DOT STANDARD SPEC'S. FOR HIGHWAY & STRUCTURE CONSTRUCTION, SECTION 630.3 EITHER METHOD A OR B.
- SEED MULCH SHALL BE IN ACCORDANCE WITH WI DOT STANDARD SPEC'S. FOR HIGHWAY & STRUCTURE CONSTRUCTION, SECTION 627.2.
- SEED MULCH SHALL BE APPLIED IN ACCORDANCE WITH WI DOT STANDARD SPEC'S. FOR HIGHWAY & STRUCTURE CONSTRUCTION, SECTION 627.2 METHOD B OR C.
- TOPSOIL SHALL BE SUPPLIED & INSTALLED IN ACCORDANCE WITH WI DOT STANDARD SPEC'S. FOR HIGHWAY & STRUCTURE CONSTRUCTION, SECTION 625.
- ADJUST OR ADD SILT FENCE AS NEEDED TO PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION SITE.
- INSTALL SILT FENCE AS NEEDED AROUND ANY TEMPORARY SOIL STORAGE PILES.
- TRACKING AREA, REMOVE & REPLACE AGGREGATE WHEN VOIDS BECOME FILLED W/ SEDIMENT OR IF SURFACE OPENINGS BECOME PLUGGED SO THAT TRACKING AREA DOES NOT FUNCTION.
- SUPPLY EROSION CONTROL MAT AS PER WI DOT PAL REQUIREMENTS. INSTALL EROSION CONTROL MAT AS PER MFR'S SPEC'S.
- ALL DISTURBED AREAS LEFT FOR MORE THAN 14 DAYS SHALL BE STABILIZE W/ SEED & MULCH TO PREVENT EROSION.
- ALL WASTE & UNUSED BUILDING MATERIAL SHALL BE REMOVED FROM THE SITE & DISPOSED OF & NOT ALLOWED TO BE CARRIED OFF BY STORM WATER RUNOFF.
- THE CONTRACTOR SHALL FOLLOW ALL PRACTICES AS DEFINED IN THE WI DNR TECHNICAL STANDARDS FOR CONSTRUCTION SITE EROSION & SEDIMENT CONTROL.

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**NOTES:**

- CONTRACTOR SHALL LOCATE ALL EXIST. UTILITIES IN & AROUND CONSTRUCTION AREA.
- CONTRACTOR SHALL FIELD VERIFY DEPTHS, LOCATIONS & SIZES OF ALL EXIST. UTILITIES. LOCATIONS ARE APPROXIMATE.
- 12 & 15" STORM SEWER PIPE SHALL BE REINFORCED CONCRETE, CLASS 5 UNLESS OTHERWISE NOTED.
- HDPE STORM SEWER PIPE SHALL BE DUAL-WALLED POLY-ETHYLENE PIPE W/ SMOOTH INTERIOR WALLS MEETING AASHTO REQ. TYPE S PIPE & M 294 & ASTM F 667 FOR HDPE PIPE.
- IF THE WATERMAIN OR WATER LATERAL PIPE CROSSING A SEWER PIPE IS BELOW THE SEWER PIPE, THERE SHALL BE AN 18" MIN. SEPARATION. IF THE WATER PIPE IS ABOVE THE SEWER PIPE, THERE SHALL BE A 12" MIN. SEPARATION.
- CONTRACTOR SHALL VERIFY LOCATIONS & ELEVATIONS FOR ALL UTILITY CROSSINGS (EXIST. & PROP.) TO ELIMINATE POSSIBLE CONFLICTS. REPORT ANY CONFLICTS TO ARCHITECT IMMEDIATELY.
- ALL ELECTRIC, TELEPHONE & GAS SERVICE LINES SHALL BE CONSTRUCTED TO THE APPROPRIATE UTILITY CO. SPECS. LOCATIONS SHALL BE COORDINATED W/ APPROPRIATE UTILITY CO.
- ALL UTILITIES SHALL BE INSTALLED ACCORDING TO STATE & LOCAL REQUIREMENTS. W/ DOT STANDARD SPEC FOR HWY & STRUCTURE CONSTRUCTION LATEST ED. & ALL SUPPLEMENTALS & STANDARD SPEC FOR SEWER & WATER CONST. IN W/ LATEST ED. INCLUDING ALL ADDENDUMS & REVISIONS.
- INSTALL TRAFFIC CONTROL & TEMP. DETOUR AS PER MUTCD & MUNICIPALITIES REQUIREMENTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL APPLICABLE LOCAL & STATE PERMITS AND PERMITS FEES.
- WHEN WORKING ON AN EXISTING INLET OR MANHOLE THE CONTRACTOR SHALL ASSURE THAT THE INLET OR MANHOLE IS COMPLETELY SEALED TO PREVENT LEAKAGE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REQUIRED REPAIRS TO THE EXISTING INLETS OR MANHOLES IF REQUIRED.
- CONTRACTOR SHALL MAINTAIN A MIN. OF 6' COVER OVER TOP OF WATER PIPES.
- CONTRACTOR SHALL COORDINATE UTILITY REMOVALS & RELOCATIONS WITH PROJECT MANAGER.

JOB NO.	1430-01
BOOK NO.	N/A
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CHECKED BY	R K
DATE	OCT. 2019
REVISIONS	
REFERENCE FILE	
DRAWING FILE	00Draw_14030001.dwg

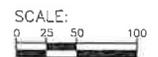
www.cedarcorp.com  
800-472-7372

**Cedar Corporation**

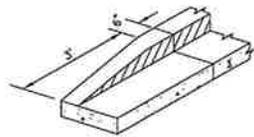
1825 N. Main Street  
Menasha, WI 54952  
Phone: 920-735-2000  
Fax: 920-735-2001

**SITE AND BUILDING ADDITION**  
MENARDS, CITY GERMANTOWN  
W/86N9754 APPLETON AVENUE  
GERMANTOWN, WI 53022

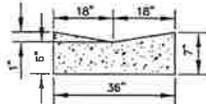
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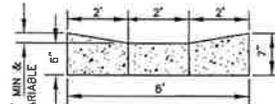
UTILITY PLAN



**CURB & GUTTER END TAPER SECTION**  
NO SCALE



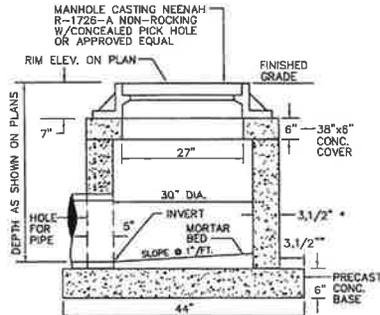
**SECTION CONCRETE VALLEY GUTTER IN ASPHALT**  
NO SCALE



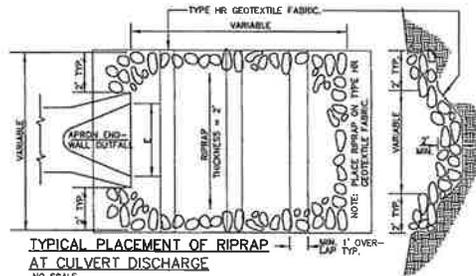
**SECTION CONCRETE DRAINAGE CHANNEL ALONG BUILDING**  
NO SCALE



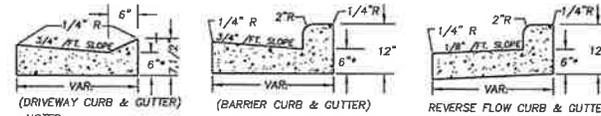
**SILT FENCE DETAIL**  
NO SCALE  
\* SILT FENCE SHALL BE SUPPLIED & INSTALLED AS PER THE W DOT STANDARD SPECIFICATIONS FOR HIGHWAY & STRUCTURE CONSTRUCTION.



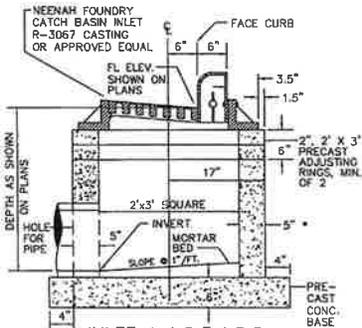
**STORM MANHOLE # 1,3,4,5,6,7**  
NO SCALE  
\* 6" MIN. THICKNESS FOR NONREINFORCED CONC. WALL OR WHEN USING CONCRETE BLOCK



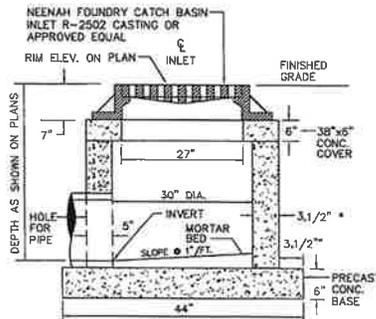
**TYPICAL PLACEMENT OF RIPRAP AT CULVERT DISCHARGE**  
NO SCALE  
\* RIPRAP & GEOTEXTILE FABRIC SHALL BE SUPPLIED & INSTALLED AS PER W DOT STANDARD SPECS. FOR HIGHWAY & STRUCTURE CONSTRUCTION.  
\* THE APRON ENDWALL & LAST 2 PIPE SECTIONS TOGETHER, MIN. 2 TIES PER SECTION.  
\* INSTALL APRON ENDWALLS AT ALL PIPE OUTFALLS.



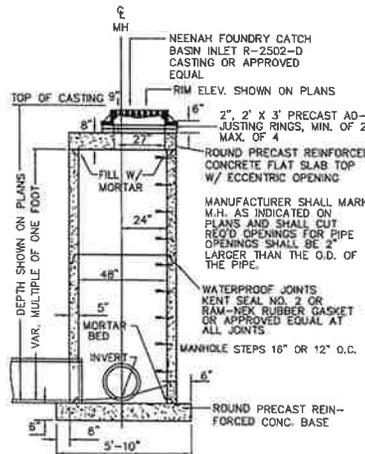
**NOTES:**  
\* THE BOTTOM OF THE CURB AND GUTTER MAY BE CONSTRUCTED EITHER LEVEL OR PARALLEL TO THE SLOPE OF THE SUBGRADE OR BASE COURSE. PROVIDING A 6" MIN. DEPTH GUTTER THICKNESS IS MAINTAINED.  
\* INSTALL CURB & GUTTER ON 6" DEPTH OF COMPACTED AGGREGATE BASE.  
\* THE NEW CURB & GUTTER @ THE EXISTING STREETS SHALL MEET & EQUAL EXISTING CURB & GUTTER.  
**24" CURB & GUTTER** NO SCALE



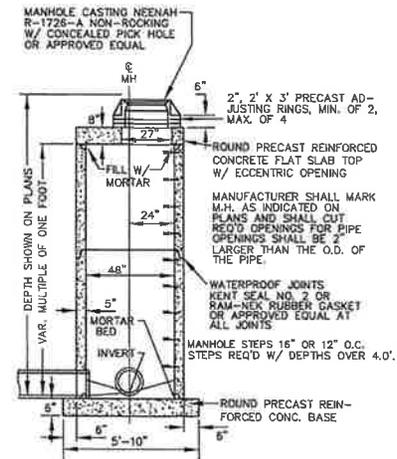
**INLET # 1,2,3,4,5,6**  
NO SCALE  
\* 6" MIN. THICKNESS FOR NONREINFORCED CONC. WALL OR WHEN USING CONCRETE BLOCK



**INLET # 7,8,9,10,12,13,14**  
NO SCALE  
\* 6" MIN. THICKNESS FOR NONREINFORCED CONC. WALL OR WHEN USING CONCRETE BLOCK



**STORM MANHOLE INLET # 11**  
NO SCALE



**STORM MANHOLE # 2** NO SCALE

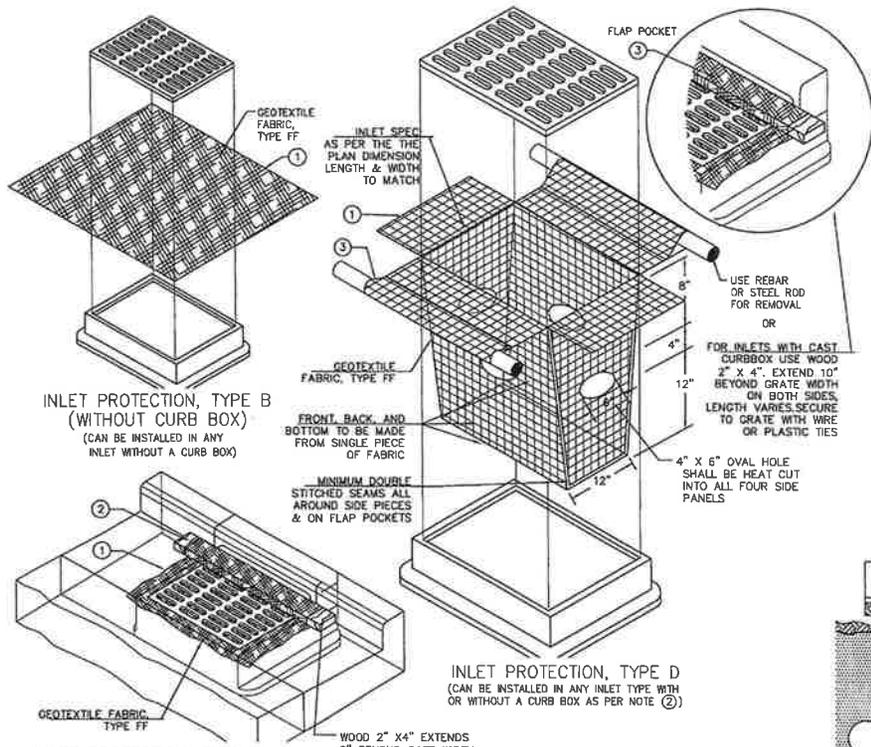
**SITE DETAILS**

JOB NO.	1430-81
BOOK NO.	N/A
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CHECKED BY	R K
DATE	OCT. 2019
REVISIONS	
REFERENCE FILE	
DRAWING FILE	D0base_14030081.dwg

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800-472-7372  
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10000 W. Higgins Ave., Suite 100, Germantown, WI 53032  
Phone: 262-338-1400 Fax: 262-338-1401  
www.cedarcorp.com

**SITE AND BUILDING ADDITION**  
MENARDS, CITY GERMANTOWN  
W186N754 APPLETON AVENUE  
GERMANTOWN, WI 53022

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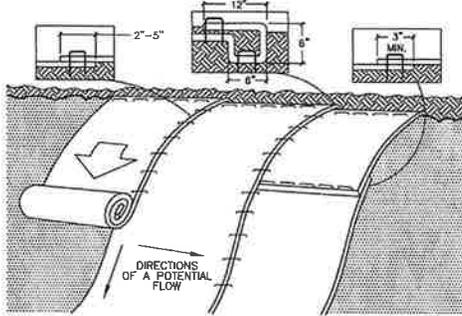


**INLET PROTECTION, TYPE B  
(WITHOUT CURB BOX)**  
(CAN BE INSTALLED IN ANY  
INLET WITHOUT A CURB BOX)

**INLET PROTECTION, TYPE C  
INSTALLATION NOTES**

**TYPE B & C**  
TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.  
THE CONTRACTOR SHALL DEMONSTRATE A METHOD OF MAINTENANCE, USING A SEWN FLAP, HAND  
HOLDS OR OTHER METHOD TO PREVENT ACCUMULATED SEDIMENT FROM ENTERING THE INLET.

**TYPE D**  
DO NOT INSTALL INLET PROTECTION TYPE D IN INLETS SHALLOWER THAN 30", MEASURED  
FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.  
TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.  
THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET WALL AND THE BAG,  
MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL  
CINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED AT  
A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.



- \* PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL MAT, INCLUDING GRADING, TOPSOIL, SEED & FERTILIZER.
- \* BEGIN AT TOP OF SLOPE, BY ANCHORING MAT IN TRENCH, INSTALL STAPLES 12" APART, SEE DETAIL.
- \* ROLL MAT DOWN SLOPE AS SHOWN. FASTEN MAT TO SOIL SURFACE W/ STAPLES. STAPLE PATTERN GUIDE BY MFR.
- \* OVERLAP MAT AS PER MFRS. SPEC.
- \* NORTH AMERICAN GREEN, USA 1-800-772-2040, www.nogreen.com.

**EROSION CONTROL MAT DETAIL, NO SCALE**

JOB NO.	1430-81
BOOK NO.	N/A
DRAWN BY	D B
CHECKED BY	R K
DATE	OCT. 2019
REVISIONS	

REFERENCE FILE  
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www.cedarcorporation.com  
800-472-1372

**Cedar Corporation**

1400 Westpark Drive  
Menards, WI 53022  
Tel: 800-472-1372  
Fax: 920-754-3333

**SITE AND BUILDING ADDITION**  
MENARDS, CITY GERMANTOWN  
W186N9754 APPLETON AVENUE  
GERMANTOWN, WI 53022

SHEET NO.  
**C1.8**

**SITE DETAILS**

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	EPM NAME EPM NUMBER EPM EMAIL
ADS SALES REP	SALES NAME SALES NUMBER SALES EMAIL
PROJECT NO.	



ADVANCED DRAINAGE SYSTEMS, INC.

**SiteASSIST**  
by StormTech  
FOR STORMTECH  
INSTRUCTIONS,  
DOWNLOAD THE  
INSTALLATION APP



## MENARDS EXPANSION SYSTEM #1 GERMANTOWN, WI

### MC-3500 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-3500.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

- STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
  - THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
    - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
    - NO RUBBER Tired LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
    - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
  - FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.
- USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

**PROPOSED LAYOUT**

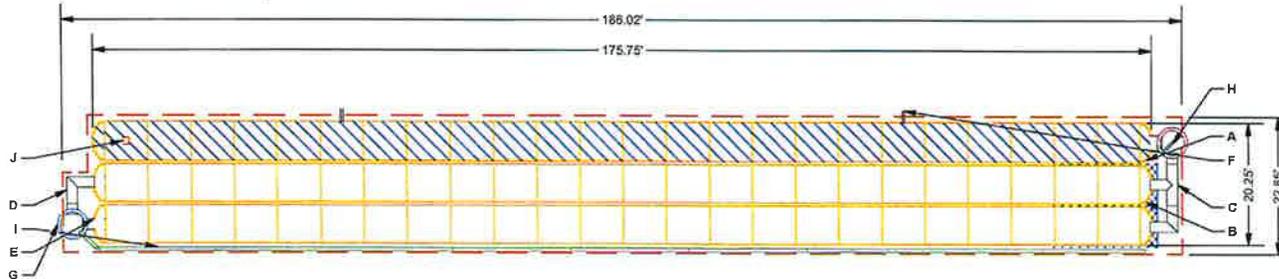
72	STORMTECH MC-3500 CHAMBERS
6	STORMTECH MC-3500 END CAPS
12	STONE ABOVE (in)
9	STONE BELOW (in)
40	% STONE VOID
	INSTALLED SYSTEM VOLUME (CF)
	(PERIMETER STONE INCLUDED)
14066	(COVER STONE INCLUDED)
	(BASE STONE INCLUDED)
4211	SYSTEM AREA (SF)
417.73	SYSTEM PERIMETER (ft)

**PROPOSED ELEVATIONS**

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	857.00
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	851.50
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	850.50
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	850.50
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	850.50
TOP OF STONE:	850.00
TOP OF MC-3500 CHAMBER:	849.00
4" INSERTA TEE INVERT:	845.75
24" ISOLATOR ROW INVERT:	845.42
18" x 18" BOTTOM MANIFOLD INVERT:	845.40
18" x 18" BOTTOM MANIFOLD INVERT:	845.40
18" BOTTOM CONNECTION INVERT:	845.40
BOTTOM OF MC-3500 CHAMBER:	845.25
UNDERDRAIN INVERT:	844.50
BOTTOM OF STONE:	844.50

857.00
851.50
850.50
850.50
850.00
849.00
845.75
845.42
845.40
845.40
845.40
845.25
844.50
844.50

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	*INVERT ABOVE BASE OF CHAMBER	
			INVERT*	MAX FLOW
PREFABRICATED END CAP	A	24" BOTTOM CORED END CAP/TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS	2.08"	
PREFABRICATED END CAP	B	18" BOTTOM CORED END CAP/TYP OF ALL 18" BOTTOM CONNECTIONS	1.77"	
MANIFOLD	C	18" X 18" BOTTOM, ADS N-12	1.77"	
MANIFOLD	D	18" X 18" BOTTOM, ADS N-12	1.77"	
PIPE CONNECTION	E	18" BOTTOM CONNECTION	1.77"	
INSERTA TEE	F	4" DIAMETER	6.00"	
CONCRETE STRUCTURE	G	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		8.0 CFS OUT
CONCRETE STRUCTURE W/WWEIR	H	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		11.0 CFS IN
UNDERDRAIN	I	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
INSPECTION PORT	J	4" SEE DETAIL		



- ISOLATOR ROW (SEE DETAIL)
- PLACE MINIMUM 17.5" OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS
- BED LIMITS

**NOTES**

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH SHEET #7 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- NOT FOR CONSTRUCTION

MENARDS EXPANSION SYSTEM #1 GERMANTOWN, WI	DRAWN: JB CHECKED: N/A	DATE: PROJECT #: PROJECT NAME:	DESCRIPTION REV   DRW   CHK
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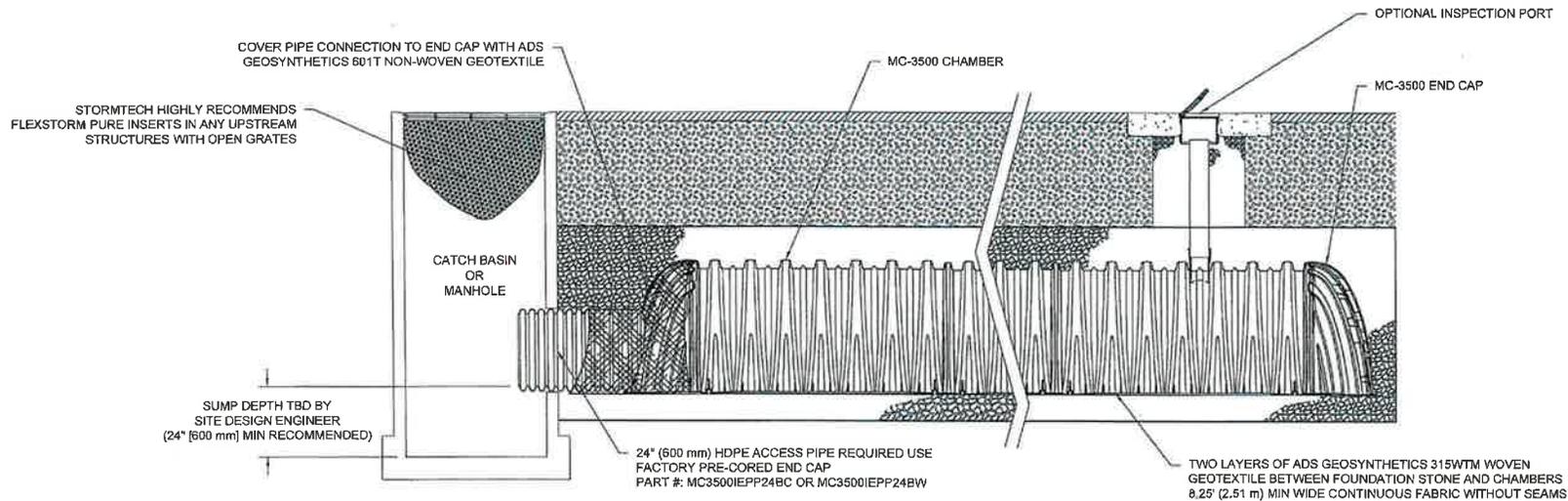
70 INWOOD ROAD, SUITE 2 | ROCKY HILL, CT 06287  
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SHEET  
**2 OF 6**





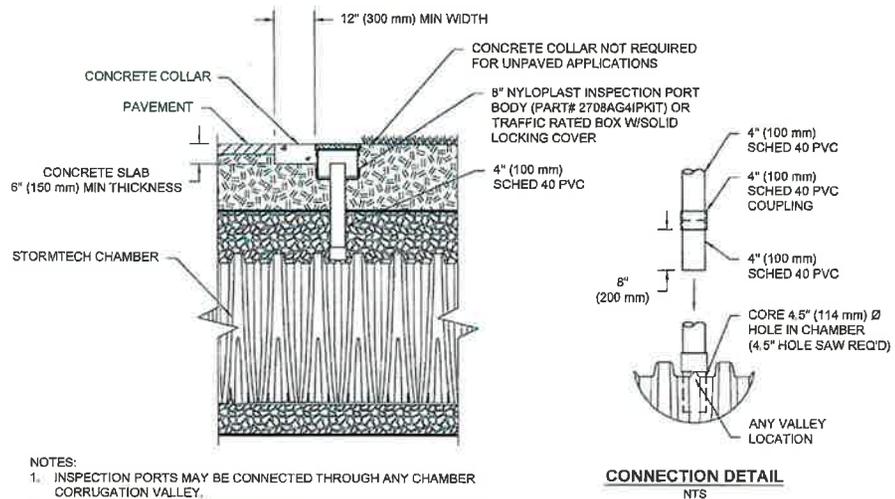
**MC-3500 ISOLATOR ROW DETAIL**  
NTS

**INSPECTION & MAINTENANCE**

- STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
    - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
    - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
    - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
    - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
    - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2, IF NOT, PROCEED TO STEP 3.
  - B. ALL ISOLATOR ROWS
    - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
    - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
      - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
      - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
  - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

**NOTES**

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



- NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.
  2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED (4" PVC NOT PROVIDED BY ADS).

**4" PVC INSPECTION PORT DETAIL**  
NTS

MENARDS EXPANSION SYSTEM #1	
GERMANTOWN, WI	
DATE:	DRAWN: JB
PROJECT #:	CHECKED: N/A

REV	DRW	CHK	DESCRIPTION

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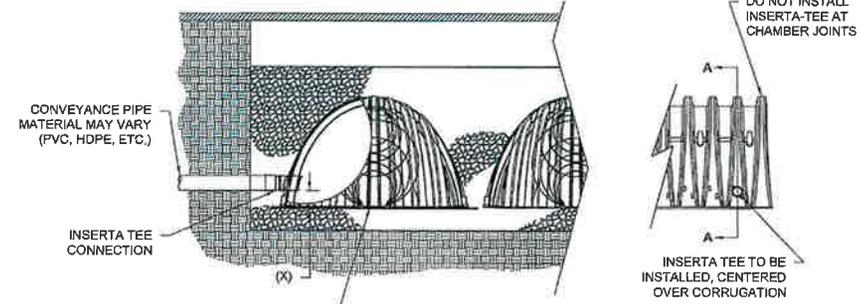
4840 TRUMAN BLVD  
 HILLIARD, OH 43026  
 1-800-733-7473

**ADS**  
 ADVANCED DRAINAGE SYSTEMS, INC.

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**INSERTA TEE DETAIL**  
NTS



PLACE ADS GEOSYNTHETICS 315 WOVEN GEOTEXTILE (CENTERED ON INSERTA-TEE INLET) OVER BEDDING STONE FOR SCOUR PROTECTION AT SIDE INLET CONNECTIONS. GEOTEXTILE MUST EXTEND 6" (150 mm) PAST CHAMBER FOOT

**SECTION A-A**

**SIDE VIEW**

**NOTE:**  
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)

INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON

	<b>MENARDS EXPANSION SYSTEM #1</b>	GERMANTOWN, WI	DATE: _____	DRAWN: JB
				CHECKED: N/A
				PROJECT #: _____
REV	DRW	CHK	DESCRIPTION	

**ADS**  
ADVANCED DRAINAGE SYSTEMS, INC.

4840 TRUENMAN BLVD  
MILLARD, OH 43026  
1-800-733-7473

**INSERTA TEE**

INSERTA TEE | PO BOX 714  
LITTLETON, CO 80120  
PH: (303) 251-2110 FAX: (303) 251-5417  
SALES@INSERTATEE.COM

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT IS IDENTIFIED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE STATE, FEDERAL, AND PROJECT REQUIREMENTS.

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	EPM NAME EPM NUMBER EPM EMAIL
ADS SALES REP	SALES NAME SALES NUMBER SALES EMAIL
PROJECT NO.	



ADVANCED DRAINAGE SYSTEMS, INC.

**SiteASSIST**  
by StormTech  
FOR STORMTECH  
INSTRUCTIONS,  
DOWNLOAD THE  
INSTALLATION APP



## MENARDS EXPANSION SYSTEM #2

### GERMANTOWN, WI

#### MC-4500 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-4500.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

#### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

- STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
- STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

#### NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER Tired LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2894 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

**PROPOSED LAYOUT**

- 100 STORMTECH MC-4500 CHAMBERS
- 8 STORMTECH MC-4500 END CAPS
- 12 STONE ABOVE (in)
- 9 STONE BELOW (in)
- 40 % STONE VOID
- INSTALLED SYSTEM VOLUME (CF)
- 18295 (PERIMETER STONE INCLUDED)
- (COVER STONE INCLUDED)
- (BASE STONE INCLUDED)
- 4345 SYSTEM AREA (SF)
- 308.75 SYSTEM PERIMETER (ft)

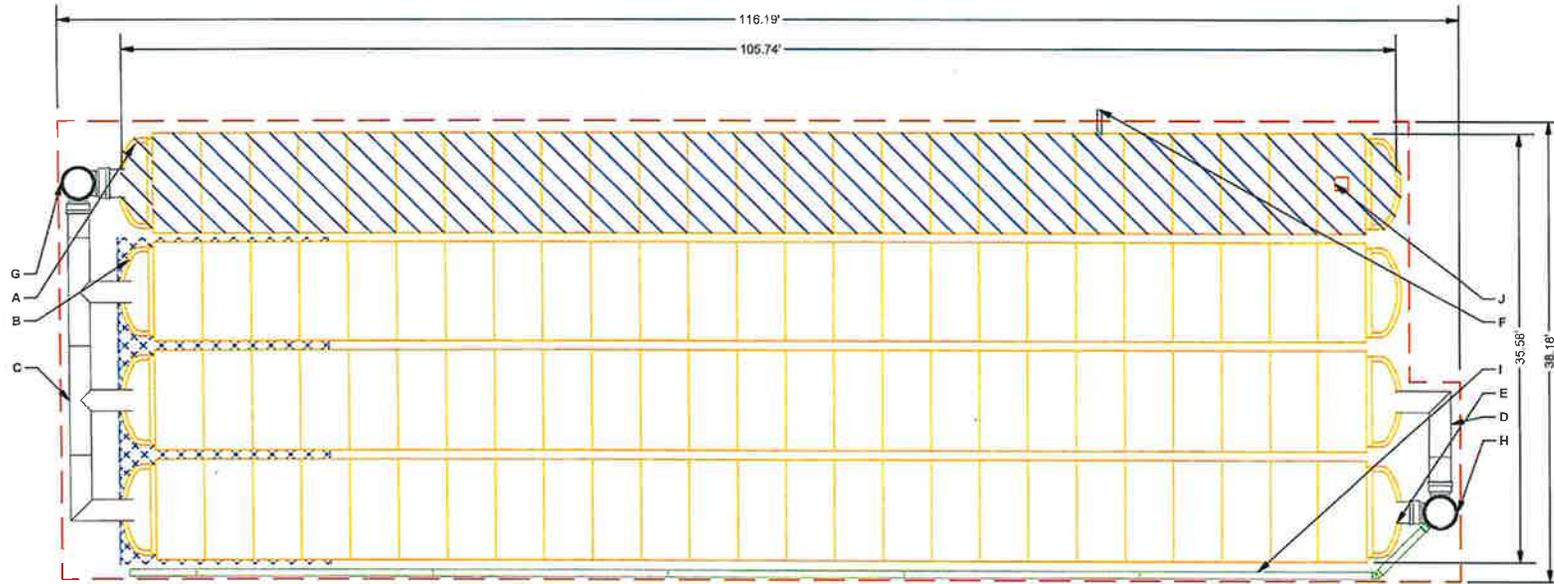
**PROPOSED ELEVATIONS**

- MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
- MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
- MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
- MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):
- MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
- TOP OF STONE:
- TOP OF MC-4500 CHAMBER:
- 4" INSERTA TEE INVERT:
- 24" ISOLATOR ROW INVERT:
- 18" x 18" BOTTOM MANIFOLD INVERT:
- 18" x 18" BOTTOM MANIFOLD INVERT:
- 18" BOTTOM CONNECTION INVERT:
- BOTTOM OF MC-4500 CHAMBER:
- UNDERDRAIN INVERT:
- BOTTOM OF STONE:

- 856.15
- 851.65
- 851.15
- 851.15
- 851.15
- 850.15
- 846.15
- 844.82
- 844.34
- 844.34
- 844.31
- 844.31
- 844.31
- 844.15
- 843.40
- 843.40

\*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	24" BOTTOM CORED END CAP/TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS	2.26"	
PREFABRICATED END CAP	B	18" BOTTOM CORED END CAP/TYP OF ALL 18" BOTTOM CONNECTIONS	29.37"	
MANIFOLD	C	18" X 18" BOTTOM, ADS N-12	1.97"	
MANIFOLD	D	18" X 18" BOTTOM, ADS N-12	1.97"	
PIPE CONNECTION	E	18" BOTTOM CONNECTION	1.97"	
INSERTA TEE	F	4" DIAMETER	8.00"	
NYLOPLAST (INLET W/ ISO ROW)	G	30" DIAMETER (24" SUMP MIN)		16.5 CFS IN
NYLOPLAST (OUTLET)	H	30" DIAMETER (DESIGN BY ENGINEER)		8.0 CFS OUT
UNDERDRAIN	I	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
INSPECTION PORT	J	4" SEE DETAIL		



- ISOLATOR ROW (SEE DETAIL)
- PLACE MINIMUM 17.50' OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS
- BED LIMITS

**NOTES**

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH SHEET #7 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- NOT FOR CONSTRUCTION

DESCRIPTION

REV. DRW. CHK.

PROJECT #:

DATE:

DRAWN: JB

CHECKED: N/A

DESCRIPTION

REV. DRW. CHK.

PROJECT #:

DATE:

DRAWN: JB

CHECKED: N/A

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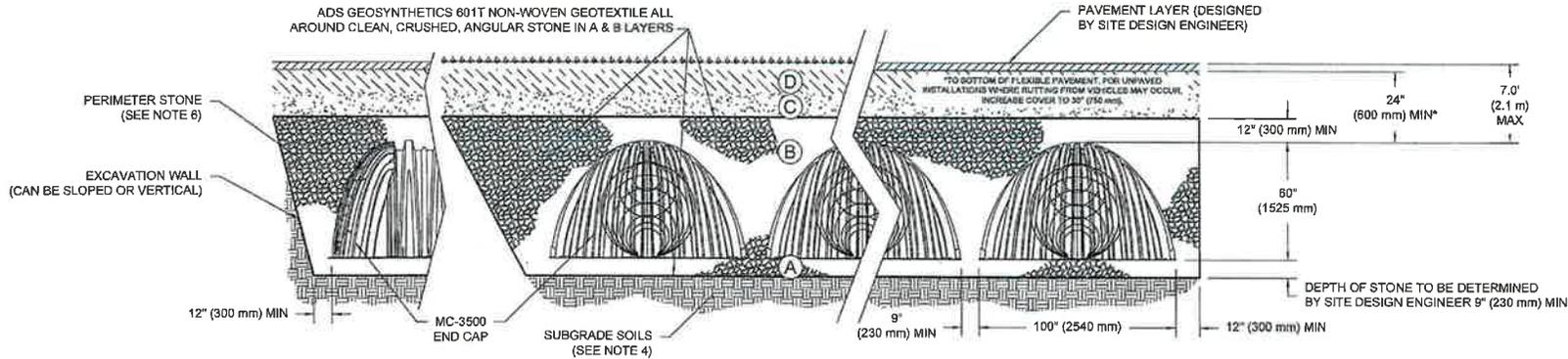
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10'

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## ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	<b>FINAL FILL:</b> FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	<b>INITIAL FILL:</b> FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE.  MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 <sup>1</sup> A-1, A-2-4, A-3  OR AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 76, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	<b>EMBEDMENT STONE:</b> FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 4	NO COMPACTION REQUIRED.
A	<b>FOUNDATION STONE:</b> FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE <sup>2,3</sup>

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
  - STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
  - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
  - ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

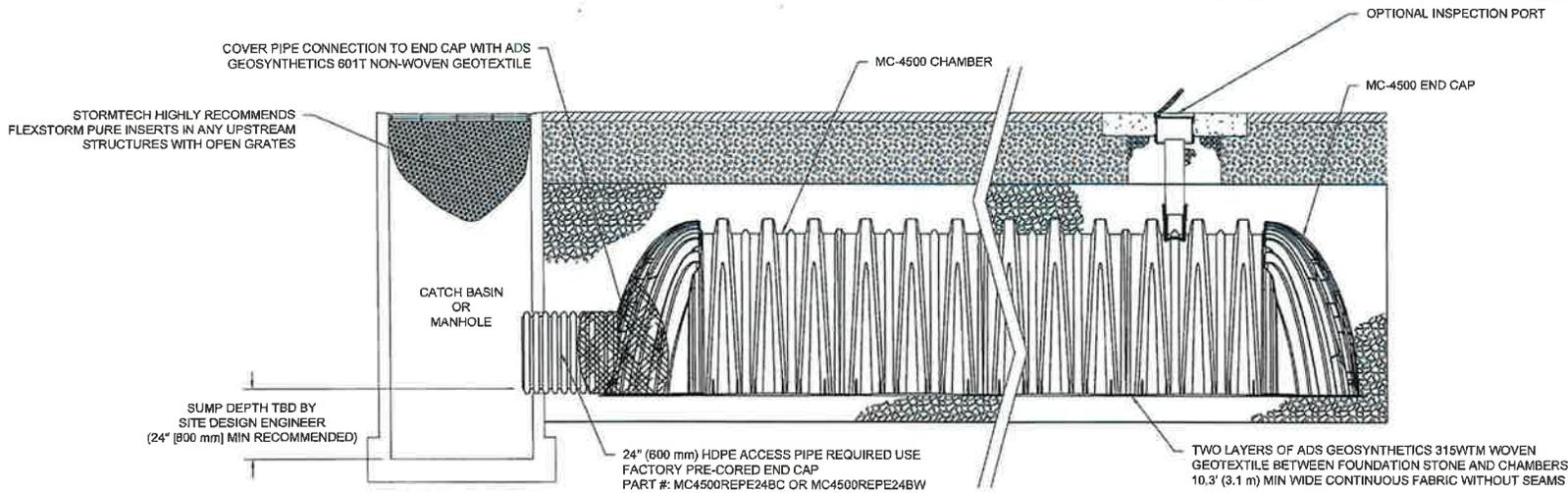


### NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
- MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

DESCRIPTION	MENARDS EXPANSION SYSTEM #2		
REV	DRW	CHK	DATE
GERMANTOWN, WI		DRAWN: JB	CHECKED: N/A
PROJECT #:			
70 INWOOD ROAD, SUITE 3   ROCKY HILL, CT 06067 860.628.9188   888.888.8888   WWW.STORMTECH.COM			
4640 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473			
ADVANCED DRAINAGE SYSTEMS, INC.			
SHEET <b>3 OF 6</b>			

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS SINCE THE DIRECTION OF THE SITE DESIGN ENGINEER ON OTHER PRODUCT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCTS (DETAILED AND ALL ASSOCIATED DETAILS) MEET ALL APPLICABLE CODES, REGULATIONS, AND PROJECT REQUIREMENTS.



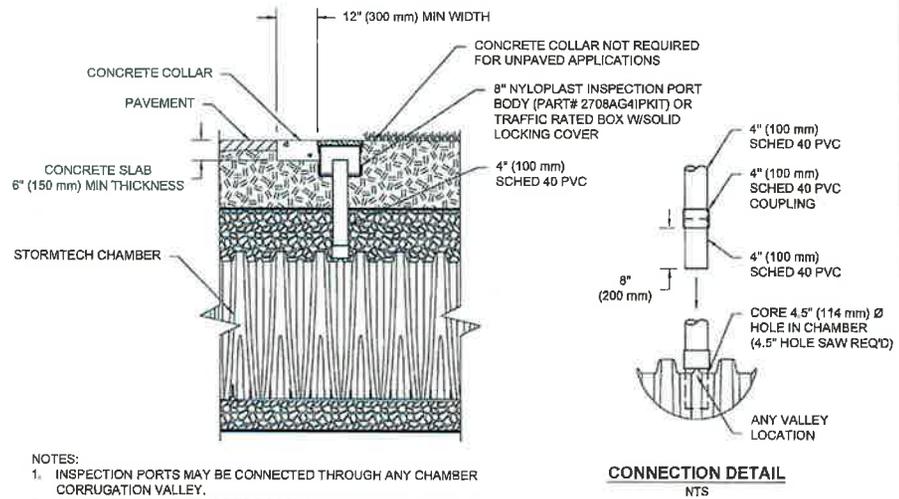
**MC-4500 ISOLATOR ROW DETAIL**  
NTS

**INSPECTION & MAINTENANCE**

- STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
    - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
    - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
    - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
    - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
    - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
  - B. ALL ISOLATOR ROWS
    - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
    - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
      - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
      - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
  - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

**NOTES**

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



- NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.
  2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED (4\"/>

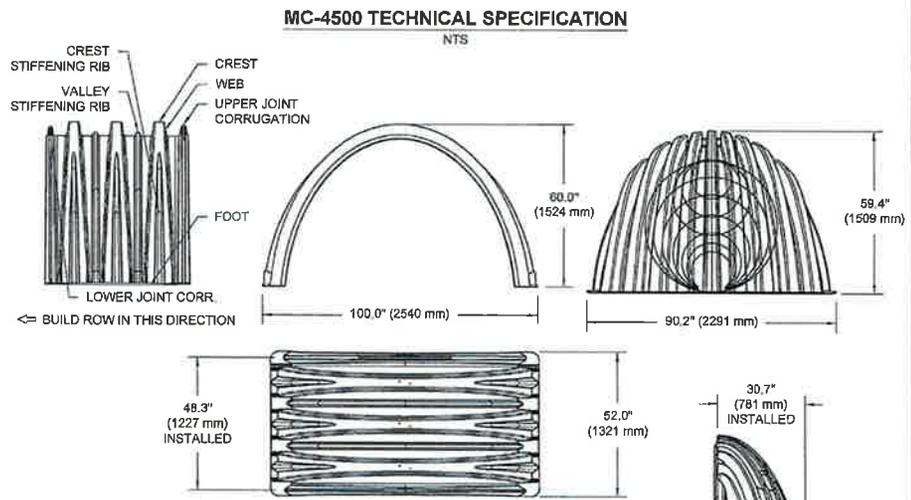
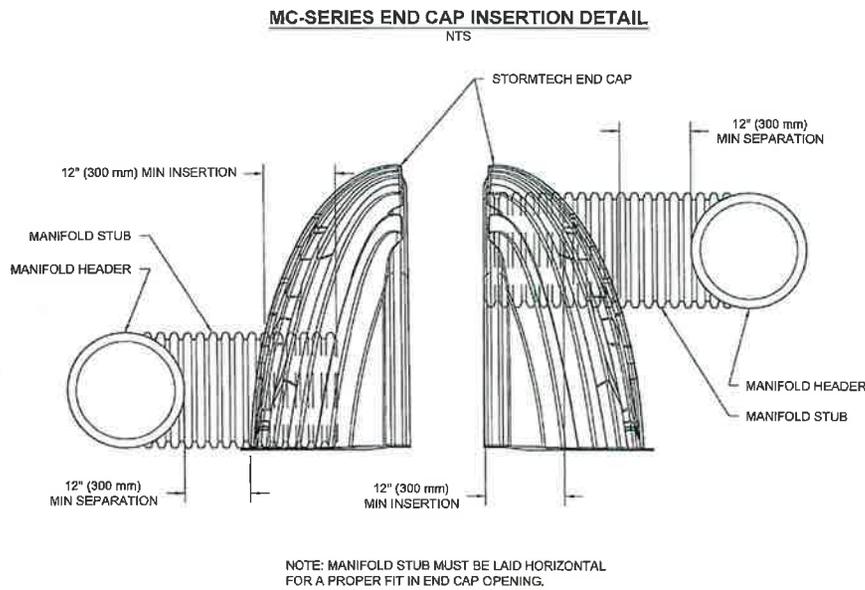
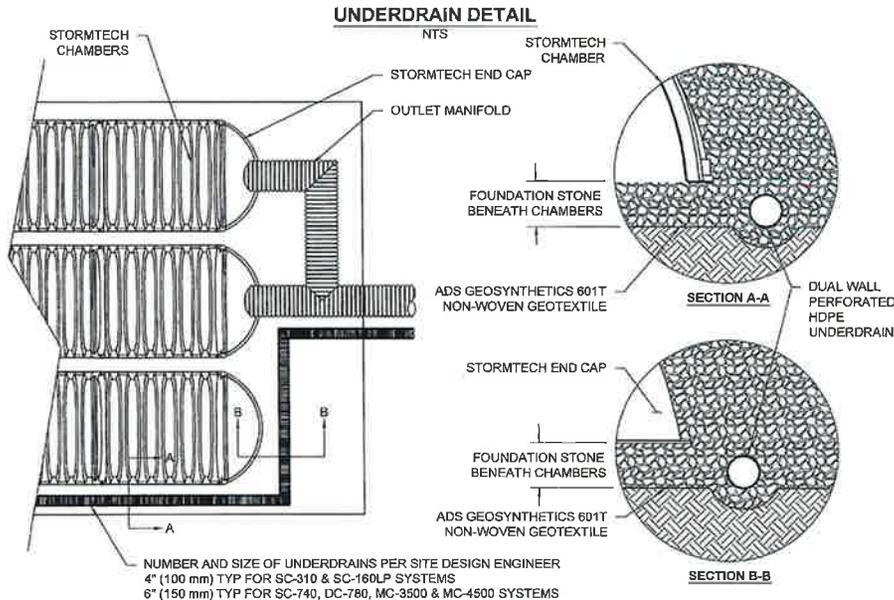
**4\"/>**

DESCRIPTION	MENARDS EXPANSION SYSTEM #2
REV	GERMANTOWN, WI
DATE	PROJECT #:
DRAWN: JB	CHECKED: N/A

DESCRIPTION	
REV	
DATE	
DRAWN: JB	
CHECKED: N/A	

**StormTech**  
 70 INWOOD ROAD, SUITE 3 | 19007 KELL CT | 10002  
 800-609-4184 | 800-810-2981 | WWW.STORMTECH.COM

**ADS**  
 4640 TRUEMAN BLVD  
 HILLIARD, OH 43026  
 1-800-733-7473



**NOMINAL CHAMBER SPECIFICATIONS**

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m <sup>3</sup> )
WEIGHT	130.0 lbs.	(59.0 kg)

**NOMINAL END CAP SPECIFICATIONS**

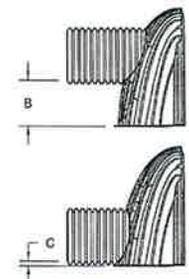
SIZE (W X H X INSTALLED LENGTH)	90.2" X 59.4" X 30.7"	(2291 mm X 1509 mm X 781 mm)
END CAP STORAGE	35.7 CUBIC FEET	(1.01 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	106.7 CUBIC FEET	(3.08 m <sup>3</sup> )
WEIGHT	135.0 lbs.	(61.2 kg)

\*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
 STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
 END CAPS WITH A WELDED CROWN PLATE END WITH "C"  
 END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500REPE06T	6" (150 mm)	42.54" (1.081 m)	---
MC4500REPE06B	---	---	0.88" (22 mm)
MC4500REPE08T	8" (200 mm)	40.50" (1.029 m)	---
MC4500REPE08B	---	---	1.01" (26 mm)
MC4500REPE10T	10" (250 mm)	38.37" (975 mm)	---
MC4500REPE10B	---	---	1.33" (34 mm)
MC4500REPE12T	12" (300 mm)	35.69" (907 mm)	---
MC4500REPE12B	---	---	1.55" (39 mm)
MC4500REPE15T	15" (375 mm)	32.72" (831 mm)	---
MC4500REPE15B	---	---	1.70" (43 mm)
MC4500REPE18TC	---	29.36" (746 mm)	---
MC4500REPE18TW	18" (450 mm)	---	---
MC4500REPE18CB	---	---	1.97" (50 mm)
MC4500REPE24TC	---	23.05" (585 mm)	---
MC4500REPE24TW	24" (600 mm)	---	---
MC4500REPE24CB	---	---	2.26" (57 mm)
MC4500REPE24BW	---	---	---
MC4500REPE30CB	30" (750 mm)	---	2.95" (75 mm)
MC4500REPE36CB	36" (900 mm)	---	3.25" (83 mm)
MC4500REPE42CB	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECURED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MENARDS EXPANSION SYSTEM #2  
 GERMANTOWN, WI  
 DATE: \_\_\_\_\_ DRAWN: JB  
 PROJECT #: \_\_\_\_\_ CHECKED: N/A

REV	DRW	CHK	DESCRIPTION



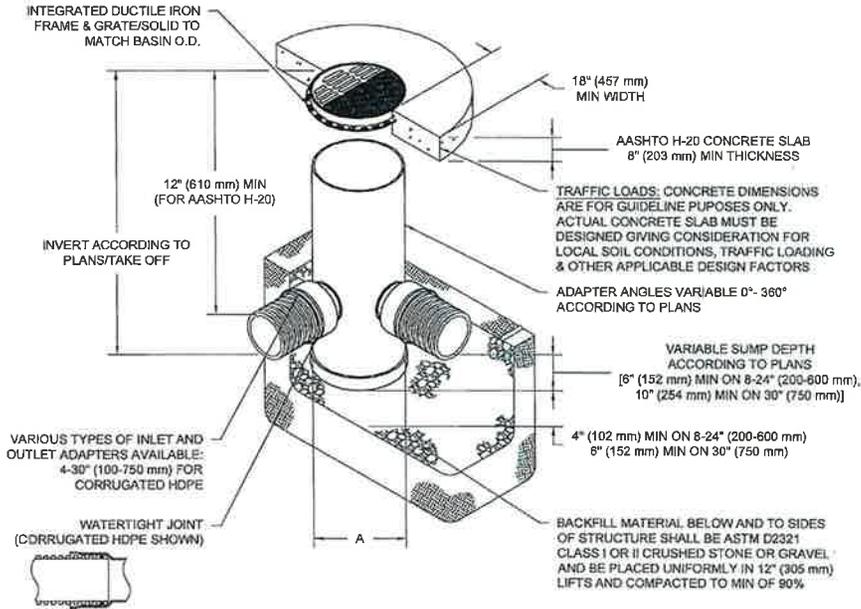
70 NEWWOOD ROAD, SUITE 3 | ROCKY HILL, CT 06067  
 860-309-4488 | 888-885-0881 | WWW.STORMTECH.COM



4840 TRUJEMAN BLVD  
 HILLIARD, OH 43026  
 1-800-733-7473

### NYLOPLAST DRAIN BASIN

NTS



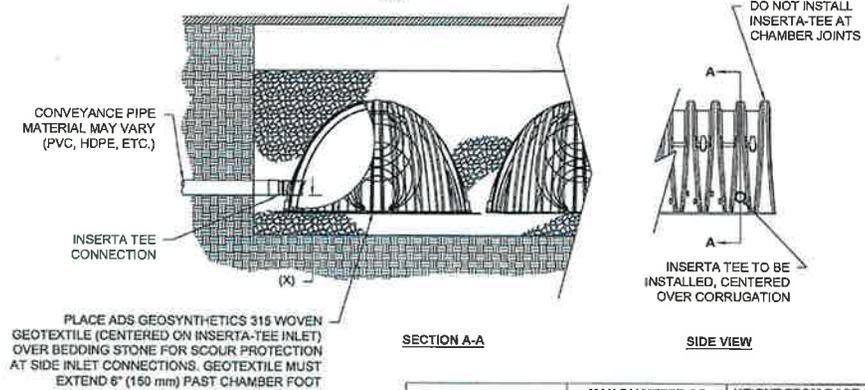
### NOTES

- 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
- DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANGCOR DUAL WALL) & SDR 35 PVC
- FOR COMPLETE DESIGN AND PRODUCT INFORMATION: [WWW.NYLOPLAST-US.COM](http://WWW.NYLOPLAST-US.COM)
- TO ORDER CALL: 800-821-6710

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

### INSERTA TEE DETAIL

NTS



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)

INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON

**NOTE:**  
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

MENARDS EXPANSION SYSTEM #2  
GERMANTOWN, WI

DATE: \_\_\_\_\_ DRAWN: JB

PROJECT #: \_\_\_\_\_ CHECKED: N/A

REV	DRW	CHK	DESCRIPTION

3150 VERONA AVE  
MILWAUKEE, WI 53208  
PHN (770) 832-2483  
FAX (770) 832-2480  
[www.nyloplast-us.com](http://www.nyloplast-us.com)

**Nyloplast**

4640 TRULEMAN BLVD  
HILLIARD, OH 43026  
1-800-733-7473

**ADS**  
Advanced Drainage Systems, Inc.

EASEMENT AGREEMENT

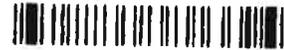
Document Number

Document Title

DOC#: 856000

Recorded  
MAY 16, 2000 AT 03:35PM

DOROTHY C. GONNERING  
REGISTER OF DEEDS  
WASHINGTON COUNTY, WI  
Fee Amount: \$28.00



Recording Area

28-10

Name and Return Address

ALAN MARCOVITZ  
700 N WATER ST #1506  
MILWAUKEE WI 53202

Parcel Identification Number (PIN)

X  
of

This information must be completed by submitter: document title, name & return address, and PIN (if required). Other information such as the granting clauses, legal description, etc. may be placed on this first page of the document or may be placed on additional pages of the document. Note: Use of this cover page adds one page to your document and \$2.00 to the recording fee. Wisconsin Statutes, 59.517. WRDA 2/96

EASEMENT AGREEMENT

THIS EASEMENT AGREEMENT (hereinafter referred to as the "Agreement"), made this 13 day of March, 2000, by and between L&D INVESTMENT CO., a Wisconsin partnership (hereinafter referred to as "L&D") and the ESTATE OF ALFRIEDA C. ROGERS, an estate pending in the Washington County, Wisconsin Circuit Court, as File No. 96-IN-153 (hereinafter referred to as "Rogers").

WITNESSETH:

WHEREAS, Rogers is the owner of certain real estate situated in the Village of Germantown, Washington County, Wisconsin, as more particularly described on EXHIBIT "A" attached hereto and incorporated herein by reference (the "Rogers Parcel"); and

WHEREAS, L&D is the owner of certain real estate located adjacent to the Rogers Parcel, which real estate is also situated in the Village of Germantown, Washington County, Wisconsin, as more particularly described on EXHIBIT "B" attached hereto and incorporated herein by reference (the "L&D Parcel"); and

WHEREAS, Rogers and L&D mutually desire to grant to the other certain easements for ingress and egress to and from their respective parcels and to set forth in detail their respective rights and obligations with respect to the use and maintenance of such easements, all in accordance with the terms and conditions hereinafter set forth;

NOW, THEREFORE, for and in consideration of the premises, the mutual covenants and promises contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

1. L&D hereby grants and conveys to Rogers a permanent, perpetual and non-exclusive easement for vehicular and pedestrian ingress and egress on, over and across that portion of the L&D Parcel equal to 6,464 square feet, as further described in EXHIBIT "C" attached hereto and made a part hereof.

2. Rogers hereby grants and conveys to L&D a permanent, perpetual and non-exclusive easement for vehicular and pedestrian ingress and egress on, over and across that portion of the Rogers Parcel equal to 6,145 square feet, as further described on EXHIBIT "C" attached hereto and made a part hereof.

3. The adjacent easements hereinabove granted together form a driveway approximately 45 feet in width, the location of which is set forth on said EXHIBIT "C."

4. It is understood and agreed by the parties hereto that each easement granted herein is a non-exclusive easement and that each grantor party reserves the right to use its easement area for ingress and egress to and from the balance of such grantor party's parcel.

5. L&D shall be responsible for the construction of the improvements within the area depicted in Exhibit "C." If Rogers conveys its parcel to anyone within six months of the date of this document, the party to whom the Rogers parcel is conveyed shall thereupon reimburse L&D in the amount of \$ 15,000. If there is no such conveyance, the obligation to reimburse L&D shall be null and void.

6. L&D shall also be responsible for the repair, replacement and maintenance, including snow removal of the area depicted in Exhibit "C." If and when the Rogers parcel is developed with one or more commercial uses, Rogers shall thereafter pay 50% of such costs each calendar quarter. Such amount shall be paid by Rogers to L&D, within 15 days after delivery of said bill. Fulfillment of the foregoing obligations by L&D shall not unreasonably interfere with

the rights of Rogers hereunder. Upon the failure of L&D to perform any of its obligations hereunder, and after reasonable notice to L&D, Rogers shall have the right to perform or cause to be performed the necessary repairs, replacements, and maintenance and to bill L&D for its allocable share of the full cost thereof. The party performing, or causing to be performed, the foregoing procedures shall substantiate to the other party, by means of invoices or other documentation, the costs incurred. Further, the party performing or causing to be performed such procedures shall indemnify and defend the other party from claims or suits arising from such activities. The responsibility of the party performing or causing such activities to be performed shall also be responsible for prompt and complete restoration.

7. Each party warrants and represents that it shall not construct any buildings or improvements over any portion of the easements so as not to interfere with the use of the same as herein provided and that the surface of the easements shall at all times be in such condition as to permit ingress and egress of trucks, trailers and automobiles. In connection therewith, each of the parties agrees to pay for any damages arising from its negligent use of the easements granted herein.

8. The rights and privileges granted herein shall accrue to the benefit of and be appurtenant to the parcel of each grantor and run with such party's parcel. The easements and rights granted herein shall constitute permanent, perpetual encumbrances on the parcel of each grantor. The rights, privileges and obligations hereunder shall inure to the benefit of and be binding upon the parties hereto, their successors and assigns.

Either party may enforce this instrument by appropriate action and, should it prevail in such litigation, that party shall be entitled to recover as part of its costs reasonable attorney's fees.

9. The address for notices to Rogers is c/o Harold L. Rogers, Personal Representative, 15 Windsor Court, Streamwood, Illinois 60107, and the address for notices to L&D is c/o Jack Stein, 5400 South 27<sup>th</sup> Street, Milwaukee, Wisconsin 53221. Either party may give written notice of change of address to the other party. All notices shall be sent by U.S. Mail to the address provided for and shall be deemed given when deposited in the mail.

10. None of the foregoing shall (i) unduly restrict or interfere with the rights of the respective parties hereto as granted herein, (ii) require the dedication of any further portion of the parcel of either party, or (iii) impose any cost or expense on either party except as provided hereinabove. In the event any action by the Village of Germantown, Washington County, or State of Wisconsin shall require widening, relocation or otherwise have an impact on the easements provided herein, the parties shall equitably share of the costs incurred, as a result thereof.

11. L&D and Rogers may terminate this instrument only by jointly executing and recording a mutual release in recordable form, whereupon all rights, duties, and liabilities hereby created shall terminate.

IN WITNESS WHEREOF, the parties hereto have executed this instrument as of the day and year first set forth above.

L&D INVESTMENT CO., a partnership

By:   
Jack Stein, Attorney in Fact

ESTATE OF ALFRIEDA C. ROGERS

By:   
Harold L. Rogers  
Personal Representative

STATE OF WISCONSIN )  
 ) ss  
COUNTY OF MILWAUKEE )

Personally came before me this 13 day of March, 2000, L&D Investment Co., by Jack Stein, Attorney-in-fact for its partners, to me known to be the person who executed the foregoing instrument and acknowledged that he executed the same as such.



*Alan Marcumtz*  
Notary Public, State of Wisconsin  
My commission (is) ~~(exp.)~~ permanent

STATE OF WISCONSIN )  
 ) ss  
COUNTY OF WASHINGTON )

Personally came before me this 13<sup>th</sup> day of March, 2000, Harold L. Rogers, personal representative of the Estate of Alfrieda C. Rogers, to me known to be the person who executed the foregoing instrument and acknowledged that he executed the same as such.



*Robert L. Wilkins*  
Notary Public, State of Wisconsin  
My commission (is) ~~(exp.)~~ PERMANENT

This instrument was drafted by and following recording should be returned to Attorney Sherwin C. Peltin, Weiss Berzowski Brady & Donahue LLP, 700 North Water Street, Suite 1500, Milwaukee, WI 53202.

# National Survey & Engineering

16745 West Bluemound Road, Suite 200  
Brookfield, Wisconsin 53005-5938  
Phone 414-781-1000  
Fax 414-781-8466  
Website www.nsae.com

## EXHIBIT A

THAT PART OF THE SOUTHWEST 1/4 OF SECTION 33, TOWN 9 NORTH, RANGE 22 EAST, TOWN OF GERMANTOWN, WASHINGTON COUNTY, WISCONSIN, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE WEST 1/4 CORNER, SECTION 33, TOWN 9 NORTH, RANGE 22 EAST; THENCE NORTH 89°55' EAST ON THE WEST 1/4 LINE OF SAID SECTION 1182.00 FEET TO THE POINT OF BEGINNING OF THIS DESCRIPTION; THENCE CONTINUING NORTH 89°55' EAST 204.00 FEET; THENCE SOUTH 10°28' WEST 2109.90 FEET; THENCE NORTH 48°28' WEST ON CENTER LINE OF STATE TRUNK HIGHWAY 175, 200.85 FEET; THENCE NORTH 09°38' EAST 1969.08 FEET TO THE POINT OF BEGINNING.

PREPARED BY: ERIC R STURM  
DATE: JANUARY 14, 2000  
SURVEY NO.: 5152853

W:\5152853\EXHIBIT-A

S I T E B A L A N C E



# National Survey & Engineering

16745 West Bluemound Road, Suite 200  
Brookfield, Wisconsin 53005-5938  
Phone 414-781-1000  
Fax 414-781-8466  
Website www.nsa.com

## EXHIBIT B

THAT PART OF THE SOUTHWEST 1/4 OF SECTION 33, TOWN 9 NORTH, RANGE 22 EAST, TOWN OF GERMANTOWN, WASHINGTON COUNTY, WISCONSIN, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT IN THE CENTER LINE OF THE MEMOMONEE RIVER WHERE THE EAST AND WEST QUARTER LINE OF SECTION 33 CROSSES THE SAME (BEING 25.00 CHAINS EAST OF THE WEST QUARTER STONE OF SAID SECTION); THENCE WEST ALONG SAID QUARTER SECTION LINE, 4.00 CHAINS (BEING THE NORTHEAST CORNER OF FORMER PETER RUDOLPH LANDS); THENCE SOUTH 10-3/4 DEGREES WEST (ALONG SAID PETER RUDOLPH EAST LINE) TO A STAKE SET 13.50 CHAINS EAST OF THE SOUTHWEST CORNER OF SAID SECTION 33 AND ON THE SECTIONS AND COUNTY LINE; THENCE EAST ALONG SAID SECTION AND COUNTY LINE 4.50 CHAINS; THENCE NORTH 14° EAST 22.45 CHAINS TO A STAKE ON THE SOUTHWEST SIDE OF THE MEMOMONEE RIVER; THENCE NORTH AND EAST TO THE CENTER OF SAID RIVER, 25 LINKS; THENCE NORTHERLY ALONG THE CENTER OF SAID RIVER TO THE PLACE OF BEGINNING.

EXCEPTING THEREFROM THAT PORTION THEREOF HERETOFORE CONVEYED TO KENNETH DUEHRING AND ELIZABETH DUEHRING, HIS WIFE, AS DESCRIBED BY DEED RECORDED IN THE WASHINGTON COUNTY REGISTRY IN VOLUME 341 OF RECORDS ON PAGE 435, AS DOCUMENT NO. 252890.

PREPARED BY: ERIC R STURM  
DATE: JANUARY 14, 2000  
SURVEY NO.: 5152853

W:\5152853\EXHIBIT-B

S I T E B A L A N C E



# National Survey & Engineering

16745 West Bluemound Road, Suite 200  
Brookfield, Wisconsin 53005-5938  
Phone 262-781-1000  
Fax 262-781-8466  
Website www.nsae.com

*Exhibit C/1*

## INGRESS AND EGRESS EASEMENT FOR THE BENEFIT OF ROGERS

SITUATED ON WEST APPLETON AVENUE, VILLAGE OF GERMANTOWN, WISCONSIN

PART OF THE SOUTHWEST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 33, TOWN 9 NORTH, RANGE 20 EAST, IN THE VILLAGE OF GERMANTOWN, WASHINGTON COUNTY, WISCONSIN. COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHWEST 1/4 OF SAID SECTION 33; THENCE SOUTH 89°20'48" WEST ALONG THE SOUTH LINE OF SAID SOUTHWEST 1/4 SECTION 1002.80 FEET TO A POINT ON THE CENTERLINE OF WEST APPLETON AVENUE; THENCE NORTH 49°53'22" WEST ALONG THE CENTERLINE OF WEST APPLETON AVENUE 868.30 FEET TO A POINT; THENCE NORTH 09°33'19" EAST 69.68 FEET TO A POINT ON THE NORTH LINE OF WEST APPLETON AVENUE AND THE POINT OF BEGINNING OF THE LANDS TO BE DESCRIBED; THENCE NORTH 09°33'19" EAST 182.05 FEET TO A POINT; THENCE SOUTH 77°09'43" EAST 45.59 FEET TO A POINT; THENCE SOUTH 13°00'57" WEST 121.40 FEET TO A POINT; THENCE SOUTH 39°54'39" WEST 44.68 FEET TO A POINT; THENCE SOUTHWESTERLY 29.45 FEET ALONG THE ARC OF A CURVE WHOSE CENTER LIES TO THE SOUTHEAST, WHOSE RADIUS IS 30.00 FEET AND WHOSE CHORD BEARS SOUTH 11°47'20" WEST 28.28 FEET TO A POINT ON THE NORTH RIGHT OF WAY LINE OF WEST APPLETON AVENUE; THENCE NORTH 49°53'22" WEST 16.84 FEET TO THE POINT OF BEGINNING.  
SAID LAND CONTAINS 6,464 SQUARE FEET.

## INGRESS AND EGRESS EASEMENT FOR THE BENEFIT OF L & D INVESTMENT COMPANY (STEINS)

SITUATED ON WEST APPLETON AVENUE, VILLAGE OF GERMANTOWN, WISCONSIN

PART OF THE SOUTHWEST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 33, TOWN 9 NORTH, RANGE 20 EAST, IN THE VILLAGE OF GERMANTOWN, WASHINGTON COUNTY, WISCONSIN. COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHWEST 1/4 OF SAID SECTION 33; THENCE SOUTH 89°20'48" WEST ALONG THE SOUTH LINE OF SAID SOUTHWEST 1/4 SECTION 1002.80 FEET TO POINT ON THE CENTERLINE OF WEST APPLETON AVENUE; THENCE NORTH 49°53'22" WEST ALONG THE CENTERLINE OF WEST APPLETON AVENUE 868.30 FEET TO A POINT; THENCE NORTH 09°33'19" EAST 38.32 FEET TO THE NORTH LINE OF WEST APPLETON AVENUE AND THE POINT OF BEGINNING OF SAID LANDS TO BE DESCRIBED; THENCE NORTH 49°53'22" WEST ALONG SAID NORTH LINE 199.85 FEET TO A POINT; THENCE SOUTH 64°31'55" EAST 87.03 FEET TO A POINT; THENCE SOUTH 49°53'24" EAST 25.21 FEET TO A POINT; THENCE NORTHEASTERLY 47.12 FEET ALONG THE ARC OF A CURVE WHOSE CENTER LIES TO THE NORTHEAST, WHOSE RADIUS IS 30.00 FEET AND WHOSE CHORD BEARS NORTH 85°06'36" EAST 42.43 FEET TO A POINT; THENCE NORTH 40°06'36" EAST 29.92 FEET TO A POINT; THENCE NORTH 12°48'58" EAST 112.55 FEET TO A POINT; THENCE SOUTH 77°09'43" EAST 4.01 FEET TO A POINT; THENCE SOUTH 09°33'19" WEST 213.40 FEET TO THE POINT OF BEGINNING.  
SAID LAND CONTAINS 6,145 SQUARE FEET

PREPARED BY: ERIC R. STURM  
DATE: MARCH 8, 2000  
SURVEY NO.: 152853

S I T E B A L A N C E

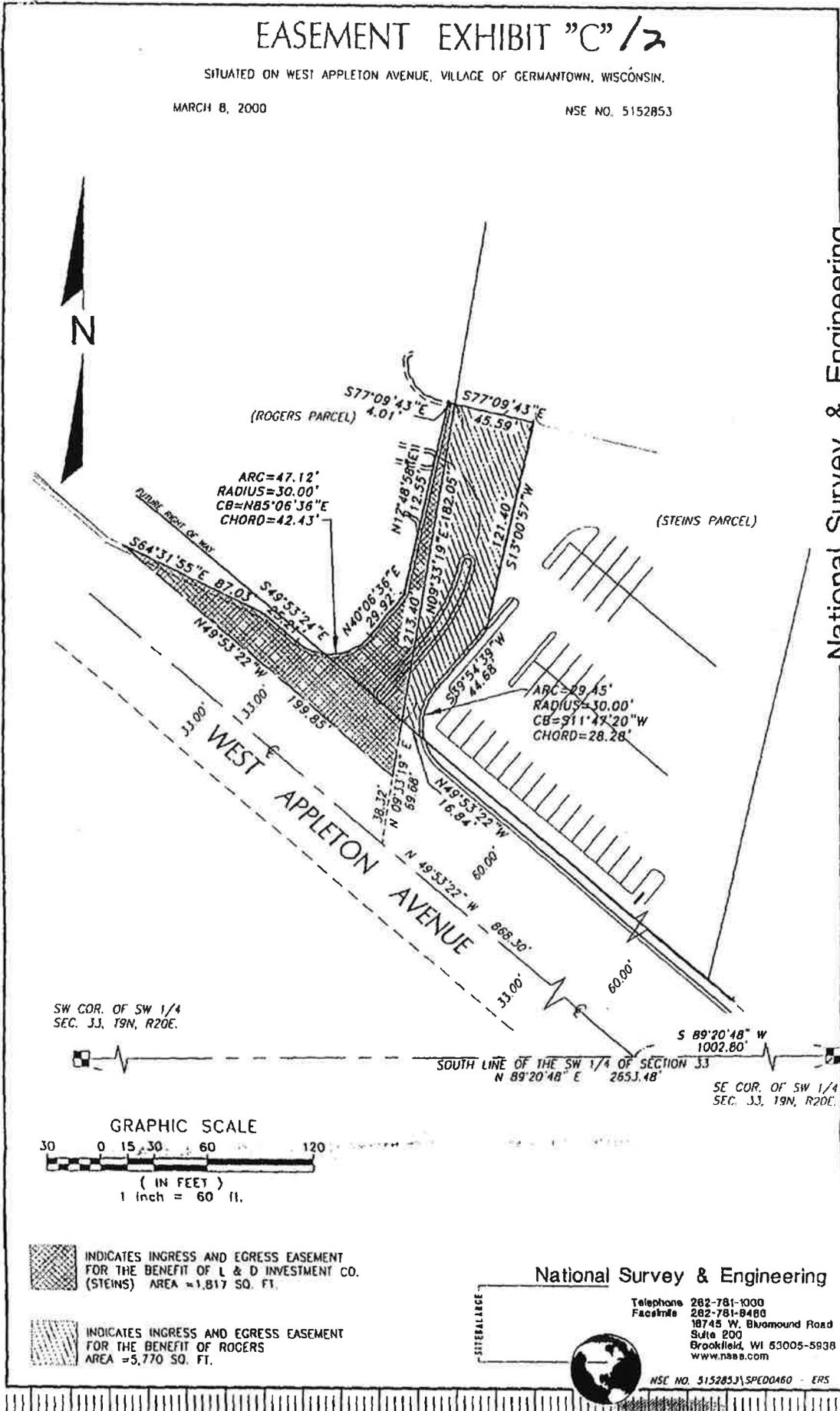


# EASEMENT EXHIBIT "C" 1/2

SITUATED ON WEST APPLETON AVENUE, VILLAGE OF GERMANTOWN, WISCONSIN.

MARCH 8, 2000

NSE NO. 5152853



National Survey & Engineering

**State of Wisconsin**  
**DEPARTMENT OF NATURAL RESOURCES**  
141 NW Barstow, Room 180  
Waukesha, WI 53188

**Tony Evers, Governor**  
**Preston D. Cole, Secretary**  
Telephone 608-266-2621  
Toll Free 1-888-936-7463  
TTY Access via relay - 711



June 10, 2019

IP-SE-2019-67-00209

Tyler Edwards  
Menard Inc.  
5101 Menard Drive  
Eau Claire, WI 54703

Dear Mr. Edwards:

The Department has completed review of your proposal. We have determined that your project meets state standards. Enclosed is your state wetland permit which approves your project and lists the conditions which must be followed. Please read your permit carefully so that you are fully aware of what is expected of you.

Your enclosed state water quality certification confirms the state certification necessary for proceeding under an approval pursuant to a federal permit issued by the Army Corps of Engineers.

Please note you are required to submit photographs of the completed project within 7 days after you've finished construction. This helps both of us to document the completion of the project and compliance with the permit conditions.

Your next step will be to notify me of the date on which you plan to start construction and again after your project is complete.

If you have any questions about your permit, please call me at (262) 574-2136 or email [Erin.Cox@wisconsin.gov](mailto:Erin.Cox@wisconsin.gov).

Sincerely,

Erin Cox  
Water Management Specialist

cc: U.S. Army Corps of Engineers  
Washington County  
Josie Lathrop and Tom Nedland, Mitigation Coordinators  
Bob Lee, Conservation Warden  
Michelle Scott, Supervisor  
Kyle Brockman, Wisconsin Environmental Restorations LLC

**STATE OF WISCONSIN  
DEPARTMENT OF NATURAL RESOURCES**

**Wetland Individual Permit  
IP-SE-2019-67-00209**

Tyler Edwards is hereby granted under Section 281.36, Wisconsin Statutes, and 33 U.S.C.S §1341 (CWA §401) a permit for wetland fill or disturbance near the Menomonee River and unnamed stream (WBIC 5034130), in the Village of Germantown, Washington County, also described as being in the NW1/4 of the SW1/4 of Section 33, Township 09 North, Range 20 East, subject to the following conditions:

**PERMIT**

1. You must notify Erin Cox at phone (262) 574-2136 or email Erin.Cox@wisconsin.gov before starting the discharge and again not more than 5 days after the discharge is complete.
2. You must complete the discharge as described on or before 06/10/2022. If you will not complete the discharge by this date, you must submit a written request for an extension prior to the expiration date of the permit. Your request must identify the requested extension date and the reason for the extension. A permit extension may be granted, for good cause, by the Department. You may not begin or continue construction after the original permit expiration date unless the Department grants a new permit or permit extension in writing.
3. This permit does not authorize any work other than what you specifically describe in your application and plans dated January 17<sup>th</sup>, 2019, and as modified by the conditions of this permit. If you wish to alter the project or permit conditions, you must first obtain written approval of the Department.
4. You are responsible for obtaining any permit or approval that may be required for your project by local zoning ordinances and by the U.S. Army Corps of Engineers before starting your project.
5. Upon reasonable notice, you shall allow access to your project site during reasonable hours to any Department employee who is investigating the project's construction, operation, maintenance or permit compliance.
6. The Department may modify or revoke this permit if the project is not completed according to the terms of the permit, or if the Department determines the activity results in significant adverse impact to wetland functional values, in significant adverse impact to water quality, or in other significant adverse environmental consequences.
7. You must post a copy of this permit at a conspicuous location on the project site, for at least five days prior to construction, and remaining at least five days after construction. You must also have a copy of the permit and approved plan available at the project site at all times until the project is complete.
8. Your acceptance of this permit and efforts to begin work on this project signify that you have read, understood and agreed to follow all conditions of this permit.
9. You must submit a series of photographs to the Department, within one week of completion of work on the site. The photographs must be taken from different vantage points and depict all work authorized by this permit.

10. You, your agent, and any involved contractors or consultants may be considered a party to the violation pursuant to Section 281.36 (13), Wis. Stats., for any violations of Section 281.36, Wisconsin Statutes, or this permit.
11. Construction shall be accomplished in such a manner as to minimize erosion and siltation into surface waters. Erosion control measures (such as silt fence and straw bales) must meet or exceed the technical standards of ch. NR 151, Wis. Adm. Code. The technical standards are found at: [http://dnr.wi.gov/topic/stormwater/standards/const\\_standards.html](http://dnr.wi.gov/topic/stormwater/standards/const_standards.html) .
12. Authorization hereby granted by the Department is transferable to any person upon prior written approval of the transfer by the Department.
13. All equipment used for the project including but not limited to tracked vehicles, barges, boats, hoses, sheet pile and pumps shall be de-contaminated for invasive and exotic viruses and species prior to use and after use.

The following steps must be taken *every time* you move your equipment to avoid transporting invasive and exotic viruses and species. To the extent practicable, equipment and gear used on infested waters shall not be used on other non-infested waters.

1. **Inspect and remove** aquatic plants, animals, and mud from your equipment.
2. **Drain all water** from your equipment that comes in contact with infested waters, including but not limited to tracked vehicles, barges, boats, hoses, sheet pile and pumps.
3. **Dispose** of aquatic plants, animals in the trash. Never release or transfer aquatic plants, animals or water from one waterbody to another.
4. **Wash your equipment** with hot (>140° F) and/or high pressure water,

- OR -

Allow your equipment to **dry thoroughly for 5 days**.

#### FINDINGS OF FACT

1. Tyler Edwards has filed an application for a permit for wetland fill/disturbance near the Menomonee River and unnamed stream (WBIC 5034130), in the Village of Germantown, Washington County, also described as being in the NW1/4 of the SW1/4 of Section 33, Township 09 North, Range 20 East.
2. The project will consist of an expansion to the existing Menard Inc. Germantown Store. The discharge will affect a total of 0.9140 acres of wetland, since the discharged material will cover 0.914 acres of wetland.
3. The applicant proposed to compensate for wetland losses through mitigation. The Department evaluated the wetland mitigation proposal and determined that mitigation credits could fulfill the compensation requirement. The mitigation plan proposed to purchase 1.32 credits from the WWCT program at the required 1.45:1 mitigation ratio. The credits were debited on March 19th

and an Affidavit of Credit Purchase was submitted to the Department certifying the debit and fulfilling the compensation requirement.

4. No practicable alternative exists which would avoid adverse impacts to wetlands, and the project will result in the least environmentally damaging practicable alternative taking into consideration practicable alternatives that avoid wetland impacts. Taking no action towards an expansion would have a negative impact on the Menards future business. The current layout could be utilized, but the existing store could not accept or store a larger volume of product in the future. This could cause a loss of future profit, and loss of potential customers to online retailers that have the desired stock readily available. A different parcel was explored as an option but would also have potential wetland impacts associated with it and would be much closer to the Menominee River. Different alternative layouts on existing Menards property were also explored but involved larger amounts of wetland impact or would cause greater operational and construction difficulties.
5. All practicable measures to minimize adverse impacts to the functional values of the wetland have been taken. The layout that causes the least amount of wetland impacts overall is the layout that has been pursued for this permit.
6. The proposed project will not result in significant adverse impacts to wetland functional values, significant impacts to water quality, or other significant adverse environmental consequences.
7. The direct impact of the proposed project to wetland functional values is 0.914 acres of permanent wetland fill.
8. If similar projects are pursued in this area, the result would be reduced natural areas for plant and animal communities, reduced water quality protection, and reduced groundwater integrity.
9. There are no significant secondary impacts expected to result from this project as proposed.
10. A net negative environmental impact would result from this project.
11. The Department has completed an investigation of the project site and has evaluated the project as described in the application and plans.
12. The Department of Natural Resources has determined that the agency's review of the proposed project constitutes an equivalent analysis action under s. NR 150.20(2), Wis. Adm. Code. The Department has considered the impacts on the human environment, alternatives to the proposed projects and has provided opportunities for public disclosure and comment. The Department has completed all procedural requirements of s. 1.11(2)(c), Wis. Stats., and NR 150, Wis. Adm. Code for this project.
13. The Department of Natural Resources has completed all procedural requirements and the project as permitted will comply with all applicable requirements of Sections 281.36, and 281.37, Wisconsin Statutes and Chapters NR 103, 299, 350, and 353 of the Wisconsin Administrative Code.

The applicant was responsible for fulfilling the procedural requirements for publication of notices under s. 281.36(3p)(d)1m., Stats, Stats., and was responsible for publication of the notice of pending application under s. 281.36(3p)(d)1m., Stats. or the notice of public informational hearing under s. 281.36(3p)(d)1m., Stats., or both. Section 281.36(3p)(d)1m., Stats., provides that if no public hearing is held, the Department must issue its decision within 30 days of the 30-day public comment period, and if

a public hearing is held, the Department must issue its decision within 20 days after the 10-day period for public comment after the public hearing. Section 281.36(3p)(d)1m., Stats, requires the Department to consider the date on which the department publishes a notice on its web site as the date of notice.

#### CONCLUSIONS OF LAW

1. The Department has authority under the above indicated Statutes and Administrative Codes, to issue a permit for the construction and maintenance of this project.

#### NOTICE OF APPEAL RIGHTS

If you believe that you have a right to challenge this decision, you should know that the Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions shall be filed. For judicial review of a decision pursuant to sections 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

To request a contested case hearing of any individual permit decision pursuant to section 281.36.(3q), Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources, P.O. Box 7921, Madison, WI, 53707-7921. The petition shall be in writing, shall be dated and signed by the petitioner, and shall include as an attachment a copy of the decision for which administrative review is sought. If you are not the applicant, you must simultaneously provide a copy of the petition to the applicant. If you wish to request a stay of the project, you must provide information, as outlined below, to show that a stay is necessary to prevent significant adverse impacts or irreversible harm to the environment. If you are not the permit applicant, you must provide a copy of the petition to the permit applicant at the same time that you serve the petition on the Department.

**The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.**

A request for contested case hearing must meet the requirements of section 281.36 (3q), Wis. Stats., and section NR 2.03, Wis. Adm. Code, and if the petitioner is not the applicant, the petition must include the following information:

1. A description of the objection that is sufficiently specific to allow the department to determine which provisions of this section may be violated if the proposed discharge under the wetland individual permit is allowed to proceed.
2. A description of the facts supporting the petition that is sufficiently specific to determine how the petitioner believes the discharge, as proposed, may result in a violation of the provisions of this section.
3. A commitment by the petitioner to appear at the administrative hearing and present information supporting the petitioner's objection.
4. If the petition contains a request for a stay of the project, the petition must also include information showing that a stay is necessary to prevent significant adverse impacts or irreversible harm to the environment.

Dated at Waukesha Service Center, Wisconsin on June 10<sup>th</sup>, 2019.

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES  
For the Secretary

By *Erin Cox*  
Erin Cox  
Water Management Specialist



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT  
180 FIFTH STREET EAST, SUITE 700  
ST. PAUL, MN 55101-1678

July 12, 2019

Regulatory File No. MVP-2019-00231-RJH

Tyler Edwards  
Menard Inc.  
5101 Menard Drive  
Eau Claire, Wisconsin 54703

Dear Mr. Edwards:

This letter concerns your request for Department of the Army authorization to discharge dredged and fill material into 0.91 acre of wetlands adjacent to the Menomonee River for the purpose of constructing a warehouse and lumber yard associated with the expansion of the Menards-Germantown Store. The project site is in Section 33, Township 09 North, Range 20 East, Washington County, Wisconsin.

The discharge of dredged or fill material proposed within waters of the United States is authorized under the provisions of Letter of Permission LOP-06-WI, provided the work complies with the enclosed General Conditions and is constructed in accordance with the enclosed drawings labeled MVP-2019-00231-RJH, pages 1 of 2 through pages 2 of 2, which are hereby incorporated as part of this Letter of Permission.

The authorization is subject to the following special condition:

1. To compensate for unavoidable adverse impacts to 0.91 acre of fresh wet meadow wetlands, you shall purchase 1.32 advanced credits from the WI Wetland Conservation Trust (WWCT) SW Lake Michigan Service Area prior to conducting any authorized work. The credits purchased on March 19, 2019 fulfill this compensation requirement.

This Letter of Permission is issued under the provisions of Section 404 of the Clean Water Act (33 U.S.C. 1344). The time limit for completing this authorized work ends three years from the date of this letter. This Federal authorization does not obviate the need to obtain other Federal, state or local authorizations required by law.

This letter constitutes an initial proffered permit for your project. Also enclosed is a Notification of Administrative Appeal Options and Process (NAP) fact sheet and Request for Appeal (RFA) form which provides information regarding your right to object to these determinations.

If you object to the terms or conditions of this initial proffered permit, please see Section I-A, complete Section II of the RFA, and submit it to the **District Engineer** in accordance with 33 CFR 331. Your objections to the initial proffered permit must be received by the **St. Paul District Office** within 60 days of the date of the NAP or you will forfeit your right to challenge the terms or conditions of the permit.

Regulatory Branch (File No. MVP-2019-00231-RJH)

Before accepting the RFA, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR 331.5, and that it has been received by the District or Division Office within 60 days of the date of the NAP. It is not necessary to submit an RFA form to the Corps District or Division Office if you do not object to the initial proffered permit enclosed with this letter.

If you have any questions, please contact Ryan Huber in our Green Bay office at (651) 290-5859 or [Ryan.J.Huber@usace.army.mil](mailto:Ryan.J.Huber@usace.army.mil). In any correspondence or inquiries, please refer to the Regulatory file number shown above.

Sincerely,



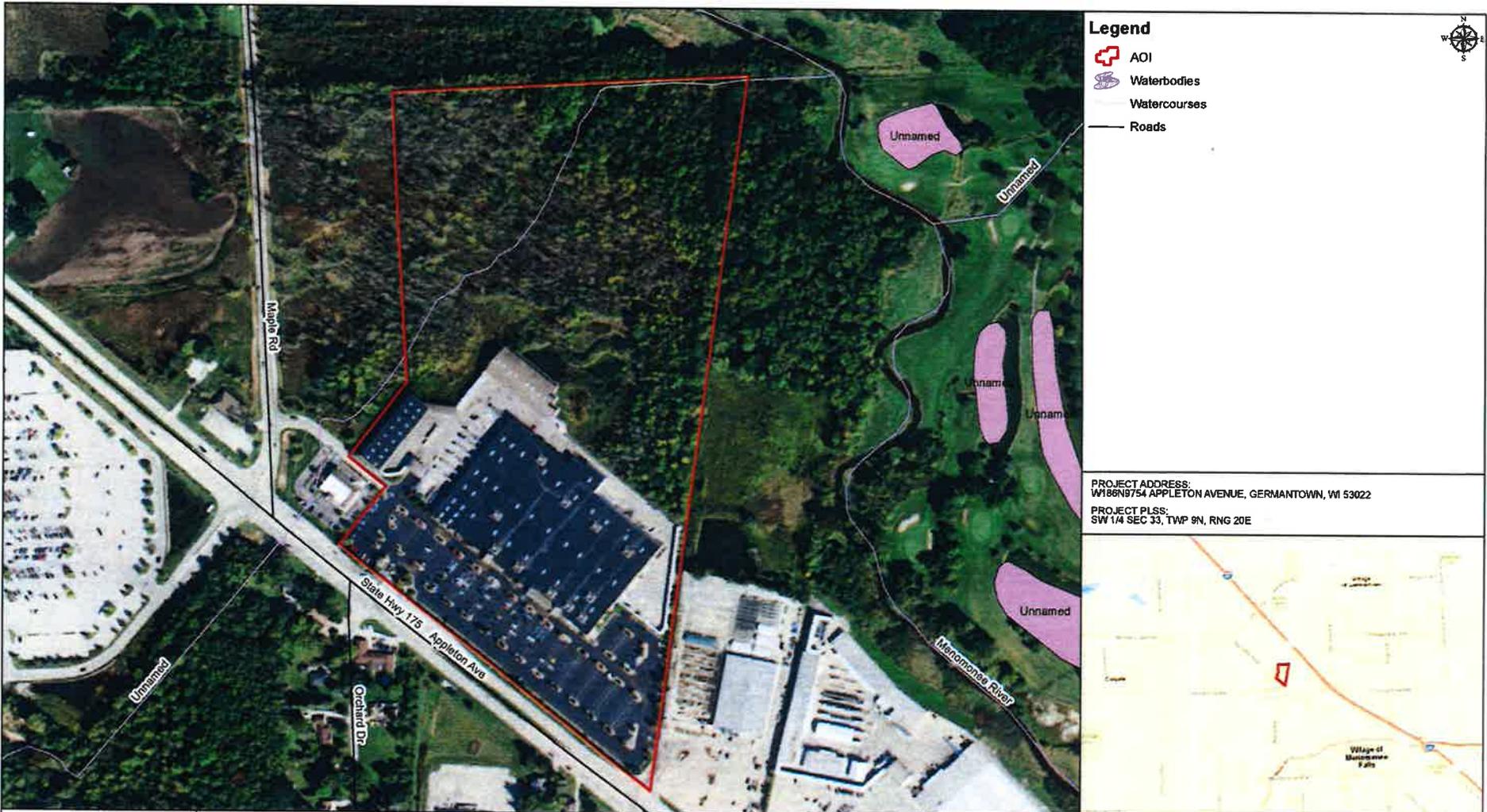
for Karl D. Jansen  
Colonel, Corps of Engineers  
District Engineer

Enclosure(s)

cc:

WDNR- Erin Cox

Wisconsin Environmental Restorations LLC- Kyle Brockman

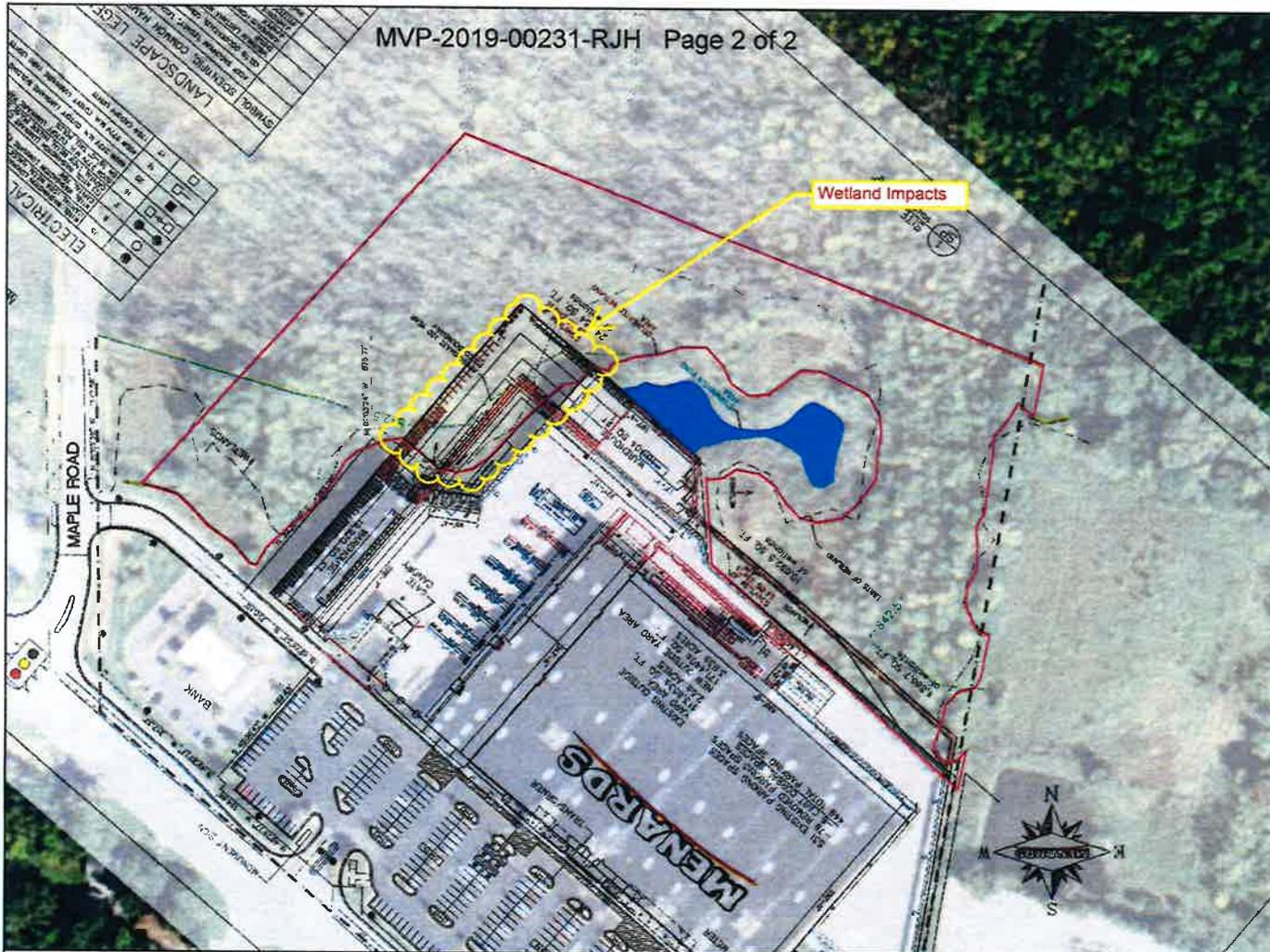


PROJECT ADDRESS:  
W186N754 APPLETON AVENUE, GERMANTOWN, WI 53022

PROJECT PLSS:  
SW 1/4 SEC 33, TWP 9N, RNG 20E



<b>EXHIBIT A</b> Wisconsin Environmental Restorations LLC PO Box 69 Strum, WI 54770 Office (715) 695-3254 www.wisconsinenvironmental.com	Notes:	FIGURE/PHOTO DESCRIPTION:	CREATED BY:	0 75 150 300 450 600 Feet SHEET OF SCALE (11 x 17): 1 in = 250 feet SOURCE DATA: WER, (insert data sources) PROJECTION: Transverse Mercator COORDINATE SYSTEM: NAD 1983 UTM Zone 15N	PROJECT NO.
		LOCATION MAP	KBROCKMAN		WER 126.0002.4
		CLIENT/PROJECT:	MANAGER:		DATE:
		MENARD INC. - GERMANTOWN FACILITY EXPANSION	NHAUS		11/2/2018
			FIELD DATA COLLECTED BY:		
			WER		



**Legend**

-  Delineated Wetland
-  Storm Water Pond



PROJECT ADDRESS:  
W156N8754 APPLETON AVENUE, GERMANTOWN, WI 53022  
PROJECT P.L.S.S:  
S1W 1/4 SEC 33, TWP 9N, RNG 20E



**EXHIBIT A**  
Wisconsin Environmental Restorations LLC  
PO Box 99  
Strum, WI 54770  
Office (715) 695-3254  
www.wisconsinenvironmental.com

Notes:

FIGURE/PHOTO DESCRIPTION:  
SITE PLAN OVERLAY  
CLIENT/PROJECT:  
MENARD INC. - GERMANTOWN FACILITY EXPANSION

CREATED BY:  
KBROCKMAN  
MANAGER:  
NHAUS  
FIELD DATA COLLECTED BY:  
WER

0 40 80 160 240 320 Feet  
SHEET OF SCALE (11 x 17): 1 in = 136.23 feet  
SOURCE DATA: WER, (insert data sources)  
PROJECTION: Transverse Mercator  
COORDINATE SYSTEM: NAD 1983 2011 WISCRS Washington Feet

PROJECT NO.  
WER 126.0002.4  
DATE:  
3/26/2019  
**WER**

**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND  
REQUEST FOR APPEAL**

**Applicant:** Tyler Edwards- Menard Inc      **File No.:** MVP-2019-00231-RJH      **Date:** JUL 12 2019

Attached is:		See Section below
X	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

**SECTION I -** The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://usace.army.mil/inet/functions/cw/cecwo/reg> or Corps regulations at 33 CFR Part 331.

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:

U.S Army Corps of Engineers  
Attn: Ryan Huber  
211 North Broadway Street Ste. 221  
Green Bay, Wisconsin 54303-2757

If you only have questions regarding the appeal process you may also contact the Division Engineer through:

Administrative Appeals Review Officer  
Mississippi Valley Division  
P.O. Box 80 (1400 Walnut Street)  
Vicksburg, MS 39181-0080  
601-634-5820 FAX: 601-634-5816

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

\_\_\_\_\_  
Signature of appellant or agent.

Date:

Telephone number:

## LOP-06-WI CONDITIONS

### GENERAL INFORMATION

Persons proposing to do work should note that, in ALL cases, LOP-06-WI requires that adverse impacts to water and wetland resources be avoided and minimized TO THE MAXIMUM EXTENT PRACTICABLE. Also, activities that would adversely affect Federal or State endangered plant or animal species or certain cultural or archaeological resources, or that would impair reserved Native American tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights, are not eligible for authorization under LOP-06-WI.

### DEPARTMENT OF THE ARMY PERMIT GENERAL CONDITIONS

1. The time limit for completing work authorized by an LOP ends three years after the date of the Corps' authorization letter. If you find that you need more time to complete the authorized activity, submit your request for a time extension to the Corps for consideration at least three months before the expiration date is reached.

2. You must maintain the authorized activity in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you

abandon the permitted activity, although you may make a good faith transfer to a third party. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archaeological remains while accomplishing the authorized activity you must immediately stop work and notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to the LOP-06-WI authorization. A copy of the certification will be attached to the LOP-06-WI authorization if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms

and conditions of LOP-06-WI.

### Further Information.

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344).

2. Limits of this authorization.

a. This LOP does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This LOP does not grant any property rights or exclusive privileges.

c. This LOP does not authorize any injury to the property or rights of others.

d. This LOP does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In authorizing work, the Federal Government does not assume any liability, including but not limited to the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

## LOP-06-WI CONDITIONS

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision. Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification,

and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1., above, establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

### **OTHER INFORMATION**

1. **FEDERAL TRUST RESPONSIBILITY TO INDIAN TRIBES.** Projects the District finds to have potential to affect tribal interests will be coordinated with the appropriate Indian

Tribal governments. The Tribe's views and the Federal trust responsibility will be considered in the District's evaluation. Throughout the state, including the treaty-ceded territories, the District review of all provisional LOP projects which impact more than 10,000 square feet of wetland/water area will include coordination with any potentially affected tribe(s). The District will provide, by facsimile transmission, project notifications to the concerned tribe(s) for a 30-day review period. The views of the tribe(s) will be considered in the District's evaluation of the activity and in the District's determination of whether the activity is in compliance with LOP-06-WI Standard Condition 18 that prohibits activities, or their operation, that may impinge or abrogate treaty rights, including, but not limited to, reserved treaty fishing and hunting rights.

### **2. PROJECT-SPECIFIC LOP-06-WI CONDITIONS.**

The District evaluation will identify any need for project-specific special conditions and require such conditions to minimize adverse project impacts and/or protect the public interest.

3. **FORM AND CONFIRMATION OF AUTHORIZATION.** Every LOP-06-WI authorization will be confirmed in writing by the St. Paul District via a

## LOP-06-WI CONDITIONS

letter of authorization to the project Applicant or authorized agent. The letter will identify any required special conditions.

### 4. FEDERAL AND STATE ENDANGERED SPECIES AND CULTURAL RESOURCES.

LOP-06-WI does not affect the Corps responsibility to insure that all Section 404 authorizations comply with Section 7 of the Federal Endangered Species Act, s. 29.604, Wisconsin Statutes and Section 106 of the National Historic Preservation Act. No Corps permit will be granted for projects found not to comply with these Acts.

### 5. GRANDFATHER

PROVISION. Regulated work for commenced activities that was authorized under the LOP provisions of GP/LOP-98-WI continues to be authorized under the terms of the original authorization

### 6. MODIFICATION OF PROCEDURES.

The St. Paul District has authority to modify, revoke, or suspend these procedures at any time it determines that circumstances concerning the public interest warrant such action.

### STATE SECTION 401 CERTIFICATION, CONDITIONS AND LIMITATIONS OF SECTION 401 CERTIFICATION OF LOP-06-WI.

#### **I. General Conditions**

1. The applicant shall allow the WDNR reasonable entry and access to the discharge site to inspect the proposed discharge for compliance with this certification and applicable laws and to inspect permitted discharges for compliance with this certification and applicable laws.

2. If any conditions of this certification are found to be invalid or unenforceable, certification for all activities to which that condition applies is denied.

3. The following activities are not eligible for certification under this water quality certification action for LOP-06-WI.

A. Activities likely to jeopardize the continued existence of a state designated threatened or endangered species or a species proposed for such designation or which is likely to destroy or adversely modify the habitat of such species.

B. Activities that result in adverse impacts to fishery spawning habitat or adversely affect avifauna breeding areas or substantially disrupt the movement of those species that normally migrate from open water to upland or vice versa (i.e. amphibians, reptiles and mammals).

C. Activities detrimental to waters of the state, including wetlands, that would

adversely affect designated areas of special natural resource interest as defined in NR 103.04, Wis. Adm. Code.

D. Activities, individually or cumulatively, detrimental to waters of the state, including wetlands, that would further the substantial degradation of designated impaired waters of the state.

4. Applicants seeking authorization under the LOP-06-WI (Letter of Permission procedures) shall complete a Joint State/Federal Permit Application and submit two copies to each, the appropriate local COE office and the local WDNR Water Management Specialist. Applications for water quality certification must be complete as determined by the WDNR. Please note an application fee is required for state water quality certification activities identified under Section II below.

#### **II. Water Quality Certification**

1. The WDNR grants water quality certification for projects that satisfy all applicable conditions of LOP-06-WI subject to the General Conditions above, and:

2. The applicant receives written confirmation from the department that their proposed activity(s) is consistent with the requirements of NR 299 Water Quality Certification, Wis. Adm.

## **LOP-06-WI CONDITIONS**

**Code, and the Department confirms that the applicant has adequately demonstrated that no other practicable alternative exists which would not adversely impact wetlands and would not result in other significant adverse environmental consequences and the Department confirms that the activity is consistent with the requirements of NR 103.08, Wis. Adm. Code.**

NOTE: If additional information is needed, or if heavy snow or ice cover prevents WDNR from completing their review, the normal processing time for confirming activities eligible for authorization under this certification may be extended (by written notice from WDNR to the applicant.)

### **WISCONSIN COASTAL MANAGEMENT PROGRAM (WCMP) CONDITIONS.**

The WCMP's Federal consistency determination for LOP-06-WI provides that no LOP-06-WI authorization for an activity taking place in coastal wetlands identified as ridge and swale complexes and/or wetlands adjacent to the Mink River, Door County, and the Kakagon and Bad Rivers, Ashland County will be valid unless and until a Federal consistency determination is granted or waived by the WCMP. This requirement

therefore is incorporated as a permit condition of LOP-06-WI. Applicants will be notified of this condition in the District's LOP provisional authorization for projects in these areas.

# **STORMWATER MANAGEMENT PLAN REPORT**

Menards Germantown- Yard Expansion

Village of Germantown, WI

Washington County

Located at: W186N9754 Appleton Ave

October 2019

**PREPARED BY:**

**CEDAR CORPORATIO  
604 WILSON AVENUE  
MENOMONIE, WI 54751  
(715)-235-9081**

## Table of Contents

Introduction:.....	3
Site Description:.....	3
Existing Stormwater Runoff Analysis: .....	3
Site Improvements: .....	3
Proposed Stormwater Runoff Analysis:.....	4
WisDNR Requirements: .....	4

## Appendix

Appendix A- Existing Site Conditions

Appendix B- NRCS Soil Report

Appendix C- Pre-Developed HydroCAD Report

Appendix D- Existing HydroCAD Report

Appendix E- Proposed HydroCAD Report

Appendix F- WinSLAMM Summary

## Introduction:

Menards Germantown Store is a commercial home improvement store located at W186N9754 Appleton Ave, Germantown, WI. The site consists of mainly impervious pavement parking lots, and an impervious warehouse and holding yard. Menards is proposing an expansion to its current site which will also include an expansion to the existing stormwater holding facilities. Currently the site is split into two stormwater holding facilities, one facility is located off of the southeast corner of the building and another is located to the northwest of the building within the existing yard.

## Site Description:

The Menards Store is constructed on approximately 34 acres. The existing stormwater facilities serves the impervious area of the site which equates to approximately 16.5 acres of impervious area. See [Appendix A](#) for the existing site conditions and drainage areas from a previously submitted stormwater report. All of the stormwater from the existing parking lot is directed and treated in the stormwater holding tank located in the parking lot. Well the runoff from the building and all of the other impervious areas is directed to the second stormwater holding tanks located under the existing holding yard. The existing soils around the site where found to be primarily silt loam soils. See [Appendix B](#) for the NRCS Soils Report.

## Existing Stormwater Runoff Analysis:

Stormwater runoff of the existing project site was evaluated with HydroCAD v10.0 stormwater modeling software. The table below summarizes existing stormwater runoff amounts from the stormwater drainage ares for the 1-year, 2-year, 10-year, 25-year, and 100-year storm events. The HydroCAD report for the pre-developed site can be seen below in [Appendix C](#) and the existing site conditions HydroCAD report can also be found in [Appendix D](#).

<b>Storm Event</b>	<b>1-year</b>	<b>2-year</b>	<b>10-year</b>	<b>25-year</b>	<b>100-year</b>
<b>Rainfall Amount (in)</b>	2.35"	2.65"	3.82"	4.73"	6.41"
<b>Existing Runoff (cfs)</b>	1.91	2.28	3.29	4.03	30.61
<b>Pre-developed Runoff (cfs)</b>	17.52	21.91	40.24	55.34	83.57

Table 1 – Existing Stormwater Runoff Rates (Cubic Feet per Second)

## Site Improvements:

The proposed project is construction of a warehouse addition, building additions, and yard expansion behind and existing Menards Store, in Germantown, WI. Construction activities will include demolition and removals of existing structures and pavement, earthwork, grading, utility installation, asphalt paving, curb and gutter, sidewalk, stormwater pond construction, and building construction. The site will be 50% impervious.

### Proposed Stormwater Runoff Analysis:

The proposed site will be split into 4 different drainage areas. The existing pavement parking lot located in front of the store will drain to the existing storm sewer holding system and discharge into the second storm sewer holding system. The second drainage area consist of the existing yard, the existing building and some paved parking areas within the site. The second area will drain into the second stormwater holding system and be discharged from there. The second storm sewer holding system was designed to provide rate control for the existing site. The third drainage area includes the warehouse addition and some of the pavement additions located to the northwest of the existing building along with approximately 20,350 square feet of the existing second drainage area will be directed to the third drainage system, lessening the load on the second system. And the fourth area will be the new pavement that is located to the north of the existing loading dock. Both of the new systems will be produced by ADS Stromtech and will be installed under the proposed expansion and will meet both rate control and provide water quality for the addition. Details of the proposed systems can be found attached to the plans. The table below shows the runoff amounts for the proposed site compared to the pre-developed site. The HydroCAD report for this evaluation can also be found in [Appendix E](#).

<b>Storm Event</b>	<b>1-year</b>	<b>2-year</b>	<b>10-year</b>	<b>25-year</b>	<b>100-year</b>
<b>Rainfall Amount (in)</b>	2.35"	2.65"	3.82"	4.73"	6.41"
<b>Pre-developed Runoff (cfs)</b>	17.52	21.91	40.24	55.34	83.57
<b>Proposed Runoff (cfs)</b>	1.95	2.32	3.32	4.08	48.37

Table 2 – Proposed Stormwater Runoff Rates

Stormwater runoff quality of the proposed project site was evaluated with WinSLAMM v10.3.4 model. The findings of this evaluation can be found in [Appendix F](#) and are summarized in Table 3 below.

	<b>Load (lbs)</b>	<b>Removed (lbs)</b>	<b>Discharge (lbs)</b>	<b>Removal Efficiency (%)</b>
Menards Germantown Expansion	798.90	478.00	320.90	56.55

Table 3 – Proposed Stormwater Water Quality Results

### WisDNR Requirements:

Sections NR 151.122 to 151.128 outline post construction performance standards for the project. The Village of Germantowns Stormwater Management Requirements, and the Milwaukee Metropolitan Sewerage District requirements have also been consulted. The following standards have been addressed:

WisDNR NR 151.122 requires 40% TSS removal for a "Re-Development" site. As stated Table 3, above, the proposed stormwater holding system will provide 59.93 % TSS removal for the proposed menards expansion area.

WisDNR NR 151.123 requires proposed peak discharge rates to be less than or equal to existing peak discharge rates for the 1- and 2-year storm events. As stated in Table 2, above, the proposed stormwater holding system will reduce the peak discharge rates from the 1-year, 2-year, 10-year, 50-year, and 100-year storm events. And meet the MMSD requirements for discharge of the 2-year and 100-year event.

WisDNR NR 151.124 requires infiltration of the post-construction site. For moderate imperviousness, the post construction site shall infiltrate atleast 75% of the infiltration volume of the predevelopment infiltration volume. No more than 2 percent of the post construction site is required to meet this requirement.

## Appendix A

**GERMANTOWN MENARDS SITE  
DRAINAGE REPORT**

**CLIENT:  
MENARDS**

**PREPARED BY:  
TEC DESIGN, INC.  
5828 ARNDT LANE  
EAU CLAIRE, WI 54701**

**APRIL 2001**  
*(Revised June 14, 2001)*  
*(Revised July 25, 2001)*  
*(Revised February 7, 2002)*  
*(Revised June 6, 2002)*  
*(Revised February 6, 2003)*  
*(Revised March 12, 2003)*



## ***INDEX***

Index	i
Stormwater Requirements and Methodology	1
Stormwater Detention Design	1
Summary	2
Appendix A	
Pre-developed Drainage Basin Map	A-1
Post-developed Drainage Basin Map	A-2
Appendix B'	
Pre-developed Drainage Diagram	B-1
Pre-developed – 2-year Recurrence Calculations	B-2
Pre-developed – 100-year Recurrence Calculations	B-3
Post-developed Drainage Diagram	B-4
Post-developed – 2-year Recurrence Calculations	B-5
Post-developed – 100-year Recurrence Calculations	B-11
Pond 1 Volume Calculations	B-17
Pond 1 Stage-Discharge Curve	B-19
Pond 2 Volume Calculations	B-20
Pond 2 Stage-Discharge Curve	B-24

### **STORMWATER REQUIREMENTS AND METHODOLOGY**

The Menards site being developed has to satisfy stringent stormwater detention requirements. Per the Milwaukee Metropolitan Sewerage District (MMSD), the post-developed release rate from the site may not exceed 0.15 cfs/acre during the 2-year storm event. During the 100-year storm event, the release rate must not exceed 0.50 cfs/acre. A detention pond with an outlet control structure will be used to control the peak flows that are discharged from the site. HydroCad (Version 6) Stormwater Modeling System was utilized for modeling of the stormwater management for this site.

### **STORMWATER DETENTION DESIGN**

Using HydroCad modeling it was determined that post-developed peak flows for the 2-year and 100-year storm event are 41.9 cfs and 107.1 cfs, respectively. Per the requirements of the MMSD, the peak flows must be reduced to 0.15 cfs/acre for the 2-year storm event and 0.50 cfs/acre for the 100-year storm event. The proposed Menards site is 16.6 acres. The allowable release rates for the 2-year and 100-year storm events are 2.5 cfs and 7.9 cfs, respectively. Based on the post-developed peak inflows and the allowable outflows, a considerable storage volume will be required to reduce the peak flows to the allowable. Due to constraints with availability of land for the required detention pond and existing subsurface conditions, combined detention facilities composed of underground storage and the traditional detention pond has been proposed for the Menards site.

The volume of the traditional detention pond and the underground storage system (consisting of 60-inch diameter storm pipe), referred to as Pond 2, were calculated on

Page B-20. The volume of the combined system was considered to be inadequate to control the post-developed inflow and release at the required rates. Therefore a preliminary pond, referred to as Pond 1, was designed to reduce the peak-developed flows from the upper portion of the site. This pond will be an underground system consisting of a series of 48-inch diameter storm pipe. The peak discharge from this stormwater detention facility will be conveyed to the combination detention facility where the peak post-developed inflows will be reduced to the required release rates.

Two (2) 2-stage outlet structures, with a 4.5-inch and a 5.75-inch orifices cored into a 6-inch thick concrete divider within a storm manhole, were designed to control release rates from the stormwater detention facility. The 2-year post-developed peak inflow was routed through the detention pond system. The peak outflow during this event is 2.5 cfs, which is equal to the allowable 2.5 cfs. The 100-year post-developed peak inflow was routed through the detention pond system. The peak outflow during this event is 7.9 cfs, which is less than the allowable 8.3 cfs. The highwater level during the 100-year storm event was determined to be 848.75. This will allow for a freeboard depth of 0.95 feet.

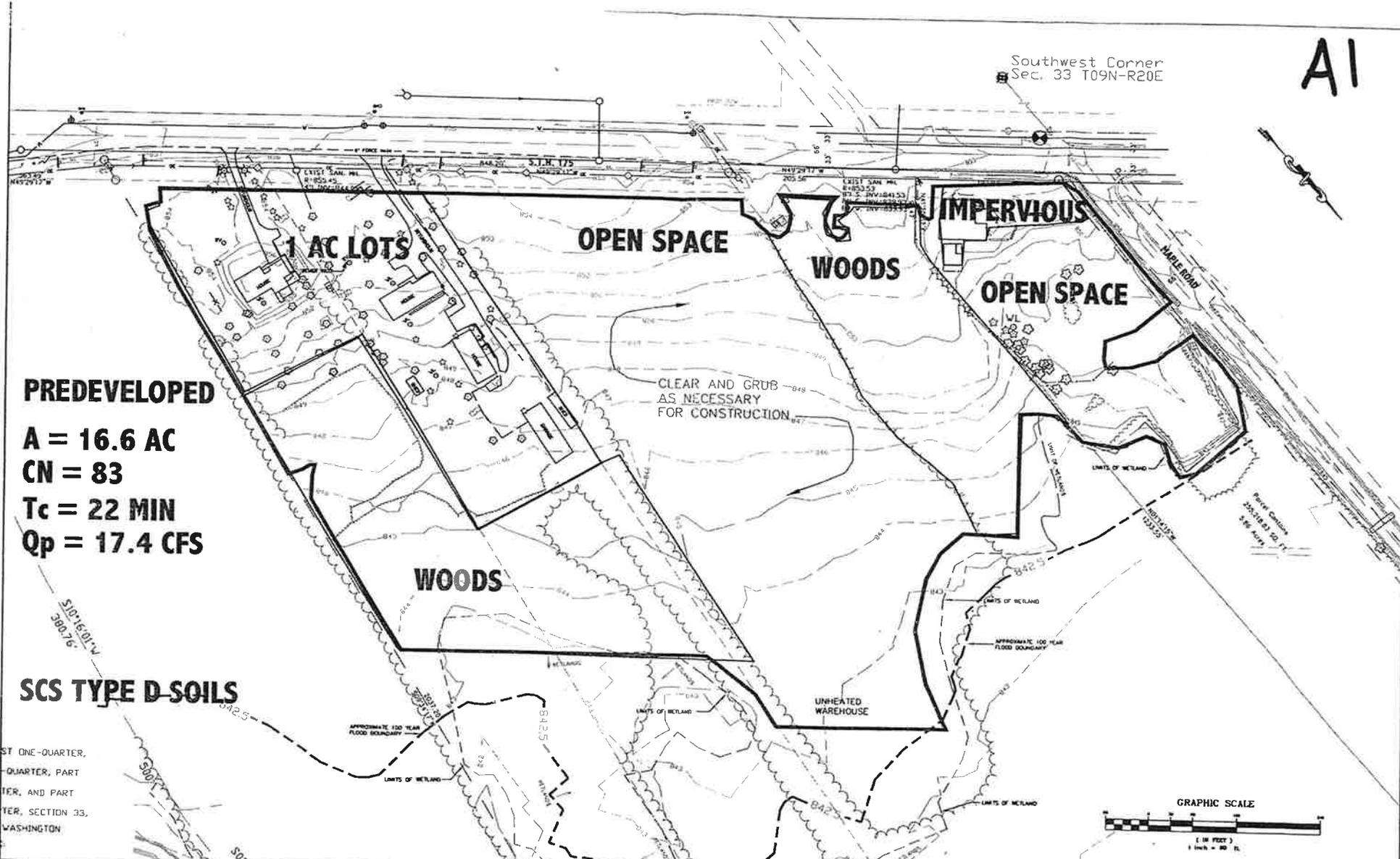
#### **SUMMARY**

The stormwater requirements of the City of Germantown have been met through creative stormwater management practices. The system will achieve the stormwater management objectives set forth in Germantown's ordinances.

APPENDIX 'A'

**A1**

Southwest Corner  
Sec. 33 T09N-R20E



**PREDEVELOPED**

**A = 16.6 AC**

**CN = 83**

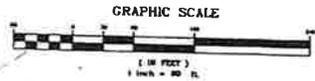
**Tc = 22 MIN**

**Qp = 17.4 CFS**

**SCS TYPE D SOILS**

CLEAR AND GRUB  
AS NECESSARY  
FOR CONSTRUCTION

ST ONE-QUARTER,  
QUARTER, PART  
IER, AND PART  
YER, SECTION 33,  
WASHINGTON



<table border="1"> <tr> <td>NO.</td> <td>BY</td> <td>DATE</td> <td>REVISIONS</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>				NO.	BY	DATE	REVISIONS													PROJ. NO. 0117	<b>TEC DESIGN</b> YOUR SITE SPECIALIST TECHNICAL ENGINEERING CONCEPTS & DESIGN	CROWFOOT METRO AREA 5478 HENRIE LANE EAU CLAIRE, WI 54601 PH 715-652-0218 FX 715-652-0532	3830 HANSON LANE SUITE 124 PLUMCOURT, WI 53447 PH 612-577-2214 FX 612-577-2124	EXISTING SITE	MENARDS SITE IMPROVEMENT PLANS - 2001 GERMANTOWN, WISCONSIN	DWG. NAME 0117ERIS1	DATE 7/01	1 1
NO.	BY	DATE	REVISIONS																									



APPENDIX 'B'

**PRE-DEVELOPED**



Drainage Diagram for 0117-PRE  
Prepared by TEC Design, Inc. 2/5/03  
HydroCAD® 6.00 s/n 002094 © 1986-2001 Applied Microcomputer Systems

0117-PRE

Type II 24-hr Rainfall=2.60" (Pre-developed 2-year Recurrence)

Prepared by TEC Design, Inc.

Page 2

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2/5/03

**Subcatchment 1S: SC1**

Runoff = 19.40 cfs @ 12.16 hrs, Volume= 1.423 af

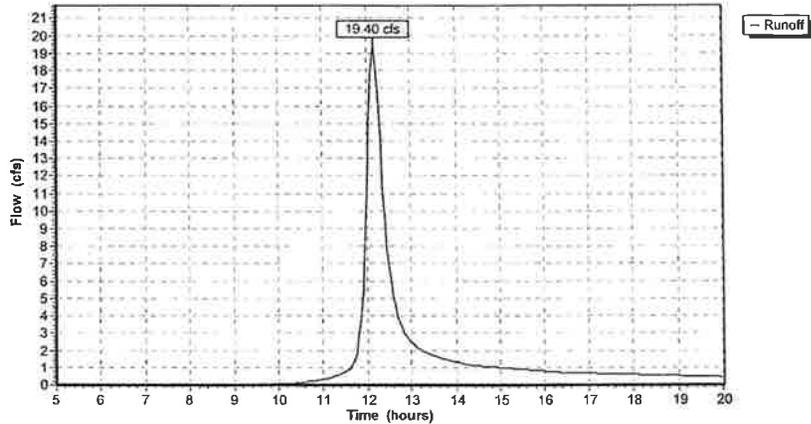
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr Rainfall=2.60"

Area (ac)	CN	Description
3.000	84	1 acre lots, 20% imp, HSG D
8.200	84	50-75% Grass cover, Fair, HSG D
5.100	79	Woods, Fair, HSG D
0.300	98	Paved parking & roofs
16.600	83	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	300	0.0220	0.3		Sheet Flow, Sheet Flow n= 0.100 P2= 2.70"
4.2	500	0.0150	2.0		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
22.1	800	Total			

**Subcatchment 1S: SC1**

Hydrograph Plot



0117-PRE

Type II 24-hr Rainfall=7.20" (Pre-developed 100-year Recurrence)

Prepared by TEC Design, Inc.

Page 2

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2/5/03

**Subcatchment 1S: SC1**

Runoff = 89.11 cfs @ 12.15 hrs, Volume= 6.725 af

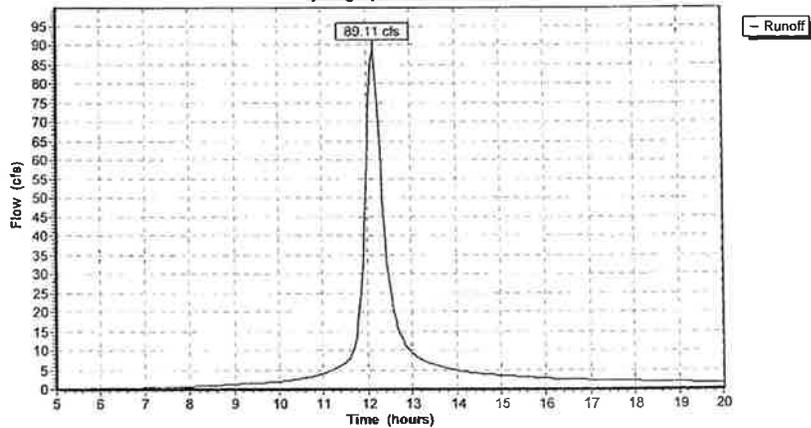
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr Rainfall=7.20"

Area (ac)	CN	Description
3.000	84	1 acre lots, 20% imp, HSG D
8.200	84	50-75% Grass cover, Fair, HSG D
5.100	79	Woods, Fair, HSG D
0.300	98	Paved parking & roofs
16.600	83	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	300	0.0220	0.3		Sheet Flow, Sheet Flow n= 0.100 P2= 2.70"
4.2	500	0.0150	2.0		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
22.1	800	Total			

**Subcatchment 1S: SC1**

Hydrograph Plot



POST-DEVELOPED

0117-post

Type II 24-hr Rainfall=2.60" (Post-developed 2-year Recurrence)

Prepared by TEC Design, Inc.

Page 2

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3/12/03

### Subcatchment 1S: SC1

Runoff = 18.99 cfs @ 12.01 hrs, Volume= 1,165 af

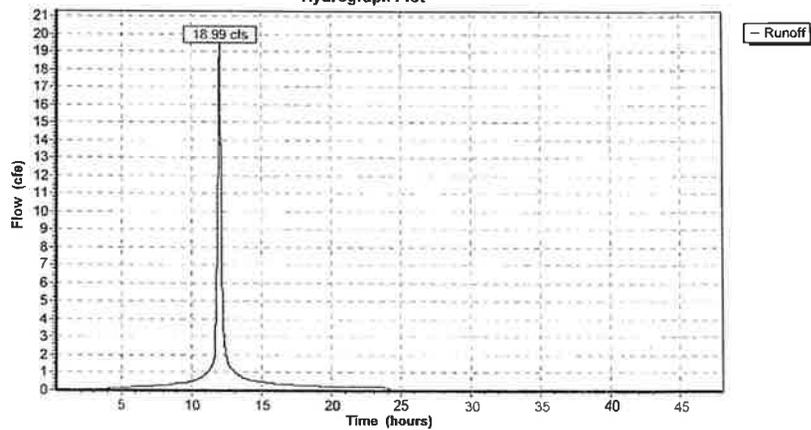
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=2.60"

Area (ac)	CN	Description
5.900	98	Paved parking & roofs

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

### Subcatchment 1S: SC1

#### Hydrograph Plot



B-5

0117-post

Type II 24-hr Rainfall=2.60" (Post-developed 2-year Recurrence)

Prepared by TEC Design, Inc.

Page 4

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3/12/03

**Pond 1P: Pond 1**

Inflow = 18.99 cfs @ 12.01 hrs, Volume= 1.165 af  
 Outflow = 8.95 cfs @ 12.10 hrs, Volume= 1.165 af, Atten= 53%, Lag= 5.6 min  
 Primary = 8.95 cfs @ 12.10 hrs, Volume= 1.165 af

Routing by Sim-Route method, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs

Peak Elev= 846.22' Storage= 13,234 cf

Plug-Flow detention time= 52.6 min calculated for 1.165 af (100% of inflow)

Elevation (feet)	Cum Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Primary OutFlow (Dynamic Tailwater)

↑-1=Culvert

#	Routing	Invert	Outlet Devices
1	Primary	844.60'	24.0" x 514.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 843.47' S= 0.0022 'f' n= 0.010 Cc= 0.900

0117-post

Type II 24-hr Rainfall=2.60" (Post-developed 2-year Recurrence)

Prepared by TEC Design, Inc.

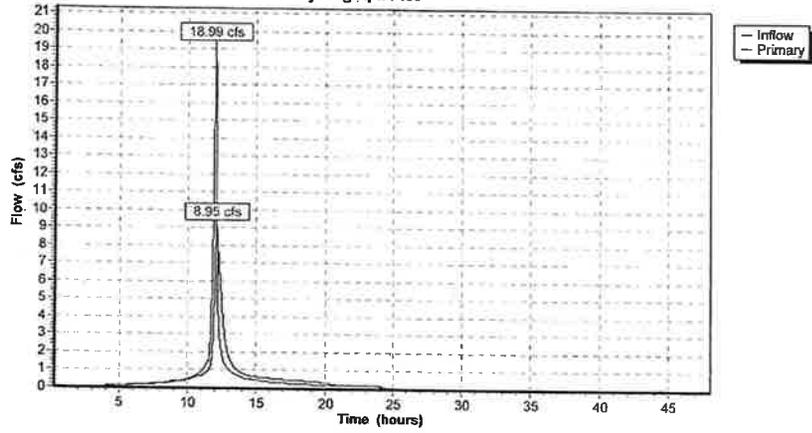
Page 5

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3/12/03

**Pond 1P: Pond 1**

Hydrograph Plot



0117-post

Type II 24-hr Rainfall=2.60" (Post-developed 2-year Recurrence)

Prepared by TEC Design, Inc.

Page 3

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3/12/03

**Subcatchment 2S: SC2**

Runoff = 34.45 cfs @ 12.01 hrs, Volume= 2.113 af

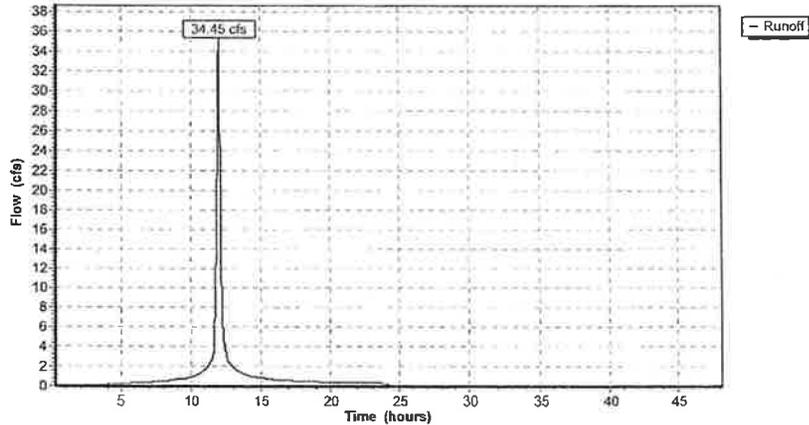
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=2.60"

Area (ac)	CN	Description
9.400	98	Paved parking & roofs
1.300	95	Urban commercial, 85% imp, HSG D
10.700	98	Weighted Average

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

**Subcatchment 2S: SC2**

Hydrograph Plot



0117-post

Type II 24-hr Rainfall=2.60" (Post-developed 2-year Recurrence)

Prepared by TEC Design, Inc.

Page 6

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3/12/03

**Pond 2P: Pond 2**

Inflow = 41.91 cfs @ 12.01 hrs, Volume= 3.278 af  
 Outflow = 2.49 cfs @ 13.52 hrs, Volume= 3.304 af, Atten= 94%, Lag= 90.5 min  
 Primary = 2.49 cfs @ 13.52 hrs, Volume= 3.304 af

Routing by Sim-Route method, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs

Peak Elev= 845.39' Storage= 73,283 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Elevation (feet)	Cum.Store (cubic-feet)
842.50	0
843.00	5,579
844.00	25,375
845.00	58,382
846.00	96,687
847.00	136,565
848.00	173,130
849.00	199,843
850.00	226,720

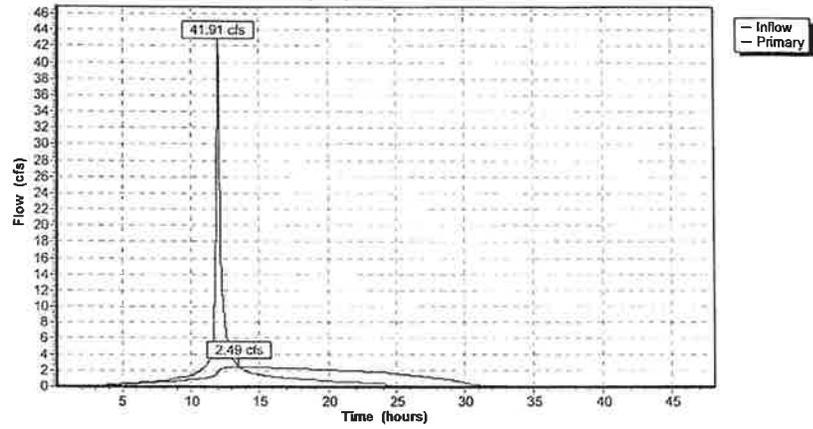
Primary OutFlow (Dynamic Tailwater)

1=Orifice/Grate  
 2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	842.42'	4.5" Vert. Orifice/Grate X 2.00 C= 0.820
2	Primary	845.30'	5.8" Vert. Orifice/Grate X 2.00 C= 0.820

Pond 2P: Pond 2

Hydrograph Plot



0117-post

Type II 24-hr Rainfall=7.20" (Post-developed 100-year Recurrence)

Prepared by TEC Design, Inc.

Page 2

HydroCAD® 6.00 s/n 002094 © 1986-2001 Applied Microcomputer Systems

3/12/03

**Subcatchment 1S: SC1**

Runoff = 53.46 cfs @ 12.01 hrs, Volume= 3.422 af

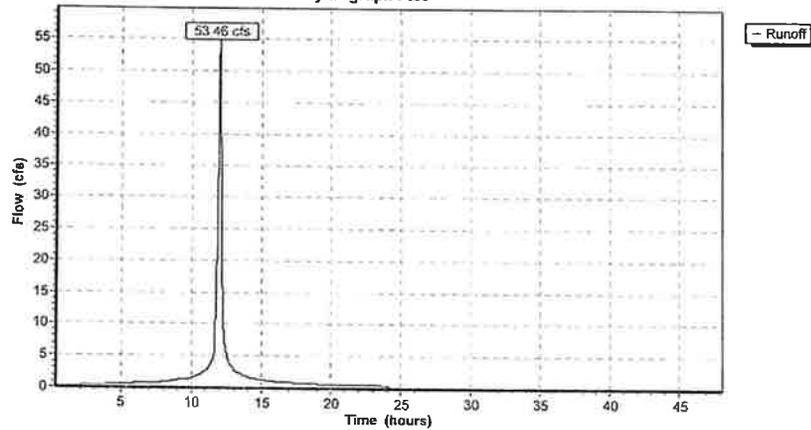
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=7.20"

Area (ac)	CN	Description
5.900	98	Paved parking & roofs

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

**Subcatchment 1S: SC1**

Hydrograph Plot



B-11

0117-post

Type II 24-hr Rainfall=7.20" (Post-developed 100-year Recurrence)

Prepared by TEC Design, Inc.

Page 4

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3/12/03

**Pond 1P: Pond 1**

Inflow = 53.46 cfs @ 12.01 hrs, Volume= 3.422 af  
 Outflow = 11.16 cfs @ 12.14 hrs, Volume= 3.422 af, Atten= 79%, Lag= 7.6 min  
 Primary = 11.16 cfs @ 12.14 hrs, Volume= 3.422 af

Routing by Sim-Route method, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs

Peak Elev= 848.92' Storage= 49,325 cf

Plug-Flow detention time= 164.9 min calculated for 3.422 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

**Primary OutFlow** (Dynamic Tailwater)

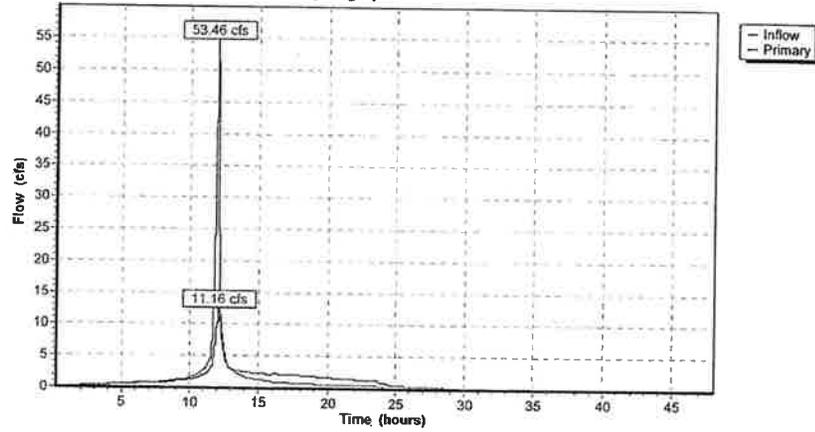
└─1=Culvert

#	Routing	Invert	Outlet Devices
1	Primary	844.60'	24.0" x 514.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 843.47' S= 0.0022 ' /' n= 0.010 Cc= 0.900

B-12

**Pond 1P: Pond 1**

Hydrograph Plot



0117-post

Type II 24-hr Rainfall=7.20" (Post-developed 100-year Recurrence)

Prepared by TEC Design, Inc.

Page 3

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3/12/03

### Subcatchment 2S: SC2

Runoff = 96.95 cfs @ 12.01 hrs, Volume= 6.207 af

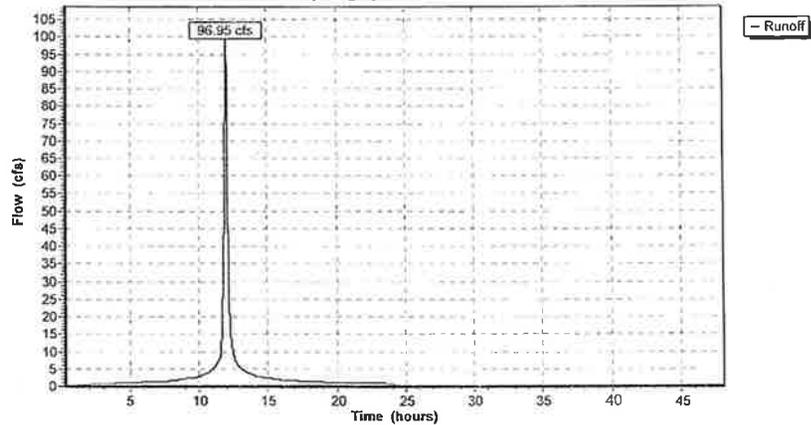
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=7.20"

Area (ac)	CN	Description
9.400	98	Paved parking & roofs
1.300	95	Urban commercial, 85% imp, HSG D
10.700	98	Weighted Average

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

### Subcatchment 2S: SC2

#### Hydrograph Plot



B-14

0117-post

Type II 24-hr Rainfall=7.20" (Post-developed 100-year Recurrence)

Prepared by TEC Design, Inc.

Page 6

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3/12/03

**Pond 2P: Pond 2**

Inflow = 107.12 cfs @ 12.01 hrs, Volume= 9.628 af  
 Outflow = 7.93 cfs @ 13.08 hrs, Volume= 9.638 af, Atten= 93%, Lag= 64.1 min  
 Primary = 7.93 cfs @ 13.08 hrs, Volume= 9.638 af

Routing by Sim-Route method, Time Span= 0.25-48.00 hrs, dt= 0.01 hrs

Peak Elev= 848.75' Storage= 193,195 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Elevation (feet)	Cum.Store (cubic-feet)
842.50	0
843.00	5,579
844.00	25,375
845.00	58,382
846.00	96,687
847.00	136,565
848.00	173,130
849.00	199,843
850.00	226,720

Primary OutFlow (Dynamic Tailwater)

- 1=Orifice/Grate
- 2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	842.42'	4.5" Vert. Orifice/Grate X 2.00 C= 0.820
2	Primary	845.30'	5.8" Vert. Orifice/Grate X 2.00 C= 0.820

B-15

0117-post

Type II 24-hr Rainfall=7.20" (Post-developed 100-year Recurrence)

Prepared by TEC Design, Inc.

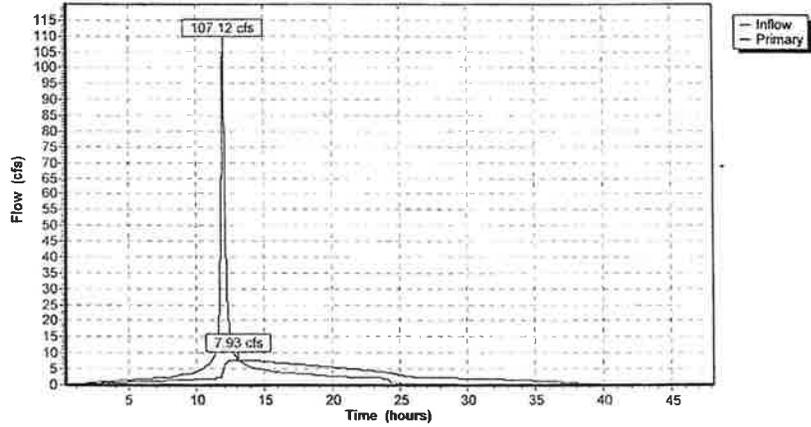
Page 7

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3/12/03

### Pond 2P: Pond 2

Hydrograph Plot



B-16

Ø-17

PIPE DETERMINATION - POND 1

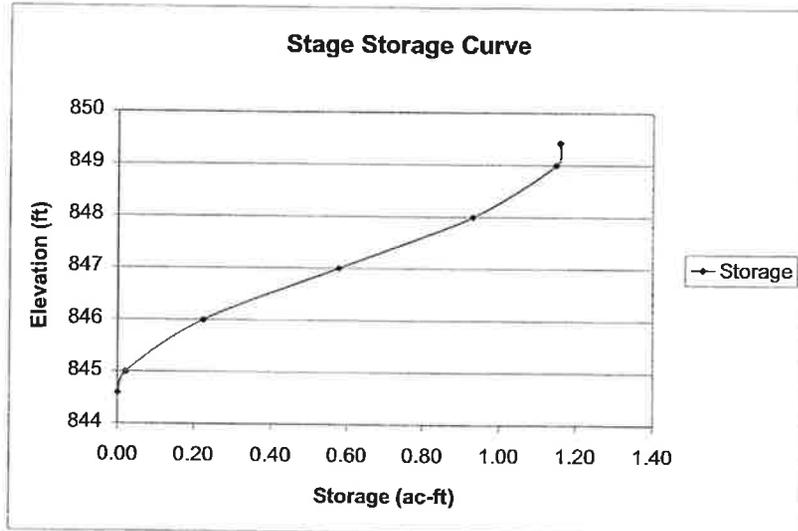
Dia (ft) 4  
 Area (sq ft) 12.56  
 N pipes 201.0  
 L (ft) 20.00  
 volume(ft^3) 50491.20  
 ac-ft 1.16

STAGE	D1	D2	Dave	d/D	a/A	Vfull	Vpipe	Vac-ft
844.6	0	0						0.00
845	0.4	0	0.2	0.05	0.01869	50491.20	943.7	0.02
846	1.4	0.59	0.995	0.24875	0.194128	50491.20	9801.7	0.23
847	2.4	1.59	1.995	0.49875	0.498408	50491.20	25165.2	0.58
848	3.4	2.59	2.995	0.74875	0.803118	50491.20	40550.4	0.93
849	4	3.59	3.795	0.94875	0.991935	50491.20	50084.0	1.15
849.41	4	4	4	1	1	50491.20	50491.2	1.16

Project:	Getmantown Menards (Underground 1)
Client:	Menards, Inc.
Date:	08/2002 (Revised 3-12-03)
By:	JDH

### Stage-Storage Curve Pond 1

Elevation ft	Area sq ft	Ave Pond Area	Incremental Depth	Incremental Volume	Total Vol (ft <sup>3</sup> )	Total Vol (ac-ft)
844.6					0	0.00
845		0	0.4	0	943	0.02
846		0	1	0	9801	0.23
847		0	1	0	25165	0.58
848		0	1	0	40550	0.93
849		0	1	0	50084	1.15
849.41		0	0.41	0	50491	1.16



0117-post

Prepared by TEC Design, Inc.

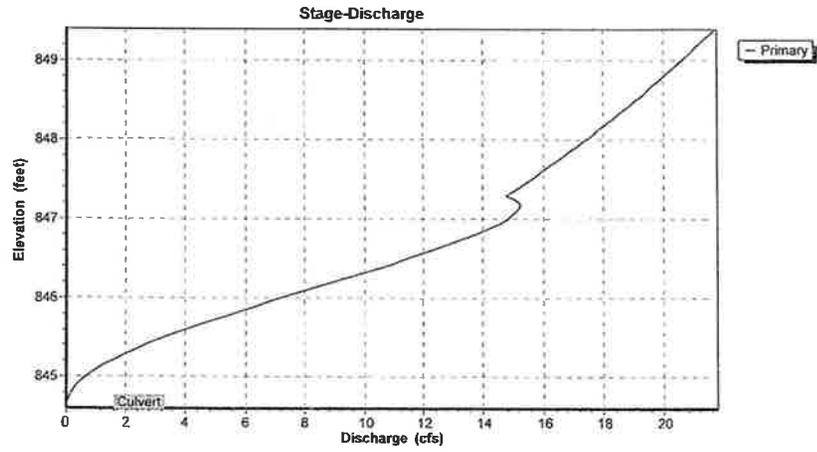
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Type II 24-hr Rainfall=2.60"

Page 1

3/12/03

Pond 1P: Pond 1



PIPE DETERMINATION - POND 2

Dia (ft) 5  
 Area (sq ft) 19.63  
 N pipes 216.8  
 L (ft) 20.00  
 volume(ft<sup>3</sup>) 85074.38  
 ac-ft 1.95

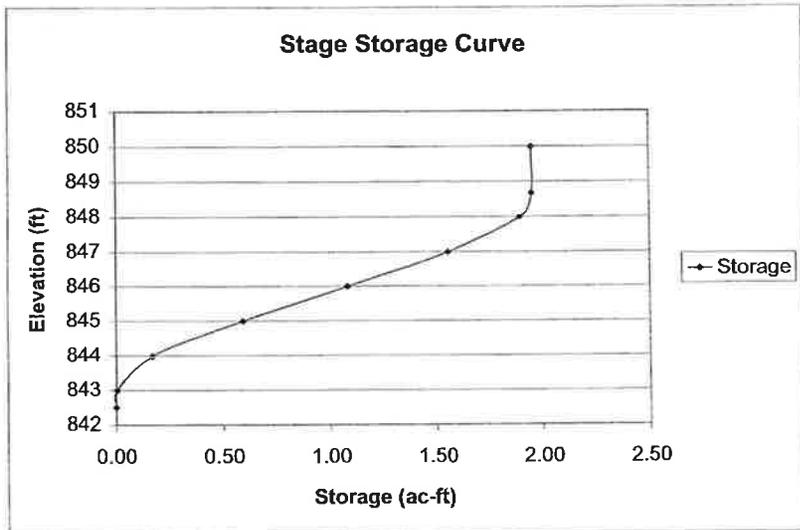
STAGE	D1	D2	Dave	d/D	a/A	Vfull	Vpipe	Vpond	Vtotal	Vac-ft
842.5	0	0						0	0	0.0
843	0.1	0	0.05	0.01	0.00169	85074.38	143.8	5435	5578.8	0.1
844	1.1	0.33	0.715	0.143	0.087766	85074.38	7466.6	17908	25374.6	0.6
845	2.1	1.33	1.715	0.343	0.30344	85074.38	25815.0	32567	58382.0	1.3
846	3.1	2.33	2.715	0.543	0.554684	85074.38	47189.4	49498	96687.4	2.2
847	4.1	3.33	3.715	0.743	0.796742	85074.38	67782.3	68783	136565.3	3.1
848	5	4.33	4.665	0.933	0.971144	85074.38	82619.5	90510	173129.5	4.0
848.67	5	5	5	1	1	85074.38	85074.4	114769	199843.4	4.6
849	5	5	5	1	1	85074.38	85074.4	141646	226720.4	5.2

B-20

Project:	Getmantown Menards (Underground)
Client:	Menards, Inc.
Date:	6/6/2002 (Revised 3-12-03)
By:	JDH

**Stage-Storage Curve - Underground 2**

Elevation ft	Area sq ft	Ave Pond Area	Incremental Depth	Incremental Volume	Total Vol (ft <sup>3</sup> )	Total Vol (ac-ft)
842.5					0	0.00
843		0	0.5	0	144	0.00
844		0	1	0	7467	0.17
845		0	1	0	25815	0.59
846		0	1	0	47189	1.08
847		0	1	0	67782	1.56
848		0	0.67	0	82620	1.90
848.67		0	1.33	0	85075	1.95
850					85075	1.95

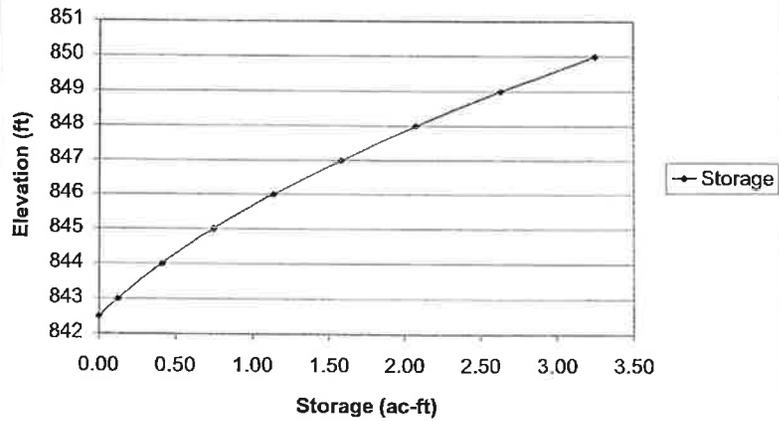


Project:	Germanstown Menards (Surface Pond)
Client:	Menards, Inc.
Date:	3/23/2001
By:	SCK

### Stage-Storage Curve (Pond)

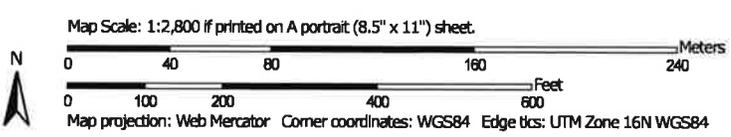
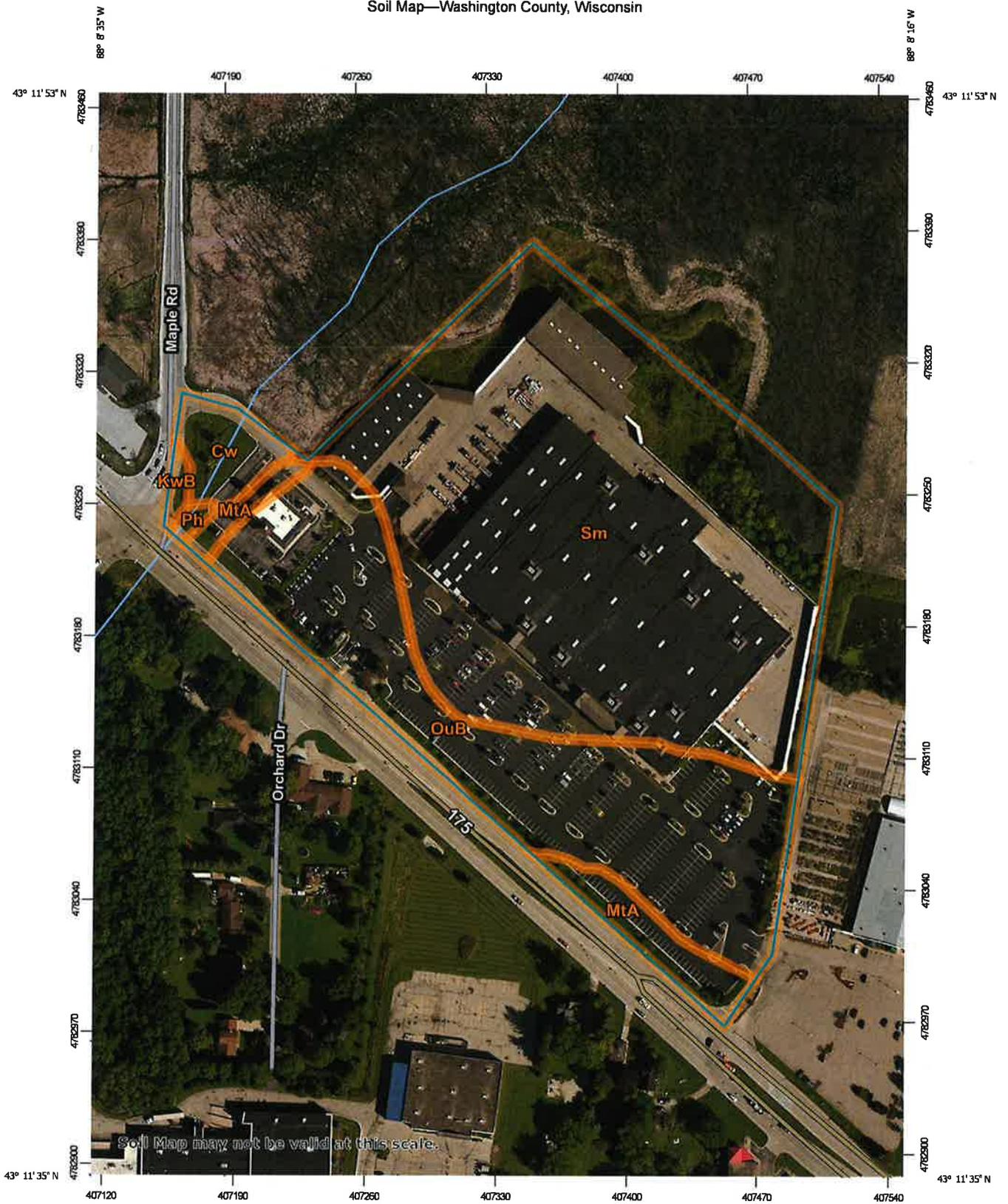
Elevation ft.	Area sq ft	Ave Pond Area	Incremental Depth	Incremental Volume	Total Vol (ft <sup>3</sup> )	Total Vol (ac-ft)
842.5	10351				0	0.00
843	11388	10869.5	0.5	5434.75	5435	0.12
844	13058	12473	1	12473	17908	0.41
845	15760	14659	1	14659	32567	0.75
846	18103	16931.5	1	16931.5	49508	1.14
847	20467	19285	1	19285	68783	1.58
848	22986	21726.5	1	21726.5	90510	2.08
849	25533	24259.5	1	24259.5	114769	2.63
850	28220	26876.5	1	26876.5	141646	3.25

### Stage Storage Curve



## Appendix B

Soil Map—Washington County, Wisconsin



### MAP LEGEND

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

### MAP INFORMATION

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

**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: Washington County, Wisconsin  
Survey Area Data: Version 18, Sep 12, 2018

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

Date(s) aerial images were photographed: Apr 29, 2011—Sep 22, 2014

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

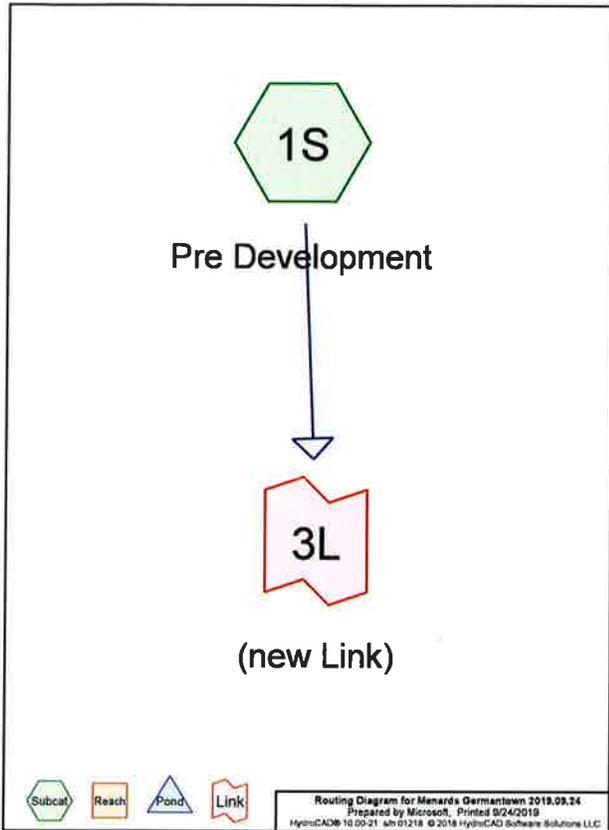
## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cw	Colwood silt loam, 0 to 2 percent slopes	0.6	3.0%
KwB	Knowles silt loam, 1 to 6 percent slopes	0.1	0.5%
MtA	Mequon silt loam, 1 to 3 percent slopes	0.9	4.4%
OuB	Ozaukee silt loam, high carbonate substratum, 2 to 6 percent slopes	5.8	30.0%
Ph	Pella silt loam, 0 to 2 percent slopes	0.1	0.3%
Sm	Sebewa silt loam, 0 to 2 percent slopes	12.0	61.7%
<b>Totals for Area of Interest</b>		<b>19.5</b>	<b>100.0%</b>

## Appendix C

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.000	84	1 acre lots, 20% imp, HSG D (1S)
9.500	84	50-75% Grass cover, Fair, HSG D (1S)
0.300	98	Paved parking, HSG D (1S)
5.100	79	Woods, Fair, HSG D (1S)
17.900	83	TOTAL AREA



Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
17.900	HSG D	1S
0.000	Other	
17.900		TOTAL AREA

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	3.000	0.000	3.000	1 acre lots, 20% imp	1S
0.000	0.000	0.000	9.500	0.000	9.500	50-75% Grass cover, Fair	1S
0.000	0.000	0.000	0.300	0.000	0.300	Paved parking	1S
0.000	0.000	0.000	5.100	0.000	5.100	Woods, Fair	1S
0.000	0.000	0.000	17.900	0.000	17.900	TOTAL AREA	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1S: Pre Development Runoff Area=17.900 ac 5.03% Impervious Runoff Depth>0.94"  
 Flow Length=800' Tc=22.1 min CN=83 Runoff=17.52 cfs 1.406 af

Link 3L: (new Link) Inflow=17.52 cfs 1.406 af  
 Primary=17.52 cfs 1.406 af

Total Runoff Area = 17.900 ac Runoff Volume = 1.406 af Average Runoff Depth = 0.94"  
 94.97% Pervious = 17.000 ac 5.03% Impervious = 0.900 ac

Summary for Subcatchment 1S: Pre Development

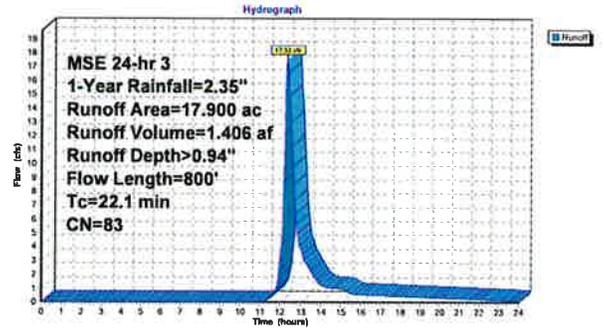
Runoff = 17.52 cfs @ 12.34 hrs, Volume= 1.406 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.35"

Area (ac)	CN	Description
3.000	84	1 acre lots, 20% Imp, HSG D
8.500	84	50-75% Grass cover, Fair, HSG D
5.100	79	Woods, Fair, HSG D
0.300	96	Paved parking, HSG D
17.900	83	Weighted Average
17.000		94.97% Pervious Area
0.900		5.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	800		0.60		Direct Entry,

Subcatchment 1S: Pre Development

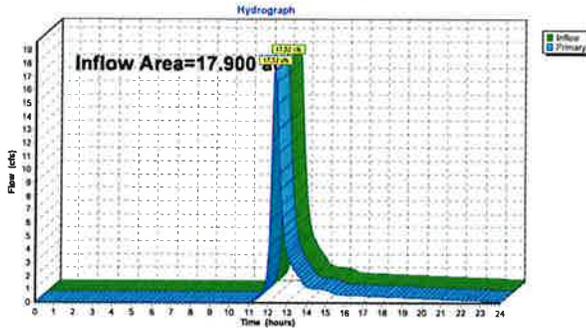


Summary for Link 3L: (new Link)

Inflow Area = 17.900 ac, 5.03% Impervious, Inflow Depth > 0.94" for 1-Year event  
 Inflow = 17.52 cfs @ 12.34 hrs, Volume= 1.406 af  
 Primary = 17.52 cfs @ 12.34 hrs, Volume= 1.406 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: (new Link)



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1S: Pre Development Runoff Area=17.900 ac 5.03% Impervious Runoff Depth>1.17"  
 Flow Length=800' Tc=22.1 min CN=83 Runoff=21.91 cfs 1.743 af

Link 3L: (new Link) Inflow=21.91 cfs 1.743 af  
 Primary=21.91 cfs 1.743 af

Total Runoff Area = 17.900 ac Runoff Volume = 1.743 af Average Runoff Depth = 1.17"  
 94.97% Pervious = 17.000 ac 5.03% Impervious = 0.900 ac

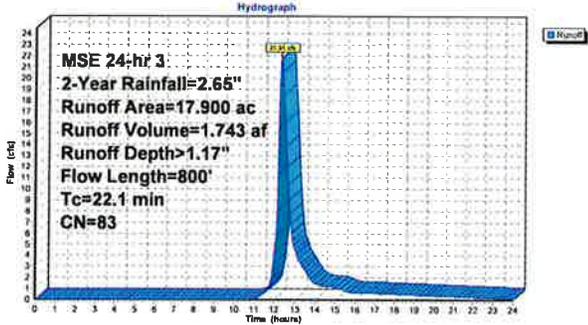
**Summary for Subcatchment 1S: Pre Development**

Runoff = 21.91 cfs @ 12.33 hrs, Volume= 1.743 af, Depth> 1.17"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.65"

Area (ac)	CN	Description
3.000	84	1 acre lots, 20% Imp, HSG D
9.500	84	50-75% Grass cover, Fair, HSG D
5.100	78	Woods, Fair, HSG D
0.300	98	Paved parking, HSG D
17.900	83	Weighted Average
17.000		94.97% Pervious Area
0.900		5.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	800		0.60		Direct Entry,

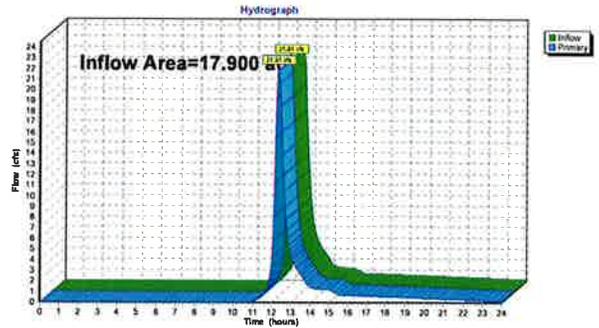
**Subcatchment 1S: Pre Development**



**Summary for Link 3L: (new Link)**

Inflow Area = 17.900 ac, 5.03% Impervious, Inflow Depth > 1.17" for 2-Year event  
 Inflow = 21.91 cfs @ 12.33 hrs, Volume= 1.743 af  
 Primary = 21.91 cfs @ 12.33 hrs, Volume= 1.743 af, Atten= 0%, Lag= 0.0 min  
 Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 3L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1S: Pre Development Runoff Area=17.900 ac 5.03% Impervious Runoff Depth>2.13"  
 Flow Length=800' Tc=22.1 min CN=83 Runoff=40.24 cfs 3.174 af

Link 3L: (new Link) Inflow=40.24 cfs 3.174 af  
 Primary=40.24 cfs 3.174 af

Total Runoff Area = 17.900 ac Runoff Volume = 3.174 af Average Runoff Depth = 2.13"  
 94.97% Pervious = 17.000 ac 5.03% Impervious = 0.900 ac

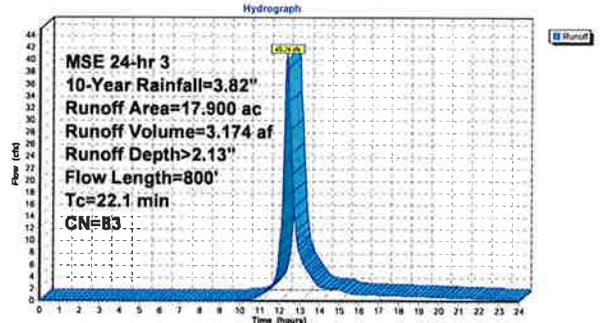
**Summary for Subcatchment 1S: Pre Development**

Runoff = 40.24 cfs @ 12.33 hrs, Volume= 3.174 af, Depth> 2.13"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=3.82"

Area (ac)	CN	Description
3.000	84	1 acre lots, 20% Imp, HSG D
9.500	84	50-75% Grass cover, Fair, HSG D
5.100	78	Woods, Fair, HSG D
0.300	98	Paved parking, HSG D
17.900	83	Weighted Average
17.000		94.97% Pervious Area
0.900		5.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	800		0.60		Direct Entry,

**Subcatchment 1S: Pre Development**

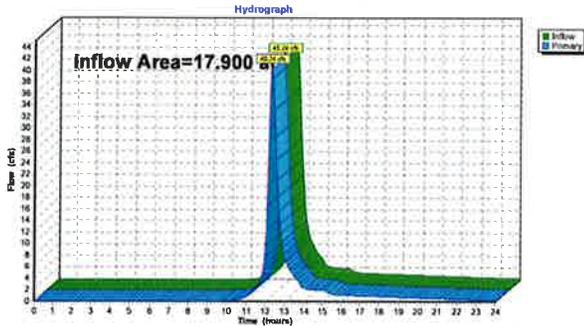


Summary for Link 3L: (new Link)

Inflow Area = 17,900 ac, 5.03% Impervious, Inflow Depth > 2.13" for 10-Year event  
 Inflow = 40.24 cfs @ 12.33 hrs, Volume= 3,174 af  
 Primary = 40.24 cfs @ 12.33 hrs, Volume= 3,174 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: (new Link)



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1S: Pre Development Runoff Area=17,900 ac 5.03% Impervious Runoff Depth>2.93"  
 Flow Length=800' Tc=22.1 min CN=83 Runoff=55.34 cfs 4,366 af

Link 3L: (new Link)

Inflow=55.34 cfs 4,366 af  
 Primary=55.34 cfs 4,366 af

Total Runoff Area = 17,900 ac Runoff Volume = 4,366 af Average Runoff Depth = 2.93"  
 94.97% Pervious = 17,000 ac 5.03% Impervious = 0.900 ac

Summary for Subcatchment 1S: Pre Development

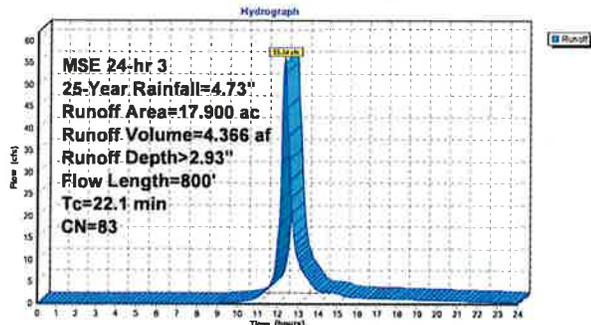
Runoff = 55.34 cfs @ 12.32 hrs, Volume= 4,366 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 25-Year Rainfall=4.73"

Area (ac)	CN	Description
3.000	84	1 acre lots, 20% imp, HSG D
9.500	84	50-75% Grass cover, Fair, HSG D
5.100	70	Woods, Fair, HSG D
0.300	88	Paved parking, HSG D
17.900	83	Weighted Average
17.000		84.97% Pervious Area
0.900		5.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	800		0.60		Direct Entry,

Subcatchment 1S: Pre Development

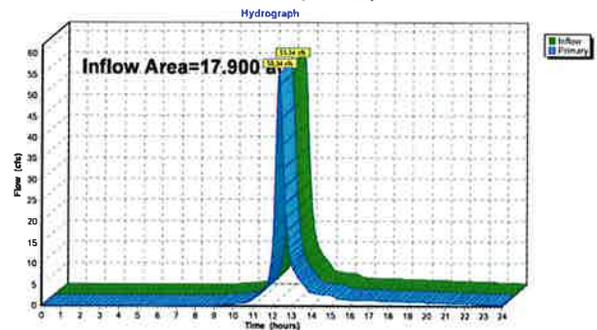


Summary for Link 3L: (new Link)

Inflow Area = 17,900 ac, 5.03% Impervious, Inflow Depth > 2.93" for 25-Year event  
 Inflow = 55.34 cfs @ 12.32 hrs, Volume= 4,366 af  
 Primary = 55.34 cfs @ 12.32 hrs, Volume= 4,366 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: (new Link)



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1S: Pre Development Runoff Area=17.900 ac 5.03% Impervious Runoff Depth>4.47"  
 Flow Length=800' Tc=22.1 min CN=83 Runoff=83.57 cfs 6.664 af

Link 3L: (new Link) Inflow=83.57 cfs 6.664 af  
 Primary=83.57 cfs 6.664 af

Total Runoff Area = 17,900 ac Runoff Volume = 6,664 af Average Runoff Depth = 4.47"  
 94.97% Pervious = 17,000 ac 5.03% Impervious = 0,900 ac

Summary for Subcatchment 1S: Pre Development

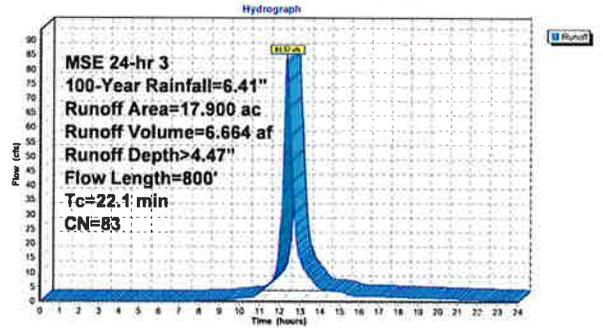
Runoff = 83.57 cfs @ 12.32 hrs, Volume= 6.664 af, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=6.41"

Area (ac)	CN	Description
3.000	84	1 acre lots, 20% Imp, HSG D
9.500	84	50-75% Grass cover, Fair, HSG D
5.100	79	Woods, Fair, HSG D
0.300	98	Paved parking, HSG D
17.900	83	Weighted Average
17.000		94.97% Pervious Area
0.900		5.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	800		0.60		Direct Entry,

Subcatchment 1S: Pre Development

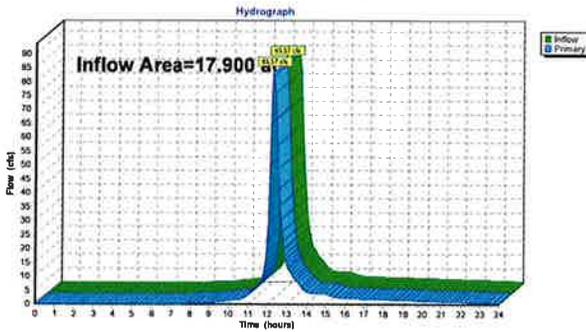


Summary for Link 3L: (new Link)

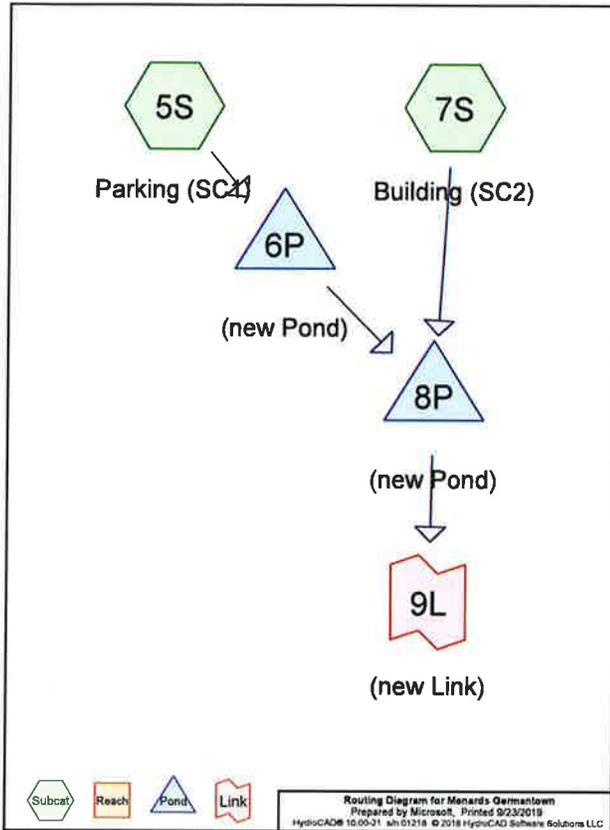
Inflow Area = 17,900 ac, 5.03% Impervious, Inflow Depth > 4.47" for 100-Year event  
 Inflow = 83.57 cfs @ 12.32 hrs, Volume= 6.664 af  
 Primary = 83.57 cfs @ 12.32 hrs, Volume= 6.664 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: (new Link)



## Appendix D



Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.300	84	50-75% Grass cover, Fair, HSG D (7S)
15.300	98	Paved parking, HSG D (5S, 7S)
1.300	95	Urban commercial, 85% imp, HSG D (7S)
17.900	97	TOTAL AREA

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
17.900	HSG D	5S, 7S
0.000	Other	
17.900		TOTAL AREA

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.300	0.000	1.300	50-75% Grass cover, Fair	7S
0.000	0.000	0.000	15.300	0.000	15.300	Paved parking	5S, 7S
0.000	0.000	0.000	1.300	0.000	1.300	Urban commercial, 85% imp	7S
0.000	0.000	0.000	17.900	0.000	17.900	TOTAL AREA	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	6P	844.60	843.47	514.0	0.0022	0.010	24.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 5S: Parking (SC1)</b>	Runoff Area=5,900 ac 100.00% Impervious Runoff Depth>2.12" Tc=10.0 min CN=98 Runoff=16.99 cfs 1,043 af
<b>Subcatchment 7S: Building (SC2)</b>	Runoff Area=12,000 ac 87.54% Impervious Runoff Depth>1.91" Tc=10.0 min CN=96 Runoff=32.71 cfs 1,914 af
<b>Pond 6P: (new Pond)</b>	Peak Elev=846.15' Storage=12,136 cf Inflow=16.99 cfs 1,043 af 24.0" Round Culvert n=0.010 L=514.0' S=0.0022' f' Outflow=8.50 cfs 1,036 af
<b>Pond 8P: (new Pond)</b>	Peak Elev=845.80' Storage=88,856 cf Inflow=39.59 cfs 2,950 af Outflow=1.81 cfs 1,567 af
<b>Link 9L: (new Link)</b>	Inflow=1.91 cfs 1,567 af Primary=1.81 cfs 1,567 af

**Total Runoff Area = 17,900 ac Runoff Volume = 2,957 af Average Runoff Depth = 1.98"  
 8.35% Pervious = 1,495 ac 91.65% Impervious = 16,405 ac**

Summary for Subcatchment 5S: Parking (SC1)

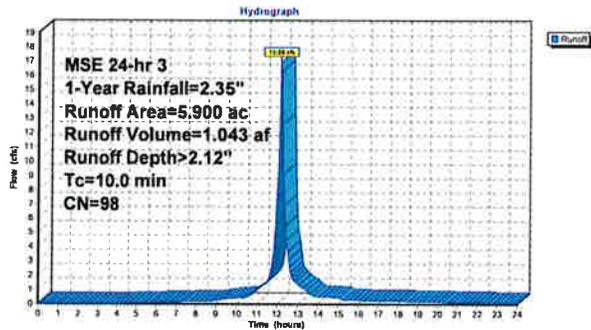
Runoff = 16.99 cfs @ 12.17 hrs, Volume= 1,043 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.35"

Area (ac)	CN	Description
5,900	98	Paved parking, HSG D
5,900		100.00% Impervious Area

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

Subcatchment 5S: Parking (SC1)



Summary for Subcatchment 7S: Building (SC2)

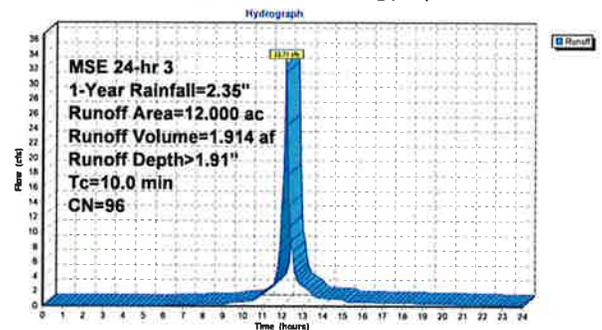
Runoff = 32.71 cfs @ 12.17 hrs, Volume= 1,914 af, Depth> 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.35"

Area (ac)	CN	Description
9,400	98	Paved parking, HSG D
1,300	95	Urban commercial, 85% Imp, HSG D
1,300	84	50-75% Grass cover, Fair, HSG D

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

Subcatchment 7S: Building (SC2)



Summary for Pond 6P: (new Pond)

Inflow Area = 5.900 ac, 100.00% Impervious, Inflow Depth > 2.12" for 1-Year event  
 Inflow = 16.99 cfs @ 12.17 hrs, Volume= 1,043 af  
 Outflow = 8.50 cfs @ 12.32 hrs, Volume= 1,036 af, Atten= 50%, Lag= 8.8 min  
 Primary = 8.50 cfs @ 12.32 hrs, Volume= 1,036 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.15' @ 12.32 hrs Surf.Area= 0 sf Storage= 12,136 cf

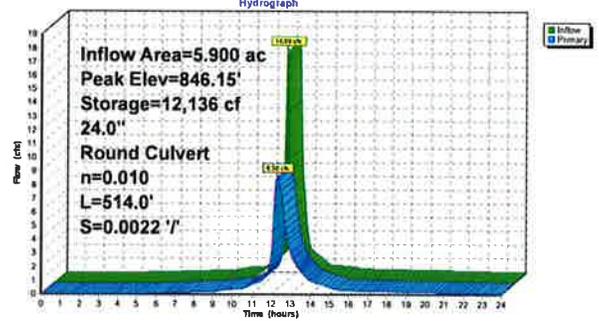
Plug-Flow detention time= 29.4 min calculated for 1,034 af (98% of inflow)  
 Center-of-Mass del. time= 25.6 min ( 786.3 - 760.7 )

Volume #1	Invert	Avail.Storage	Storage Description
	844.60'	50,491 cf	Custom Stage Data Listed below
Elevation (feet)	Cum.Store (cubic-feet)		
844.60	0		
845.00	944		
846.00	9,801		
847.00	25,165		
848.00	40,550		
849.00	50,084		
849.41	50,491		

Device #1	Routing	Invert	Outlet Devices
	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq. cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.00222 ' / n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max= 8.47 cfs @ 12.32 hrs HW= 846.15' (Free Discharge)  
 1=Culvert (Barrel Controls 8.47 cfs @ 4.48 fps)

Pond 6P: (new Pond)



Summary for Pond 8P: (new Pond)

[81] Warning: Exceeded Pond 6P by 0.86' @ 15.50 hrs

Inflow Area = 17.900 ac, 91.65% Impervious, Inflow Depth > 1.98" for 1-Year event  
 Inflow = 39.59 cfs @ 12.18 hrs, Volume= 2,850 af  
 Outflow = 1.91 cfs @ 14.19 hrs, Volume= 1,567 af, Atten= 95%, Lag= 120.3 min  
 Primary = 1.91 cfs @ 14.19 hrs, Volume= 1,567 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 845.80' @ 14.19 hrs Surf.Area= 0 sf Storage= 88,856 cf

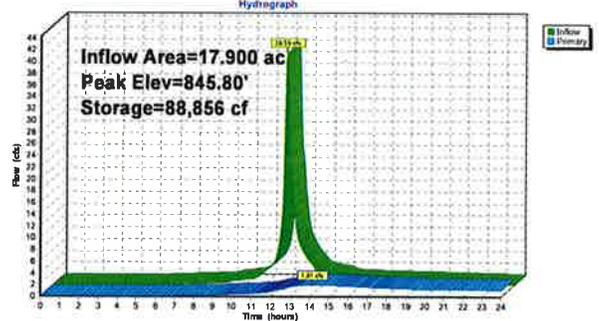
Plug-Flow detention time= 318.0 min calculated for 1,564 af (53% of inflow)  
 Center-of-Mass del. time= 235.9 min ( 1,015.2 - 779.3 )

Volume #1	Invert	Avail.Storage	Storage Description
	842.50'	226,720 cf	Custom Stage Data Listed below
Elevation (feet)	Cum.Store (cubic-feet)		
842.50	0		
843.00	5,579		
844.00	25,375		
845.00	58,382		
846.00	86,687		
847.00	136,565		
848.00	173,130		
849.00	199,843		
850.00	226,720		

Device #1	Routing	Invert	Outlet Devices
	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.620

Primary OutFlow Max= 1.91 cfs @ 14.19 hrs HW= 845.80' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 1.30 cfs @ 11.75 fps)  
 2=Orifice/Grate (Orifice Controls 0.61 cfs @ 3.32 fps)

Pond 8P: (new Pond)

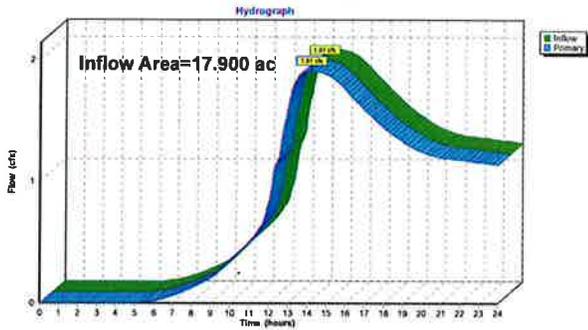


**Summary for Link 9L: (new Link)**

Inflow Area = 17.900 ac, 81.65% Impervious, Inflow Depth > 1.05" for 1-Year event  
 Inflow = 1.91 cfs @ 14.18 hrs, Volume= 1.567 af  
 Primary = 1.81 cfs @ 14.19 hrs, Volume= 1.567 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 9L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 6S: Parking (SC1)** Runoff Area=5.900 ac 100.00% Impervious Runoff Depth>2.42"  
 Tc=10.0 min CN=98 Runoff=19.25 cfs 1.189 af
- Subcatchment 7S: Building (SC2)** Runoff Area=12.000 ac 87.54% Impervious Runoff Depth>2.21"  
 Tc=10.0 min CN=96 Runoff=37.40 cfs 2.207 af
- Pond 6P: (new Pond)** Peak Elev=846.26' Storage=13,786 cf Inflow=19.25 cfs 1.189 af  
 24.0' Round Culvert n=0.010 L=514.0' S=0.0022' Outflow=9.44 cfs 1.182 af
- Pond 8P: (new Pond)** Peak Elev=846.12' Storage=101,390 cf Inflow=45.06 cfs 3.390 af  
 Outflow=2.28 cfs 1.869 af
- Link 9L: (new Link)** Inflow=2.28 cfs 1.869 af  
 Primary=2.28 cfs 1.869 af

**Total Runoff Area = 17.900 ac Runoff Volume = 3.397 af Average Runoff Depth = 2.28"**  
 8.35% Pervious = 1.495 ac 81.65% Impervious = 16.405 ac

**Summary for Subcatchment 6S: Parking (SC1)**

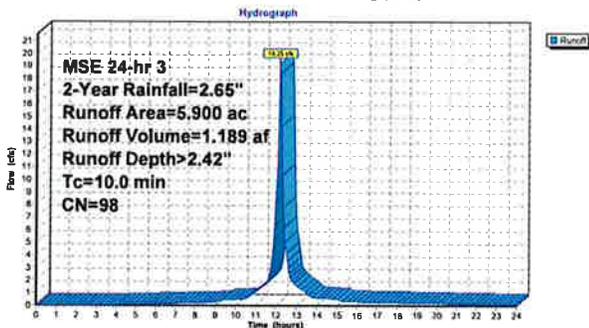
Runoff = 19.25 cfs @ 12.17 hrs, Volume= 1.189 af, Depth> 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.65"

Area (ac)	CN	Description
5.900	98	Paved parking, HSG D
5.900		100.00% Impervious Area

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

**Subcatchment 6S: Parking (SC1)**



**Summary for Subcatchment 7S: Building (SC2)**

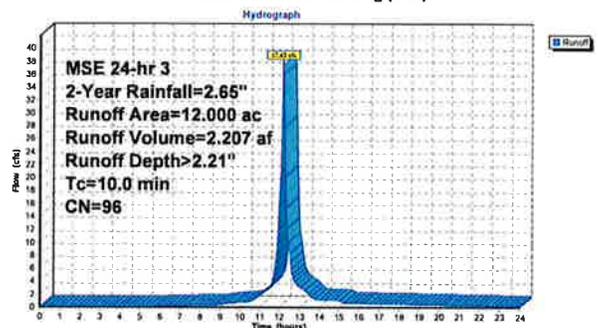
Runoff = 37.40 cfs @ 12.17 hrs, Volume= 2.207 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.65"

Area (ac)	CN	Description
8.400	98	Paved parking, HSG D
1.300	95	Urban commercial, 85% imp, HSG D
1.300	84	50-75% Grass cover, Fair, HSG D
12.000	98	Weighted Average
1.495		12.46% Pervious Area
10.505		87.54% Impervious Area

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

**Subcatchment 7S: Building (SC2)**



Summary for Pond 6P: (new Pond)

Inflow Area = 5,900 ac, 100.00% Impervious, Inflow Depth > 2.42" for 2-Year event  
 Inflow = 19.25 cfs @ 12.17 hrs, Volume= 1,189 af  
 Outflow = 9.44 cfs @ 12.32 hrs, Volume= 1,182 af, Atten= 51%, Lag= 9.0 min  
 Primary = 9.44 cfs @ 12.32 hrs, Volume= 1,182 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.26' @ 12.32 hrs Surf.Area= 0 sf Storage= 13,786 cf

Plug-Flow detention time= 28.9 min calculated for 1,180 af (98% of inflow)  
 Center-of-Mass det. time= 25.3 min (783.8 - 758.5)

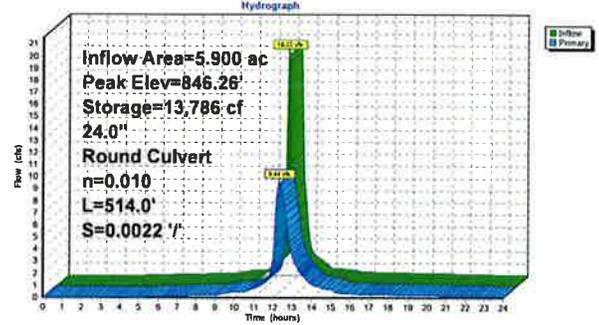
Volume	Invert	Avail.Storage	Storage Description
#1	844.60'	50,491 cf	Custom Stage Data Listed below

Elevation (feet)	Cum.Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.0022 '/' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=9.40 cfs @ 12.32 hrs HW=846.25' (Free Discharge)  
 1=Culvert (Barrel Controls 9.40 cfs @ 4.59 fps)

Pond 6P: (new Pond)



Summary for Pond 8P: (new Pond)

[81] Warning: Exceeded Pond 6P by 1.14' @ 15.50 hrs

Inflow Area = 17,900 ac, 81.65% Impervious, Inflow Depth > 2.27" for 2-Year event  
 Inflow = 45.08 cfs @ 12.18 hrs, Volume= 3,390 af  
 Outflow = 2.28 cfs @ 14.03 hrs, Volume= 1,869 af, Atten= 95%, Lag= 111.1 min  
 Primary = 2.28 cfs @ 14.03 hrs, Volume= 1,869 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.12' @ 14.03 hrs Surf.Area= 0 sf Storage= 101,390 cf

Plug-Flow detention time= 311.2 min calculated for 1,865 af (55% of inflow)  
 Center-of-Mass det. time= 230.3 min (1,006.9 - 776.7)

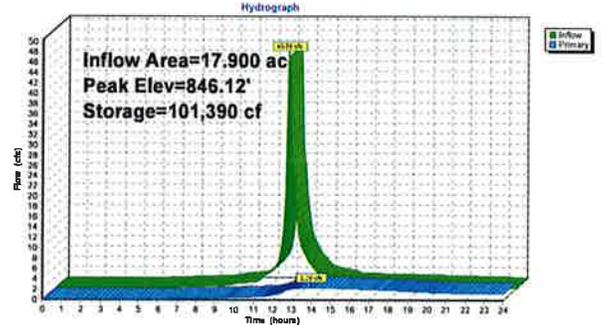
Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below

Elevation (feet)	Cum.Store (cubic-feet)
842.50	0
843.00	5,579
844.00	25,375
845.00	58,382
846.00	98,687
847.00	136,565
848.00	173,130
849.00	199,843
850.00	226,720

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary OutFlow Max=2.28 cfs @ 14.03 hrs HW=846.12' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 1.38 cfs @ 12.33 fps)  
 2=Orifice/Grate (Orifice Controls 0.92 cfs @ 5.00 fps)

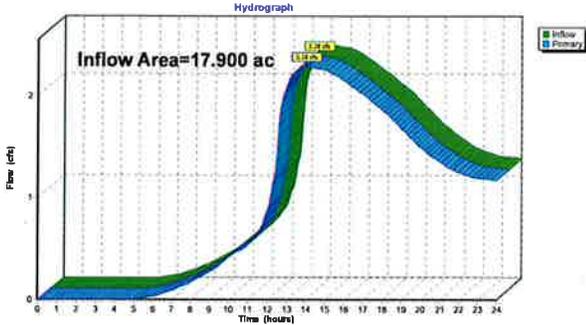
Pond 8P: (new Pond)



**Summary for Link 9L: (new Link)**

Inflow Area = 17.900 ac, 91.65% Impervious, Inflow Depth > 1.25" for 2-Year event  
 Inflow = 2.28 cfs @ 14.03 hrs, Volume= 1.869 af  
 Primary = 2.28 cfs @ 14.03 hrs, Volume= 1.869 af, Atten= 0%, Lag= 0.0 min  
 Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 9L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 5S: Parking (SC1)** Runoff Area=5.900 ac 100.00% Impervious Runoff Depth=3.58"  
 Tc=10.0 min CN=98 Runoff=28.00 cfs 1.762 af
  - Subcatchment 7S: Building (SC2)** Runoff Area=12.000 ac 87.54% Impervious Runoff Depth=3.36"  
 Tc=10.0 min CN=96 Runoff=55.53 cfs 3.360 af
  - Pond 6P: (new Pond)** Peak Elev=846.69' Storage=20,353 cf Inflow=28.00 cfs 1.762 af  
 24.0" Round Culvert n=0.010 L=514.0' S=0.0022 1' Outflow=12.93 cfs 1.754 af
  - Pond 8P: (new Pond)** Peak Elev=847.48' Storage=154,141 cf Inflow=65.82 cfs 5.115 af  
 Outflow=3.29 cfs 3.002 af
  - Link 9L: (new Link)** Inflow=3.29 cfs 3.002 af  
 Primary=3.29 cfs 3.002 af
- Total Runoff Area = 17.900 ac Runoff Volume = 5.123 af Average Runoff Depth = 1.43"  
 8.35% Pervious = 1.495 ac 91.65% Impervious = 16.405 ac**

**Summary for Subcatchment 5S: Parking (SC1)**

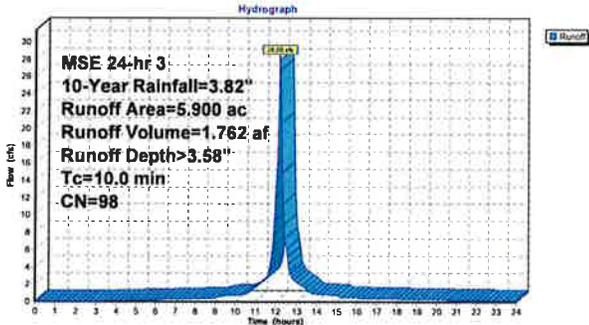
Runoff = 28.00 cfs @ 12.17 hrs, Volume= 1.762 af, Depth > 3.58"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=3.82"

Area (ac)	CN	Description
5.900	98	Paved parking, HSG D
5.900		100.00% Impervious Area

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

**Subcatchment 5S: Parking (SC1)**



**Summary for Subcatchment 7S: Building (SC2)**

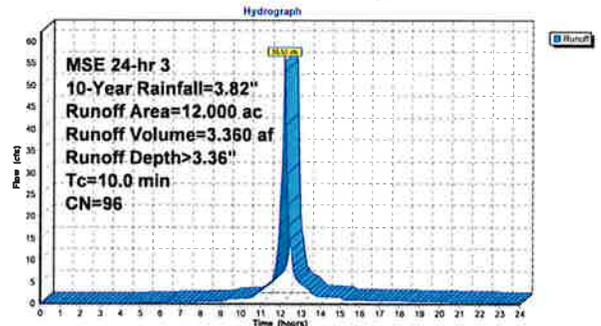
Runoff = 55.53 cfs @ 12.17 hrs, Volume= 3.360 af, Depth > 3.36"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=3.82"

Area (ac)	CN	Description
8.400	98	Paved parking, HSG D
1.300	85	Urban commercial, 85% Imp, HSG D
1.300	84	50-75% Grass cover, Fair, HSG D
12.000	96	Weighted Average
1.495		12.46% Pervious Area
10.505		87.54% Impervious Area

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

**Subcatchment 7S: Building (SC2)**



**Summary for Pond 6P: (new Pond)**

Inflow Area = 5.900 ac, 100.00% Impervious, Inflow Depth > 3.58" for 10-Year event  
 Inflow = 28.00 cfs @ 12.17 hrs, Volume= 1,762 af  
 Outflow = 12.83 cfs @ 12.33 hrs, Volume= 1,754 af, Atten= 54%, Lag= 9.6 min  
 Primary = 12.83 cfs @ 12.33 hrs, Volume= 1,754 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.69' @ 12.33 hrs Surf.Area= 0 sf Storage= 20,353 cf

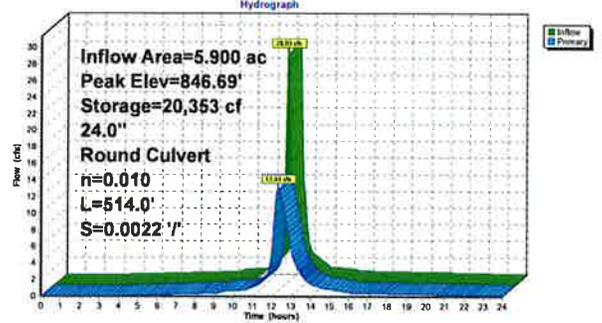
Plug-Flow detention time= 27.8 min calculated for 1.754 af (100% of inflow)  
 Center-of-Mass det. time= 24.8 min ( 777.3 - 752.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	844.60'	50,491 cf	Custom Stage Data Listed below
Elevation (feet)	Cum.Store (cubic-feet)		
844.60	0		
845.00	944		
846.00	9,801		
847.00	25,165		
848.00	40,550		
848.00	50,084		
849.41	50,491		

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.0022 ' /' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=12.80 cfs @ 12.33 hrs HW=846.68' (Free Discharge)  
 1=Culvert (Barrel Controls 12.80 cfs @ 4.90 fps)

**Pond 6P: (new Pond)**



**Summary for Pond 8P: (new Pond)**

[81] Warning: Exceeded Pond 6P by 2.36' @ 14.85 hrs

Inflow Area = 17.900 ac, 91.65% Impervious, Inflow Depth > 3.43" for 10-Year event  
 Inflow = 65.82 cfs @ 12.18 hrs, Volume= 5,115 af  
 Outflow = 3.29 cfs @ 13.98 hrs, Volume= 3,002 af, Atten= 85%, Lag= 108.1 min  
 Primary = 3.29 cfs @ 13.98 hrs, Volume= 3,002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 847.48' @ 13.98 hrs Surf.Area= 0 sf Storage= 154,141 cf

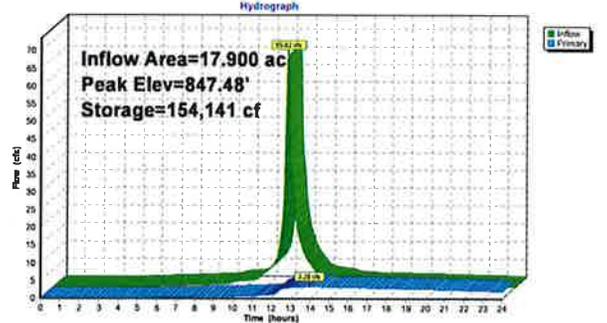
Plug-Flow detention time= 331.7 min calculated for 2.996 af (59% of inflow)  
 Center-of-Mass det. time= 252.2 min ( 1,021.5 - 769.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below
Elevation (feet)	Cum.Store (cubic-feet)		
842.50	0		
843.00	5,579		
844.00	25,375		
845.00	58,382		
846.00	96,687		
847.00	136,565		
848.00	173,130		
849.00	199,843		
850.00	226,720		

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary OutFlow Max=3.29 cfs @ 13.98 hrs HW=847.48' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 1.80 cfs @ 14.53 fps)  
 2=Orifice/Grate (Orifice Controls 1.68 cfs @ 9.16 fps)

**Pond 8P: (new Pond)**

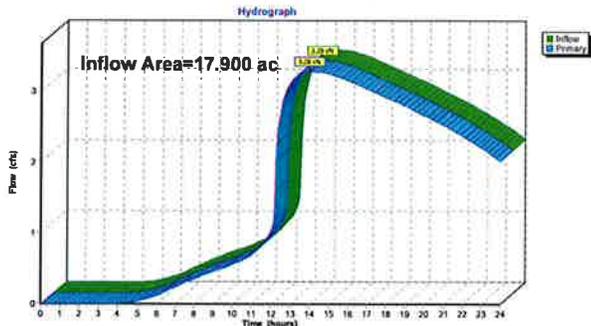


**Summary for Link 9L: (new Link)**

Inflow Area = 17.900 ac, 91.65% Impervious, Inflow Depth > 2.01" for 10-Year event  
 Inflow = 3.29 cfs @ 13.88 hrs, Volume= 3.002 af  
 Primary = 3.29 cfs @ 13.88 hrs, Volume= 3.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 9L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 5S: Parking (SC1)** Runoff Area=5.900 ac 100.00% Impervious Runoff Depth>4.49"  
 Tc=10.0 min CN=98 Runoff=34.78 cfs 2.209 af
- Subcatchment 7S: Building (SC2)** Runoff Area=12.000 ac 87.54% Impervious Runoff Depth>4.26"  
 Tc=10.0 min CN=96 Runoff=69.51 cfs 4.263 af
- Pond 6P: (new Pond)** Peak Elev=847.04' Storage=25,815 cf Inflow=34.78 cfs 2.209 af  
 24.0" Round Culvert n=0.010 L=514.0' S=0.0022' Outflow=14.98 cfs 2.200 af
- Pond 8P: (new Pond)** Peak Elev=848.88' Storage=196,600 cf Inflow=81.73 cfs 6.462 af  
 Outflow=4.03 cfs 3.711 af
- Link 9L: (new Link)** Inflow=4.03 cfs 3.711 af  
 Primary=4.03 cfs 3.711 af

**Total Runoff Area = 17.900 ac Runoff Volume = 6.471 af Average Runoff Depth = 4.34"  
 8.35% Pervious = 1.495 ac 91.65% Impervious = 16.405 ac**

**Summary for Subcatchment 5S: Parking (SC1)**

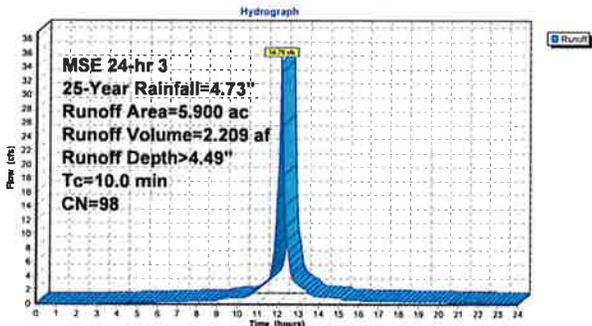
Runoff = 34.78 cfs @ 12.17 hrs, Volume= 2.209 af, Depth> 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 25-Year Rainfall=4.73"

Area (ac)	CN	Description
5.900	98	Paved parking, HSG D
5.900		100.00% Impervious Area

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

**Subcatchment 5S: Parking (SC1)**



**Summary for Subcatchment 7S: Building (SC2)**

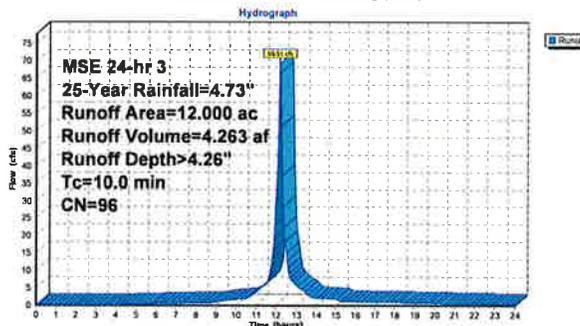
Runoff = 69.51 cfs @ 12.17 hrs, Volume= 4.263 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 25-Year Rainfall=4.73"

Area (ac)	CN	Description
8.400	98	Paved parking, HSG D
1.300	85	Urban commercial, 85% imp, HSG D
1.300	84	50-75% Grass cover, Fair, HSG D
12.000	96	Weighted Average
1.495		12.46% Pervious Area
10.505		87.54% Impervious Area

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

**Subcatchment 7S: Building (SC2)**



**Summary for Pond 6P: (new Pond)**

Inflow Area = 5,900 ac, 100.00% Impervious, Inflow Depth > 4.49" for 25-Year event  
 Inflow = 34.78 cfs @ 12.17 hrs, Volume= 2,209 af  
 Outflow = 14.98 cfs @ 12.34 hrs, Volume= 2,200 af, Atten= 57%, Lag= 10.4 min  
 Primary = 14.98 cfs @ 12.34 hrs, Volume= 2,200 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 847.04' @ 12.34 hrs Surf.Area= 0 sf Storage= 25,815 cf

Plug-Flow detention time= 27.7 min calculated for 2,200 af (100% of inflow)  
 Center-of-Mass det. time= 25.1 min ( 774.5 - 749.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	844.60'	50,491 cf	Custom Stage Data Listed below

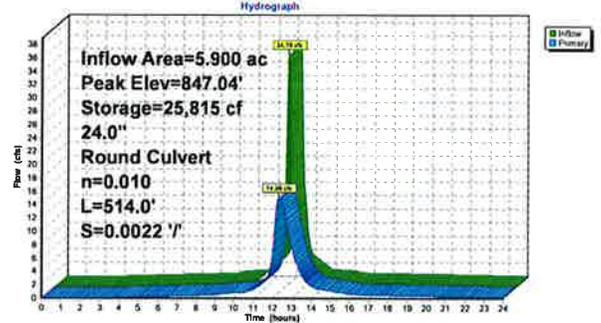
  

Elevation (feet)	Cum.Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq. cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.0022 ' S= 0.0022 ' Cc= 0.800 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=14.98 cfs @ 12.34 hrs HW=847.04' (Free Discharge)  
 1=Culvert (Barrel Controls 14.98 cfs @ 4.97 fps)

**Pond 6P: (new Pond)**



**Summary for Pond 8P: (new Pond)**

[B1] Warning: Exceeded Pond 6P by 3.69' @ 14.65 hrs

Inflow Area = 17,900 ac, 81.65% Impervious, Inflow Depth > 4.33" for 25-Year event  
 Inflow = 81.73 cfs @ 12.18 hrs, Volume= 6,462 af  
 Outflow = 4.03 cfs @ 13.99 hrs, Volume= 3,711 af, Atten= 95%, Lag= 108.6 min  
 Primary = 4.03 cfs @ 13.99 hrs, Volume= 3,711 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 848.88' @ 13.99 hrs Surf.Area= 0 sf Storage= 196,600 cf

Plug-Flow detention time= 339.1 min calculated for 3,703 af (57% of inflow)  
 Center-of-Mass det. time= 257.1 min ( 1,022.7 - 765.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below

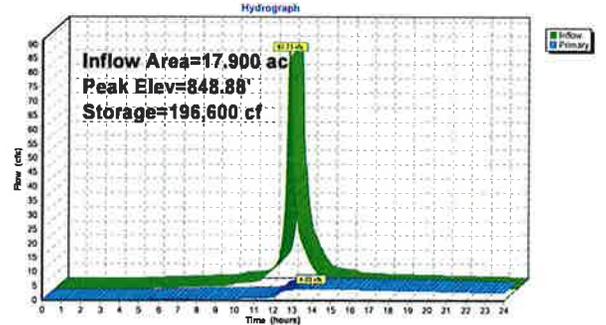
  

Elevation (feet)	Cum.Store (cubic-feet)
842.50	0
843.00	5,579
844.00	25,375
845.00	58,382
846.00	86,687
847.00	136,565
848.00	173,130
848.00	199,843
850.00	226,720

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary OutFlow Max=4.03 cfs @ 13.99 hrs HW=848.88' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 1.82 cfs @ 16.48 fps)  
 2=Orifice/Grate (Orifice Controls 2.21 cfs @ 12.02 fps)

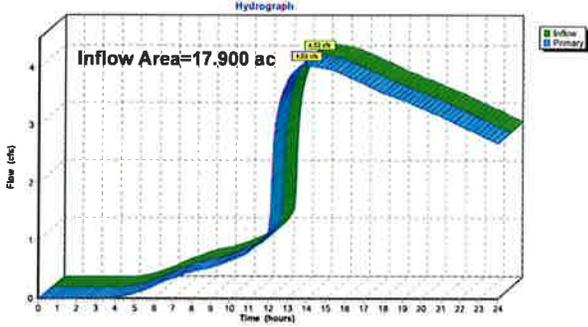
**Pond 8P: (new Pond)**



Summary for Link 9L: (new Link)

Inflow Area = 17,900 ac, 81.65% Impervious, Inflow Depth > 2.48" for 25-Year event  
 Inflow = 4.03 cfs @ 13.99 hrs, Volume= 3,711 af  
 Primary = 4.03 cfs @ 13.99 hrs, Volume= 3,711 af, Atten= 0%, Lag= 0.0 min  
 Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 9L: (new Link)



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 5S: Parking (SC1) Runoff Area=5,900 ac 100.00% Impervious Runoff Depth>6.17"  
 Tc=10.0 min CN=98 Runoff=47.26 cfs 3.033 af
- Subcatchment 7S: Building (SC2) Runoff Area=12,000 ac 87.54% Impervious Runoff Depth>5.93"  
 Tc=10.0 min CN=96 Runoff=95.15 cfs 5.933 af
- Pond 6P: (new Pond) Peak Elev=847.82' Storage=37,735 cf Inflow=47.26 cfs 3.033 af  
 24.0" Round Culvert n=0.010 L=514.0' S=0.0022 1/ Outflow=16.79 cfs 3.023 af
- Pond 8P: (new Pond) Peak Elev=1,077.72' Storage=226,720 cf Inflow=110.01 cfs 6.956 af  
 Outflow=30.61 cfs 5.585 af
- Link 9L: (new Link) Inflow=30.61 cfs 5.585 af  
 Primary=30.61 cfs 5.585 af

Total Runoff Area = 17,900 ac Runoff Volume = 8,967 af Average Runoff Depth = 6.01"  
 8.35% Pervious = 1,495 ac 91.65% Impervious = 16,405 ac

Summary for Subcatchment 5S: Parking (SC1)

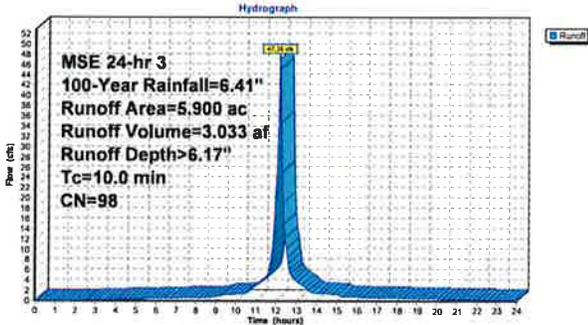
Runoff = 47.26 cfs @ 12.17 hrs, Volume= 3.033 af, Depth> 6.17"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=6.41"

Area (ac)	CN	Description
5,900	98	Paved parking, HSG D
5,900		100.00% Impervious Area

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

Subcatchment 5S: Parking (SC1)



Summary for Subcatchment 7S: Building (SC2)

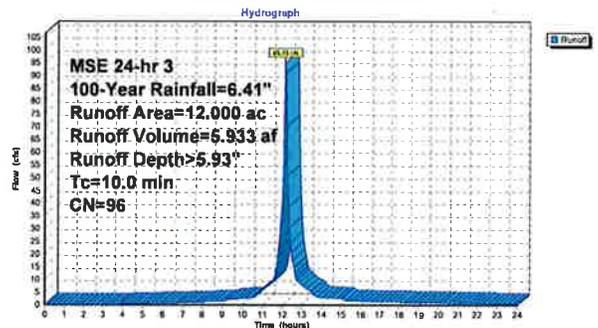
Runoff = 95.15 cfs @ 12.17 hrs, Volume= 5.933 af, Depth> 5.93"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=6.41"

Area (ac)	CN	Description
8,400	98	Paved parking, HSG D
1,300	95	Urban commercial, 85% imp, HSG D
1,300	84	50-75% Grass cover, Fair, HSG D
12,000	96	Weighted Average
1,495		12.46% Pervious Area
10,505		87.54% Impervious Area

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

Subcatchment 7S: Building (SC2)



**Summary for Pond 6P: (new Pond)**

Inflow Area = 5.900 ac, 100.00% Impervious, Inflow Depth > 6.17" for 100-Year event  
 Inflow = 47.26 cfs @ 12.17 hrs, Volume= 3.033 af  
 Outflow = 16.79 cfs @ 12.38 hrs, Volume= 3.023 af, Atten= 64%, Lag= 12.6 min  
 Primary = 16.79 cfs @ 12.38 hrs, Volume= 3.023 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 847.82' @ 12.38 hrs Surf.Area= 0 sf Storage= 37,735 cf

Plug-Flow detention time= 29.3 min calculated for 3.017 af (98% of inflow)  
 Center-of-Mass del. time= 27.2 min ( 772.7 - 745.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	844.60'	50,491 cf	Custom Stage Data Listed below

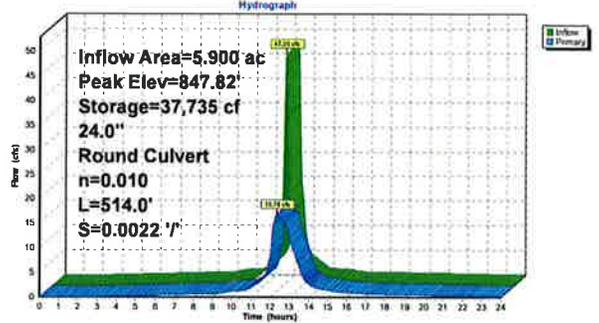
  

Elevation (feet)	Cum.Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.0022' /' C= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max= 16.78 cfs @ 12.38 hrs HW= 847.81' (Free Discharge)  
 1=Culvert (Barrel Controls 16.78 cfs @ 5.34 fps)

**Pond 6P: (new Pond)**



**Summary for Pond 8P: (new Pond)**

[93] Warning: Storage range exceeded by 227.72'  
 [85] Warning: Oscillations may require smaller dt or Finer Routing (severity=15)  
 [81] Warning: Exceeded Pond 6P by 219.03' @ 12.65 hrs

Inflow Area = 17.900 ac, 81.65% Impervious, Inflow Depth > 6.00" for 100-Year event  
 Inflow = 110.01 cfs @ 12.17 hrs, Volume= 8.856 af  
 Outflow = 30.61 cfs @ 12.67 hrs, Volume= 5.585 af, Atten= 72%, Lag= 29.8 min  
 Primary = 30.61 cfs @ 12.67 hrs, Volume= 5.585 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,077.72' @ 12.66 hrs Surf.Area= 0 sf Storage= 226,720 cf

Plug-Flow detention time= 282.4 min calculated for 5.573 af (62% of inflow)  
 Center-of-Mass del. time= 203.8 min ( 965.1 - 761.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below

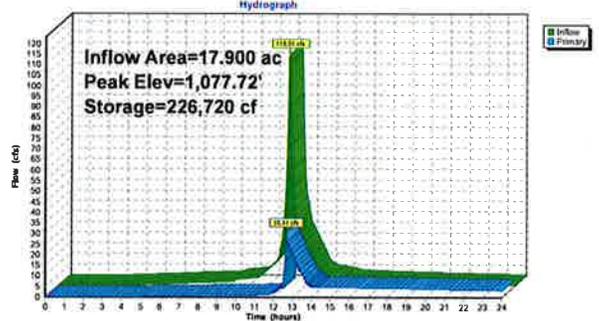
  

Elevation (feet)	Cum.Store (cubic-feet)
842.50	0
843.00	5,579
844.00	25,375
845.00	58,382
846.00	96,687
847.00	136,585
848.00	173,130
849.00	199,843
850.00	226,720

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary OutFlow Max= 27.43 cfs @ 12.67 hrs HW= 1,045.51' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 10.35 cfs @ 93.74 fps)  
 2=Orifice/Grate (Orifice Controls 17.07 cfs @ 93.08 fps)

**Pond 8P: (new Pond)**



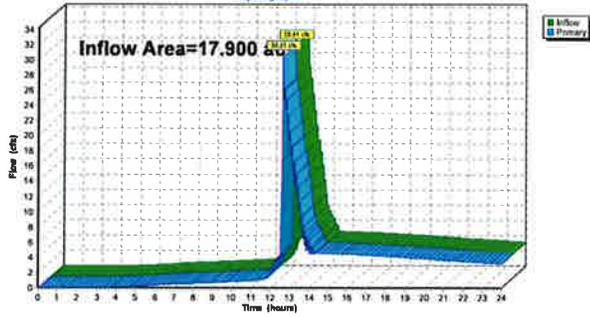
**Summary for Link 9L: (new Link)**

Inflow Area = 17.900 ac, 91.65% Impervious, Inflow Depth > 3.74" for 100-Year event  
Inflow = 30.81 cfs @ 12.67 hrs, Volume= 5.585 af  
Primary = 30.81 cfs @ 12.67 hrs, Volume= 5.585 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 9L: (new Link)**

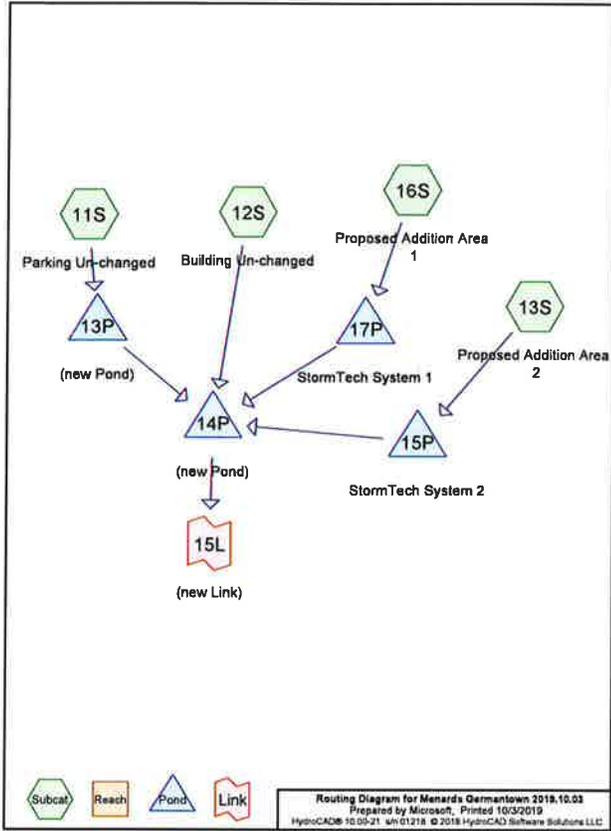
Hydrograph



## Appendix E

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.300	84	50-75% Grass cover, Fair, HSG D (12S)
16.400	88	Paved parking, HSG D (11S, 12S, 13S, 16S)
0.734	98	Roofs, HSG D (13S)
1.300	95	Urban commercial, 85% imp, HSG D (12S)
19.734	97	TOTAL AREA



Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
19.734	HSG D	11S, 12S, 13S, 16S
0.000	Other	
19.734	TOTAL AREA	

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.300	0.000	1.300	50-75% Grass cover, Fair	12S
0.000	0.000	0.000	16.400	0.000	16.400	Paved parking	11S, 12S, 13S, 16S
0.000	0.000	0.000	0.734	0.000	0.734	Roofs	13S
0.000	0.000	0.000	1.300	0.000	1.300	Urban commercial, 85% imp	12S
0.000	0.000	0.000	19.734	0.000	19.734	TOTAL AREA	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Wdth (inches)	Height (inches)	Inside-Fill (inches)
1	13P	844.60	843.47	514.0	0.0022	0.010	24.0	0.0	0.0
2	15P	0.00	-1.00	10.0	0.1000	0.012	12.0	0.0	0.0
3	17P	0.00	-1.00	10.0	0.1000	0.012	12.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 11S: Parking Un-changed** Runoff Area=5.900 ac 100.00% Impervious Runoff Depth>2.12"  
 Tc=10.0 min CN=98 Runoff=16.99 cfs 1.043 af
- Subcatchment 12S: Building Un-changed** Runoff Area=12.000 ac 87.54% Impervious Runoff Depth>1.91"  
 Tc=10.0 min CN=96 Runoff=32.71 cfs 1.914 af
- Subcatchment 13S: Proposed Addition** Runoff Area=1.052 ac 100.00% Impervious Runoff Depth>2.12"  
 Tc=10.0 min CN=98 Runoff=3.03 cfs 0.186 af
- Subcatchment 16S: Proposed Addition** Runoff Area=0.782 ac 100.00% Impervious Runoff Depth>2.12"  
 Tc=10.0 min CN=98 Runoff=2.25 cfs 0.138 af
- Pond 13P: (new Pond)** Peak Elev=846.15' Storage=12,136 cf Inflow=16.99 cfs 1.043 af  
 24.0' Round Culvert n=0.010 L=514.0' S=0.0022' Outflow=8.50 cfs 1.036 af
- Pond 14P: (new Pond)** Peak Elev=845.83' Storage=90,261 cf Inflow=38.71 cfs 3.124 af  
 Outflow=1.95 cfs 1.636 af
- Pond 15P: StormTech System 2** Peak Elev=2.15' Storage=0.138 af Inflow=3.03 cfs 0.186 af  
 Outflow=0.13 cfs 0.106 af
- Pond 17P: StormTech System 1** Peak Elev=1.74' Storage=0.105 af Inflow=2.25 cfs 0.138 af  
 Outflow=0.09 cfs 0.069 af
- Link 15L: (new Link)** Inflow=1.95 cfs 1.636 af  
 Primary=1.95 cfs 1.636 af

Total Runoff Area = 19.734 ac Runoff Volume = 3.281 af Average Runoff Depth = 1.99"  
 7.58% Pervious = 1.495 ac 92.42% Impervious = 18.239 ac

Summary for Subcatchment 11S: Parking Un-changed

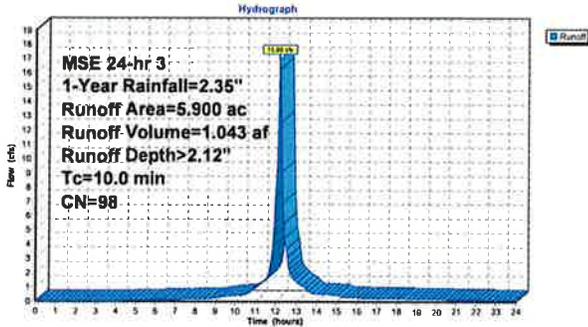
Runoff = 16.99 cfs @ 12.17 hrs, Volume= 1.043 af, Depth> 2.12"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.35"

Area (ac)	CN	Description
5.900	98	Paved parking, HSG D
5.900		100.00% Impervious Area

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

Subcatchment 11S: Parking Un-changed



Summary for Subcatchment 12S: Building Un-changed

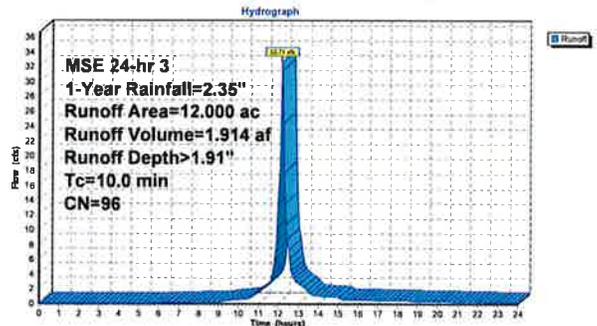
Runoff = 32.71 cfs @ 12.17 hrs, Volume= 1.914 af, Depth> 1.91"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.35"

Area (ac)	CN	Description
8.400	98	Paved parking, HSG D
1.300	95	Urban commercial, 85% imp, HSG D
1.300	84	50-75% Grass cover, Fair, HSG D
12.000	96	Weighted Average
1.495		12.46% Pervious Area
10.505		87.54% Impervious Area

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

Subcatchment 12S: Building Un-changed



**Summary for Subcatchment 13S: Proposed Addition Area 2**

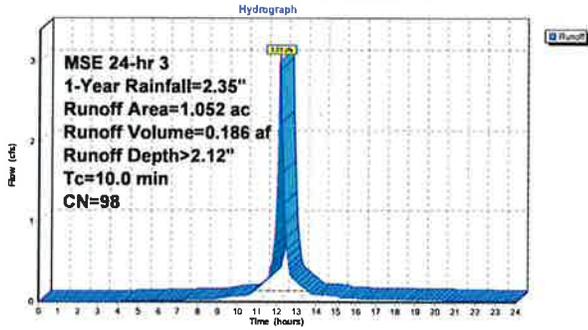
Runoff = 3.03 cfs @ 12.17 hrs, Volume= 0.186 af, Depth> 2.12"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.35"

Area (ac)	CN	Description
0.318	98	Paved parking, HSG D
0.734	98	Roofs, HSG D
1.052	98	Weighted Average
1.052		100.00% Impervious Area

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

**Subcatchment 13S: Proposed Addition Area 2**



**Summary for Subcatchment 16S: Proposed Addition Area 1**

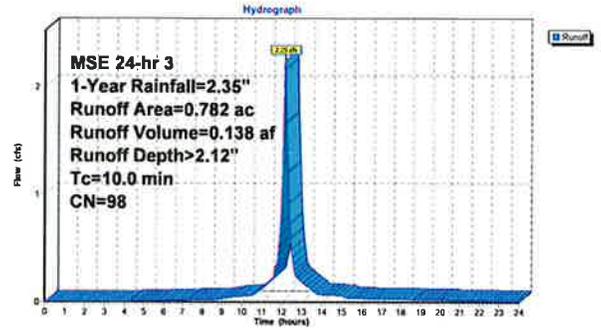
Runoff = 2.25 cfs @ 12.17 hrs, Volume= 0.138 af, Depth> 2.12"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.35"

Area (ac)	CN	Description
0.782	98	Paved parking, HSG D
0.782		100.00% Impervious Area

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

**Subcatchment 16S: Proposed Addition Area 1**



**Summary for Pond 13P: (new Pond)**

Inflow Area = 5.900 ac, 100.00% Impervious, Inflow Depth > 2.12" for 1-Year event  
 Inflow = 16.89 cfs @ 12.17 hrs, Volume= 1.043 af  
 Outflow = 8.50 cfs @ 12.32 hrs, Volume= 1.036 af, Atten= 50%, Lag= 8.8 min  
 Primary = 8.50 cfs @ 12.32 hrs, Volume= 1.036 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.15' @ 12.32 hrs Surf.Area= 0 sf Storage= 12,136 cf

Plug-Flow detention time= 29.4 min calculated for 1.034 af (99% of inflow)  
 Center-of-Mass det. time= 25.6 min (786.3 - 760.7)

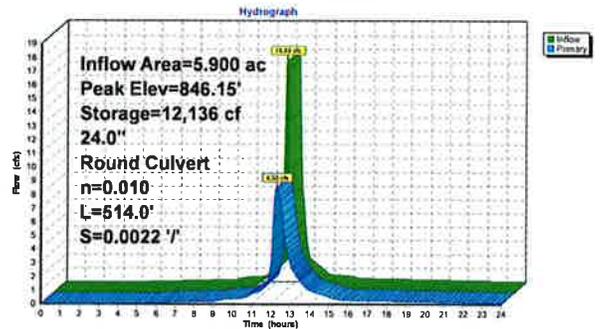
Volume	Invert	Avail Storage	Storage Description
#1	844.60'	50,491 cf	Custom Stage Data Listed below

Elevation (feet)	Cum.Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.0022' /' Cc= 0.800 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=8.47 cfs @ 12.32 hrs HW=846.15' (Free Discharge)  
 1=Culvert (Barrel Controls 8.47 cfs @ 4.48 fps)

**Pond 13P: (new Pond)**



**Summary for Pond 14P: (new Pond)**

[81] Warning: Exceeded Pond 13P by 0.91' @ 15.55 hrs  
 [81] Warning: Exceeded Pond 15P by 843.78' @ 22.10 hrs  
 [81] Warning: Exceeded Pond 17P by 844.11' @ 14.90 hrs

Inflow Area = 19.734 ac, 92.42% Impervious, Inflow Depth > 1.90" for 1-Year event  
 Inflow = 39.71 cfs @ 12.18 hrs, Volume= 3,124 af  
 Outflow = 1.85 cfs @ 14.44 hrs, Volume= 1,636 af, Atten= 85%, Lag= 135.8 min  
 Primary = 1.85 cfs @ 14.44 hrs, Volume= 1,636 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 845.83' @ 14.44 hrs Surf.Area= 0 sf Storage= 90,261 cf

Plug-Flow detention time= 319.6 min calculated for 1,636 af (52% of inflow)  
 Center-of-Mass det. time= 223.3 min (1,017.9 - 794.6)

Volume	Invert	Avail. Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below

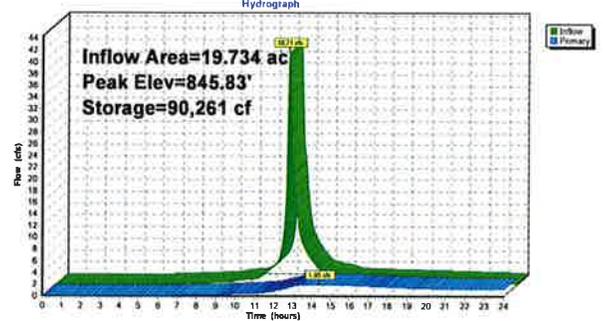
  

Elevation (feet)	Cum. Store (cubic-feet)
842.50	0
843.00	5,579
844.00	25,375
845.00	58,382
846.00	88,687
847.00	136,565
848.00	173,130
849.00	189,843
850.00	226,720

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Gate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Gate C= 0.820

Primary OutFlow Max=1.96 cfs @ 14.44 hrs HW=845.83' (Free Discharge)  
 1=Orifice/Gate (Orifice Controls 1.31 cfs @ 11.82 fps)  
 2=Orifice/Gate (Orifice Controls 0.65 cfs @ 3.55 fps)

**Pond 14P: (new Pond)**



**Summary for Pond 16P: StormTech System 2**

Inflow Area = 1.052 ac, 100.00% Impervious, Inflow Depth > 1.12' for 1-Year event  
 Inflow = 3.03 cfs @ 12.17 hrs, Volume= 0.186 af  
 Outflow = 0.13 cfs @ 13.62 hrs, Volume= 0.106 af, Atten= 96%, Lag= 86.7 min  
 Primary = 0.13 cfs @ 13.62 hrs, Volume= 0.106 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 2.15' @ 13.62 hrs Surf.Area= 0.093 ac Storage= 0.138 af

Plug-Flow detention time= 369.7 min calculated for 0.106 af (57% of inflow)  
 Center-of-Mass det. time= 290.8 min (1,051.5 - 760.7)

Volume	Invert	Avail. Storage	Storage Description
#1A	0.00'	0.151 af	37.58'W x 107.74'L x 6.75'H Field A 0.627 af Overall - 0.251 af Embedded = 0.376 af x 40.0% Voids
#2A	0.75'	0.251 af	ADS StormTech MC-4500+Cap x 100 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 25 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
			0.402 af Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Inverts= 0.00' / -1.00' S= 0.1000' / Cc= 0.800 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	1.00'	2.2" Vert. Orifice/Gate C= 0.600
#3	Device 1	6.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions(s)

Primary OutFlow Max=0.13 cfs @ 13.62 hrs HW=2.15' (Free Discharge)  
 1=Culvert (Passes 0.13 cfs of 6.08 cfs potential flow)  
 2=Orifice/Gate (Orifice Controls 0.13 cfs @ 4.98 fps)  
 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 16P: StormTech System 2 - Chamber Wizard Field A**

Chamber Model= ADS StormTechMC-4500+Cap (ADS StormTechMC-4500 with cap volume)  
 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf  
 Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap  
 Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 8.0" Spacing = 109.0" C-C Row Spacing

25 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 105.74' Row Length +12.0" End Stone x 2 = 107.74' Base Length  
 4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width  
 9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

100 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 10,934.6 cf Chamber Storage

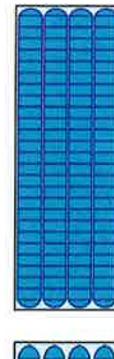
27,332.7 cf of Field - 10,934.6 cf of Chambers = 16,398.1 cf of Stone x 40.0% Voids = 6,559.2 cf Stone Storage

Chamber Storage + Stone Storage = 17,493.9 cf = 0.402 af

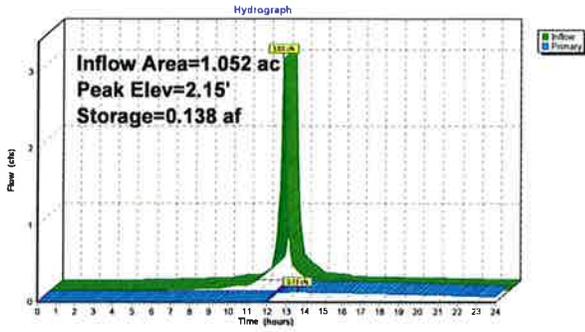
Overall Storage Efficiency = 64.0%

Overall System Size = 107.74' x 37.58' x 6.75'

100 Chambers  
 1,012.3 cy Field  
 607.3 cy Stone



**Pond 15P: StormTech System 2**



**Summary for Pond 17P: StormTech System 1**

Inflow Area = 0.782 ac, 100.00% Impervious, Inflow Depth > 2.12" for 1-Year event  
 Inflow = 2.25 cfs @ 12.17 hrs, Volume= 0.138 af  
 Outflow = 0.09 cfs @ 13.67 hrs, Volume= 0.069 af, Atten= 96%, Lag= 90.0 min  
 Primary = 0.09 cfs @ 13.67 hrs, Volume= 0.069 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1.74' @ 13.67 hrs Surf.Area= 0.093 ac Storage= 0.105 af

Plug-Flow detention time= 379.9 min calculated for 0.069 af (50% of inflow)  
 Center-of-Mass det. time= 294.1 min ( 1,054.8 - 760.7 )

Volume	Invert	Avail. Storage	Storage Description
#1A	0.00'	0.131 af	22.75'W x 177.78'L x 5.50'H Field A 0.511 af of Overall - 0.184 af Embedded = 0.327 af x 40.0% Voids
#2A	0.75'	0.184 af	ADS_StormTech MC-3500 d +Cap x 72 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 24 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
			0.315 af Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, K= 0.200 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.1000 / Cc= 0.800 n= 0.012, Flow Area= 0.75 sf
#2	Device 1	1.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	5.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions(s)

Primary OutFlow Max=0.09 cfs @ 13.67 hrs HW=1.74' (Free Discharge)

- 1=Culvert (Passes 0.09 cfs of 5.26 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.09 cfs @ 3.90 fps)
- 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 17P: StormTech System 1 - Chamber Wizard Field A**

ChamberModel = ADS\_StormTechMC-3500 d +Cap (ADS StormTechMC-3500 d rev 03/14 with Cap volume)

Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf  
 Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap  
 Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" W/de + 9.0" Spacing = 86.0" C-C Row Spacing

24 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 175.78' Row Length +12.0" End Stone x 2 = 177.78' Base Length  
 3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width  
 9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

72 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 8,005.9 cf Chamber Storage

22,244.7 cf Field - 8,005.9 cf Chambers = 14,238.8 of Stone x 40.0% Voids = 5,695.5 cf Stone Storage

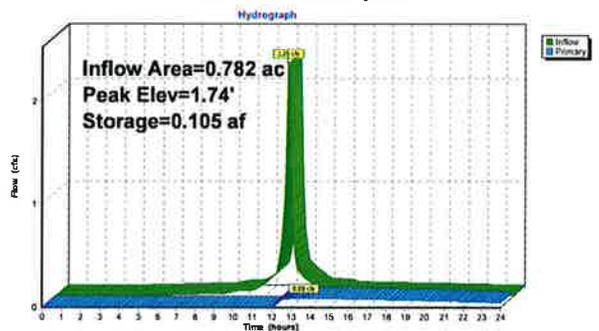
Chamber Storage + Stone Storage = 13,701.5 cf = 0.315 af

Overall Storage Efficiency = 61.6%  
 Overall System Size = 177.78' x 22.75' x 5.50'

72 Chambers  
 823.9 cy Field  
 527.4 cy Stone



**Pond 17P: StormTech System 1**

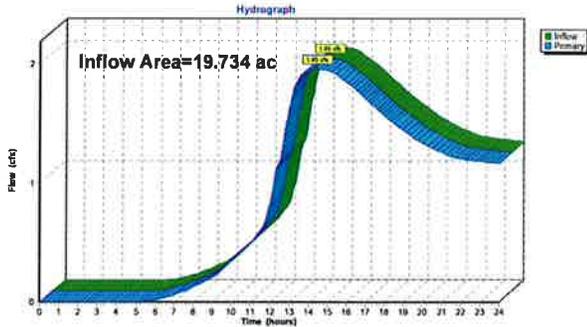


**Summary for Link 15L: (new Link)**

Inflow Area = 19.734 ac, 82.42% Impervious, Inflow Depth > 0.99" for 1-Year event  
 Inflow = 1.95 cfs @ 14.44 hrs, Volume= 1.636 af  
 Primary = 1.95 cfs @ 14.44 hrs, Volume= 1.636 af, Atten= 0%, Lag= 0.0 hrs

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 15L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 11S: Parking Un-changed** Runoff Area=5.900 ac 100.00% Impervious Runoff Depth>2.42"  
 Tc=10.0 min CN=98 Runoff=1.189 af
- Subcatchment 12S: Building Un-changed** Runoff Area=12.000 ac 87.54% Impervious Runoff Depth>2.21"  
 Tc=10.0 min CN=96 Runoff=2.207 af
- Subcatchment 13S: Proposed Addition** Runoff Area=1.052 ac 100.00% Impervious Runoff Depth>2.42"  
 Tc=10.0 min CN=98 Runoff=0.212 af
- Subcatchment 16S: Proposed Addition** Runoff Area=0.782 ac 100.00% Impervious Runoff Depth>2.42"  
 Tc=10.0 min CN=98 Runoff=0.158 af
- Pond 13P: (new Pond)** Peak Elev=846.26' Storage=13,786 cf Inflow=19.25 cfs 1.189 af  
 24.0" Round Culvert n=0.010 L=514.0' S=0.0022' / Outflow=9.44 cfs 1.182 af
- Pond 14P: (new Pond)** Peak Elev=846.16' Storage=102,939 cf Inflow=45.21 cfs 3.591 af  
 Outflow=2.32 cfs 1.966 af
- Pond 15P: StormTech System 2** Peak Elev=2.41' Storage=0.158 af Inflow=3.43 cfs 0.212 af  
 Outflow=0.15 cfs 0.121 af
- Pond 17P: StormTech System 1** Peak Elev=1.93' Storage=0.119 af Inflow=2.55 cfs 0.158 af  
 Outflow=0.10 cfs 0.080 af
- Link 15L: (new Link)** Inflow=2.32 cfs 1.966 af  
 Primary=2.32 cfs 1.966 af

**Total Runoff Area = 19.734 ac Runoff Volume = 3.766 af Average Runoff Depth = 2.29"**  
 7.58% Pervious = 1,495 ac 92.42% Impervious = 18,239 ac

**Summary for Subcatchment 11S: Parking Un-changed**

Runoff = 19.25 cfs @ 12.17 hrs, Volume= 1.189 af, Depth> 2.42"

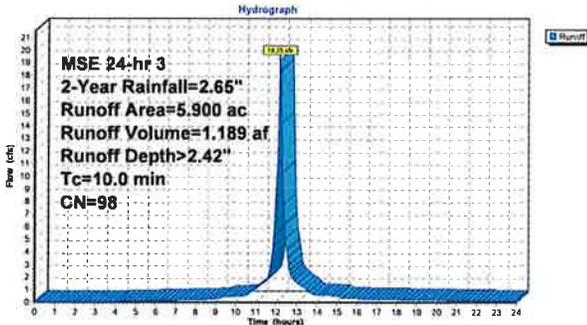
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.65"

Area (ac)	CN	Description
5.900	98	Paved parking, HSG D
5.900		100.00% Impervious Area

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

**Subcatchment 11S: Parking Un-changed**



**Summary for Subcatchment 12S: Building Un-changed**

Runoff = 37.40 cfs @ 12.17 hrs, Volume= 2.207 af, Depth> 2.21"

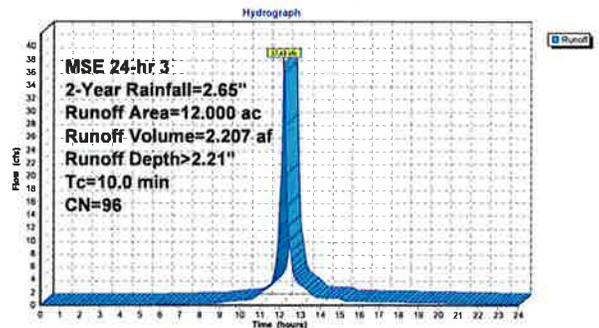
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.65"

Area (ac)	CN	Description
9.400	98	Paved parking, HSG D
1.300	95	Urban commercial, 85% imp, HSG D
1.300	84	50-75% Grass cover, Fair, HSG D
12.000	96	Weighted Average
1.495		12.46% Pervious Area
10.505		87.54% Impervious Area

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

**Subcatchment 12S: Building Un-changed**



**Summary for Subcatchment 13S: Proposed Addition Area 2**

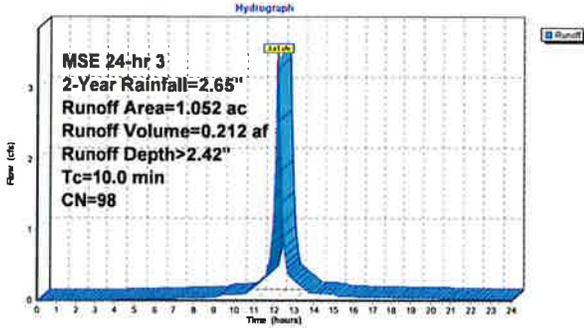
Runoff = 3.43 cfs @ 12.17 hrs, Volume= 0.212 af, Depth> 2.42"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.65"

Area (ac)	CN	Description
0.318	98	Paved parking, HSG D
0.734	98	Roofs, HSG D
1.052	98	Weighted Average
1.052		100.00% Impervious Area

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

**Subcatchment 13S: Proposed Addition Area 2**



**Summary for Subcatchment 16S: Proposed Addition Area 1**

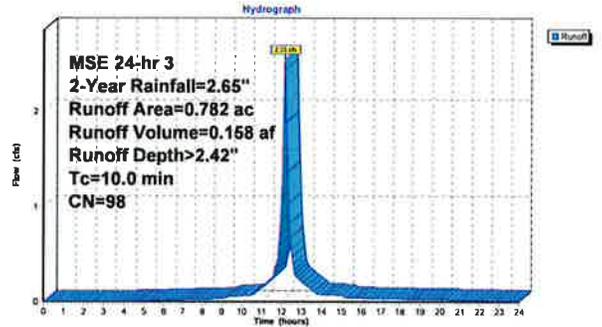
Runoff = 2.55 cfs @ 12.17 hrs, Volume= 0.158 af, Depth> 2.42"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.65"

Area (ac)	CN	Description
0.782	98	Paved parking, HSG D
0.782		100.00% Impervious Area

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

**Subcatchment 16S: Proposed Addition Area 1**



**Summary for Pond 13P: (new Pond)**

Inflow Area = 5.900 ac, 100.00% Impervious, Inflow Depth > 2.42" for 2-Year event  
 Inflow = 19.25 cfs @ 12.17 hrs, Volume= 1.189 af  
 Outflow = 9.44 cfs @ 12.32 hrs, Volume= 1.182 af, Atten= 51%, Lag= 9.0 min  
 Primary = 9.44 cfs @ 12.32 hrs, Volume= 1.182 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.26' @ 12.32 hrs Surf.Area= 0 sf Storage= 13,786 cf

Plug-Flow detention time= 28.9 min calculated for 1.180 af (99% of inflow)  
 Center-of-Mass det. time= 25.3 min (763.8 - 758.5)

Volume #1	Invert	Avail. Storage	Storage Description
	844.60'	50,491 cf	Custom Stage Data Listed below

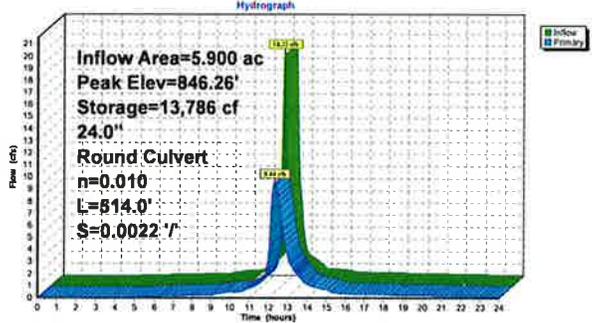
  

Elevation (feet)	Cum. Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq. cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.0022' /' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary Outflow Max=9.40 cfs @ 12.32 hrs HW=846.25' (Free Discharge)  
 1=Culvert (Barrel Controls 9.40 cfs @ 4.59 fps)

**Pond 13P: (new Pond)**



**Summary for Pond 14P: (new Pond)**

[81] Warning: Exceeded Pond 13P by 1.20' @ 15.55 hrs  
 [81] Warning: Exceeded Pond 15P by 843.80' @ 15.45 hrs  
 [81] Warning: Exceeded Pond 17P by 844.24' @ 14.85 hrs

Inflow Area = 19.734 ac, 82.42% Impervious, Inflow Depth > 2.18" for 2-Year event  
 Inflow = 45.21 cfs @ 12.18 hrs, Volume= 3.591 af  
 Outflow = 2.32 cfs @ 14.25 hrs, Volume= 1.966 af, Atten= 95%, Lag= 124.5 min  
 Primary = 2.32 cfs @ 14.25 hrs, Volume= 1.966 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.16' @ 14.25 hrs Surf.Area= 0 sf Storage= 102,939 cf

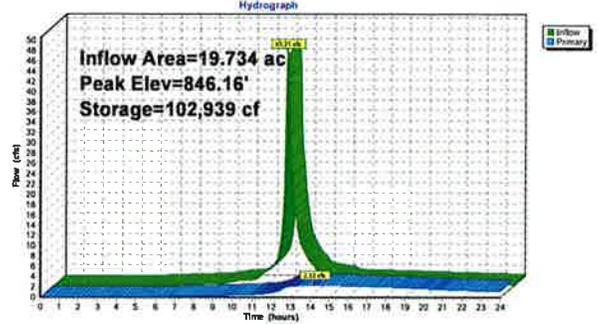
Plug-Flow detention time= 315.8 min calculated for 1.961 af (55% of inflow)  
 Center-of-Mass det. time= 221.7 min (1,014.0 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below
Elevation (feet)	Cum.Store (cubic-feet)		
842.50	0		
843.00	5,579		
844.00	25,375		
845.00	58,382		
846.00	96,697		
847.00	136,585		
848.00	173,130		
849.00	199,843		
850.00	226,720		

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary OutFlow Max=2.32 cfs @ 14.25 hrs HW=846.16' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 1.37 cfs @ 12.40 fps)  
 2=Orifice/Grate (Orifice Controls 0.95 cfs @ 5.16 fps)

**Pond 14P: (new Pond)**



**Summary for Pond 15P: StormTech System 2**

Inflow Area = 1.052 ac, 100.00% Impervious, Inflow Depth > 2.42" for 2-Year event  
 Inflow = 3.43 cfs @ 12.17 hrs, Volume= 0.212 af  
 Outflow = 0.15 cfs @ 13.62 hrs, Volume= 0.121 af, Atten= 96%, Lag= 87.1 min  
 Primary = 0.15 cfs @ 13.62 hrs, Volume= 0.121 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 2.41' @ 13.62 hrs Surf.Area= 0.093 ac Storage= 0.158 af

Plug-Flow detention time= 375.1 min calculated for 0.121 af (57% of inflow)  
 Center-of-Mass det. time= 295.5 min (1,054.0 - 758.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.151 af	37.58'W x 107.74'L x 6.75'H Field A 0.627 af Overall - 0.251 af Embedded = 0.376 af x 40.0% Voids
#2A	0.75'	0.251 af	ADS_StormTech MC-4500 +Cap x 100 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 25 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.402 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, Kp= 0.200 Inlet / Outlet Inverts: 0.00' / -1.00' S= 0.1000' /' Cc= 0.800 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	1.00'	2.2" Vert. Orifice/Grate C= 0.600
#3	Device 1	6.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions)

Primary OutFlow Max=0.15 cfs @ 13.62 hrs HW=2.41' (Free Discharge)  
 1=Culvert (Passes 0.15 cfs of 6.54 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.15 cfs @ 5.53 fps)  
 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 16P: StormTech System 2 - Chamber Wizard Field A**

Chamber Model= ADS\_StormTechMC-4500 +Cap (ADS StormTechMC-4500 with cap volume)  
 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf  
 Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap  
 Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0' Wide + 9.0' Spacing = 109.0" C-C Row Spacing

25 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 105.74' Row Length +12.0' End Stone x 2 = 107.74' Base Length  
 4 Rows x 100.0' Wide + 9.0' Spacing x 3 + 12.0' Side Stone x 2 = 37.58' Base Width  
 9.0' Base + 60.0' Chamber Height + 12.0' Cover = 6.75' Field Height

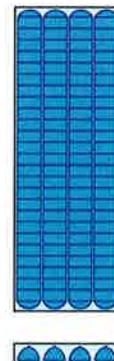
100 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 10,934.6 cf Chamber Storage

27,332.7 cf Field - 10,934.6 cf Chambers = 16,398.1 cf of Stone x 40.0% Voids = 6,559.2 cf of Stone Storage

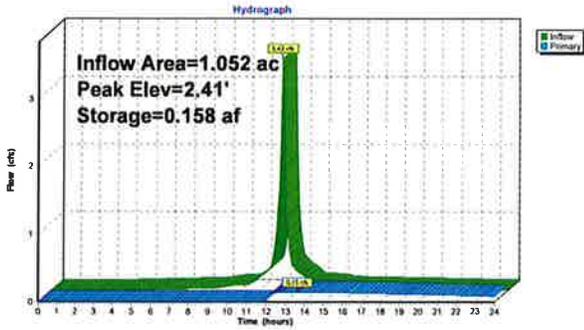
Chamber Storage + Stone Storage = 17,493.0 cf = 0.402 af

Overall Storage Efficiency = 64.0%  
 Overall System Size = 107.74' x 37.58' x 6.75'

100 Chambers  
 1,012.3 cy Field  
 607.3 cy Stone



**Pond 15P: StormTech System 2**



**Summary for Pond 17P: StormTech System 1**

Inflow Area = 0.782 ac, 100.00% Impervious, Inflow Depth > 2.42" for 2-Year event  
 Inflow = 2.55 cfs @ 12.17 hrs, Volume = 0.158 af  
 Outflow = 0.10 cfs @ 13.67 hrs, Volume = 0.080 af, Atten= 96%, Lag= 89.9 min  
 Primary = 0.10 cfs @ 13.67 hrs, Volume = 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1.93' @ 13.67 hrs Surf.Area= 0.093 ac Storage= 0.119 af

Plug-Flow detention time= 385.3 min calculated for 0.080 af (51% of inflow)  
 Center-of-Mass det. time= 299.0 min ( 1,057.5 - 758.5 )

Volume	Invert	Avail. Storage	Storage Description
#1A	0.00'	0.131 af	22.75'W x 177.78'L x 5.50'H Field A 0.511 af Overall - 0.184 af Embedded = 0.327 af x 40.0% Voids
#2A	0.75'	0.184 af	ADS_StormTech MC-3500 d +Capx 72 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 af x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 24 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
			0.315 af Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Inverts 0.00' / -1.00' S= 0.1000 / Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	1.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	5.25'	3.0" long Sharp-Crested Rectangular Weir 2 End Contractions(e)

Primary OutFlow Max=0.10 cfs @ 13.67 hrs HW=1.93' (Free Discharge)

- 1=Culvert (Passes 0.10 cfs of 5.66 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.10 cfs @ 4.44 fps)
- 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 17P: StormTech System 1 - Chamber Wizard Field A**

Chamber Model = ADS\_StormTechMC-3500 d +Cap (ADS StormTechMC-3500 d rev 03/14 with Cap volume)

Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf  
 Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap  
 Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

24 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 175.78' Row Length +12.0" End Stone x 2 = 177.78' Base Length  
 3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width  
 9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

72 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 8,005.9 cf Chamber Storage

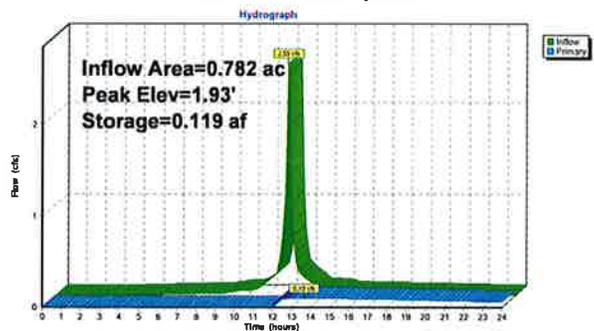
22,244.7 cf Field - 8,005.9 cf Chambers = 14,238.8 cf Stone x 40.0% Voids = 5,695.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,701.5 cf = 0.315 af  
 Overall Storage Efficiency = 61.6%  
 Overall System Size = 177.78' x 22.75' x 5.50'

72 Chambers  
 823.9 cy Field  
 527.4 cy Stone



**Pond 17P: StormTech System 1**

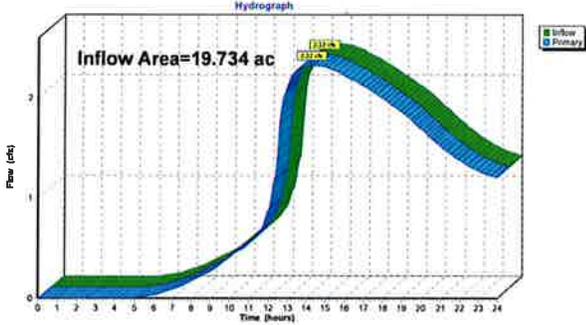


**Summary for Link 15L: (new Link)**

Inflow Area = 19,734 ac, 92.42% Impervious, Inflow Depth > 1.20" for 2-Year event  
 Inflow = 2.32 cfs @ 14.25 hrs, Volume= 1,966 af  
 Primary = 2.32 cfs @ 14.25 hrs, Volume= 1,966 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 15L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 461 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

- Subcatchment11S: Parking Un-changed** Runoff Area=5.900 ac 100.00% Impervious Runoff Depth>3.58"  
 Tc=10.0 min CN=98 Runoff=28.00 cfs 1,762 af
- Subcatchment12S: Building Un-changed** Runoff Area=12.000 ac 87.54% Impervious Runoff Depth>3.36"  
 Tc=10.0 min CN=96 Runoff=55.53 cfs 3,360 af
- Subcatchment13S: Proposed Addition** Runoff Area=1.052 ac 100.00% Impervious Runoff Depth>3.58"  
 Tc=10.0 min CN=98 Runoff=4.99 cfs 0.314 af
- Subcatchment16S: Proposed Addition** Runoff Area=0.782 ac 100.00% Impervious Runoff Depth>3.58"  
 Tc=10.0 min CN=98 Runoff=3.71 cfs 0.234 af
- Pond 13P: (new Pond)** Peak Elev=846.69' Storage=20,353 cf Inflow=28.00 cfs 1,762 af  
 24.0" Round Culvert n=0.010 L=514.0' S=0.0022 1' Outflow=12.83 cfs 1,754 af
- Pond 14P: (new Pond)** Peak Elev=847.54' Storage=156,418 cf Inflow=66.05 cfs 5,405 af  
 Outflow=3.32 cfs 3,105 af
- Pond 15P: StormTech System 2** Peak Elev=3.47' Storage=0.235 af Inflow=4.99 cfs 0.314 af  
 Outflow=0.20 cfs 0.172 af
- Pond 17P: StormTech System 1** Peak Elev=2.73' Storage=0.177 af Inflow=3.71 cfs 0.234 af  
 Outflow=0.13 cfs 0.118 af
- Link 15L: (new Link)** Inflow=3.32 cfs 3,105 af  
 Primary=3.32 cfs 3,105 af

**Total Runoff Area = 19,734 ac Runoff Volume = 5,670 af Average Runoff Depth = 3.45"**  
 7.58% Pervious = 1,495 ac 92.42% Impervious = 18,239 ac

**Summary for Subcatchment 11S: Parking Un-changed**

Runoff = 28.00 cfs @ 12.17 hrs, Volume= 1,762 af, Depth> 3.58"

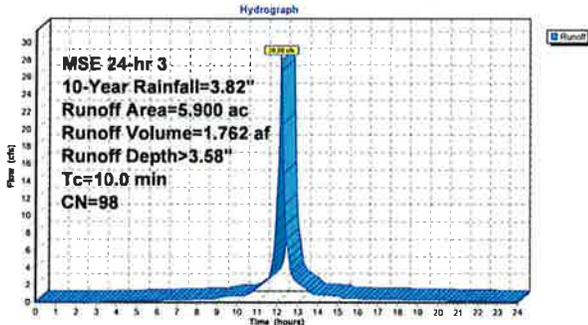
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=3.82"

Area (ac)	CN	Description
5.900	98	Paved parking, HSG D
5.900		100.00% Impervious Area

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

**Subcatchment 11S: Parking Un-changed**



**Summary for Subcatchment 12S: Building Un-changed**

Runoff = 55.53 cfs @ 12.17 hrs, Volume= 3,360 af, Depth> 3.36"

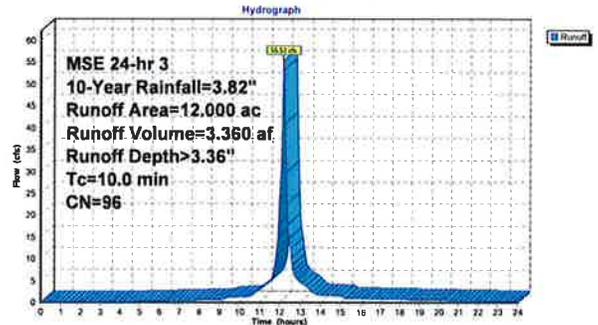
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=3.82"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG D
1.300	95	Urban commercial, 85% Imp, HSG D
1.300	84	50-75% Grass cover, Fair, HSG D
12.000	96	Weighted Average
1.495		12.46% Pervious Area
10.505		87.54% Impervious Area

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

**Subcatchment 12S: Building Un-changed**



**Summary for Subcatchment 13S: Proposed Addition Area 2**

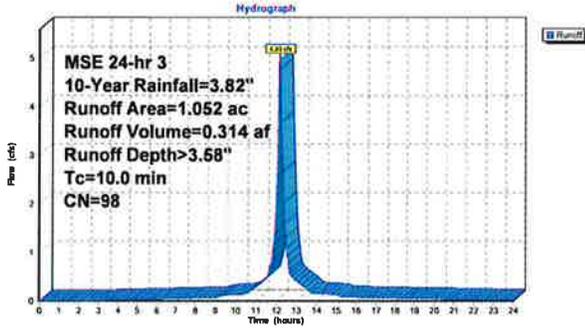
Runoff = 4.99 cfs @ 12.17 hrs, Volume= 0.314 af, Depth> 3.58"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=3.82"

Area (ac)	CN	Description
0.318	98	Paved parking, HSG D
0.734	98	Roofs, HSG D
1.052	98	Weighted Average
1.052		100.00% Impervious Area

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

**Subcatchment 13S: Proposed Addition Area 2**



**Summary for Subcatchment 16S: Proposed Addition Area 1**

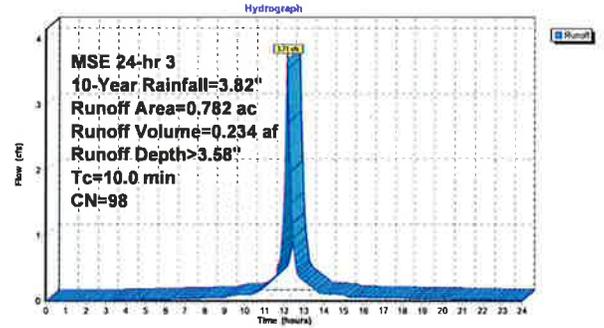
Runoff = 3.71 cfs @ 12.17 hrs, Volume= 0.234 af, Depth> 3.58"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=3.82"

Area (ac)	CN	Description
0.782	98	Paved parking, HSG D
0.782		100.00% Impervious Area

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

**Subcatchment 16S: Proposed Addition Area 1**



**Summary for Pond 13P: (new Pond)**

Inflow Area = 5.900 ac, 100.00% Impervious, Inflow Depth > 3.58" for 10-Year event  
 Inflow = 28.00 cfs @ 12.17 hrs, Volume= 1.762 af  
 Outflow = 12.93 cfs @ 12.33 hrs, Volume= 1.754 af, Atten= 54%, Lag= 9.6 min  
 Primary = 12.93 cfs @ 12.33 hrs, Volume= 1.754 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 846.69' @ 12.33 hrs Surf.Area= 0 sf Storage= 20,353 cf

Plug-Flow detention time= 27.8 min calculated for 1.754 af (100% of inflow)  
 Center-of-Mass det. time= 24.9 min (777.3 - 752.5)

Volume #1	Invert	Avail.Storage	Storage	Description
	844.60'	50,491 cf		Custom Stage Data Listed below

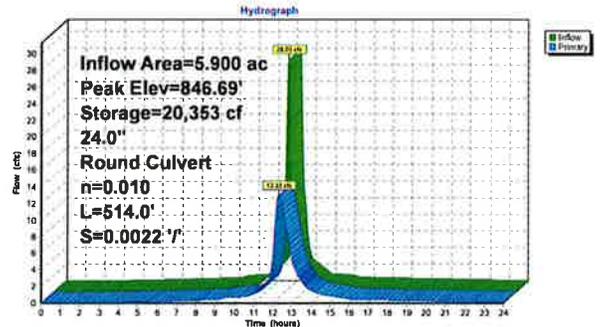
  

Elevation (feet)	Cum.Store (cubic-feet)
844.60	0
845.00	844
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device #1	Routing	Invert	Outlet Devices
	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq. cut and projecting, K= 0.500 Inlet / Outlet Inverts= 844.60' / 843.47' S= 0.0022' /' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max= 12.90 cfs @ 12.33 hrs HW= 846.68' (Free Discharge)  
 1=Culvert (Barrel Controls 12.90 cfs @ 4.90 fpe)

**Pond 13P: (new Pond)**



**Summary for Pond 14P: (new Pond)**

[B1] Warning: Exceeded Pond 13P by 2.46' @ 15.80 hrs  
 [B1] Warning: Exceeded Pond 15P by 844.13' @ 15.40 hrs  
 [B1] Warning: Exceeded Pond 17P by 844.83' @ 14.60 hrs

Inflow Area = 19.734 ac, 92.42% Impervious, Inflow Depth > 3.28" for 10-Year event  
 Inflow = 66.05 cfs @ 12.18 hrs, Volume= 5,405 af  
 Outflow = 3.32 cfs @ 14.18 hrs, Volume= 3,105 af, Atten= 95%, Lag= 120.5 min  
 Primary = 3.32 cfs @ 14.18 hrs, Volume= 3,105 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 847.54' @ 14.18 hrs Surf.Area= 0 sf Storage= 156,419 cf

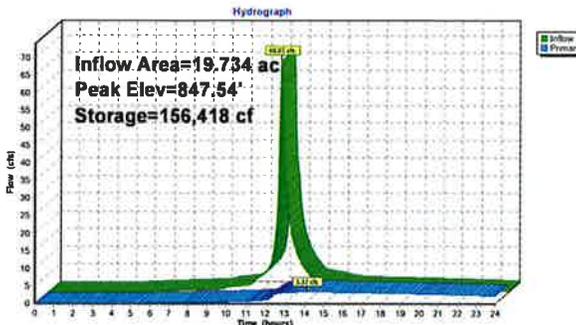
Plug-Flow detention time= 336.5 min calculated for 3.105 af (57% of inflow)  
 Center-of-Mass det. time= 242.7 min ( 1,027.5 - 784.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below
Elevation (feet)	Cum.Store (cubic-feet)		
842.50	0		
843.00	5,579		
844.00	25,375		
845.00	58,382		
846.00	96,897		
847.00	136,565		
848.00	173,130		
849.00	198,843		
850.00	226,720		

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary Outflow Max=3.32 cfs @ 14.18 hrs HW=847.54' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 1.61 cfs @ 14.62 fps)  
 2=Orifice/Grate (Orifice Controls 1.71 cfs @ 9.31 fps)

**Pond 14P: (new Pond)**



**Summary for Pond 16P: StormTech System 2**

Inflow Area = 1.052 ac, 100.00% Impervious, Inflow Depth > 3.58" for 10-Year event  
 Inflow = 4.99 cfs @ 12.17 hrs, Volume= 0.314 af  
 Outflow = 0.20 cfs @ 13.65 hrs, Volume= 0.172 af, Atten= 96%, Lag= 89.0 min  
 Primary = 0.20 cfs @ 13.65 hrs, Volume= 0.172 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 3.47' @ 13.65 hrs Surf.Area= 0.093 ac Storage= 0.235 af

Plug-Flow detention time= 388.5 min calculated for 0.172 af (55% of inflow)  
 Center-of-Mass det. time= 304.2 min ( 1,058.7 - 752.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.151 af	37.58'W x 107.74'L x 6.75'H Field A
#2A	0.75'	0.251 af	0.627 af Overall - 0.251 af Embedded = 0.376 af x 40.0% Voids ADS_StormTech MC-4500 +Cap x 100 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31" Overlap 4 Rows of 25 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.402 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove and projecting, Ke= 0.200 Inlet/Outlet invert= 0.00' / -1.00' S= 0.1000 /' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	1.00'	2.2" Vert. Orifice/Grate C= 0.600
#3	Device 1	6.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions)

Primary Outflow Max=0.20 cfs @ 13.65 hrs HW=3.47' (Free Discharge)  
 1=Culvert (Passes 0.20 cfs of 8.15 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.20 cfs @ 7.42 fps)  
 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 16P: StormTech System 2 - Chamber Wizard Field A**

Chamber Model = ADS\_StormTechMC-4500+Cap (ADS StormTech®MC-4500 with cap volume)  
 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf  
 Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31" Overlap  
 Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 8.0" Spacing = 109.0" C-C Row Spacing

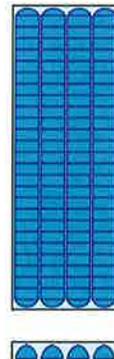
25 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 105.74' Row Length +12.0" End Stone x 2 = 107.74' Base Length  
 4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width  
 9.0" Base + 60.0" Chamber Height + 12.0" Cover = 8.75' Field Height

100 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 10,834.6 cf Chamber Storage

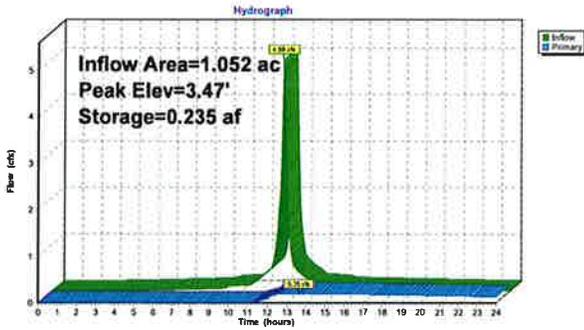
27,332.7 cf of Field - 10,834.6 cf Chambers = 16,398.1 cf of Stone x 40.0% Voids = 6,559.2 cf of Stone Storage

Chamber Storage + Stone Storage = 17,493.9 cf = 0.402 af  
 Overall Storage Efficiency = 64.0%  
 Overall System Size = 107.74' x 37.58' x 8.75'

100 Chambers  
 1,012.3 cy Field  
 607.3 cy Stone



**Pond 16P: StormTech System 2**



**Summary for Pond 17P: StormTech System 1**

Inflow Area = 0.782 ac, 100.00% Impervious, Inflow Depth > 3.58" for 10-Year event  
 Inflow = 3.71 cfs @ 12.17 hrs, Volume= 0.234 af  
 Outflow = 0.13 cfs @ 13.69 hrs, Volume= 0.118 af, Atten= 96%, Lag= 81.0 min  
 Primary = 0.13 cfs @ 13.69 hrs, Volume= 0.118 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 2.73' @ 13.69 hrs Surf.Area= 0.093 ac Storage= 0.177 af

Plug-Flow detention time= 398.4 min calculated for 0.118 af (50% of inflow)  
 Center-of-Mass det. time= 309.3 min ( 1,061.8 - 752.5 )

Volume	Invert	Avail. Storage	Storage Description
#1A	0.00'	0.131 af	22.75'W x 177.78'L x 5.50'H Field A 0.511 af Overall - 0.184 af Embedded = 0.327 af x 40.0% Voids
#2A	0.75'	0.184 af	ADS_StormTech MC-3500 d +Capx 72 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 24 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
			0.315 af Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.1000 /' Cc= 0.800 n= 0.012, Flow Area= 0.78 sf
#2	Device 1	1.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	5.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions(s)

Primary OutFlow Max=0.13 cfs @ 13.69 hrs HW=2.73' (Free Discharge)

- 1=Culvert (Passes 0.13 cfs of 7.07 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.13 cfs @ 6.19 fps)
- 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 17P: StormTech System 1 - Chamber Wizard Field A**

Chamber Model= ADS\_StormTechMC-3500 d +Cap (ADS StormTechMC-3500 d rev 03/14 with Cap volume)

Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf  
 Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap  
 Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0' Wide + 9.0" Spacing = 86.0" C-C Row Spacing

24 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 175.78' Row Length +12.0" End Stone x 2 = 177.78' Base Length  
 3 Rows x 77.0' Wide + 8.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width  
 9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

72 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 8,005.8 cf of Chamber Storage

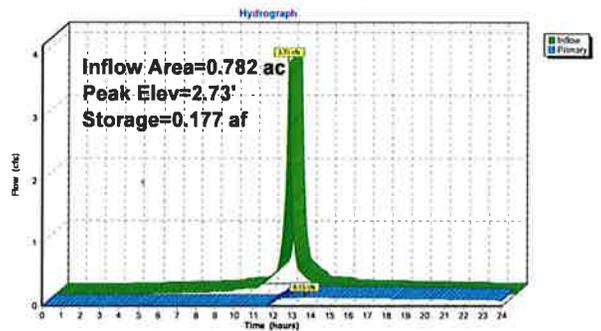
22,244.7 cf Field - 8,005.8 cf Chambers = 14,238.8 cf Stone x 40.0% Voids = 5,695.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,701.5 cf = 0.315 af  
 Overall Storage Efficiency = 61.8%  
 Overall System Size = 177.78' x 22.75' x 5.50'

72 Chambers  
 823.9 cy Field  
 527.4 cy Stone



**Pond 17P: StormTech System 1**

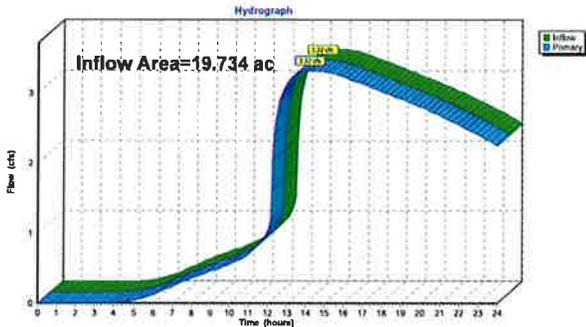


**Summary for Link 15L: (new Link)**

Inflow Area = 19.734 ac, 92.42% Impervious, Inflow Depth > 1.89" for 10-Year event  
 Inflow = 3.32 cfs @ 14.18 hrs, Volume= 3.105 af  
 Primary = 3.32 cfs @ 14.18 hrs, Volume= 3.105 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 15L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 11S: Parking Un-changed** Runoff Area=5.900 ac 100.00% Impervious Runoff Depth>4.49"  
 Tc=10.0 min CN=98 Runoff=34.78 cfs 2.209 af
- Subcatchment 12S: Building Un-changed** Runoff Area=12.000 ac 87.54% Impervious Runoff Depth>4.26"  
 Tc=10.0 min CN=96 Runoff=69.51 cfs 4.263 af
- Subcatchment 13S: Proposed Addition** Runoff Area=1.052 ac 100.00% Impervious Runoff Depth>4.49"  
 Tc=10.0 min CN=98 Runoff=6.20 cfs 0.394 af
- Subcatchment 16S: Proposed Addition** Runoff Area=0.782 ac 100.00% Impervious Runoff Depth>4.49"  
 Tc=10.0 min CN=98 Runoff=4.61 cfs 0.293 af
- Pond 13P: (new Pond)** Peak Elev=847.04' Storage=25,815 cf Inflow=34.78 cfs 2.209 af  
 24.0" Round Culvert n=0.010 L=514.0' S=0.0022 7' Outflow=14.98 cfs 2.200 af
- Pond 14P: (new Pond)** Peak Elev=848.98' Storage=189,421 cf Inflow=82.01 cfs 6.814 af  
 Outflow=4.08 cfs 3.821 af
- Pond 15P: StormTech System 2** Peak Elev=4.37' Storage=0.295 af Inflow=6.20 cfs 0.394 af  
 Outflow=0.23 cfs 0.208 af
- Pond 17P: StormTech System 1** Peak Elev=3.42' Storage=0.223 af Inflow=4.61 cfs 0.293 af  
 Outflow=0.16 cfs 0.144 af
- Link 15L: (new Link)** Inflow=4.08 cfs 3.821 af  
 Primary=4.08 cfs 3.821 af

**Total Runoff Area = 19.734 ac Runoff Volume = 7.158 af Average Runoff Depth = 4.35"**  
 7.58% Pervious = 1.495 ac 92.42% Impervious = 18.239 ac

**Summary for Subcatchment 11S: Parking Un-changed**

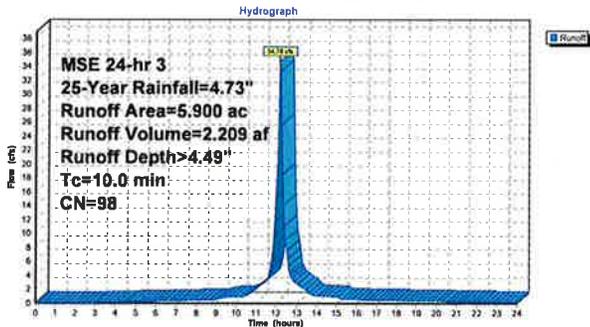
Runoff = 34.78 cfs @ 12.17 hrs, Volume= 2.209 af, Depth> 4.49"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 25-Year Rainfall=4.73"

Area (ac)	CN	Description
5.900	98	Paved parking, HSG D
5.900		100.00% Impervious Area

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

**Subcatchment 11S: Parking Un-changed**



**Summary for Subcatchment 12S: Building Un-changed**

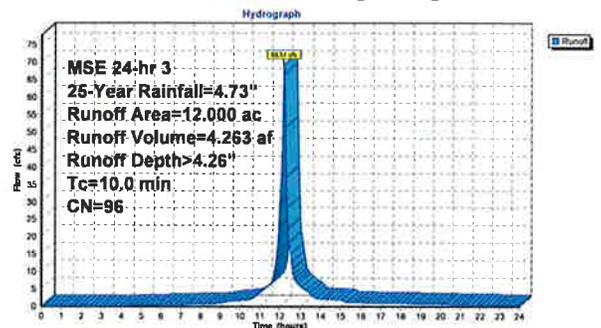
Runoff = 69.51 cfs @ 12.17 hrs, Volume= 4.263 af, Depth> 4.26"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 25-Year Rainfall=4.73"

Area (ac)	CN	Description
9.400	98	Paved parking, HSG D
1.300	85	Urban commercial, 85% imp, HSG D
1.300	84	50-75% Grass cover, Fair, HSG D
12.000	96	Weighted Average
1.495		12.46% Pervious Area
10.505		87.54% Impervious Area

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

**Subcatchment 12S: Building Un-changed**



**Summary for Subcatchment 13S: Proposed Addition Area 2**

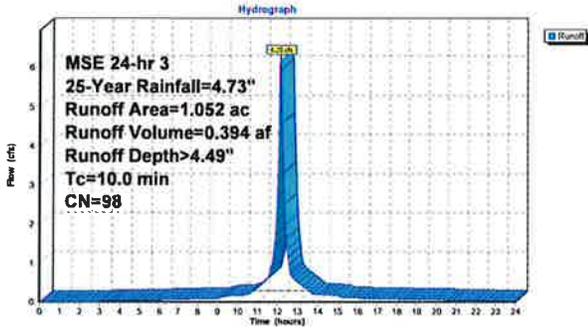
Runoff = 6.20 cfs @ 12.17 hrs, Volume= 0.394 af, Depth> 4.49"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 25-Year Rainfall=4.73"

Area (ac)	CN	Description
0.318	98	Paved parking, HSG D
0.734	98	Roofs, HSG D
1.052	98	Weighted Average
1.052		100.00% Impervious Area

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

**Subcatchment 13S: Proposed Addition Area 2**



**Summary for Subcatchment 16S: Proposed Addition Area 1**

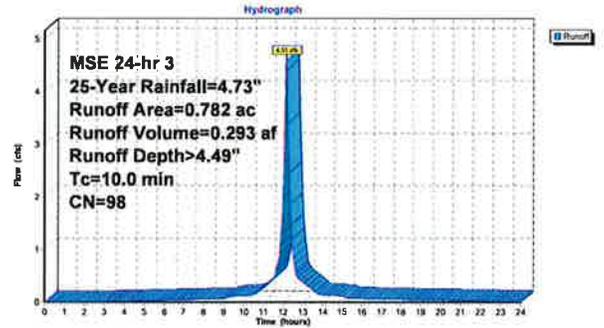
Runoff = 4.61 cfs @ 12.17 hrs, Volume= 0.293 af, Depth> 4.49"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 25-Year Rainfall=4.73"

Area (ac)	CN	Description
0.782	98	Paved parking, HSG D
0.782		100.00% Impervious Area

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

**Subcatchment 16S: Proposed Addition Area 1**



**Summary for Pond 13P: (new Pond)**

Inflow Area = 5.900 ac, 100.00% Impervious, Inflow Depth > 4.49" for 25-Year event  
 Inflow = 34.78 cfs @ 12.17 hrs, Volume= 2.209 af  
 Outflow = 14.98 cfs @ 12.34 hrs, Volume= 2.200 af, Atten= 57%, Lag= 10.4 min  
 Primary = 14.98 cfs @ 12.34 hrs, Volume= 2.200 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 847.04' @ 12.34 hrs Surf.Area= 0 sf Storage= 25,815 cf

Plug-Flow detention time= 27.7 min calculated for 2.200 af (100% of inflow)  
 Center-of-Mass det. time= 25.1 min (774.5 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1	844.60'	50,491 cf	Custom Stage Data Listed below

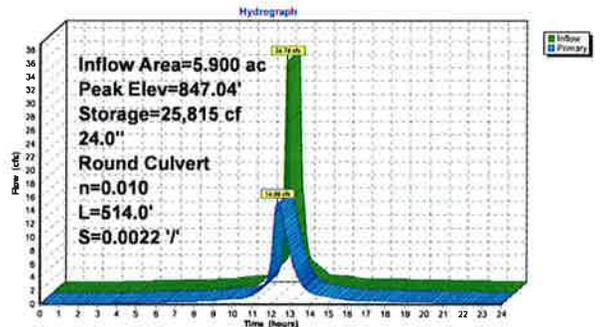
  

Elevation (feet)	Cum.Store (cubic-feet)
844.60	0
845.00	944
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq. cut and projecting, Ke= 0.500 Inlet / Outlet Inverts= 844.60' / 843.47' S= 0.0022' /' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max= 14.98 cfs @ 12.34 hrs HW= 847.04' (Free Discharge)  
 1= Culvert (Barrel Controls 14.98 cfs @ 4.97 fps)

**Pond 13P: (new Pond)**



**Summary for Pond 14P: (new Pond)**

[81] Warning: Exceeded Pond 13P by 3.83' @ 14.85 hrs  
 [81] Warning: Exceeded Pond 15P by 844.65' @ 14.75 hrs  
 [81] Warning: Exceeded Pond 17P by 845.58' @ 14.40 hrs

Inflow Area = 19.734 ac, 92.42% Impervious, Inflow Depth > 4.14" for 25-Year event  
 Inflow = 82.01 cfs @ 12.18 hrs, Volume= 6,814 af  
 Outflow = 4.08 cfs @ 14.17 hrs, Volume= 3,821 af, Atten= 95%, Lag= 119.8 min  
 Primary = 4.08 cfs @ 14.17 hrs, Volume= 3,821 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 848.98' @ 14.17 hrs Surf.Area= 0 sf Storage= 199,421 cf

Plug-Flow detention time= 341.8 min calculated for 3,813 af (56% of inflow)  
 Center-of-Mass det. time= 246.4 min ( 1,027.1 - 780.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below

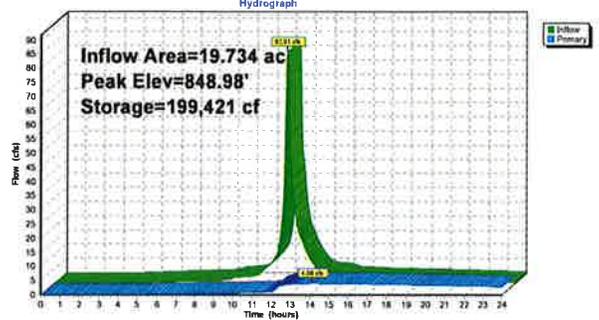
  

Elevation (feet)	Cum.Store (cubic-feet)
842.50	0
843.00	5,579
844.00	25,375
845.00	58,382
846.00	96,687
847.00	136,565
848.00	173,130
849.00	199,843
850.00	226,720

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary OutFlow Max=4.08 cfs @ 14.17 hrs HW=848.98' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 1.84 cfs @ 16.62 fps)  
 2=Orifice/Grate (Orifice Controls 2.24 cfs @ 12.21 fps)

**Pond 14P: (new Pond)**



**Summary for Pond 16P: StormTech System 2**

Inflow Area = 1.052 ac, 100.00% Impervious, Inflow Depth > 4.49" for 25-Year event  
 Inflow = 6.20 cfs @ 12.17 hrs, Volume= 0.394 af  
 Outflow = 0.23 cfs @ 13.67 hrs, Volume= 0.208 af, Atten= 96%, Lag= 90.2 min  
 Primary = 0.23 cfs @ 13.67 hrs, Volume= 0.208 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 4.37' @ 13.67 hrs Surf.Area= 0.093 ac Storage= 0.295 af

Plug-Flow detention time= 393.5 min calculated for 0.207 af (53% of inflow)  
 Center-of-Mass det. time= 305.6 min ( 1,055.0 - 749.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.151 af	37.58'W x 107.74'L x 6.75'H Field A 0.627 af Overall - 0.251 af Embedded = 0.376 af x 40.0% Voids
#2A	0.75'	0.251 af	ADS_StormTech MC-4500 +Cap x 100 Inside #1 Effective Size= 90.0"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31" Overlap 4 Rows of 25 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
			0.402 af Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.1000' / Cc= 0.800 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	1.00'	2.2" Vert. Orifice/Grate C= 0.600
#3	Device 1	6.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions(s)

Primary OutFlow Max=0.23 cfs @ 13.67 hrs HW=4.37' (Free Discharge)  
 1=Culvert (Passes 0.23 cfs of 9.30 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.23 cfs @ 8.72 fps)  
 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 16P: StormTech System 2 - Chamber Wizard Field A**

Chamber Model= ADS\_StormTechMC-4500+Cap (ADS StormTechMC-4500 with cap volume)  
 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf  
 Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31" Overlap  
 Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0' Wide x 9.0' Spacing = 109.0' C-C Row Spacing

25 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 105.74' Row Length +12.0" End Stone x 2 = 107.74' Base Length  
 4 Rows x 100.0' Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width  
 9.0' Base + 60.0' Chamber Height + 12.0" Cover = 6.75' Field Height

100 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 10,934.6 cf Chamber Storage

27,332.7 cf Field - 10,934.6 cf Chambers = 16,398.1 cf Stone x 40.0% Voids = 6,558.2 cf Stone Storage

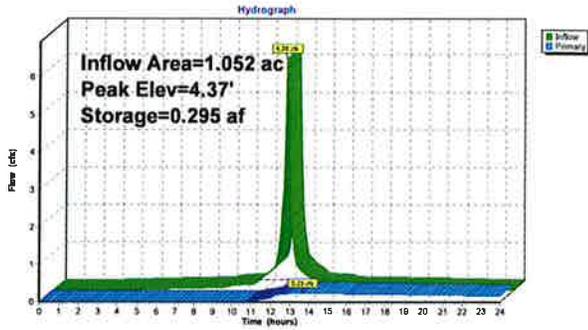
Chamber Storage + Stone Storage = 17,493.9 cf = 0.402 af

Overall Storage Efficiency = 64.0%  
 Overall System Size = 107.74' x 37.58' x 6.75'

100 Chambers  
 1,012.3 cy Field  
 607.3 cy Stone



**Pond 15P: StormTech System 2**



**Summary for Pond 17P: StormTech System 1**

Inflow Area = 0.782 ac, 100.00% Impervious, Inflow Depth > 4.49" for 25-Year event  
 Inflow = 4.61 cfs @ 12.17 hrs, Volume= 0.283 af  
 Outflow = 0.16 cfs @ 13.71 hrs, Volume= 0.144 af, Atten= 97%, Lag= 92.4 min  
 Primary = 0.16 cfs @ 13.71 hrs, Volume= 0.144 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 3.42' @ 13.71 hrs Surf.Area= 0.093 ac Storage= 0.223 af

Plug-Flow detention time= 404.8 min calculated for 0.144 af (49% of inflow)  
 Center-of-Mass det. time= 311.8 min ( 1,061.2 - 749.4 )

Volume	Invert	Avail. Storage	Storage Description
#1A	0.00'	0.131 af	22.75'W x 177.78'L x 5.50'H Field A 0.511' af Overall - 0.184' af Embedded = 0.327' af x 40.0% Voids
#2A	0.75'	0.184 af	ADS_StormTech MC-3500 d +Capx 72 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33' af x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 24 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
			0.315 af Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, K <sub>e</sub> = 0.200 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.1000 /' C <sub>c</sub> = 0.900 n= 0.012, Flow Area= 0.78 af
#2	Device 1	1.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	5.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=0.16 cfs @ 13.71 hrs HW=3.42' (Free Discharge)

- 1=Culvert (Passes 0.16 cfs of 8.07 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.16 cfs @ 7.36 fps)
- 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 17P: StormTech System 1 - Chamber Wizard Field A**

Chamber Model= ADS\_StormTechMC-3500 d +Cap (ADS StormTechMC-3500 d rev 03/14 with Cap volume)

Effective Size= 70.4"W x 45.0"H => 15.33' af x 7.17'L = 110.0 cf  
 Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap  
 Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

24 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 175.78' Row Length +12.0" End Stone x 2 = 177.78' Base Length  
 3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width  
 9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

72 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 8,005.9 cf Chamber Storage

22,244.7 cf Field - 8,005.9 cf Chambers = 14,238.8 cf Stone x 40.0% Voids = 5,695.5 cf Stone Storage

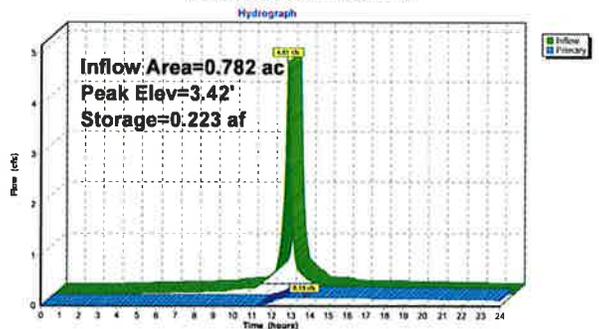
Chamber Storage + Stone Storage = 13,701.5 cf = 0.315 af

Overall Storage Efficiency = 81.6%  
 Overall System Size = 177.78' x 22.75' x 5.50'

72 Chambers  
 823.9 cy Field  
 527.4 cy Stone



**Pond 17P: StormTech System 1**

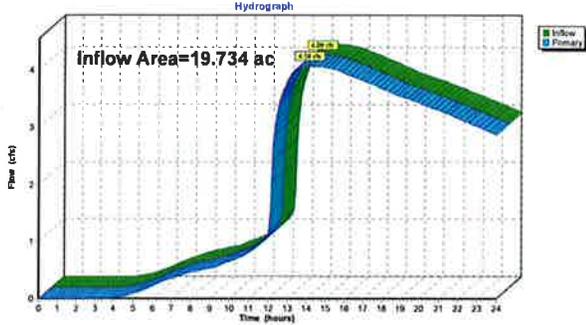


**Summary for Link 15L: (new Link)**

Inflow Area = 19,734 ac, 92.42% Impervious, Inflow Depth > 2.32" for 25-Year event  
 Inflow = 4.08 cfs @ 14.17 hrs, Volume= 3.821 af  
 Primary = 4.08 cfs @ 14.17 hrs, Volume= 3.821 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link 15L: (new Link)**



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 11S: Parking Un-changed** Runoff Area=5,900 ac 100.00% Impervious Runoff Depth>6.17"  
 Tc=10.0 min CN=98 Runoff=47.26 cfs 3.033 af
- Subcatchment 12S: Building Un-changed** Runoff Area=12,000 ac 87.54% Impervious Runoff Depth>5.93"  
 Tc=10.0 min CN=96 Runoff=95.15 cfs 5.933 af
- Subcatchment 13S: Proposed Addition** Runoff Area=1,052 ac 100.00% Impervious Runoff Depth=6.17"  
 Tc=10.0 min CN=98 Runoff=6.43 cfs 0.541 af
- Subcatchment 16S: Proposed Addition** Runoff Area=0,782 ac 100.00% Impervious Runoff Depth>6.17"  
 Tc=10.0 min CN=98 Runoff=6.26 cfs 0.402 af
- Pond 13P: (new Pond)** Peak Elev=847.82' Storage=37,735 cf Inflow=47.26 cfs 3.033 af  
 24.0' Round Culvert n=0.010 L=514.0' S=0.0022' Outflow=16.79 cfs 3.023 af
- Pond 14P: (new Pond)** Peak Elev=1,469.66' Storage=226,720 cf Inflow=110.35 cfs 9.433 af  
 Outflow=48.37 cfs 5.811 af
- Pond 15P: StormTech System 2** Peak Elev=6.36' Storage=0.387 af Inflow=8.43 cfs 0.541 af  
 Outflow=0.88 cfs 0.285 af
- Pond 17P: StormTech System 1** Peak Elev=5.24' Storage=0.305 af Inflow=6.26 cfs 0.402 af  
 Outflow=0.21 cfs 0.191 af
- Link 15L: (new Link)** Inflow=48.37 cfs 5.811 af  
 Primary=48.37 cfs 5.811 af

**Total Runoff Area = 19,734 ac Runoff Volume = 9,909 af Average Runoff Depth = 6.03"**  
 7.58% Pervious = 1,493 ac 92.42% Impervious = 18,239 ac

**Summary for Subcatchment 11S: Parking Un-changed**

Runoff = 47.26 cfs @ 12.17 hrs, Volume= 3.033 af, Depth> 6.17"

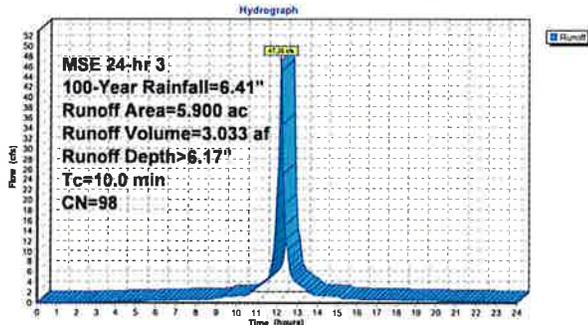
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=6.41"

Area (ac)	CN	Description
5,900	98	Paved parking, HSG D
5,900		100.00% Impervious Area

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

**Subcatchment 11S: Parking Un-changed**



**Summary for Subcatchment 12S: Building Un-changed**

Runoff = 95.15 cfs @ 12.17 hrs, Volume= 5.933 af, Depth> 5.93"

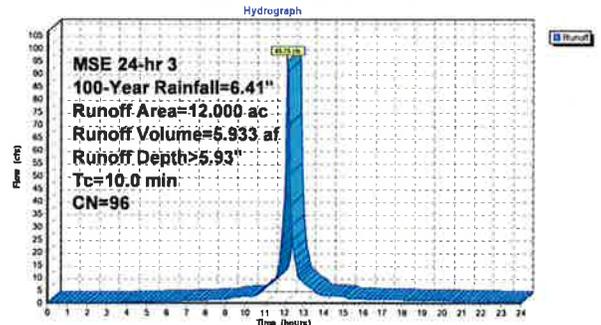
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=6.41"

Area (ac)	CN	Description
9,400	98	Paved parking, HSG D
1,300	95	Urban commercial, 85% imp, HSG D
1,300	84	50-75% Grass cover, Fair, HSG D
12,000	96	Weighted Average
1,495		12.46% Pervious Area
10,505		87.54% Impervious Area

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

**Subcatchment 12S: Building Un-changed**



**Summary for Subcatchment 13S: Proposed Addition Area 2**

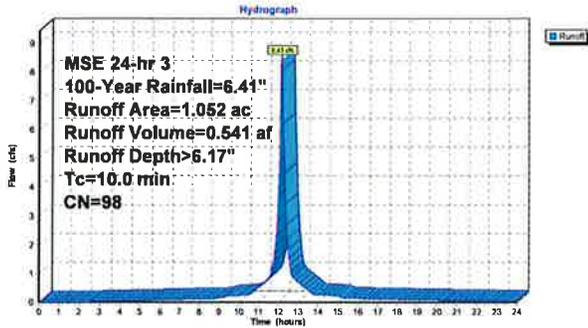
Runoff = 8.43 cfs @ 12.17 hrs, Volume= 0.541 af, Depth> 6.17"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=6.41"

Area (ac)	CN	Description
0.318	98	Paved parking, HSG D
0.734	98	Roofs, HSG D
1.052	98	Weighted Average
1.052		100.00% Impervious Area

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

**Subcatchment 13S: Proposed Addition Area 2**



**Summary for Subcatchment 16S: Proposed Addition Area 1**

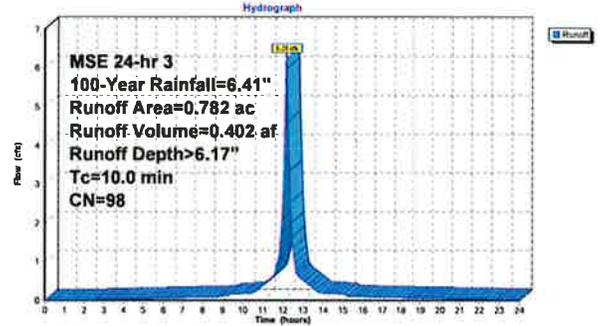
Runoff = 8.26 cfs @ 12.17 hrs, Volume= 0.402 af, Depth> 6.17"  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=6.41"

Area (ac)	CN	Description
0.782	98	Paved parking, HSG D
0.782		100.00% Impervious Area

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

**Subcatchment 16S: Proposed Addition Area 1**



**Summary for Pond 13P: (new Pond)**

Inflow Area = 5,900 ac, 100.00% Impervious, Inflow Depth > 6.17" for 100-Year event  
 Inflow = 47.26 cfs @ 12.17 hrs, Volume= 3.033 af  
 Outflow = 16.79 cfs @ 12.38 hrs, Volume= 3.023 af, Atten= 84%, Lag= 12.6 min  
 Primary = 16.79 cfs @ 12.38 hrs, Volume= 3.023 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 847.82' @ 12.38 hrs Surf.Area= 0 sf Storage= 37,735 cf

Plug-Flow detention time= 29.3 min calculated for 3.017 af (99% of inflow)  
 Center-of-Mass det. time= 27.2 min ( 772.7 - 745.5)

Volume	Invert	Avail. Storage	Storage Description
#1	844.60'	50,491 cf	Custom Stage Data Listed below

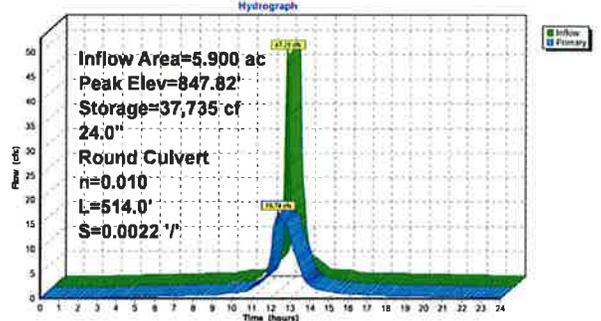
  

Elevation (feet)	Cum. Store (cubic-feet)
844.60	0
845.00	844
846.00	9,801
847.00	25,165
848.00	40,550
849.00	50,084
849.41	50,491

Device	Routing	Invert	Outlet Devices
#1	Primary	844.60'	24.0" Round Culvert L= 514.0' RCP, sq cut and projecting, Ke= 0.500 Inlet / Outlet Invert= 844.60' / 843.47' S= 0.0022' / Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=16.78 cfs @ 12.38 hrs HW=847.81' (Free Discharge)  
 1=Culvert (Barrel Controls 16.78 cfs @ 5.34 fps)

**Pond 13P: (new Pond)**



Summary for Pond 14P: (new Pond)

[93] Warning: Storage range exceeded by 619.66'  
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=19)  
[81] Warning: Exceeded Pond 13P by 622.22' @ 12.65 hrs  
[81] Warning: Exceeded Pond 15P by 1,463.61' @ 12.65 hrs  
[81] Warning: Exceeded Pond 17P by 1,465.00' @ 12.65 hrs

Inflow Area = 19.734 ac, 62.42% Impervious, Inflow Depth > 5.74" for 100-Year event  
Inflow = 110.35 cfs @ 12.17 hrs, Volume= 9,433 af  
Outflow = 48.37 cfs @ 12.65 hrs, Volume= 5,811 af, Atten= 56%, Lag= 28.8 min  
Primary = 48.37 cfs @ 12.65 hrs, Volume= 5,811 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Peak Elev= 1,469.66' @ 12.65 hrs Surf.Area= 0 sf Storage= 226,720 cf

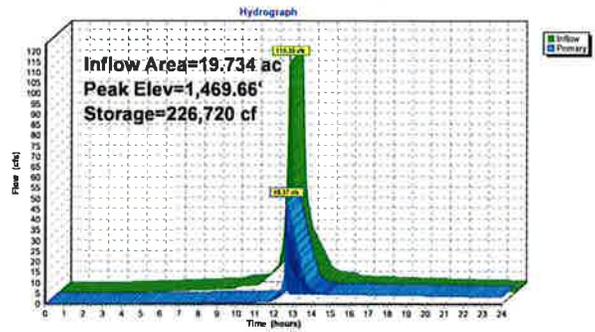
Plug-Flow detention time= 279.7 min calculated for 5.789 af (61% of inflow)  
Center-of-Mass det. time= 189.7 min ( 965.0 - 775.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	842.50'	226,720 cf	Custom Stage Data Listed below
Elevation (feet)	Cum.Store (cubic-feet)		
842.50	0		
843.00	5,579		
844.00	25,375		
845.00	59,382		
846.00	96,667		
847.00	136,565		
848.00	173,130		
849.00	199,843		
850.00	226,720		

Device	Routing	Invert	Outlet Devices
#1	Primary	842.42'	4.5" Vert. Orifice/Grate C= 0.820
#2	Primary	845.30'	5.8" Vert. Orifice/Grate C= 0.820

Primary OutFlow Max=48.14 cfs @ 12.65 hrs HW=1,463.93' (Free Discharge)  
1=Orifice/Grate (Orifice Controls 18.12 cfs @ 164.03 fps)  
2=Orifice/Grate (Orifice Controls 30.02 cfs @ 163.64 fps)

Pond 14P: (new Pond)



Summary for Pond 15P: StormTech System 2

Inflow Area = 1.052 ac, 100.00% Impervious, Inflow Depth > 6.17" for 100-Year event  
Inflow = 8.43 cfs @ 12.17 hrs, Volume= 0.541 af  
Outflow = 0.68 cfs @ 13.06 hrs, Volume= 0.285 af, Atten= 92%, Lag= 53.3 min  
Primary = 0.68 cfs @ 13.06 hrs, Volume= 0.285 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Peak Elev= 6.36' @ 13.06 hrs Surf.Area= 0.093 ac Storage= 0.387 af

Plug-Flow detention time= 372.5 min calculated for 0.285 af (53% of inflow)  
Center-of-Mass det. time= 261.8 min ( 1,027.3 - 745.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.151 af	37.58"W x 107.74"L x 6.75"H Field A
#2A	0.75'	0.251 af	0.827 af Overall - 0.251 af Embedded = 0.376 af x 40.0% Voids ADS StormTech MC-4500 +Cap x 100 Inside #1 Effective Size= 80.4"W x 60.0"H => 28.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 25 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		0.402 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Inverts= 0.00' / -1.00' S= 0.1000 /' Cc= 0.800 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	1.00'	2.2" Vert. Orifice/Grate C= 0.600
#3	Device 1	6.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions(s)

Primary OutFlow Max=0.67 cfs @ 13.06 hrs HW=6.36' (Free Discharge)  
1=Culvert (Passes 0.67 cfs of 11.45 cfs potential flow)  
2=Orifice/Grate (Orifice Controls 0.29 cfs @ 11.06 fps)  
3=Sharp-Crested Rectangular Weir (Weir Controls 0.37 cfs @ 1.10 fps)

Pond 15P: StormTech System 2 - Chamber Wizard Field A

Chamber Model= ADS StormTechMC-4500 +Cap (ADS StormTechMC-4500 with cap volume)  
Effective Size= 80.4"W x 60.0"H => 28.46 sf x 4.03'L = 106.5 cf  
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap  
Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide x 8.0" Spacing = 109.0" C-C Row Spacing

25 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 105.74' Row Length +12.0" End Stone x 2 = 107.74' Base Length  
4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width  
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

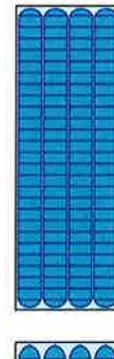
100 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 10,934.6 cf Chamber Storage

27,332.7 cf Field - 10,934.6 cf Chambers = 16,398.1 cf Stone x 40.0% Voids = 6,559.2 cf Stone Storage

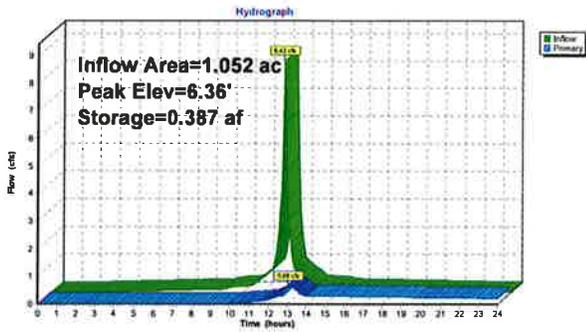
Chamber Storage + Stone Storage = 17,498.9 cf = 0.402 af

Overall Storage Efficiency = 64.0%  
Overall System Size = 107.74' x 37.58' x 6.75'

100 Chambers  
1,012.3 cy Field  
607.3 cy Stone



**Pond 15P: StormTech System 2**



**Summary for Pond 17P: StormTech System 1**

Inflow Area = 0.782 ac, 100.00% Impervious, Inflow Depth > 6.17" for 100-Year event  
 Inflow = 6.26 cfs @ 12.17 hrs, Volume= 0.402 af  
 Outflow = 0.21 cfs @ 13.72 hrs, Volume= 0.191 af, Atten= 97%, Lag= 93.0 min  
 Primary = 0.21 cfs @ 13.72 hrs, Volume= 0.191 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 5.24' @ 13.72 hrs Surf.Area= 0.093 ac Storage= 0.305 af

Plug-Flow detention time= 407.0 min calculated for 0.181 af (48% of inflow)  
 Center-of-Mass det. time= 308.1 min (1,053.7 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.131 af	22.75'W x 177.78'L x 5.50'H Field A 0.511 af Overall - 0.184 af Embedded = 0.327 af x 40.0% Voids
#2A	0.75'	0.184 af	ADS_StormTech_MC-3500 d +Cap x 72 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 24 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 88.4 cf
			0.315 af Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	12.0" Round Culvert L= 10.0' RCP, groove end projecting, K= 0.200 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.1000 / Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	1.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	5.25'	3.0' long Sharp-Crested Rectangular Weir 2 End Contractions(s)

Primary OutFlow Max=0.21 cfs @ 13.72 hrs HW=5.24' (Free Discharge)  
 1=Culvert (Passes 0.21 cfs of 10.30 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.21 cfs @ 9.82 fps)  
 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 17P: StormTech System 1 - Chamber Wizard Field A**

ChamberModel= ADS\_StormTechMC-3500 d +Cap (ADS StormTechMC-3500 d rev 03/14 with Cap volume)  
 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf  
 Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap  
 Cap Storage= +14.9 cf x 2 x 3 rows = 88.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

24 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 175.78' Row Length +12.0" End Stone x 2 = 177.78' Base Length  
 3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width  
 9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

72 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 8,005.9 cf of Chamber Storage

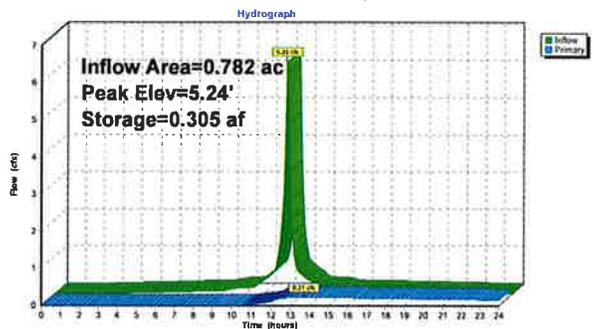
22,244.7 cf Field - 8,005.9 cf of Chambers = 14,238.8 cf of Stone x 40.0% Voids = 5,695.5 cf of Stone Storage

Chamber Storage + Stone Storage = 13,701.5 cf = 0.315 af  
 Overall Storage Efficiency = 61.6%  
 Overall System Size = 177.78' x 22.75' x 5.50'

72 Chambers  
 823.9 cy Field  
 527.4 cy Stone



**Pond 17P: StormTech System 1**

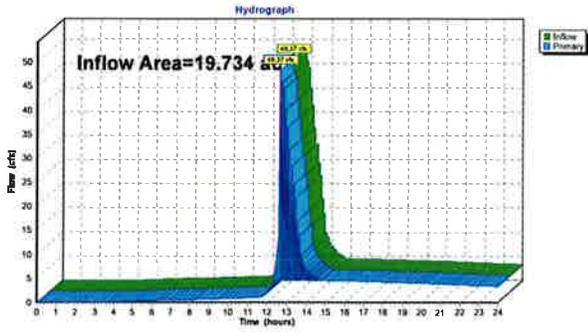


Summary for Link 16L: (new Link)

Inflow Area = 19.734 ac, 92.42% Impervious, Inflow Depth > 3.53" for 100-Year event  
Inflow = 48.37 cfs @ 12.65 hrs, Volume= 5.811 af  
Primary = 48.37 cfs @ 12.65 hrs, Volume= 5.811 af, Atten= 0%, Lag= 0.0 min

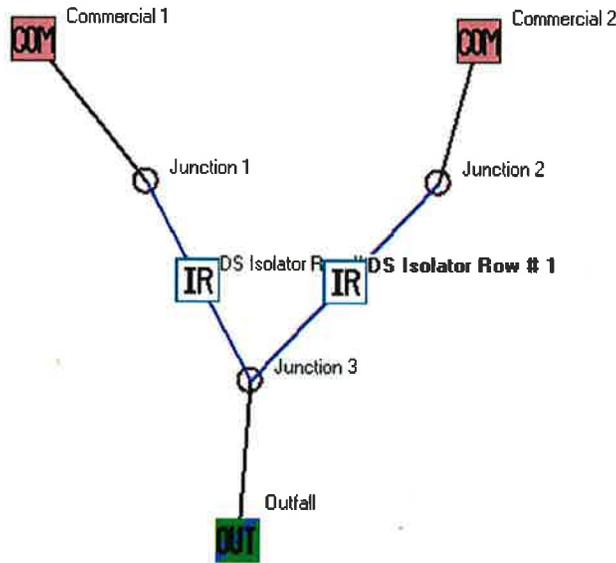
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 16L: (new Link)



## Appendix F

# WinSLAMM Model



File Name:

C:\Users\Brandon Whipple\Desktop\WinSLAMM\Germantown Menards.mdb

## Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	142378		0.67	89.88	798.9	
Outfall Total with Controls	142755	-0.26 %	0.67	38.94	347.1	56.55 %
Current File Output: Annualized Total After Outfall Controls	143147					
		Years in Model Run:	1.00		348.0	

Print Output Summary to .csv File

Print Output Summary to Text File

Print Output Summary to Printer

Total Area Modeled (ac)

1.834

## Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall  
Flow Duration  
Curve Calculations

## Receiving Water Impacts Due To Stormwater Runoff (CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.67	Poor
With Controls	0.67	Poor

**INPUT DATA:**

Data file name: C:\Users\jbrunoehler\Documents\StormTech\Projects\Menards - Germantown\Menards Germantown 2019.09.30.mdb

WinSLAMM Version 10.4.102

Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN

Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI\_AVG01.pscx

Runoff Coefficient file name: C:\WinSLAMM Files\WI\_SL06 Dec06.rsvx

Residential Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std

Institutional Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std

Commercial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std

Industrial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std

Other Urban Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std

Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std

Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False

Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI\_GEO03.ppdx

Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv

Cost Data file name:

Seed for random number generator: -42

Study period starting date: 01/01/81 Study period ending date: 12/31/81

Start of Winter Season: 12/02 End of Winter Season: 03/12

Date: 10-02-2019 Time: 22:30:13

Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.782

13 - Paved Parking 1: 0.782 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial: Commercial 2 Total area (ac): 1.052

1 - Roofs 1: 0.734 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1: 0.318 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Isolator Row CP# 1 (DS) - DS Isolator Row # 1

Total available system length (ft) = 185

Total available system width (ft) = 24

Available height from chamber base to surface (ft) = 7.00

Number of isolator rows = 1

Native soil infiltration rate (in/hr) = 0.00

Assumed stone porosity ( $\lambda$ ) = 0.40

Sizing option: Use all available area

**Selected Chamber Information**

Chamber type: MC-3500

Chamber height (in): 45.00

Chamber width (in): 86.00

Chamber segment length (in): 86.00

Final storage volume (cf): 13800.4

Number of rows: 3

Row length (ft): 174.0

Total system length (ft): 516.0

Total system width (ft): 21.5

Number of chambers: 72

Overflow weir invert elevation (ft) = 5.50

Orifice 1 invert elevation (ft) = 0.00

Orifice 1 diameter (ft) = 0.20

Orifice 2 invert elevation (ft) = 0.00

Orifice 2 diameter (ft) = 0.00

**Control Practice 2: Isolator Row CP# 2 (DS) - DS Isolator Row # 2**

Total available system length (ft) = 110

Total available system width (ft) = 40

Available height from chamber base to surface (ft) = 7.00

Number of isolator rows = 1

Native soil infiltration rate (in/hr) = 0.00

Assumed stone porosity ( $\lambda$ ) = 0.40

Sizing option: Use all available area

**Selected Chamber Information**

Chamber type: MC-4500

Chamber height (in): 60.00

Chamber width (in): 109.00

Chamber segment length (in): 48.30

Final storage volume (cf): 17070

Number of rows: 4

Row length (ft): 102.1

Total system length (ft): 402.5

Total system width (ft): 36.3

Number of chambers: 100

Overflow weir invert elevation (ft) = 5.50

Orifice 1 invert elevation (ft) = 0.00

Orifice 1 diameter (ft) = 0.20

Orifice 2 invert elevation (ft) = 0.00

Orifice 2 diameter (ft) = 0.00

**OUTPUT DATA:**

SLAMM for Windows Version 10.4.102  
(c) Copyright Robert Pitt and John Voorhees 2012  
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Data file name: C:\Users\jbrunoehler\Documents\StormTech\Projects\Menards -  
Germantown\Menards Germantown 2019.09.30.mdb

Data file description:

Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN  
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI\_AVG01.pscx  
Runoff Coefficient file name: C:\WinSLAMM Files\WI\_SL06 Dec06.rsvx  
Residential Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std  
Institutional Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std  
Commercial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std  
Industrial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std  
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std  
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std  
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI\_GEO03.ppdpx  
Start of Winter Season: 12/02      End of Winter Season: 03/12  
Model Run Start Date: 01/01/81    Model Run End Date: 12/31/81  
Date of run: 10-02-2019    Time of run: 22:30:04  
Total Area Modeled (acres): 1.834  
Years in Model Run: 1.00

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	142378	-	89.88	798.9	-
Outfall Total with Controls:	142755	-0.26%	38.94	347.1	56.55%
Annualized Total After Outfall Controls:	143147			348.0	