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# STORMWATER REPORT

# Taco Bell

37500 Ford Road
Westland, MI 48185

Prepared For:
City of Westland

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Project Manager:
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Design Date:
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September 14, 2018

Project Number:
2017088.72

STATE OF MICHIGAN
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Leonardo Sferra, P.E. — 09/14/2018

Date

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**Section 1**

## Project Background

The project is for a new Taco Bell restaurant located at 37500 Ford Road, Westland, Michigan. The project is located on a three lot parcel totaling 0.86± acres. The site has a mild slope from northeast to southwest and is grass covered.

Under proposed conditions the project will disturb approximately 0.91 acres which includes the areas offsite required for utility connections. The project will increase impervious cover to 0.53 acres within the project area, currently 0.0 acres. This impervious cover includes, building, walks, parking lot, and access drive.

## Stormwater Runoff Control Criteria

The methods for stormwater runoff control requirements have been set forth in the *Wayne County Stormwater Management Program* standards manual, dated February 2007 (revised July 2015) which states that:

**Section 6.2 – General Design Standards for Flood Control**
*For drainage areas of five acres or less, detention of the 10-year storm is required for flood control purposes. Peak flow rate shall not exceed 0.15 cfs/acre for the 10-year storm event.*

**Ten Year Peak Flow Rate:** Calculations provided in Section 4 of this report indicate a **0.129 cfs** allowable peak flow rate for the 10-year event.

## Stormwater Management Design

An excel spreadsheet was created to the guidelines of Wayne County for stormwater management design, which can be found in Section 4 of this report.

In order to meet the stormwater runoff requirements set for by Wayne County, a single underground detention system consisting of 55 StormTech chambers (SC-740) will be installed under the proposed parking lot. The stormwater runoff will collect into a series of catch basins and route to a precast pretreatment structure (described in a later section of this report), and ultimately routed to the detention basin which has a total available storage volume of 3,936 cubic feet which is able to hold the 10-year storm event. A spreadsheet summarizing the stage-storage volume for the proposed chambers and their associated details can be found in Section 4 of this report. The StormTech detention system will have an outlet structure consisting of a precast weir wall (no overflow) with 1” and 1.5” holes at various elevations to provide relief to the underground system at a controlled rate. On the outlet side of the wall, a 6” PVC pipe will route the stormwater to an existing inlet near the intersection of Ford Road and Morley Ave. Details for the outlet control structures can be found in Section 4 of this report. The underground detention system and outlet structure have been designed to meet the stormwater control requirements set forth in the *Wayne County Stormwater Management Program* manual. The calculations for this analysis can be found in Section 4 of this report.

**(MDOT)**

Requirements were also reviewed for compliance with MDOT regulations, which is to meet 100% release rate and to not increase flows to the public drainage system. The comparison routings are provided in Section 4.

The table below summarizes the information found in these calculations:

| Stormwater Management Calculations Summary | | | | |
|---|---|---|---|---|
| | CFS | CF | Size | Elevation |
| Allowable Peak Flow | 0.129 | | | |
| 10-Year Storage Volume Required | | 3,959 | | |
| 10-Year Storage Volume Provided | | 3,936 | | |
| Orifice Holes: | | | | |
| Bank Full | | | 1" | 659.53 |
| 10-Year | | | 1.5" | 660.73 |
| Release Rate to MS4 | 0.129 | | | |

The detention system mentioned previously is designed to hold the 10-year storm event. All storm events more frequent than the 10-year storm will allow the detention system to function as designed. In the event of a less frequent storm, the system will back up and begin to pond in the parking lot. In this case, the drive apron to the site will act as emergency overflows.

The combined pipe system mentioned in the previous paragraph was analyzed for the ten (10) year storm for closed conduit sizing using the rational method set forth in AutoCAD's Stormsewer program (10-year design and hydraulic grade line check).

Rainfall intensity used for this analysis:

| Rainfall Intensity (in/hr) | | | |
|---|---|---|---|
| | Design Storm (yr) | | |
| T (min) | 10 | 50 | 100 |
| 5 | 6.10 | 7.51 | 8.20 |
| 15 | 4.35 | 5.55 | 6.07 |
| 30 | 3.04 | 3.99 | 4.37 |
| 60 | 1.90 | 2.55 | 2.80 |

The proposed drainage delineation map can be found in Section 3 of this report and calculations used for closed conduit sizing calculations can be found in Section 5 of this report.

## Water Quality Analysis

Per the requirements of the *Wayne County Stormwater Management Program* manual, all development sites must include a manufactured treatment system capable of removing 80% of the net annual Total Suspended Solids (TSS) load based on a 75-micron (and smaller) particle size for a gradation mix of 50-125 microns. The manufactured treatment system should be designed to treat up to the peak flow rate for the design storm event (10-year). According to Table 8.2.3-1 of the *Wayne County Stormwater Management Program* manual, Stormceptor STC models is an approved manufactured treatment system of Wayne County.

The Stormceptor STC manufactured pretreatment system will be installed to treat stormwater prior to detainment on-site. The Stormceptor STC model 2400 will be centrally located as the primary pretreatment structure for the system. Details for the systems used can be found in Section 4 of this report.

## Erosion and Sediment Control

Based on the Wayne County Department of the Environment requirements, the proposed development shall provide erosion and sedimentation control measures. Included within the site development plans is a Stormwater Pollution Prevention Plan with associated details. It is the contractor's responsibility during construction to maintain all sedimentation and storm water pollution prevention items at all times which includes regular removal and disposal of accumulated debris. Until the site is stabilized, all erosion and sediment controls must be maintained properly. Maintenance must include inspections of all erosion and sediment controls after each runoff event and on a weekly basis. All preventative and remedial maintenance work, including clean out, repair, replacement, regrading, reseeding, remulching must be performed immediately. If erosion and sediment controls fail to perform as expected, replacement controls or modifications of those installed will be required.

# Section 2

# Hydrologic Soil Group—Wayne County, Michigan


Map Scale: 1:781 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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

## MAP LEGEND

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

**Soils**

**Soil Rating Polygons**
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Lines**
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Points**
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Water Features**
- Streams and Canals

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

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

Maps from the Web Soil Survey are based on the Web Mercator 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: Wayne County, Michigan
Survey Area Data: Version 3, Oct 6, 2017

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

Date(s) aerial images were photographed: Sep 17, 2014—Sep 27, 2014

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

# Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| OaB | Oakville fine sand, 0 to 6 percent slopes | A | 0.4 | 15.7% |
| TeA | Tedrow loamy fine sand, 0 to 2 percent slopes | A/D | 2.0 | 84.3% |
| **Totals for Area of Interest** | | | **2.3** | **100.0%** |

## Description

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

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

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

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

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

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

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

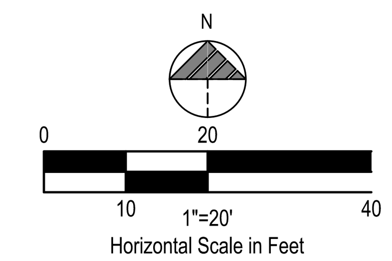
## Rating Options

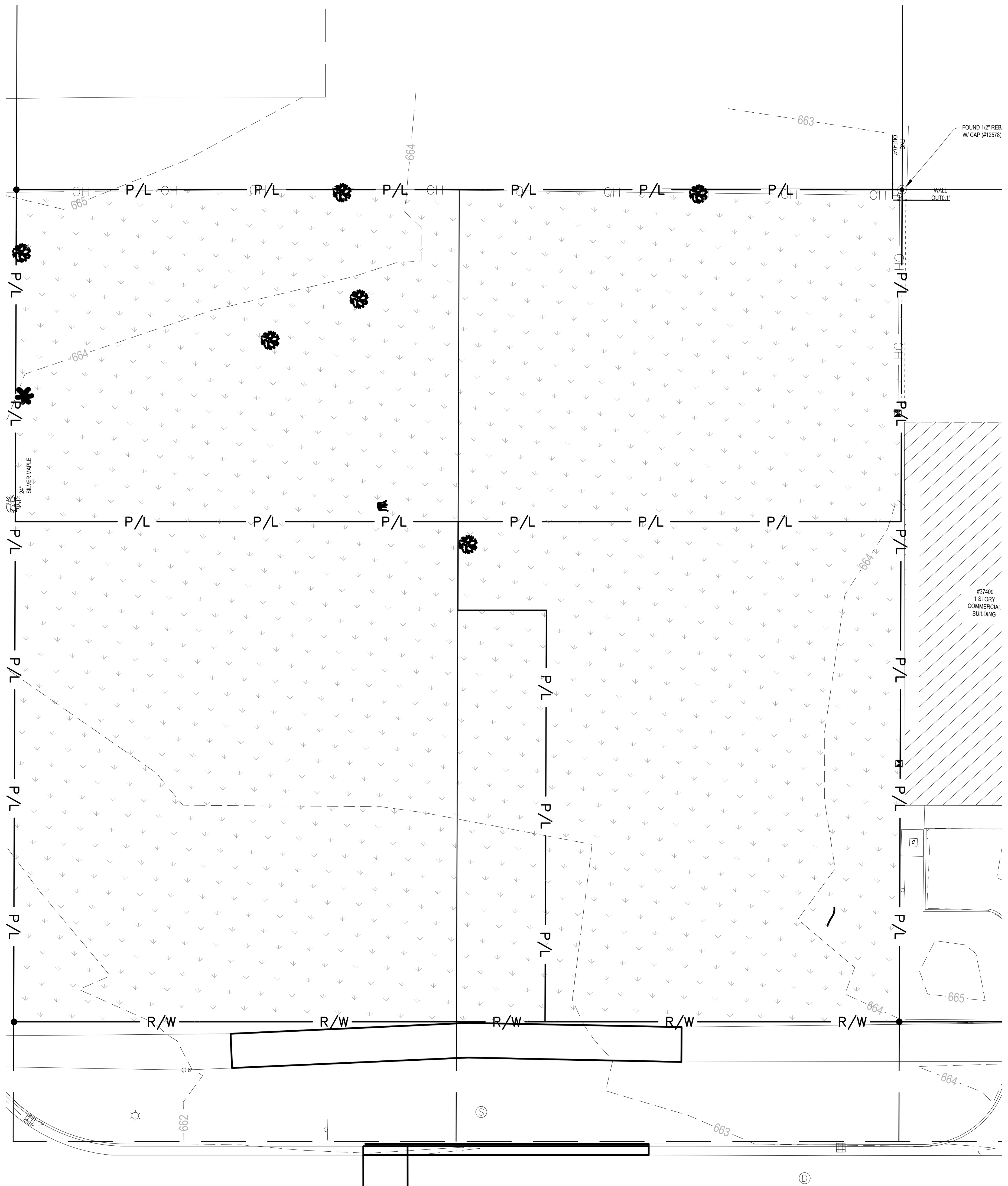
*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

**Section 3**




PERMIT FROM MDOT IS REQUIRED FOR ALL PROPOSED WORK WITHIN THE RIGHT-OF-WAY OF FORD ROAD.

FORD ROAD
120' WIDTH PUBLIC RIGHT OF WAY
ASPHALT

N88°45'00"W(R&M) 2609.97'(M)

## IMPERVIOUS/PERVIOUS DELINEATION

EXISTING IMPERVIOUS AREA

EXISTING PERVIOUS AREA

TOTAL IMPERVIOUS DRAINAGE AREA = 0.00 AC
TOTAL PERVIOUS DRAINAGE AREA = 0.86 AC
IMPERVIOUS RUNOFF COEFFICIENT = 0.95
PERVIOUS RUNOFF COEFFICIENT = 0.25
TOTAL WEIGHTED RUNOFF COEFFICIENT = 0.25

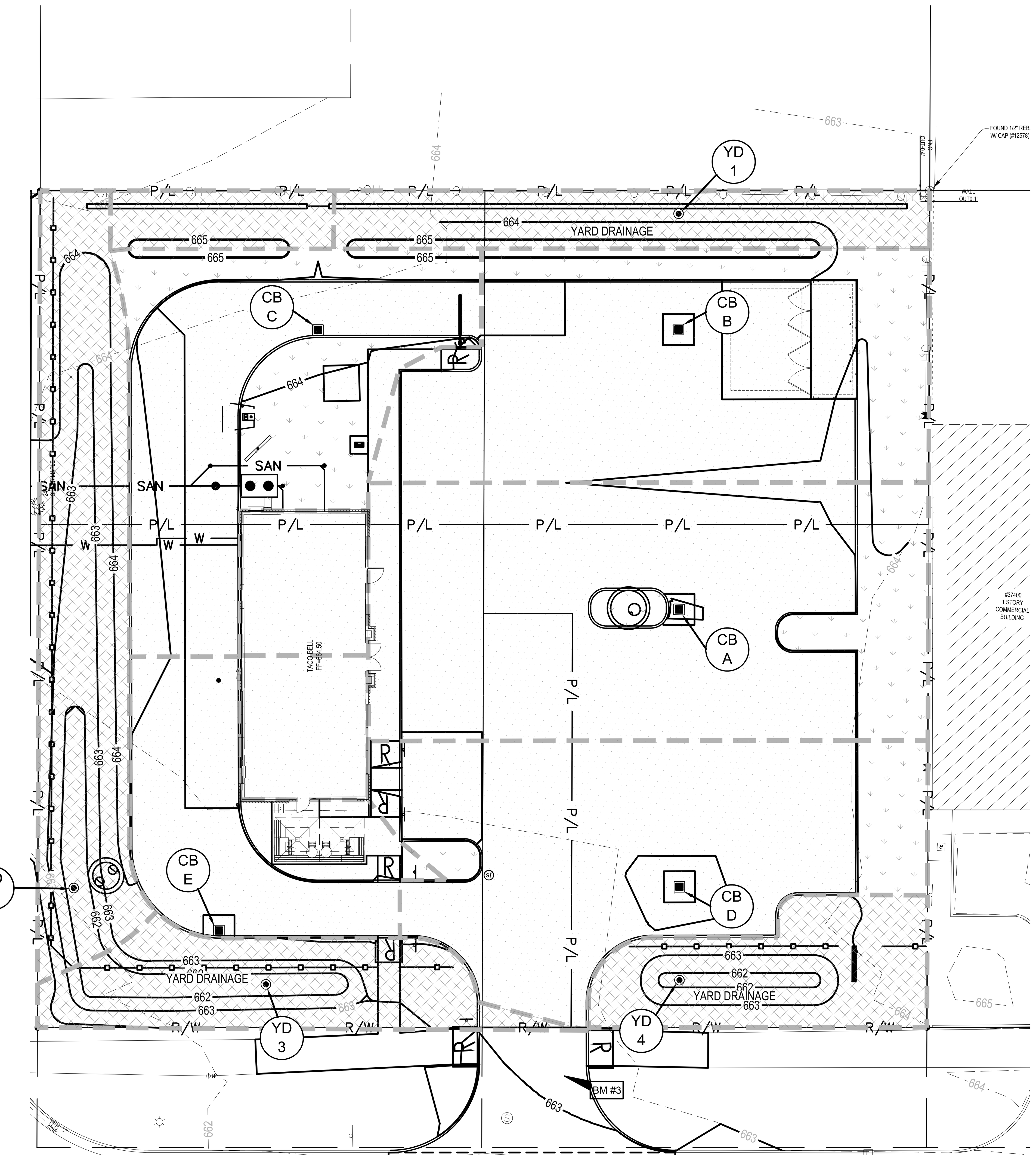
MDOT CALCULATION AREAS:
TOTAL IMPERVIOUS DRAINAGE AREA = 0.00 AC
TOTAL PERVIOUS DRAINAGE AREA = 0.86 AC
IMPERVIOUS CURVE NUMBERS = 98
PERVIOUS CURVE NUMBERS = 84
TOTAL WEIGHTED CURVE NUMBER (CONTROLLED) = 84

A2 EXISTING IMPERVIOUS/PERVIOUS MAP
1" = 20'

## MDOT PRE-POST TABLE

| | EXISTING | PROPOSED |
|---|---|---|
| | Q (CFS) | Q(CFS) |
| 1-YR | 1.172 | 0.035 |
| 2-YR | 1.471 | 0.059 |
| 5-YR | 2.020 | 0.105 |
| 10-YR | 2.554 | 0.148 |
| 25-YR | 3.380 | 0.164 |
| 50-YR | 4.081 | 0.611 |
| 100-YR | 4.825 | 3.540 |

NOTE: PRE TO POST COMPARISON VALUES WERE DETERMINED USING SCS SYNTHETIC HYDROGRAPH HYDRAULIC MODELING.




PERMIT FROM MDOT IS REQUIRED FOR ALL PROPOSED WORK WITHIN THE RIGHT-OF-WAY OF FORD ROAD.

FORD ROAD
120' WIDTH PUBLIC RIGHT OF WAY
ASPHALT

NOTE: EMERGENCY OVERLAND OVERFLOW FROM UNDERGROUND DETENTION SYSTEM FLOWS TO APRONS AND OUT TO PUBLIC ROADS.

N88°45'00"W(R&M) 2609.97'(M)

## IMPERVIOUS/PERVIOUS DELINEATION

PROPOSED IMPERVIOUS AREA

PROPOSED PERVIOUS AREA

YARD DRAINAGE (PERVIOUS)

TOTAL IMPERVIOUS DRAINAGE AREA = 0.53 AC
TOTAL PERVIOUS DRAINAGE AREA = 0.33 AC
IMPERVIOUS RUNOFF COEFFICIENT = 0.95
PERVIOUS RUNOFF COEFFICIENT = 0.25
TOTAL WEIGHT RUNOFF COEFFICIENT = 0.68

MDOT CALCULATION AREAS:
TOTAL IMPERVIOUS DRAINAGE AREA = 0.53 AC
TOTAL PERVIOUS DRAINAGE AREA = 0.33 AC
IMPERVIOUS CURVE NUMBERS = 98
PERVIOUS CURVE NUMBERS = 84
TOTAL WEIGHTED CURVE NUMBER (CONTROLLED) = 93

SITE BENCHMARK #1:
ARROW ON HYDRANT, AT THE NORTHWEST CORNER OF FORD ROAD AND MORLEY ROAD.
ELEVATION = 664.67' (NAVD88)

SITE BENCHMARK #2:
SET MAG NAIL ON EAST SIDE OF UTILITY POLE, ON WEST SIDE OF MORLEY, 200 FEET NORTH OF FORD ROAD.
ELEVATION = 666.18' (NAVD88)

SITE BENCHMARK #3:
SET MAG NAIL ON NORTH SIDE OF GUY POLE, ON NORTH SIDE OF FORD ROAD, NEAR THE MIDDLE OF SITE.
ELEVATION = 663.88' (NAVD88)

A1 PROPOSED IMPERVIOUS/PERVIOUS MAP
1" = 20'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ISSUED FOR BID 07/30/18
△ REVISED PER MDOT COMMENTS 09/14/18

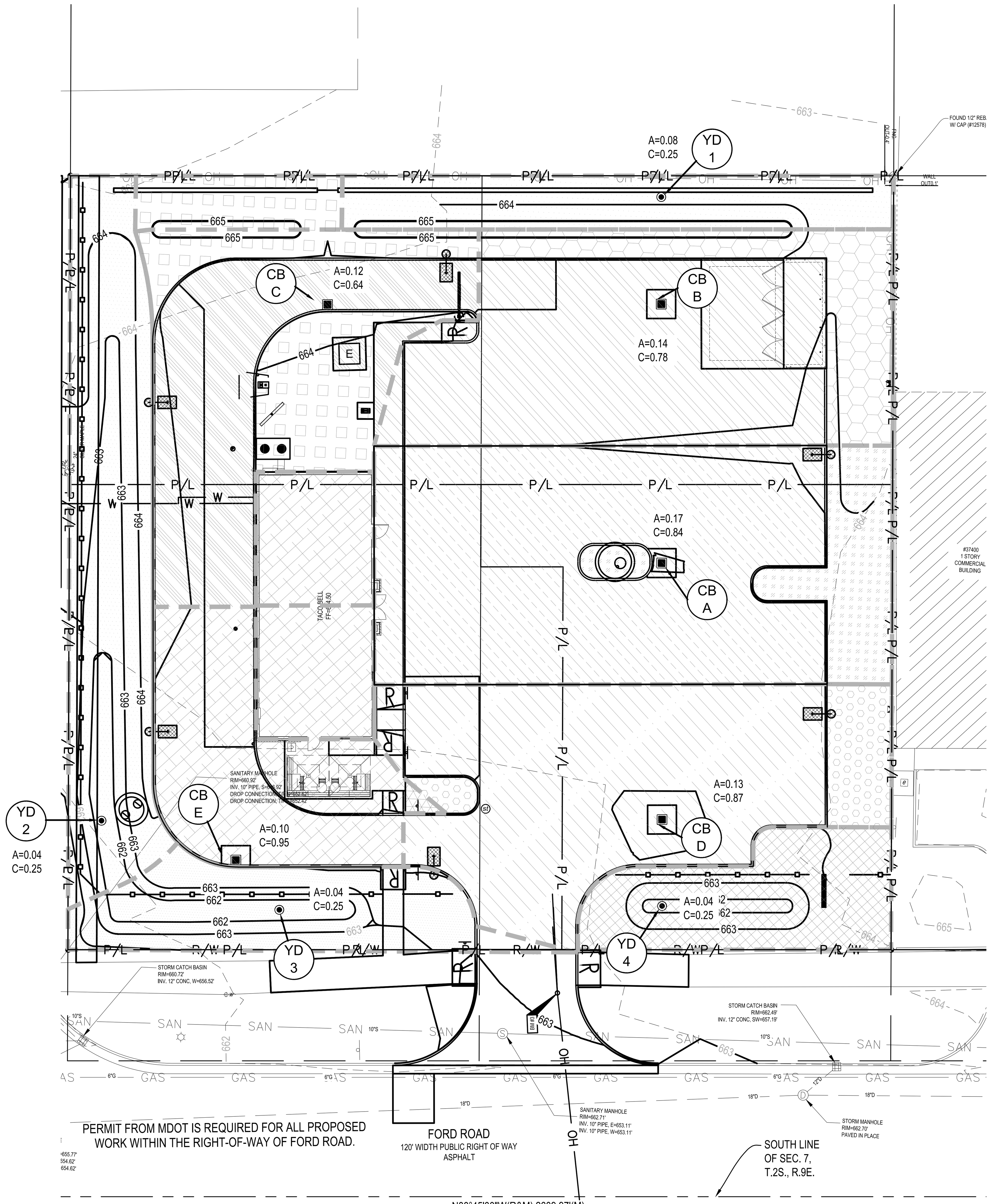
| | |
|---|---|
| CONTRACT DATE: | XX.XX.XX |
| BUILDING TYPE: | T40M-O |
| PLAN VERSION: | JAN 18 |
| SITE NUMBER: | 312720/446548 |
| STORE NUMBER: | 2017088.72 |

TACO BELL
20779 13 MILE RD.
WESTLAND, MI

MODERN EXPLORER
T40 - OPEN KITCHEN

**DRAINAGE MAPS**

**C-142**




## SITE DRAINAGE AREA DELINEATION

- PROPOSED DRAINAGE AREA TO CB A (IMPERVIOUS/PERVIOUS)
- PROPOSED DRAINAGE AREA TO CB B (IMPERVIOUS/PERVIOUS)
- PROPOSED DRAINAGE AREA TO CB C (IMPERVIOUS/PERVIOUS)
- PROPOSED DRAINAGE AREA TO CB D (IMPERVIOUS/PERVIOUS)
- PROPOSED DRAINAGE AREA TO CB E (IMPERVIOUS/PERVIOUS)
- PROPOSED DRAINAGE AREA TO YD 1 (PERVIOUS)
- PROPOSED DRAINAGE AREA TO YD 2 (PERVIOUS)
- PROPOSED DRAINAGE AREA TO YD 3 (PERVIOUS)
- PROPOSED DRAINAGE AREA TO YD 4 (PERVIOUS)

C1 PROPOSED DRAINAGE MAP
1" = 20'

**Project:** Taco Bell - Westland, MI

StormTech — Detention • Retention • Water Quality — A division of ADS

| | | |
|---|---|---|
| Chamber Model - | SC-740 | |
| Units - | Imperial | Click Here for Metric |
| Number of chambers - | 55 | |
| Voids in the stone (porosity) - | 25 | % |
| Base of STONE Elevation - | 657.23 | ft |
| Amount of Stone Above Chambers - | 6 | in |
| Amount of Stone Below Chambers - | 6 | in |
| Area of system - | 2332 | sf Min. Area - 1859 sf min. area |

☑ Include Perimeter Stone in Calculations

### StormTech SC-740 Cumulative Storage Volumes

| Height of System (inches) | Incremental Single Chamber (cubic feet) | Incremental Total Chamber (cubic feet) | Incremental Stone (cubic feet) | Incremental Ch & St (cubic feet) | Cumulative Chamber (cubic feet) | Elevation (feet) |
|---|---|---|---|---|---|---|
| 42 | 0.00 | 0.00 | 48.58 | 48.58 | 3935.97 | 660.73 — Z10=660.73 |
| 41 | 0.00 | 0.00 | 48.58 | 48.58 | 3887.39 | 660.65 |
| 40 | 0.00 | 0.00 | 48.58 | 48.58 | 3838.81 | 660.56 |
| 39 | 0.00 | 0.00 | 48.58 | 48.58 | 3790.22 | 660.48 |
| 38 | 0.00 | 0.00 | 48.58 | 48.58 | 3741.64 | 660.40 |
| 37 | 0.00 | 0.00 | 48.58 | 48.58 | 3693.06 | 660.31 |
| 36 | 0.05 | 3.02 | 47.83 | 50.85 | 3644.47 | 660.23 |
| 35 | 0.16 | 8.96 | 46.34 | 55.30 | 3593.62 | 660.15 |
| 34 | 0.28 | 15.51 | 44.71 | 60.21 | 3538.32 | 660.06 |
| 33 | 0.60 | 33.22 | 40.28 | 73.50 | 3478.10 | 659.98 |
| 32 | 0.80 | 44.09 | 37.56 | 81.65 | 3404.61 | 659.90 |
| 31 | 0.95 | 52.29 | 35.51 | 87.80 | 3322.95 | 659.81 |
| 30 | 1.07 | 59.10 | 33.81 | 92.91 | 3235.15 | 659.73 |
| 29 | 1.18 | 64.93 | 32.35 | 97.28 | 3142.25 | 659.65 |
| 28 | 1.27 | 69.61 | 31.18 | 100.79 | 3044.97 | 659.56 — ZBF=659.53 |
| 27 | 1.36 | 74.53 | 29.95 | 104.48 | 2944.18 | 659.48 |
| 26 | 1.45 | 79.98 | 28.59 | 108.56 | 2839.70 | 659.40 |
| 25 | 1.52 | 83.86 | 27.62 | 111.48 | 2731.13 | 659.31 |
| 24 | 1.58 | 87.03 | 26.83 | 113.85 | 2619.66 | 659.23 |
| 23 | 1.64 | 90.33 | 26.00 | 116.33 | 2505.80 | 659.15 |
| 22 | 1.70 | 93.47 | 25.22 | 118.69 | 2389.47 | 659.06 |
| 21 | 1.75 | 96.41 | 24.48 | 120.89 | 2270.79 | 658.98 |
| 20 | 1.80 | 99.15 | 23.79 | 122.95 | 2149.89 | 658.90 |
| 19 | 1.85 | 102.02 | 23.08 | 125.10 | 2026.94 | 658.81 |
| 18 | 1.89 | 104.12 | 22.55 | 126.67 | 1901.84 | 658.73 |
| 17 | 1.93 | 106.37 | 21.99 | 128.36 | 1775.17 | 658.65 |
| 16 | 1.97 | 108.62 | 21.43 | 130.05 | 1646.81 | 658.56 |
| 15 | 2.01 | 110.55 | 20.95 | 131.49 | 1516.76 | 658.48 |
| 14 | 2.04 | 112.47 | 20.46 | 132.94 | 1385.26 | 658.40 |
| 13 | 2.07 | 114.12 | 20.05 | 134.18 | 1252.32 | 658.31 |
| 12 | 2.10 | 115.77 | 19.64 | 135.41 | 1118.15 | 658.23 |
| 11 | 2.13 | 117.25 | 19.27 | 136.52 | 982.74 | 658.15 |
| 10 | 2.15 | 118.46 | 18.97 | 137.43 | 846.22 | 658.06 |
| 9 | 2.18 | 119.74 | 18.65 | 138.39 | 708.79 | 657.98 |
| 8 | 2.20 | 120.91 | 18.36 | 139.27 | 570.40 | 657.90 |
| 7 | 2.21 | 121.40 | 18.23 | 139.64 | 431.14 | 657.81 |
| 6 | 0.00 | 0.00 | 48.58 | 48.58 | 291.50 | 657.73 |
| 5 | 0.00 | 0.00 | 48.58 | 48.58 | 242.92 | 657.65 |
| 4 | 0.00 | 0.00 | 48.58 | 48.58 | 194.33 | 657.56 |
| 3 | 0.00 | 0.00 | 48.58 | 48.58 | 145.75 | 657.48 |
| 2 | 0.00 | 0.00 | 48.58 | 48.58 | 97.17 | 657.40 |
| 1 | 0.00 | 0.00 | 48.58 | 48.58 | 48.58 | 657.31 |

# TACO BELL - WAYNE COUNTY, MI
## Underground Detention Storm System Calculations

**Performed by:** MPM
**Date:** 1/3/2018
**Revise:** 6/18/2018
**10-year Storm Calculations**

| | Area (Ac.) | C | A x C |
|---|---|---|---|
| Impervious | 0.53 | 0.95 | 0.50 |
| Pervious | 0.33 | 0.25 | 0.08 |
| Total | 0.86 | | 0.59 |
| | | $C_{AVG}$ | 0.68 |

A = 0.86 acres
C = 0.68

$Q_A$ (allowable)=0.15*A — 0.129 cfs

$Q_0 = Q_A/(A*C)$ — 0.22 cfs/acre impervious
T10 = -19.9+(4530/Q0)^0.5 — 124 min
$V_{S10} = ((9108*T_{10})/(T_{10} + 19.9))-40*Q_0*T_{10}$ — 6,757 cf/acre impervious
$V_{T10} = V_{S10}*A*C$ — 3,959 cf
$V_{Tbf} = 5{,}160*A*C$ — 3,024 cf

### Storage Volume Calcuations

Using StormTech Chamber

| Size | cft/ft | lft provided | # Chambers | Volume (cf) |
|---|---|---|---|---|
| SC-740 | 10.06 | 391.38 | 55 | 3,936 |

$Z_0$ = 657.41 Pipe Invert at Detention Pipes
$Z_{OUT}$ = 657.37 Pipe Invert at Outlet Control Structure

**First Flush Elevation**
$Z_{ff}$ = First Flush Storage Elevation = 658.19

**Bank Full Elevation**
$Z_{bf}$ = Bank Full Storage Elevation = 659.53

**Flood Control Storage Elevation**
$Z_{10} = V_{T10}$ Elevation = 660.73

**Control Outlet Structure Design**
Sizing for First Flush
Discharge to be released within a 24-hour timeframe

$Q_{avgff} = V_{Tff}/ (86400)$ = 0.012 cfs
$h_{avg} = 0.5*(Z_{ff}-Z_0)+(Z_0-Z_{OUT})$ = 0.405 ft
$A_0 = Q_{avgff}/(0.62*(32.2*2*h_{avg})$^0.5) = 0.0039 sf
Using one 1" hole @ elev. 657.37
$A_{ACTUAL}$ = 0.0055 sf
$Q_{avg\ ACTUAL}$ = 0.028 cfs
$T_{ACTUAL}$ = 29.51 hours

**Outlet Sizing for 10-Year Storm**
$Q_{MAX} = Q_A$ = 0.129 cfs

**Bank Full Orifice Contribution**
$h_{bf} = Z_{10}-Z_{OUT}$ = 3.36 ft
$Q_{bf} = 0.62*A_{ACTUAL}*(32.2*2*h_{bf})$^0.5 = 0.050 cfs

**Additional holes required to release remainder of $Q_A$**
$Q_{ADJ} = Q_{MAX}-Q_{bf}$ = 0.079 cfs
$h_{MAX} = Z_{10}-Z_{bf}$ = 1.20 ft
$A_{ADJ} = Q_{ADJ}/(0.62*(32.2*2*h_{MAX})$^0.5 = 0.0145 sf
Hole Size (diameter) = 1.50 in
Hole Size (area)= 0.0123 sf
Number of Holes = 1.18
Number of holes used = 1.00
**Use one 1.5" hole at Elev. 659.53**

$A_{10ACTUAL}$ = 0.0123 sf
$Q_{10ACTUAL} = 0.62*A_{10ACTUAL}*(32.2*2*h_{MAX})$^0.5 = 0.067 cfs

$Q_{TOTAL} = Q_{bf} + Q_{10ACTUAL}$ = 0.117 cfs < 0.129 cfs

**Outlet Pipe Design for 10-Year Event**

$Q_{A=}$ 0.129 cfs
(See closed conduit sizing for 10-year storm)

Pipe Size = 6.0 in
Area = 0.1963 sf
n = 0.012
R = 0.125 ft
Slope = $[(Q_{PEAK}*n)/1.486*A_{OUT}*R$^0.67]^2 — 0.0457 % — using 0.05%
$V= Q_{PEAK10}/A$ — 0.66 ft/s

## TEN (10) YEAR STORM CALCULATIONS FOR CLOSED CONDUIT SIZING

| Line | Line Length (ft) | Incr. Area (ac) | Total Area (ac) | Runoff Coeff. (C) | Incr. C X A | Total C X A | Inlet Time (min) | Time Conc (min) | Rainfall Intensity (in/hr) | Total Runoff (cfs) | Total Flow (cfs) | Capacity Full (cfs) | Velocity Full (cfs) | Pipe Size (in) | Pipe Slope (%) | Inv Elev Dn (ft) | Inv Elev Up (ft) | HGL Dn (ft) | HGL Up (ft) | Grnd/Rim Dn (ft) | Grnd/Rim Up (ft) | Upper Rim-HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CB C TO CB B | 81 | 0.12 | 0.12 | 0.64 | 0.08 | 0.08 | 15 | 15 | 4.35 | 0.33 | 0.33 | 0.61 | 3.09 | 6 | 1.00 | 659.36 | 660.17 | 659.68 | 660.51 | 663 | 663 | 2.49 |
| CB B TO CB A | 63 | 0.14 | 0.34 | 0.78 | 0.11 | 0.21 | 15 | 15.44 | 4.30 | 0.47 | 0.90 | 1.39 | 3.94 | 8 | 1.10 | 658.50 | 659.19 | 659.35 | 659.68 | 662.84 | 663 | 3.32 |
| CB A TO STC 1 | 7 | 0.17 | 0.86 | 0.84 | 0.14 | 0.59 | 15 | 15.70 | 4.26 | 0.61 | 2.55 | 4.4 | 6.3 | 12 | 1.30 | 658.08 | 658.17 | 659.16 | 659.18 | 663.68 | 662.84 | 3.66 |
| STC 1 TO SYSTEM | 11 | 0 | 0.86 | 0 | 0.00 | 0.59 | 15 | 15.72 | 4.26 | 0.00 | 2.55 | 6.67 | 5.44 | 15 | 0.91 | 657.90 | 658.00 | 659.15 | 659.16 | 663.42 | 663.68 | 4.52 |
| CB E TO CB D | 104 | 0.1 | 0.18 | 0.95 | 0.10 | 0.12 | 15 | 15 | 4.35 | 0.41 | 0.50 | 3.41 | 4.34 | 12 | 0.78 | 658.81 | 659.62 | 659.44 | 659.95 | 662.79 | 663.21 | 3.26 |
| CB D TO CB A | 62 | 0.13 | 0.35 | 0.87 | 0.11 | 0.22 | 15 | 15.40 | 4.30 | 0.49 | 0.95 | 3.25 | 4.14 | 12 | 0.71 | 658.27 | 658.71 | 659.35 | 659.37 | 662.84 | 662.79 | 3.42 |
| YD 1 TO CB B | 26 | 0.08 | 0.08 | 0.25 | 0.02 | 0.02 | 15 | 15 | 4.35 | 0.09 | 0.09 | 2.90 | 8.21 | 8 | 4.77 | 659.29 | 660.53 | 659.68 | 660.71 | 663.00 | 663.20 | 2.49 |
| YD 2 TO CB E | 34 | 0.04 | 0.04 | 0.25 | 0.01 | 0.01 | 15 | 15 | 4.35 | 0.04 | 0.04 | 1.12 | 3.17 | 8 | 0.71 | 659.62 | 659.86 | 659.95 | 660 | 663.20 | 661.60 | 1.6 |
| YD 3 TO CB E | 16 | 0.04 | 0.04 | 0.25 | 0.01 | 0.01 | 15 | 15 | 4.35 | 0.04 | 0.04 | 1.11 | 3.15 | 8 | 0.70 | 659.62 | 659.73 | 659.95 | 659.87 | 663.20 | 661.60 | 1.73 |
| YD 4 TO CB D | 21 | 0.04 | 0.04 | 0.25 | 0.01 | 0.01 | 15 | 15 | 4.35 | 0.04 | 0.04 | 1.12 | 3.17 | 8 | 0.71 | 659.04 | 659.19 | 659.44 | 659.33 | 662.79 | 661.80 | 2.47 |

STORM CALCULATION FORMULAS:
Q=C*I*A
I=151.8/(t+19.9)
n=0.012
$Q_{man}=(1.486*A*(R^{\frac{2}{3}})*(S^{\frac{1}{2}}))/n$


GPD GROUP
Professional Corporation
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 Fax: 330.572.2102


| | |
|---|---|
| ISSUED FOR BID | 07/30/18 |
| CONTRACT DATE: | XX.XX.XX |
| BUILDING TYPE: | T40M-O |
| PLAN VERSION: | JAN 18 |
| SITE NUMBER: | 312720/446548 |
| STORE NUMBER: | 2017088.72 |

TACO BELL
20779 13 MILE RD.
WESTLAND, MI

MODERN EXPLORER
T40 - OPEN KITCHEN

**DESIGN CALCULATIONS**

**C-144**

**Section 4**

# TACO BELL - WAYNE COUNTY, MI

## Underground Detention Storm System Calculations

**Performed by: MPM**
**Date: 1/3/2018**
**Revise: 6/18/2018**

### 10-year Storm Calculations

| | Area (Ac.) | C | A x C |
|---|---|---|---|
| Impervious | 0.53 | 0.95 | 0.50 |
| Pervious | 0.33 | 0.25 | 0.08 |
| Total | 0.86 | | 0.59 |
| | | $C_{AVG}$ | 0.68 |

A = 0.86 acres
C= 0.68

$Q_A$ (allowable)=0.15*A — 0.129 cfs

$Q_0 = Q_A/(A*C)$ — 0.22 cfs/acre impervious
T10 = -19.9+(4530/Q0)^0.5 — 124 min
$V_{S10} = ((9108*T_{10})/(T_{10} + 19.9))-40*Q_0*T_{10}$ — 6,757 cf/acre impervious
$V_{T10} = V_{S10}*A*C$ — 3,959 cf
$V_{Tbf} = 5{,}160*A*C$ — 3,024 cf
$V_{Tff} = 1{,}815*A*C$ — 1,064 cf

### Storage Volume Calcuations

Using StormTech Chamber

| Size | cft/ft | lft provided | # Chambers | Volume (cf) |
|---|---|---|---|---|
| SC-740 | 10.06 | 391.38 | 55 | 3,936 |

$Z_0$ = 657.41 Pipe Invert at Detention Pipes
$Z_{OUT}$ = 657.37 Pipe Invert at Outlet Control Structure

### First Flush Elevation

$Z_{ff}$ = First Flush Storage Elevation = 658.19

### Bank Full Elevation

$Z_{bf}$ = Bank Full Storage Elevation = 659.53

### Flood Control Storage Elevation

$Z_{10} = V_{T10}$ Elevation = 660.73

## Control Outlet Structure Design

**Sizing for First Flush**

**Discharge to be released within a 24-hour timeframe**

| | | |
|---|---|---|
| $Q_{avgff} = V_{Tff}/ (86400) =$ | 0.012 | cfs |
| $h_{avg} = 0.5*(Z_{ff}-Z_0)+(Z_0-Z_{OUT}) =$ | 0.43 | ft |
| $A_0 = Q_{avgff}/(0.62*(32.2*2*h_{avg})$^0.5) = | 0.0038 | sf |
| equals | 0.8317 | in diameter |
| Using one 1" hole @ elev. 657.37 | | |
| $A_{ACTUAL} =$ | 0.0055 | sf |
| $Q_{avg\ ACTUAL} =$ | 0.018 | cfs |
| $T_{ACTUAL} =$ | 16.60 | hours |

**Outlet Sizing for Bank Full Flood**

**Discharge to be released within a 40-hour timeframe**

| | | |
|---|---|---|
| $Q_{avg} = V_{Tbf}/ (40*3600) =$ | 0.021 | cfs |
| $h_{avg} = 0.5*(Z_{bf}-Z_0)+(Z_0-Z_{OUT}) =$ | 1.1 | ft |
| A0 = Qavg/(0.62*(32.2*2*havg)^0.5) = | 0.0040 | sf |
| equals | 0.8589 | in dia. |
| Using one 1" hole @ elev. 657.37 | | |
| $A_{ACTUAL} =$ | 0.0055 | sf |
| $Q_{avg\ ACTUAL} =$ | 0.028 | cfs |
| $T_{ACTUAL} =$ | 29.51 | hours |

**Outlet Sizing for 10-Year Storm**

| | | |
|---|---|---|
| $Q_{MAX} = Q_A =$ | 0.129 | cfs |

**Bank Full Orifice Contribution**

| | | |
|---|---|---|
| $h_{bf} = Z_{10}-Z_{OUT} =$ | 3.36 | ft |
| $Q_{bf} = 0.62*A_{ACTUAL}*(32.2*2*h_{bf})$^0.5 = | 0.050 | cfs |

**Additional holes required to release remainder of $Q_A$**

| | | |
|---|---|---|
| $Q_{ADJ} = Q_{MAX}-Q_{bf} =$ | 0.079 | cfs |
| $h_{MAX} = Z_{10}-Z_{bf} =$ | 1.20 | ft |
| $A_{ADJ} = Q_{ADJ}/(0.62*(32.2*2*h_{MAX})$^0.5 = | 0.0145 | sf |
| Hole Size (diameter) = | 1.50 | in |
| Hole Size (area)= | 0.0123 | sf |
| Number of Holes = | 1.18 | |
| Number of holes used = | 1.00 | |

**Use one 1.5" hole at Elev. 659.53**

| | | |
|---|---|---|
| $A_{10ACTUAL} =$ | 0.0123 | sf |
| $Q_{10ACTUAL} = 0.62*A_{10ACTUAL}*(32.2*2*h_{MAX})$^0.5 = | 0.067 | cfs |

| | | |
|---|---|---|
| $Q_{TOTAL} = Q_{bf} + Q_{10ACTUAL}$ = | 0.117 cfs < 0.129 cfs | |

**Outlet Pipe Design for 10-Year Event**

| | | |
|---|---|---|
| $Q_{A=}$ | 0.129 cfs | |
| (See closed conduit sizing for 10-year storm) | | |
| Pipe Size = | 6.0 in | |
| Area = | 0.1963 sf | |
| n = | 0.012 | |
| R = | 0.125 ft | |
| Slope = $[(Q_{PEAK}*n)/1.486*A_{OUT}*R\hat{}0.67]\hat{}2$ | 0.0457 % | using 0.05% |
| V= $Q_{PEAK10}/A$ | 0.66 ft/s | |

**Project: Taco Bell - Westland, MI**

StormTech
Detention • Retention • Water Quality
A division of ADS

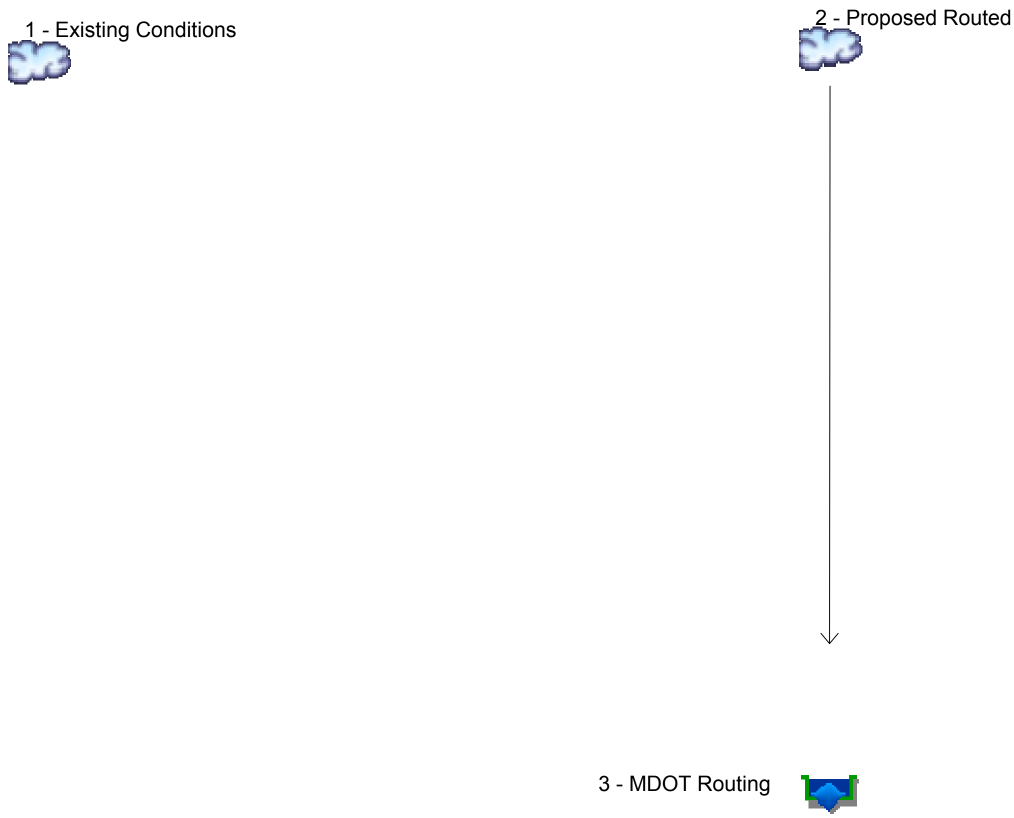
| | | |
|---|---|---|
| Chamber Model - | SC-740 | |
| Units - | Imperial | Click Here for Metric |
| Number of chambers - | 55 | |
| Voids in the stone (porosity) - | 25 | % |
| Base of STONE Elevation - | 657.23 | ft |
| Amount of Stone Above Chambers - | 6 | in |
| Amount of Stone Below Chambers - | 6 | in |
| Area of system - | 2332 | sf Min. Area - 1859 sf min. area |

☑ Include Perimeter Stone in Calculations

| Height of System (inches) | Incremental Single Chamber (cubic feet) | Incremental Total Chamber (cubic feet) | Incremental Stone (cubic feet) | Incremental Ch & St (cubic feet) | Cumulative Chamber (cubic feet) | Elevation (feet) |
|---|---|---|---|---|---|---|
| 42 | 0.00 | 0.00 | 48.58 | 48.58 | 3935.97 | 660.73 |
| 41 | 0.00 | 0.00 | 48.58 | 48.58 | 3887.39 | 660.65 |
| 40 | 0.00 | 0.00 | 48.58 | 48.58 | 3838.81 | 660.56 |
| 39 | 0.00 | 0.00 | 48.58 | 48.58 | 3790.22 | 660.48 |
| 38 | 0.00 | 0.00 | 48.58 | 48.58 | 3741.64 | 660.40 |
| 37 | 0.00 | 0.00 | 48.58 | 48.58 | 3693.06 | 660.31 |
| 36 | 0.05 | 3.02 | 47.83 | 50.85 | 3644.47 | 660.23 |
| 35 | 0.16 | 8.96 | 46.34 | 55.30 | 3593.62 | 660.15 |
| 34 | 0.28 | 15.51 | 44.71 | 60.21 | 3538.32 | 660.06 |
| 33 | 0.60 | 33.22 | 40.28 | 73.50 | 3478.10 | 659.98 |
| 32 | 0.80 | 44.09 | 37.56 | 81.65 | 3404.61 | 659.90 |
| 31 | 0.95 | 52.29 | 35.51 | 87.80 | 3322.95 | 659.81 |
| 30 | 1.07 | 59.10 | 33.81 | 92.91 | 3235.15 | 659.73 |
| 29 | 1.18 | 64.93 | 32.35 | 97.28 | 3142.25 | 659.65 |
| 28 | 1.27 | 69.61 | 31.18 | 100.79 | 3044.97 | 659.56 |
| 27 | 1.36 | 74.53 | 29.95 | 104.48 | 2944.18 | 659.48 |
| 26 | 1.45 | 79.98 | 28.59 | 108.56 | 2839.70 | 659.40 |
| 25 | 1.52 | 83.86 | 27.62 | 111.48 | 2731.13 | 659.31 |
| 24 | 1.58 | 87.03 | 26.83 | 113.85 | 2619.66 | 659.23 |
| 23 | 1.64 | 90.33 | 26.00 | 116.33 | 2505.80 | 659.15 |
| 22 | 1.70 | 93.47 | 25.22 | 118.69 | 2389.47 | 659.06 |
| 21 | 1.75 | 96.41 | 24.48 | 120.89 | 2270.79 | 658.98 |
| 20 | 1.80 | 99.15 | 23.79 | 122.95 | 2149.89 | 658.90 |
| 19 | 1.85 | 102.02 | 23.08 | 125.10 | 2026.94 | 658.81 |
| 18 | 1.89 | 104.12 | 22.55 | 126.67 | 1901.84 | 658.73 |
| 17 | 1.93 | 106.37 | 21.99 | 128.36 | 1775.17 | 658.65 |
| 16 | 1.97 | 108.62 | 21.43 | 130.05 | 1646.81 | 658.56 |
| 15 | 2.01 | 110.55 | 20.95 | 131.49 | 1516.76 | 658.48 |
| 14 | 2.04 | 112.47 | 20.46 | 132.94 | 1385.26 | 658.40 |
| 13 | 2.07 | 114.12 | 20.05 | 134.18 | 1252.32 | 658.31 |
| 12 | 2.10 | 115.77 | 19.64 | 135.41 | 1118.15 | 658.23 |
| 11 | 2.13 | 117.25 | 19.27 | 136.52 | 982.74 | 658.15 |
| 10 | 2.15 | 118.46 | 18.97 | 137.43 | 846.22 | 658.06 |
| 9 | 2.18 | 119.74 | 18.65 | 138.39 | 708.79 | 657.98 |
| 8 | 2.20 | 120.91 | 18.36 | 139.27 | 570.40 | 657.90 |
| 7 | 2.21 | 121.40 | 18.23 | 139.64 | 431.14 | 657.81 |
| 6 | 0.00 | 0.00 | 48.58 | 48.58 | 291.50 | 657.73 |
| 5 | 0.00 | 0.00 | 48.58 | 48.58 | 242.92 | 657.65 |
| 4 | 0.00 | 0.00 | 48.58 | 48.58 | 194.33 | 657.56 |
| 3 | 0.00 | 0.00 | 48.58 | 48.58 | 145.75 | 657.48 |
| 2 | 0.00 | 0.00 | 48.58 | 48.58 | 97.17 | 657.40 |
| 1 | 0.00 | 0.00 | 48.58 | 48.58 | 48.58 | 657.31 |

# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514




**Legend**

| Hyd. | Origin | Description |
|---|---|---|
| 1 | SCS Runoff | Existing Conditions |
| 2 | SCS Runoff | Proposed Routed |
| 3 | Reservoir | MDOT Routing |

Project: MDOT Routing_near final final.gpw

Friday, 09 / 14 / 2018

# Hydrograph Report

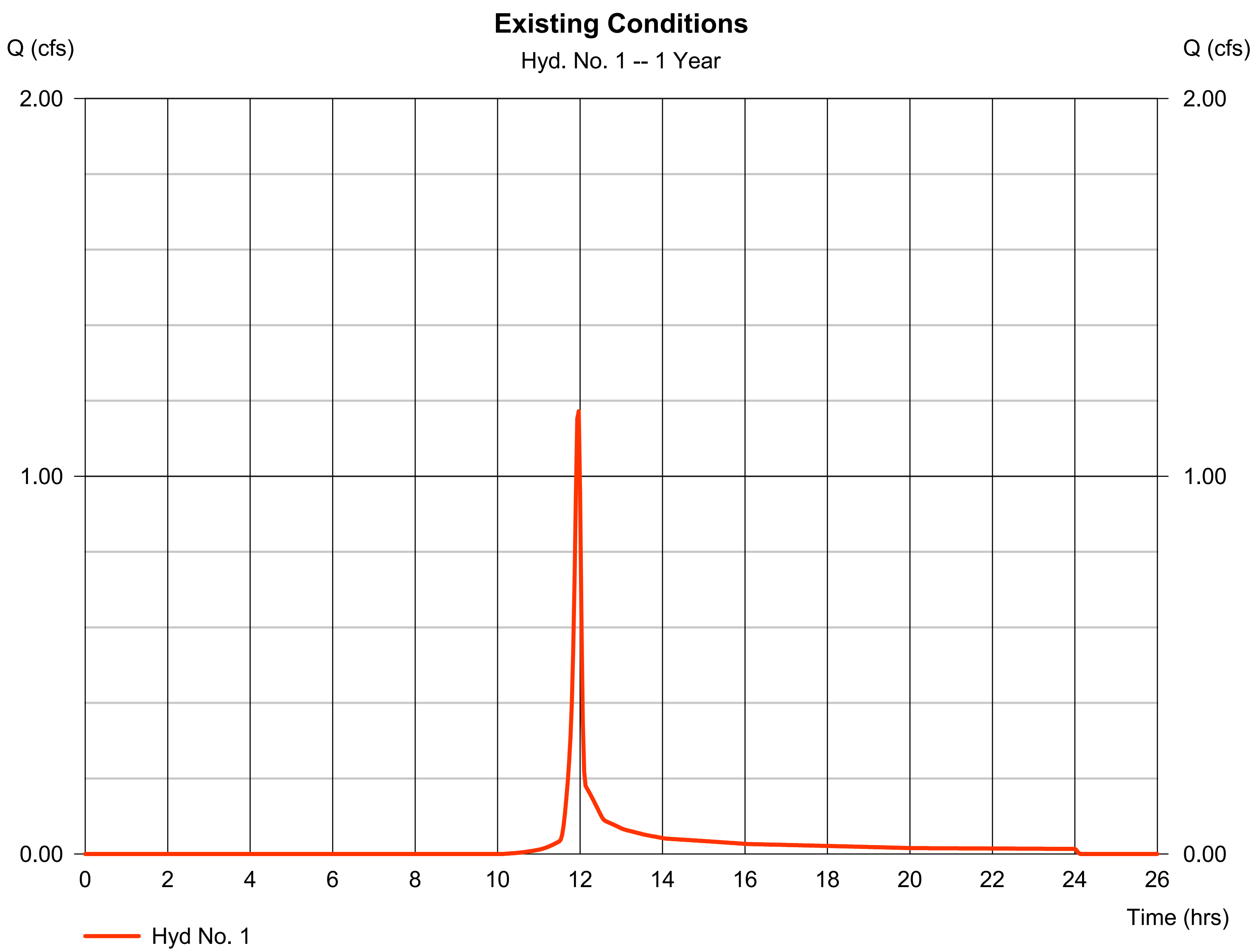
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 1

Existing Conditions

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 1.172 cfs |
| Storm frequency | = 1 yrs | Time to peak | = 11.97 hrs |
| Time interval | = 2 min | Hyd. volume | = 2,344 cuft |
| Drainage area | = 0.860 ac | Curve number | = 84* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 2.08 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.860 x 84)] / 0.860



# Hydrograph Report

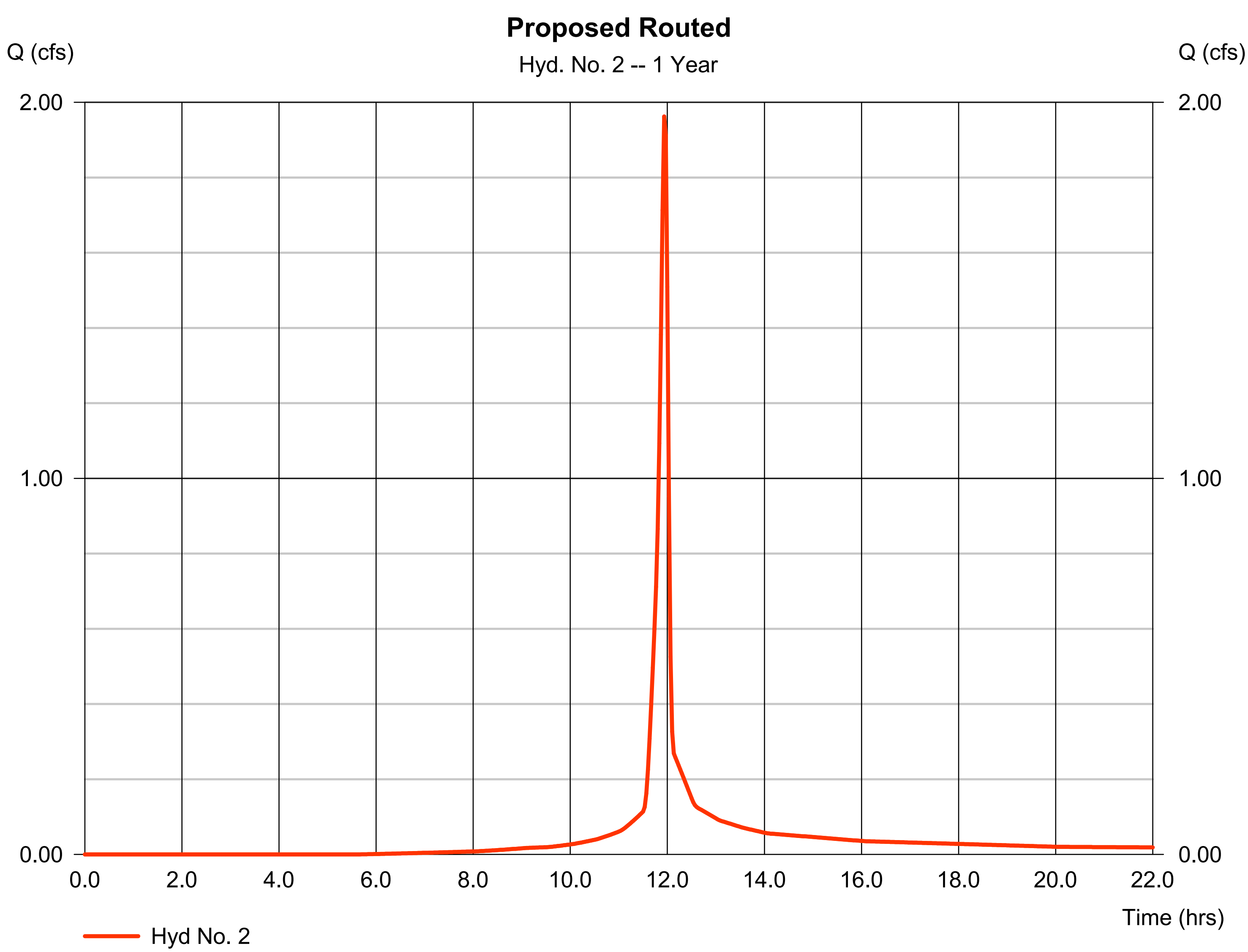
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 — Friday, 09 / 14 / 2018

## Hyd. No. 2

Proposed Routed

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 1.962 cfs |
| Storm frequency | = 1 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 4,062 cuft |
| Drainage area | = 0.860 ac | Curve number | = 93* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 2.08 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.330 x 84) + (0.530 x 98)] / 0.860



# Hydrograph Report

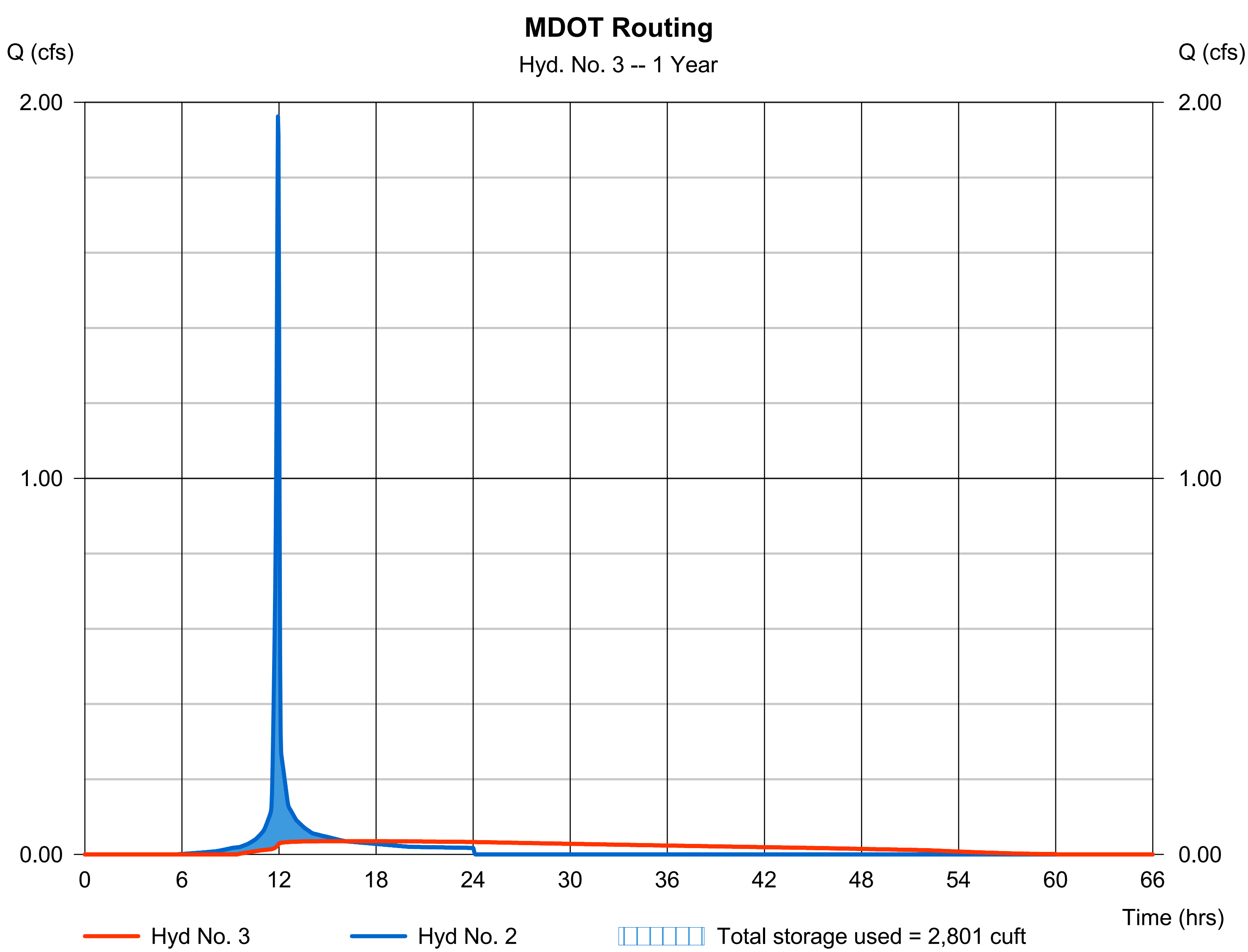
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 — Friday, 09 / 14 / 2018

## Hyd. No. 3

MDOT Routing

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.035 cfs |
| Storm frequency | = 1 yrs | Time to peak | = 16.03 hrs |
| Time interval | = 2 min | Hyd. volume | = 3,960 cuft |
| Inflow hyd. No. | = 2 - Proposed Routed | Max. Elevation | = 659.37 ft |
| Reservoir name | = SC 740 Chambers | Max. Storage | = 2,801 cuft |

Storage Indication method used. Outflow includes exfiltration.



# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 — Friday, 09 / 14 / 2018

## Pond No. 1 - SC 740 Chambers

### Pond Data

**Pond storage is based on user-defined values.**

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 657.23 | n/a | 0 | 0 |
| 0.08 | 657.31 | n/a | 49 | 49 |
| 0.42 | 657.65 | n/a | 194 | 243 |
| 0.67 | 657.90 | n/a | 327 | 570 |
| 0.92 | 658.15 | n/a | 412 | 983 |
| 1.17 | 658.40 | n/a | 403 | 1,385 |
| 1.42 | 658.65 | n/a | 390 | 1,775 |
| 1.67 | 658.90 | n/a | 375 | 2,150 |
| 1.92 | 659.15 | n/a | 356 | 2,506 |
| 2.17 | 659.40 | n/a | 334 | 2,840 |
| 2.42 | 659.65 | n/a | 303 | 3,142 |
| 2.67 | 659.90 | n/a | 262 | 3,405 |
| 2.92 | 660.15 | n/a | 189 | 3,594 |
| 3.17 | 660.40 | n/a | 148 | 3,742 |
| 3.42 | 660.65 | n/a | 146 | 3,887 |
| 3.50 | 660.73 | n/a | 49 | 3,936 |
| 4.57 | 661.80 | n/a | 16 | 3,952 |
| 4.77 | 662.00 | n/a | 392 | 4,344 |
| 5.77 | 663.00 | n/a | 1,941 | 6,285 |
| 5.97 | 663.20 | n/a | 1,850 | 8,134 |
| 6.27 | 663.50 | n/a | 2,068 | 10,202 |

### Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|---|---|---|---|---|
| **Rise (in)** | = 6.00 | 1.00 | 1.50 | 0.00 |
| **Span (in)** | = 6.00 | 1.00 | 1.50 | 0.00 |
| **No. Barrels** | = 1 | 1 | 1 | 0 |
| **Invert El. (ft)** | = 657.37 | 657.37 | 659.53 | 0.00 |
| **Length (ft)** | = 61.00 | 0.00 | 0.00 | 0.00 |
| **Slope (%)** | = 0.05 | 0.00 | 0.00 | n/a |
| **N-Value** | = .012 | .013 | .013 | n/a |
| **Orifice Coeff.** | = 0.60 | 0.60 | 0.60 | 0.60 |
| **Multi-Stage** | = n/a | Yes | Yes | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| **Crest Len (ft)** | = 265.00 | 0.00 | 0.00 | 0.00 |
| **Crest El. (ft)** | = 663.00 | 0.00 | 0.00 | 0.00 |
| **Weir Coeff.** | = 2.60 | 3.33 | 3.33 | 3.33 |
| **Weir Type** | = Broad | --- | --- | --- |
| **Multi-Stage** | = No | No | No | No |

**Exfil.(in/hr)** = 2.000 (by Wet area)

**TW Elev. (ft)** = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

### Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0 | 657.23 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.01 | 5 | 657.24 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.02 | 10 | 657.25 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.02 | 15 | 657.25 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.03 | 19 | 657.26 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.04 | 24 | 657.27 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.05 | 29 | 657.28 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.06 | 34 | 657.29 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.06 | 39 | 657.29 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.07 | 44 | 657.30 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.08 | 49 | 657.31 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.11 | 68 | 657.34 | 0.00 | 0.00 | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.15 | 87 | 657.38 | 0.00 oc | 0.00 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.000 |
| 0.18 | 107 | 657.41 | 0.00 oc | 0.00 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.001 |
| 0.22 | 126 | 657.45 | 0.00 oc | 0.00 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.004 |
| 0.25 | 146 | 657.48 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.005 |
| 0.28 | 165 | 657.51 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.007 |
| 0.32 | 185 | 657.55 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.008 |
| 0.35 | 204 | 657.58 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.009 |
| 0.39 | 223 | 657.62 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.010 |
| 0.42 | 243 | 657.65 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.011 |
| 0.44 | 276 | 657.67 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.012 |
| 0.47 | 308 | 657.70 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.013 |

*Continues on next page...*

SC 740 Chambers

## Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.49 | 341 | 657.73 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.013 |
| 0.52 | 374 | 657.75 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.014 |
| 0.54 | 407 | 657.78 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.014 |
| 0.57 | 439 | 657.80 | 0.01 oc | 0.01 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.015 |
| 0.59 | 472 | 657.83 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.015 |
| 0.62 | 505 | 657.85 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.016 |
| 0.64 | 538 | 657.88 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.016 |
| 0.67 | 570 | 657.90 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.017 |
| 0.69 | 612 | 657.92 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.017 |
| 0.72 | 653 | 657.95 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.018 |
| 0.74 | 694 | 657.98 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.018 |
| 0.77 | 735 | 658.00 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.019 |
| 0.79 | 777 | 658.03 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.019 |
| 0.82 | 818 | 658.05 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.019 |
| 0.84 | 859 | 658.08 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.020 |
| 0.87 | 900 | 658.10 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.020 |
| 0.89 | 942 | 658.13 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.021 |
| 0.92 | 983 | 658.15 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.021 |
| 0.94 | 1,023 | 658.17 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.021 |
| 0.97 | 1,063 | 658.20 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.022 |
| 0.99 | 1,103 | 658.23 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.022 |
| 1.02 | 1,144 | 658.25 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.023 |
| 1.04 | 1,184 | 658.28 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.023 |
| 1.07 | 1,224 | 658.30 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.023 |
| 1.09 | 1,265 | 658.33 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.024 |
| 1.12 | 1,305 | 658.35 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.024 |
| 1.14 | 1,345 | 658.38 | 0.02 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.024 |
| 1.17 | 1,385 | 658.40 | 0.03 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.025 |
| 1.19 | 1,424 | 658.42 | 0.03 oc | 0.02 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.025 |
| 1.22 | 1,463 | 658.45 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.025 |
| 1.24 | 1,502 | 658.48 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.026 |
| 1.27 | 1,541 | 658.50 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.026 |
| 1.29 | 1,580 | 658.53 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.026 |
| 1.32 | 1,619 | 658.55 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.027 |
| 1.34 | 1,658 | 658.58 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.027 |
| 1.37 | 1,697 | 658.60 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.027 |
| 1.39 | 1,736 | 658.63 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.028 |
| 1.42 | 1,775 | 658.65 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.028 |
| 1.44 | 1,813 | 658.67 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.028 |
| 1.47 | 1,850 | 658.70 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.028 |
| 1.49 | 1,888 | 658.73 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.029 |
| 1.52 | 1,925 | 658.75 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.029 |
| 1.54 | 1,963 | 658.78 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.029 |
| 1.57 | 2,000 | 658.80 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.030 |
| 1.59 | 2,037 | 658.83 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.030 |
| 1.62 | 2,075 | 658.85 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.030 |
| 1.64 | 2,112 | 658.88 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.030 |
| 1.67 | 2,150 | 658.90 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.031 |
| 1.69 | 2,185 | 658.92 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.031 |
| 1.72 | 2,221 | 658.95 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.031 |
| 1.74 | 2,257 | 658.98 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.031 |
| 1.77 | 2,292 | 659.00 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.032 |
| 1.79 | 2,328 | 659.03 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.032 |
| 1.82 | 2,363 | 659.05 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.032 |
| 1.84 | 2,399 | 659.08 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.032 |
| 1.87 | 2,435 | 659.10 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.033 |
| 1.89 | 2,470 | 659.13 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.033 |
| 1.92 | 2,506 | 659.15 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.033 |
| 1.94 | 2,539 | 659.17 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.034 |
| 1.97 | 2,573 | 659.20 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.034 |
| 1.99 | 2,606 | 659.23 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.034 |
| 2.02 | 2,639 | 659.25 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.034 |
| 2.04 | 2,673 | 659.28 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.034 |
| 2.07 | 2,706 | 659.30 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.035 |
| 2.09 | 2,740 | 659.33 | 0.03 oc | 0.03 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.035 |
| 2.12 | 2,773 | 659.35 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.035 |
| 2.14 | 2,806 | 659.38 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.035 |
| 2.17 | 2,840 | 659.40 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.036 |
| 2.19 | 2,870 | 659.42 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.036 |
| 2.22 | 2,900 | 659.45 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.036 |
| 2.24 | 2,930 | 659.48 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.036 |
| 2.27 | 2,961 | 659.50 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.037 |

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SC 740 Chambers

## Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.29 | 2,991 | 659.53 | 0.04 oc | 0.04 ic | 0.00 | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.037 |
| 2.32 | 3,021 | 659.55 | 0.04 oc | 0.04 ic | 0.00 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.038 |
| 2.34 | 3,051 | 659.58 | 0.04 oc | 0.04 ic | 0.00 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.040 |
| 2.37 | 3,082 | 659.60 | 0.04 oc | 0.04 ic | 0.01 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.044 |
| 2.39 | 3,112 | 659.63 | 0.05 oc | 0.04 ic | 0.01 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.048 |
| 2.42 | 3,142 | 659.65 | 0.05 oc | 0.04 ic | 0.01 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.052 |
| 2.44 | 3,168 | 659.67 | 0.06 oc | 0.04 ic | 0.02 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.055 |
| 2.47 | 3,195 | 659.70 | 0.06 oc | 0.04 ic | 0.02 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.057 |
| 2.49 | 3,221 | 659.73 | 0.06 oc | 0.04 ic | 0.02 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.060 |
| 2.52 | 3,247 | 659.75 | 0.06 oc | 0.04 ic | 0.02 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.062 |
| 2.54 | 3,273 | 659.78 | 0.06 oc | 0.04 ic | 0.03 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.064 |
| 2.57 | 3,300 | 659.80 | 0.07 oc | 0.04 ic | 0.03 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.066 |
| 2.59 | 3,326 | 659.83 | 0.07 oc | 0.04 ic | 0.03 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.067 |
| 2.62 | 3,352 | 659.85 | 0.07 oc | 0.04 ic | 0.03 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.069 |
| 2.64 | 3,378 | 659.88 | 0.07 oc | 0.04 ic | 0.03 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.071 |
| 2.67 | 3,405 | 659.90 | 0.07 oc | 0.04 ic | 0.03 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.072 |
| 2.69 | 3,424 | 659.92 | 0.07 oc | 0.04 ic | 0.03 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.074 |
| 2.72 | 3,442 | 659.95 | 0.08 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.075 |
| 2.74 | 3,461 | 659.98 | 0.08 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.076 |
| 2.77 | 3,480 | 660.00 | 0.08 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.078 |
| 2.79 | 3,499 | 660.03 | 0.08 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.079 |
| 2.82 | 3,518 | 660.05 | 0.08 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.080 |
| 2.84 | 3,537 | 660.08 | 0.08 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.082 |
| 2.87 | 3,556 | 660.10 | 0.08 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.083 |
| 2.89 | 3,575 | 660.13 | 0.09 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.084 |
| 2.92 | 3,594 | 660.15 | 0.09 oc | 0.04 ic | 0.04 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.085 |
| 2.94 | 3,608 | 660.17 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.086 |
| 2.97 | 3,623 | 660.20 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.088 |
| 2.99 | 3,638 | 660.23 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.089 |
| 3.02 | 3,653 | 660.25 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.090 |
| 3.04 | 3,668 | 660.28 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.091 |
| 3.07 | 3,682 | 660.30 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.092 |
| 3.09 | 3,697 | 660.33 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.093 |
| 3.12 | 3,712 | 660.35 | 0.09 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.094 |
| 3.14 | 3,727 | 660.38 | 0.10 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.095 |
| 3.17 | 3,742 | 660.40 | 0.10 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.096 |
| 3.19 | 3,756 | 660.42 | 0.10 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.097 |
| 3.22 | 3,771 | 660.45 | 0.10 oc | 0.04 ic | 0.05 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.098 |
| 3.24 | 3,785 | 660.48 | 0.10 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.099 |
| 3.27 | 3,800 | 660.50 | 0.10 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.100 |
| 3.29 | 3,815 | 660.53 | 0.10 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.101 |
| 3.32 | 3,829 | 660.55 | 0.10 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.102 |
| 3.34 | 3,844 | 660.58 | 0.10 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.103 |
| 3.37 | 3,858 | 660.60 | 0.10 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.104 |
| 3.39 | 3,873 | 660.63 | 0.11 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.105 |
| 3.42 | 3,887 | 660.65 | 0.11 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.105 |
| 3.43 | 3,892 | 660.66 | 0.11 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.106 |
| 3.44 | 3,897 | 660.67 | 0.11 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.106 |
| 3.44 | 3,902 | 660.67 | 0.11 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.106 |
| 3.45 | 3,907 | 660.68 | 0.11 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.107 |
| 3.46 | 3,912 | 660.69 | 0.11 oc | 0.04 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.107 |
| 3.47 | 3,917 | 660.70 | 0.11 oc | 0.05 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.107 |
| 3.48 | 3,921 | 660.71 | 0.11 oc | 0.05 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.107 |
| 3.48 | 3,926 | 660.71 | 0.11 oc | 0.05 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.108 |
| 3.49 | 3,931 | 660.72 | 0.11 oc | 0.05 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.108 |
| 3.50 | 3,936 | 660.73 | 0.11 oc | 0.05 ic | 0.06 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.108 |
| 3.61 | 3,938 | 660.84 | 0.11 oc | 0.05 ic | 0.07 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.112 |
| 3.71 | 3,939 | 660.94 | 0.12 oc | 0.05 ic | 0.07 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.115 |
| 3.82 | 3,941 | 661.05 | 0.12 oc | 0.05 ic | 0.07 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.119 |
| 3.93 | 3,942 | 661.16 | 0.12 oc | 0.05 ic | 0.07 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.122 |
| 4.04 | 3,944 | 661.27 | 0.12 oc | 0.05 ic | 0.08 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.125 |
| 4.14 | 3,946 | 661.37 | 0.13 oc | 0.05 ic | 0.08 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.128 |
| 4.25 | 3,947 | 661.48 | 0.13 oc | 0.05 ic | 0.08 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.131 |
| 4.36 | 3,949 | 661.59 | 0.13 oc | 0.05 ic | 0.08 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.134 |
| 4.46 | 3,950 | 661.69 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.137 |
| 4.57 | 3,952 | 661.80 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.140 |
| 4.59 | 3,991 | 661.82 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.140 |
| 4.61 | 4,030 | 661.84 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.141 |
| 4.63 | 4,070 | 661.86 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.141 |
| 4.65 | 4,109 | 661.88 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.142 |
| 4.67 | 4,148 | 661.90 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.142 |
| 4.69 | 4,187 | 661.92 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.143 |

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SC 740 Chambers

## Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.71 | 4,226 | 661.94 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.143 |
| 4.73 | 4,266 | 661.96 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.144 |
| 4.75 | 4,305 | 661.98 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.144 |
| 4.77 | 4,344 | 662.00 | 0.14 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.145 |
| 4.87 | 4,538 | 662.10 | 0.15 oc | 0.05 ic | 0.09 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.147 |
| 4.97 | 4,732 | 662.20 | 0.15 oc | 0.05 ic | 0.10 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.150 |
| 5.07 | 4,926 | 662.30 | 0.15 oc | 0.06 ic | 0.10 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.152 |
| 5.17 | 5,120 | 662.40 | 0.15 oc | 0.06 ic | 0.10 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.155 |
| 5.27 | 5,314 | 662.50 | 0.16 oc | 0.06 ic | 0.10 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.157 |
| 5.37 | 5,508 | 662.60 | 0.16 oc | 0.06 ic | 0.10 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.159 |
| 5.47 | 5,702 | 662.70 | 0.16 oc | 0.06 ic | 0.10 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.162 |
| 5.57 | 5,896 | 662.80 | 0.16 oc | 0.06 ic | 0.11 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.164 |
| 5.67 | 6,090 | 662.90 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.166 |
| 5.77 | 6,285 | 663.00 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 0.00 | --- | --- | --- | 0.000 | --- | 0.168 |
| 5.79 | 6,469 | 663.02 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 1.95 | --- | --- | --- | 0.000 | --- | 2.120 |
| 5.81 | 6,654 | 663.04 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 5.52 | --- | --- | --- | 0.000 | --- | 5.689 |
| 5.83 | 6,839 | 663.06 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 10.14 | --- | --- | --- | 0.000 | --- | 10.31 |
| 5.85 | 7,024 | 663.08 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 15.61 | --- | --- | --- | 0.000 | --- | 15.78 |
| 5.87 | 7,209 | 663.10 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 21.82 | --- | --- | --- | 0.000 | --- | 21.99 |
| 5.89 | 7,394 | 663.12 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 28.68 | --- | --- | --- | 0.000 | --- | 28.85 |
| 5.91 | 7,579 | 663.14 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 36.14 | --- | --- | --- | 0.000 | --- | 36.32 |
| 5.93 | 7,764 | 663.16 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 44.16 | --- | --- | --- | 0.000 | --- | 44.33 |
| 5.95 | 7,949 | 663.18 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 52.69 | --- | --- | --- | 0.000 | --- | 52.87 |
| 5.97 | 8,134 | 663.20 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 61.63 | --- | --- | --- | 0.000 | --- | 61.80 |
| 6.00 | 8,341 | 663.23 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 75.99 | --- | --- | --- | 0.000 | --- | 76.16 |
| 6.03 | 8,548 | 663.26 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 91.35 | --- | --- | --- | 0.000 | --- | 91.52 |
| 6.06 | 8,754 | 663.29 | 0.17 oc | 0.06 ic | 0.11 ic | --- | 107.62 | --- | --- | --- | 0.000 | --- | 107.80 |
| 6.09 | 8,961 | 663.32 | 0.18 oc | 0.06 ic | 0.11 ic | --- | 124.76 | --- | --- | --- | 0.000 | --- | 124.94 |
| 6.12 | 9,168 | 663.35 | 0.18 oc | 0.06 ic | 0.11 ic | --- | 142.73 | --- | --- | --- | 0.000 | --- | 142.90 |
| 6.15 | 9,375 | 663.38 | 0.18 oc | 0.06 ic | 0.11 ic | --- | 161.48 | --- | --- | --- | 0.000 | --- | 161.65 |
| 6.18 | 9,582 | 663.41 | 0.18 oc | 0.06 ic | 0.12 ic | --- | 180.99 | --- | --- | --- | 0.000 | --- | 181.16 |
| 6.21 | 9,788 | 663.44 | 0.18 oc | 0.06 ic | 0.12 ic | --- | 201.22 | --- | --- | --- | 0.000 | --- | 201.40 |
| 6.24 | 9,995 | 663.47 | 0.18 oc | 0.06 ic | 0.12 ic | --- | 222.16 | --- | --- | --- | 0.000 | --- | 222.34 |
| 6.27 | 10,202 | 663.50 | 0.18 oc | 0.06 ic | 0.12 ic | --- | 243.60 | --- | --- | --- | 0.000 | --- | 243.78 |

...End

# Hydrograph Report

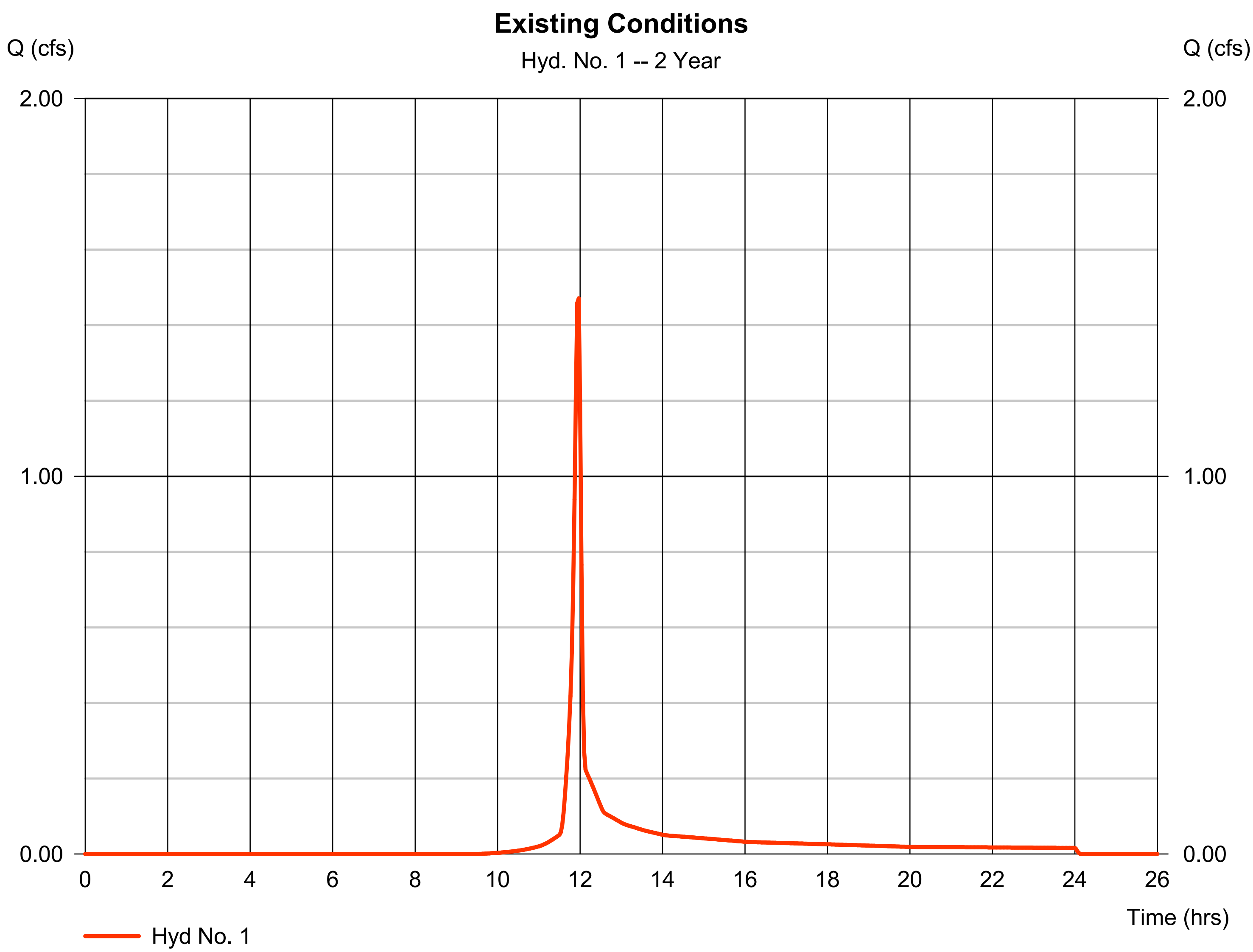
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 1

Existing Conditions

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 1.471 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 11.97 hrs |
| Time interval | = 2 min | Hyd. volume | = 2,951 cuft |
| Drainage area | = 0.860 ac | Curve number | = 84* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 2.36 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.860 x 84)] / 0.860



# Hydrograph Report

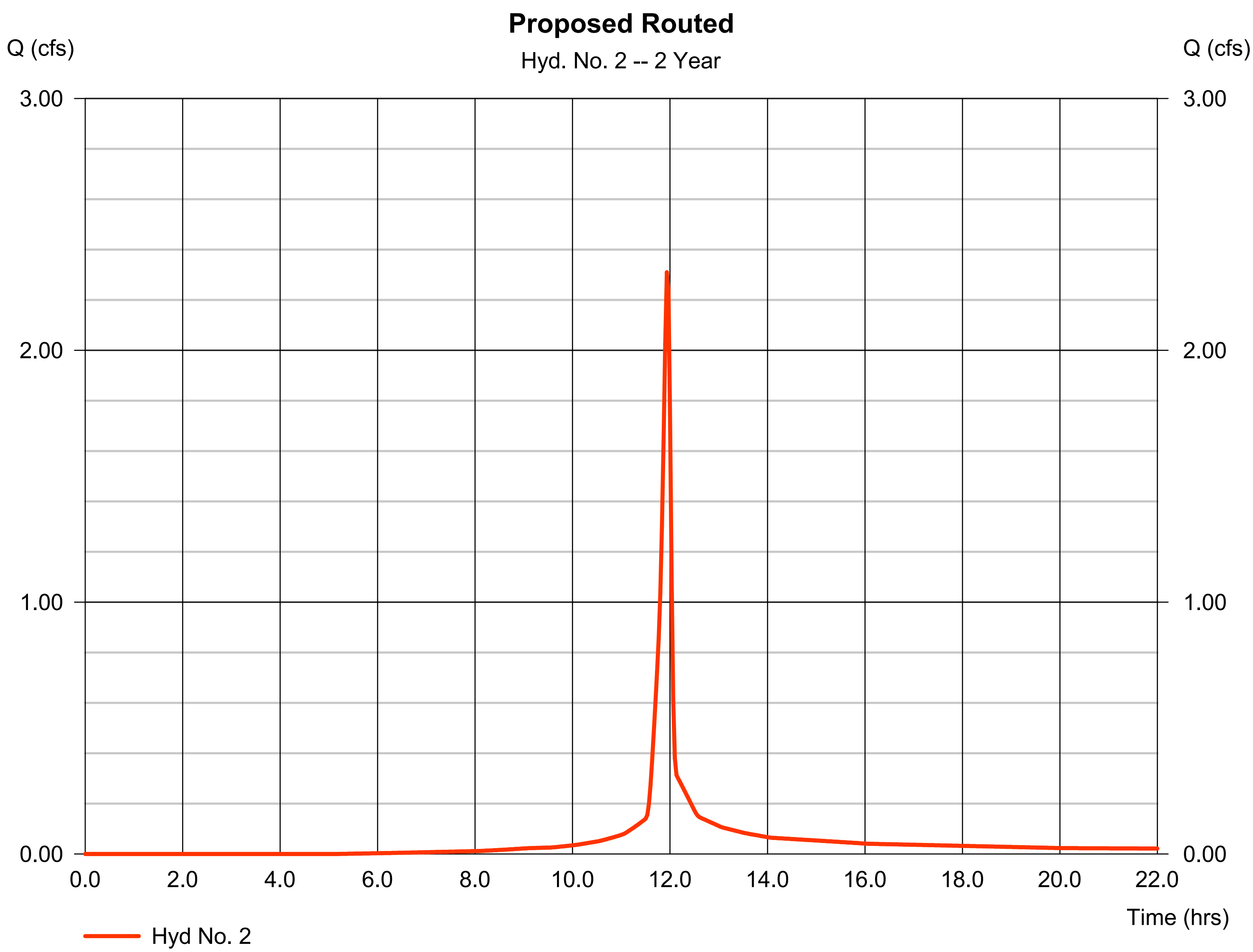
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 2

Proposed Routed

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.310 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 4,823 cuft |
| Drainage area | = 0.860 ac | Curve number | = 93* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 2.36 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.330 x 84) + (0.530 x 98)] / 0.860



# Hydrograph Report

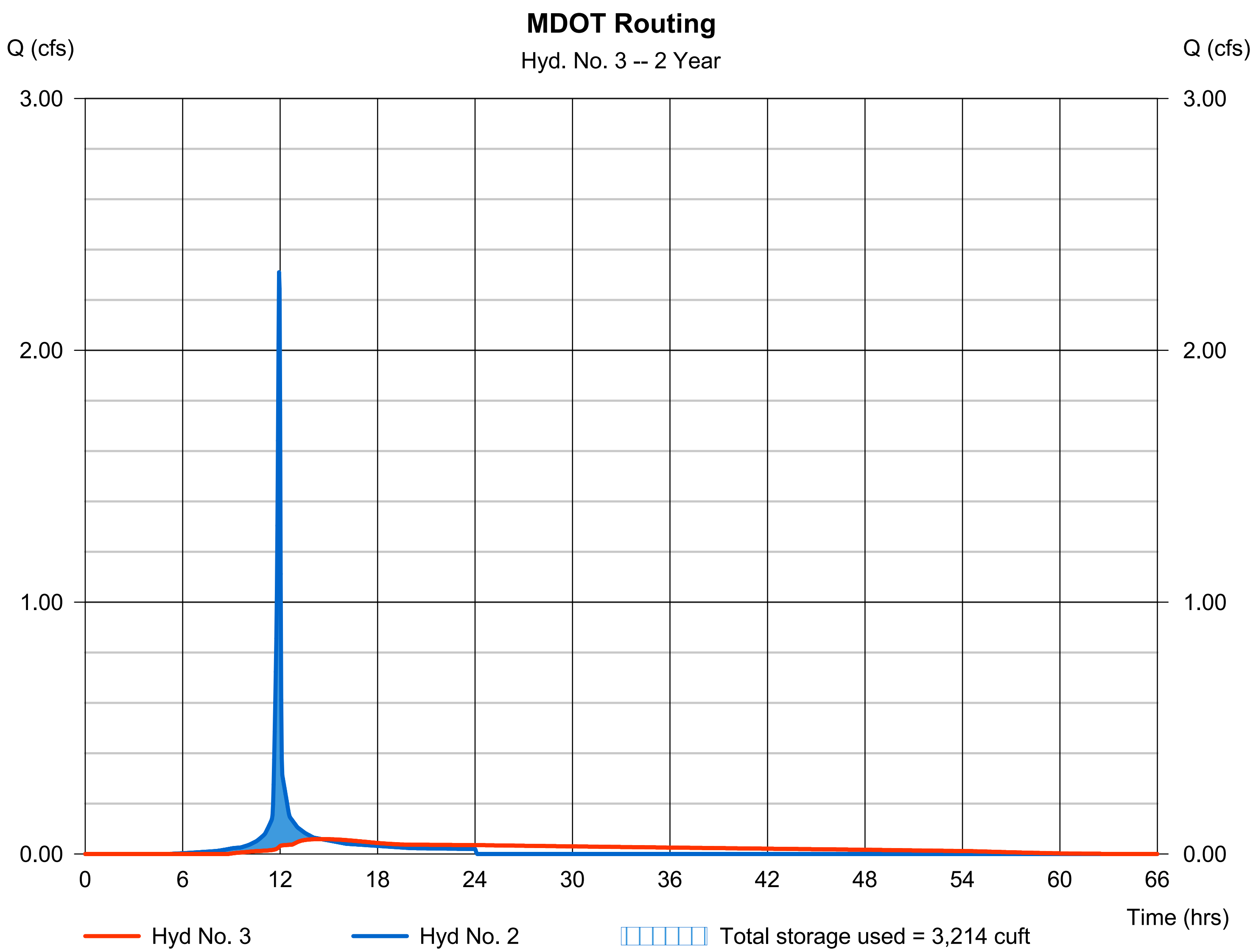
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 3

MDOT Routing

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.059 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 14.53 hrs |
| Time interval | = 2 min | Hyd. volume | = 4,721 cuft |
| Inflow hyd. No. | = 2 - Proposed Routed | Max. Elevation | = 659.72 ft |
| Reservoir name | = SC 740 Chambers | Max. Storage | = 3,214 cuft |

Storage Indication method used. Outflow includes exfiltration.



# Hydrograph Report

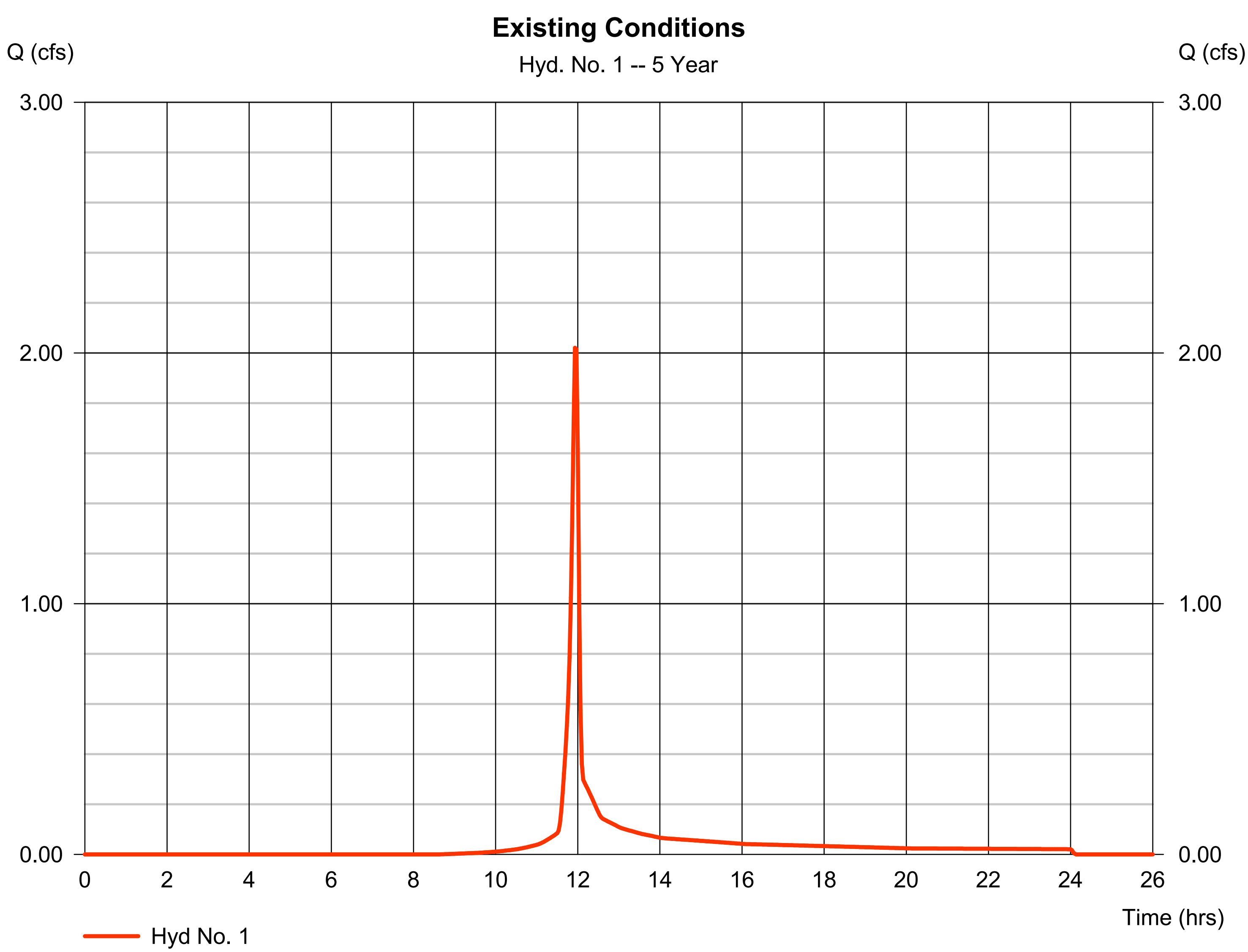
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 — Friday, 09 / 14 / 2018

## Hyd. No. 1

Existing Conditions

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.020 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 4,079 cuft |
| Drainage area | = 0.860 ac | Curve number | = 84* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 2.85 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.860 x 84)] / 0.860



# Hydrograph Report

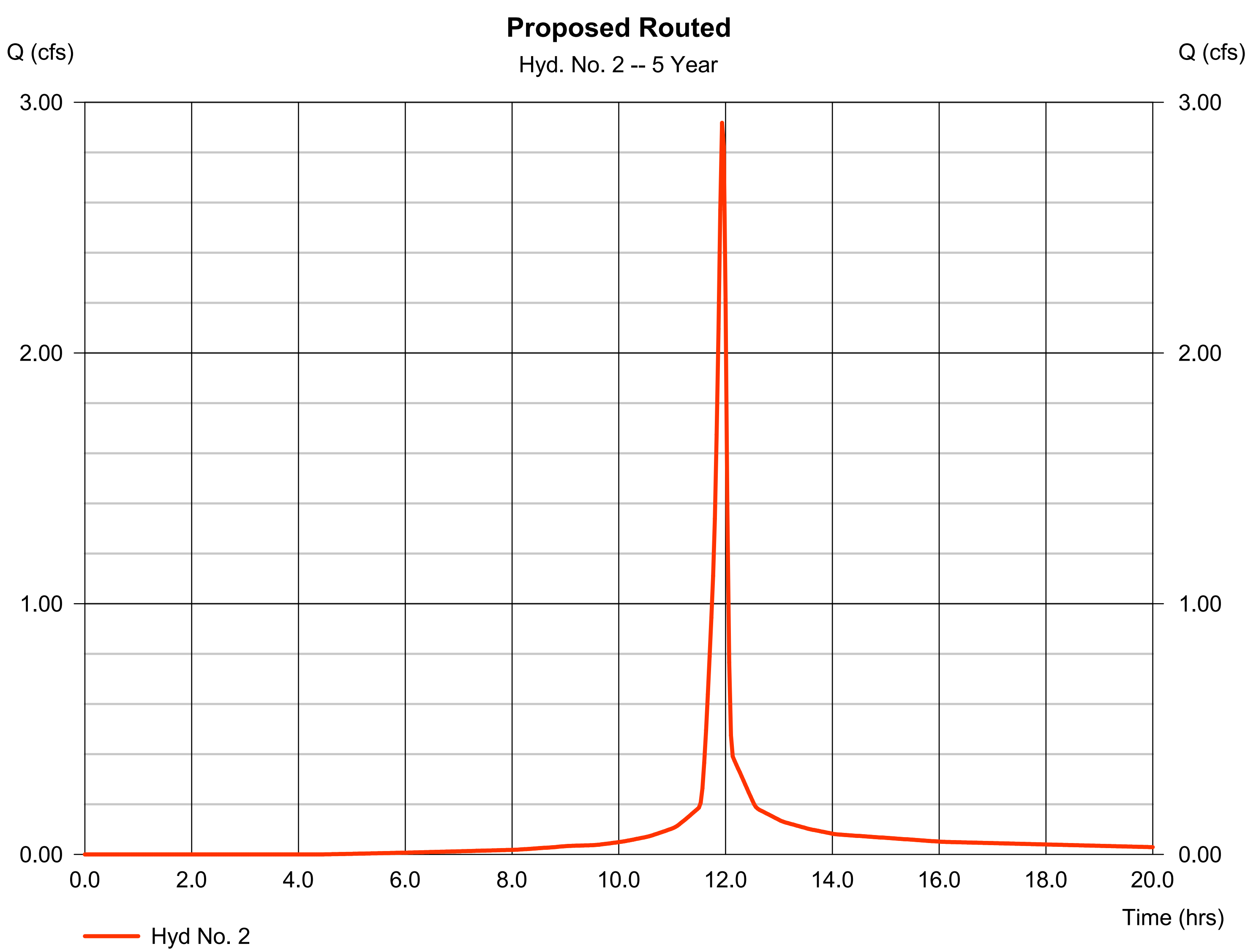
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 2

Proposed Routed

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.918 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 6,178 cuft |
| Drainage area | = 0.860 ac | Curve number | = 93* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 2.85 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.330 x 84) + (0.530 x 98)] / 0.860



# Hydrograph Report

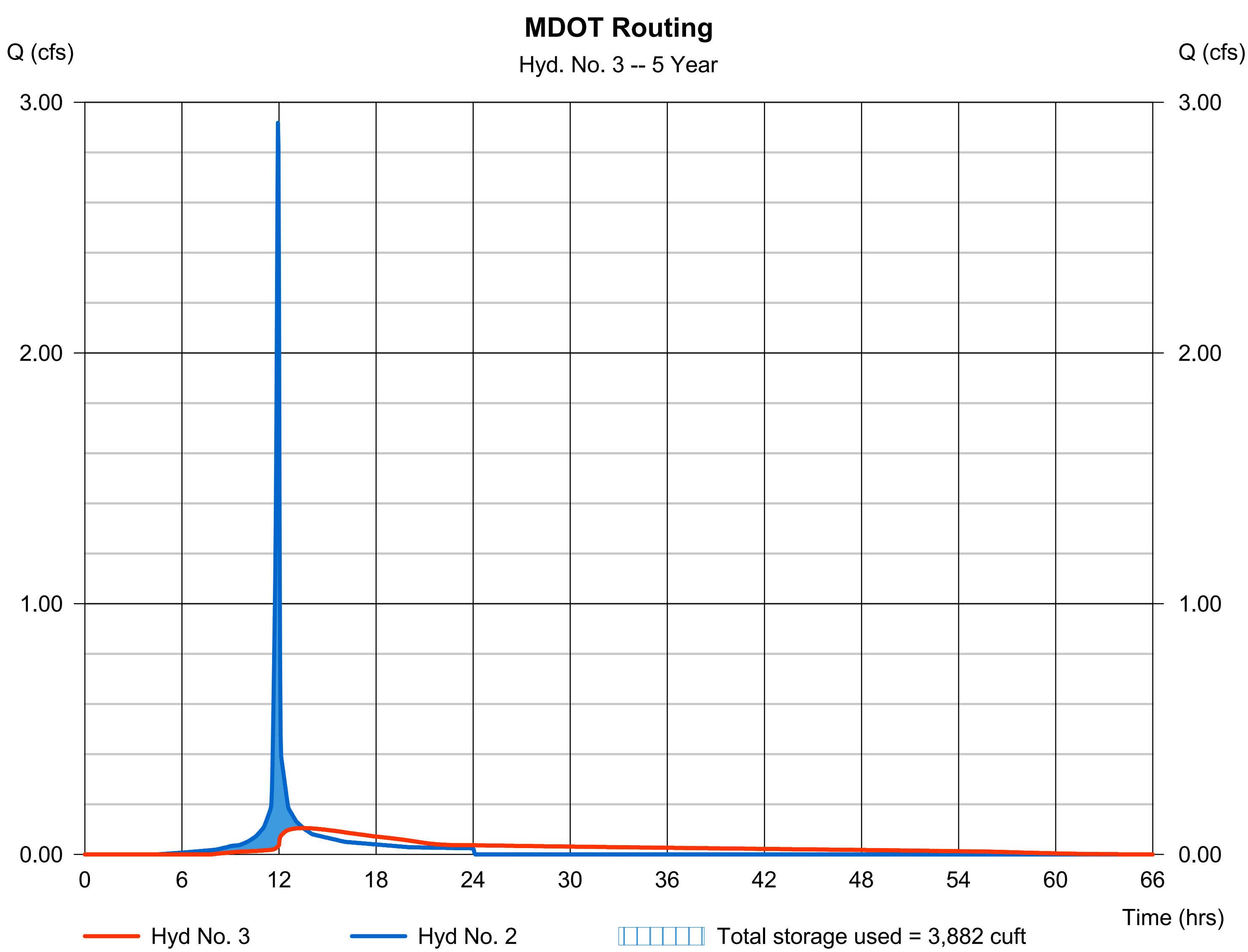
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 — Friday, 09 / 14 / 2018

## Hyd. No. 3

MDOT Routing

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.105 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 13.50 hrs |
| Time interval | = 2 min | Hyd. volume | = 6,075 cuft |
| Inflow hyd. No. | = 2 - Proposed Routed | Max. Elevation | = 660.64 ft |
| Reservoir name | = SC 740 Chambers | Max. Storage | = 3,882 cuft |

Storage Indication method used. Outflow includes exfiltration.



# Hydrograph Report

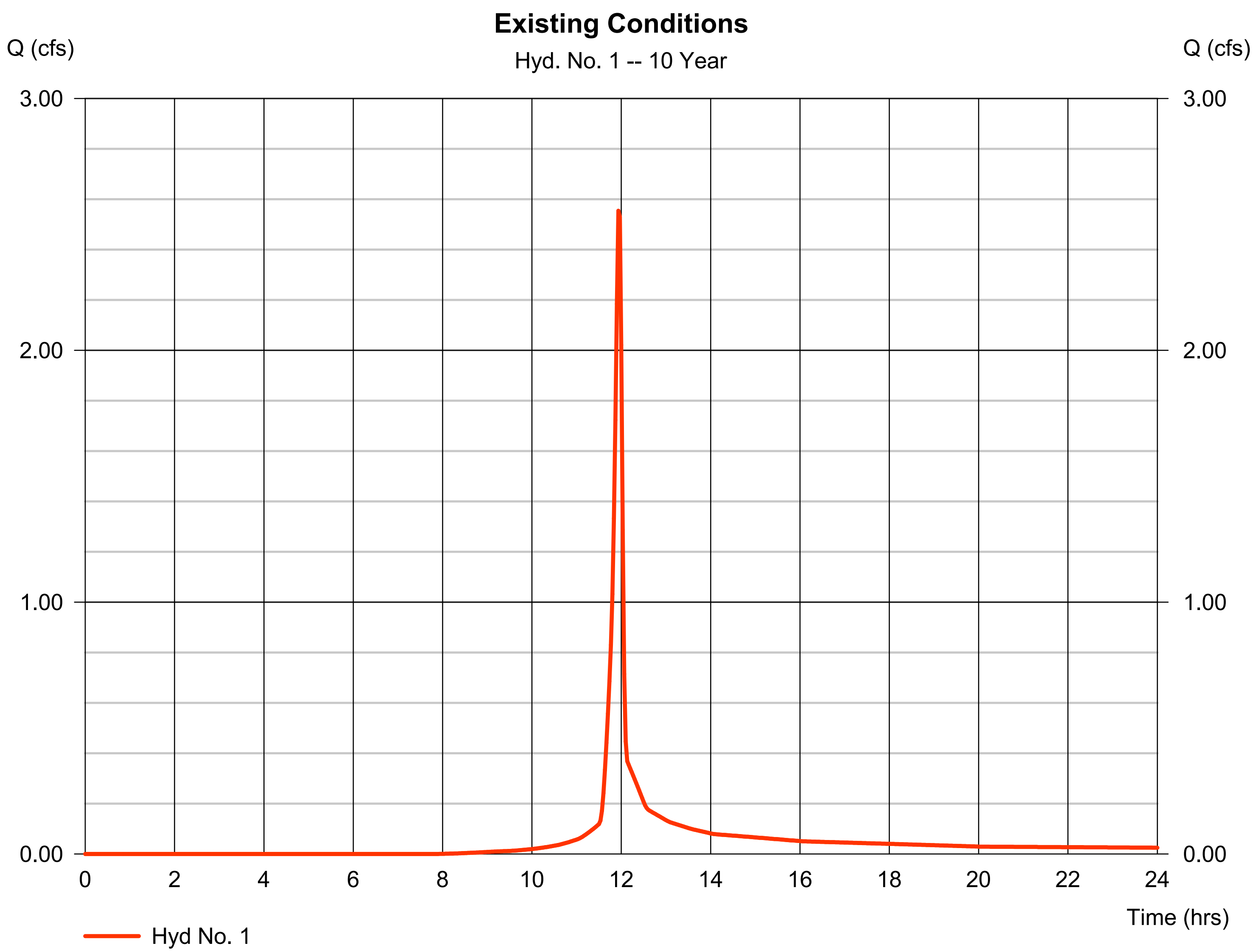
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 1

Existing Conditions

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.554 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 5,170 cuft |
| Drainage area | = 0.860 ac | Curve number | = 84* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 3.30 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.860 x 84)] / 0.860



# Hydrograph Report

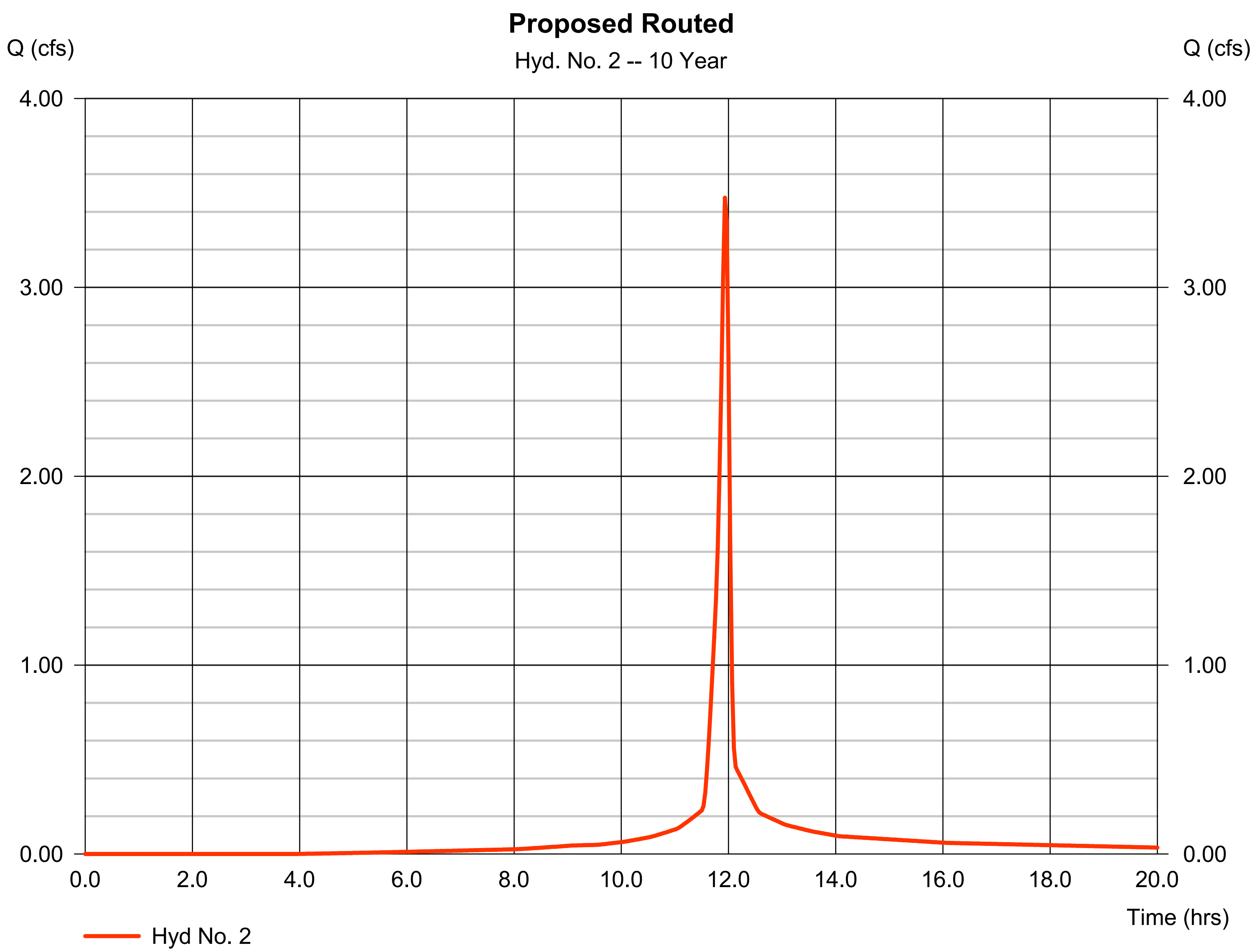
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 2

Proposed Routed

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 3.475 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 7,440 cuft |
| Drainage area | = 0.860 ac | Curve number | = 93* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 3.30 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.330 x 84) + (0.530 x 98)] / 0.860



# Hydrograph Report

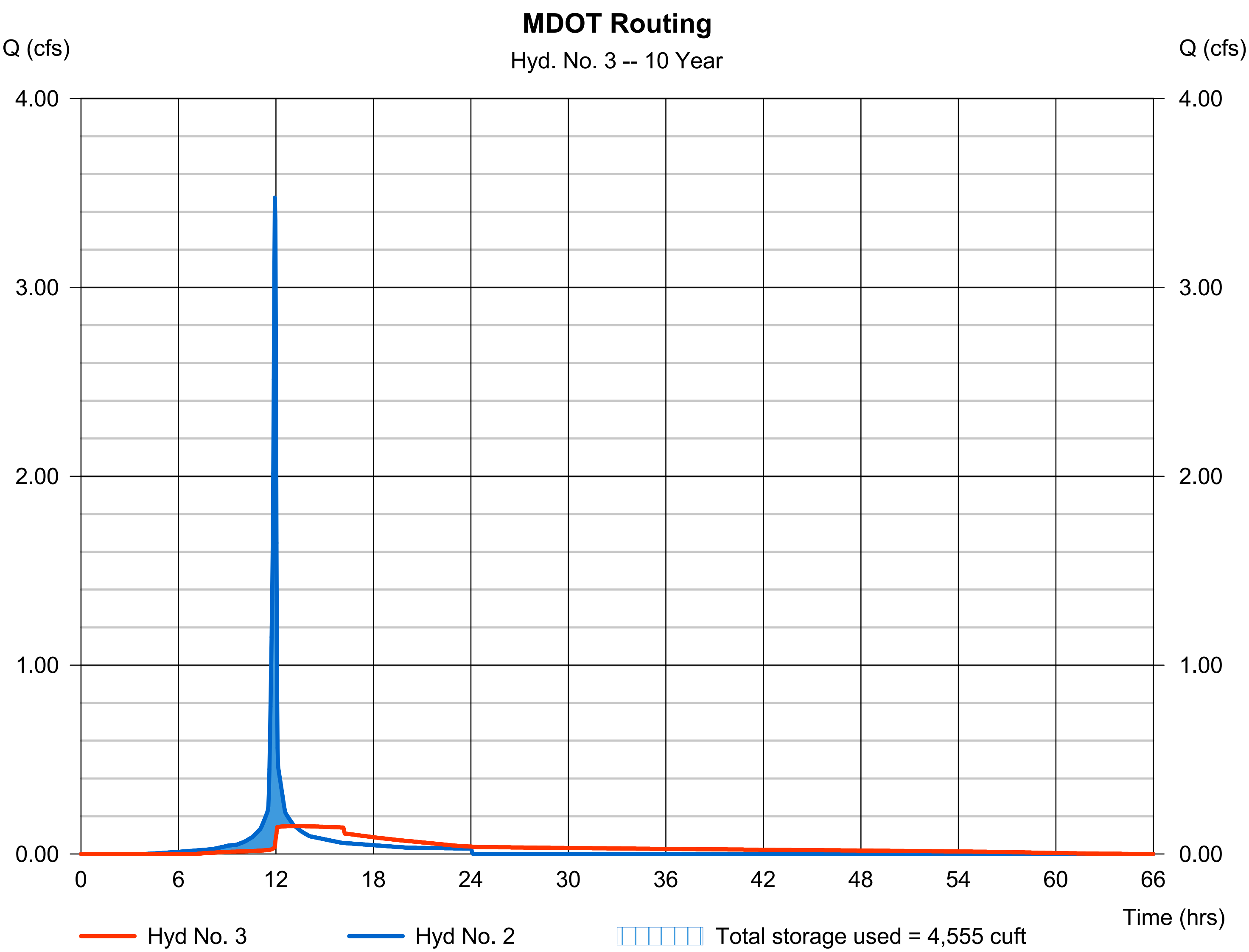
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 3

MDOT Routing

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.148 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 13.17 hrs |
| Time interval | = 2 min | Hyd. volume | = 7,337 cuft |
| Inflow hyd. No. | = 2 - Proposed Routed | Max. Elevation | = 662.11 ft |
| Reservoir name | = SC 740 Chambers | Max. Storage | = 4,555 cuft |

Storage Indication method used. Outflow includes exfiltration.



# Hydrograph Report

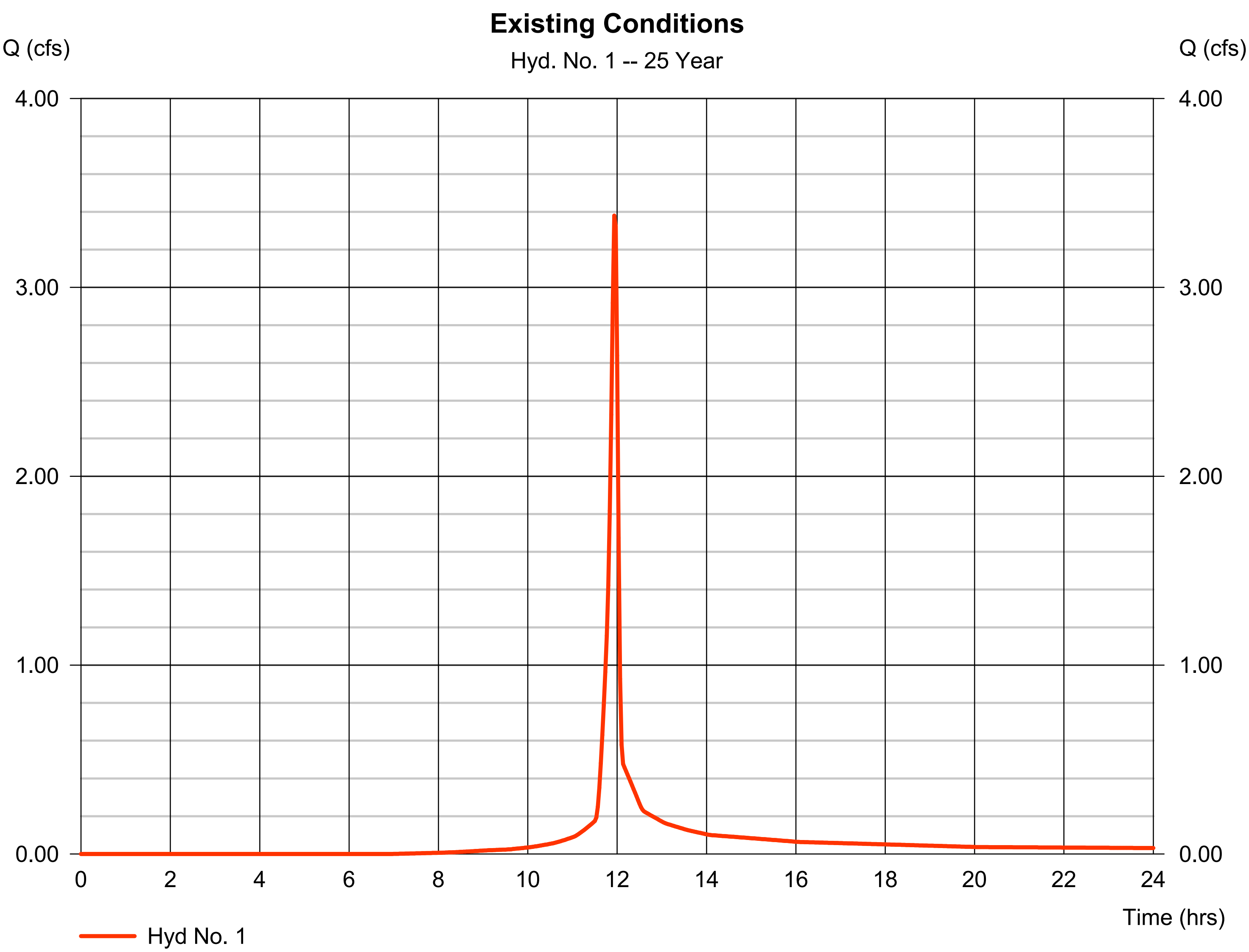
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 1

Existing Conditions

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 3.380 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 6,888 cuft |
| Drainage area | = 0.860 ac | Curve number | = 84* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 3.98 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.860 x 84)] / 0.860



# Hydrograph Report

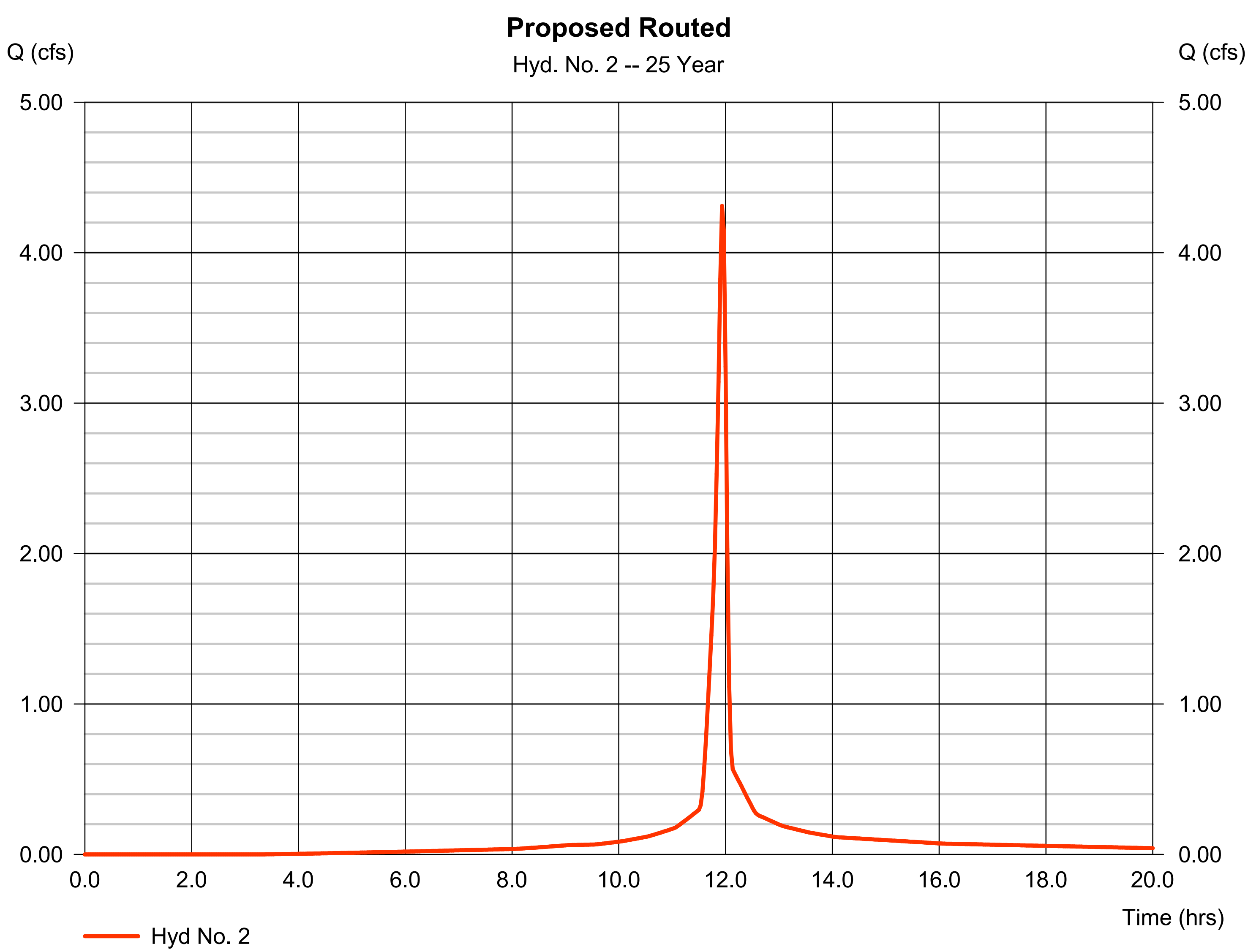
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 2

Proposed Routed

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 4.311 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 9,367 cuft |
| Drainage area | = 0.860 ac | Curve number | = 93* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 3.98 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.330 x 84) + (0.530 x 98)] / 0.860



# Hydrograph Report

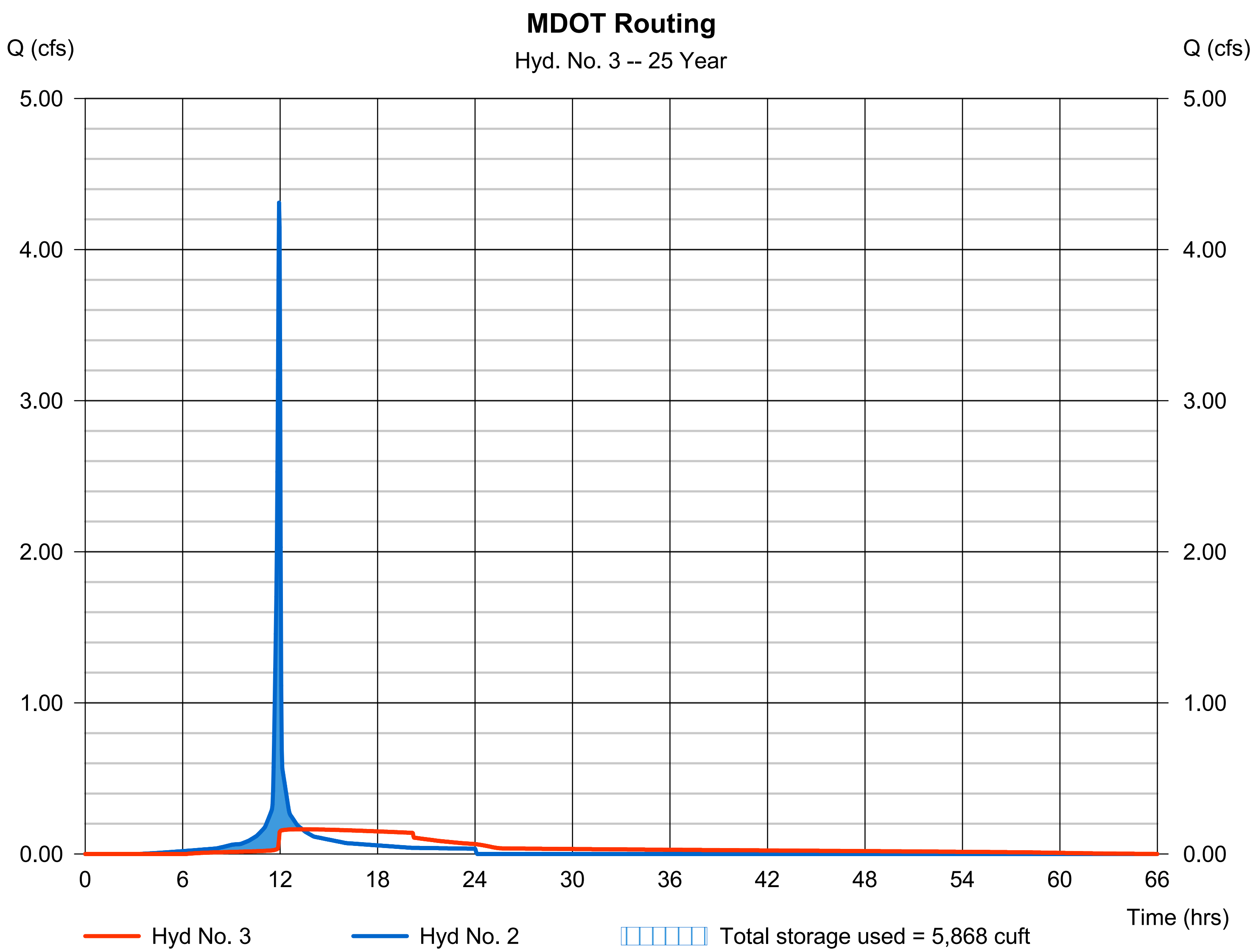
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 3

MDOT Routing

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.164 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 13.37 hrs |
| Time interval | = 2 min | Hyd. volume | = 9,264 cuft |
| Inflow hyd. No. | = 2 - Proposed Routed | Max. Elevation | = 662.79 ft |
| Reservoir name | = SC 740 Chambers | Max. Storage | = 5,868 cuft |

Storage Indication method used. Outflow includes exfiltration.



# Hydrograph Report

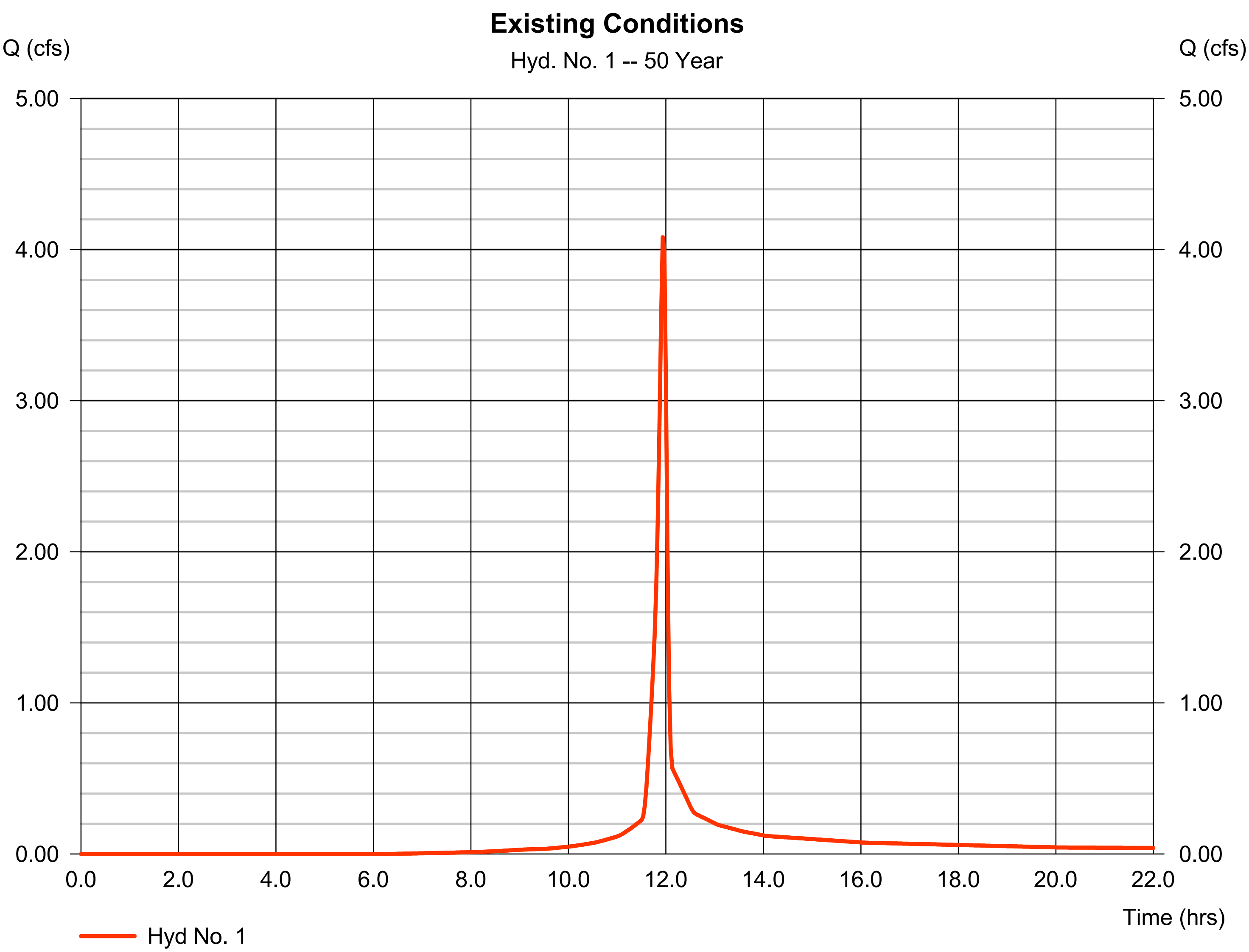
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 — Friday, 09 / 14 / 2018

## Hyd. No. 1

Existing Conditions

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 4.081 cfs |
| Storm frequency | = 50 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 8,375 cuft |
| Drainage area | = 0.860 ac | Curve number | = 84* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 4.55 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.860 x 84)] / 0.860



# Hydrograph Report

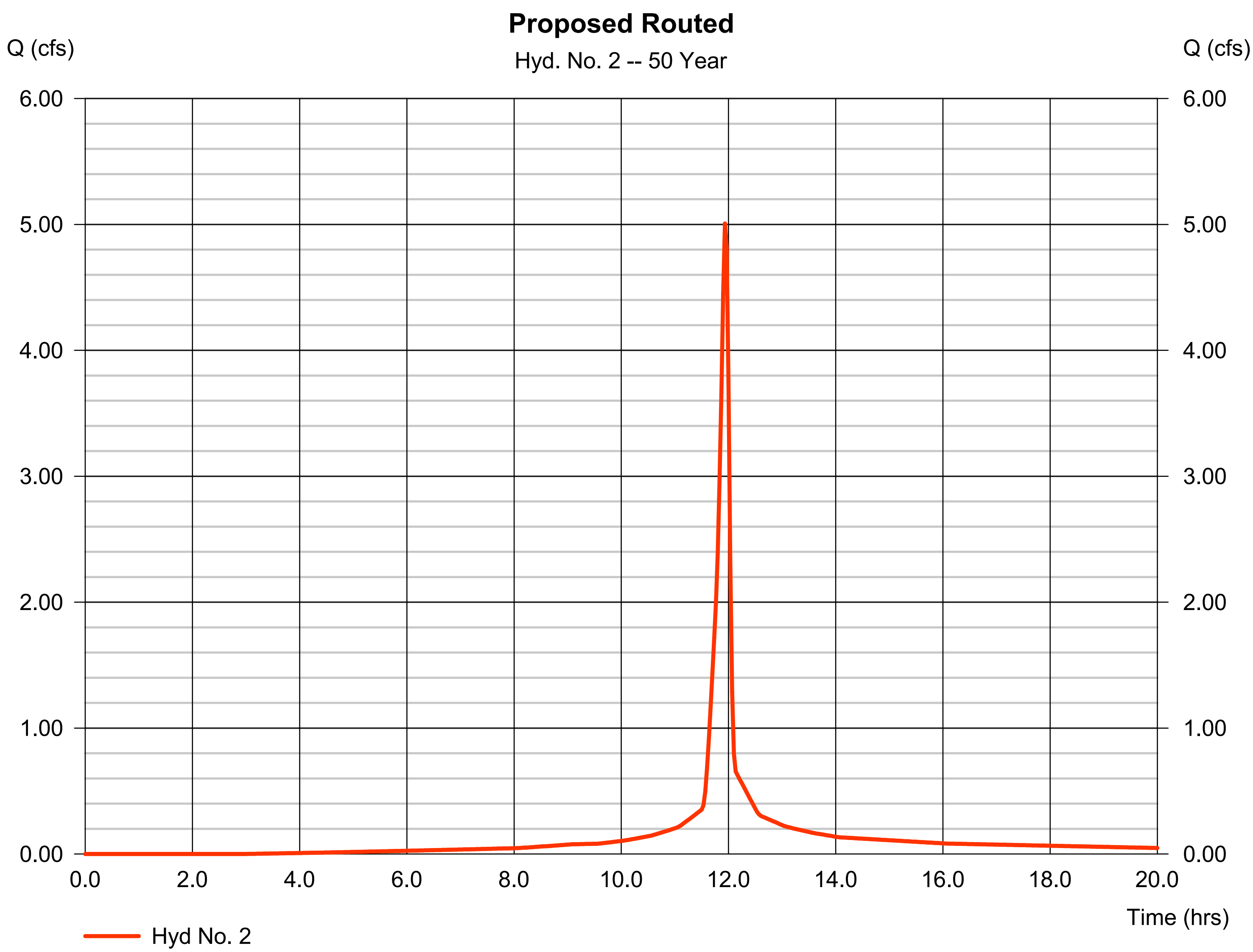
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 2

Proposed Routed

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 5.008 cfs |
| Storm frequency | = 50 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 10,995 cuft |
| Drainage area | = 0.860 ac | Curve number | = 93* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 4.55 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.330 x 84) + (0.530 x 98)] / 0.860



# Hydrograph Report

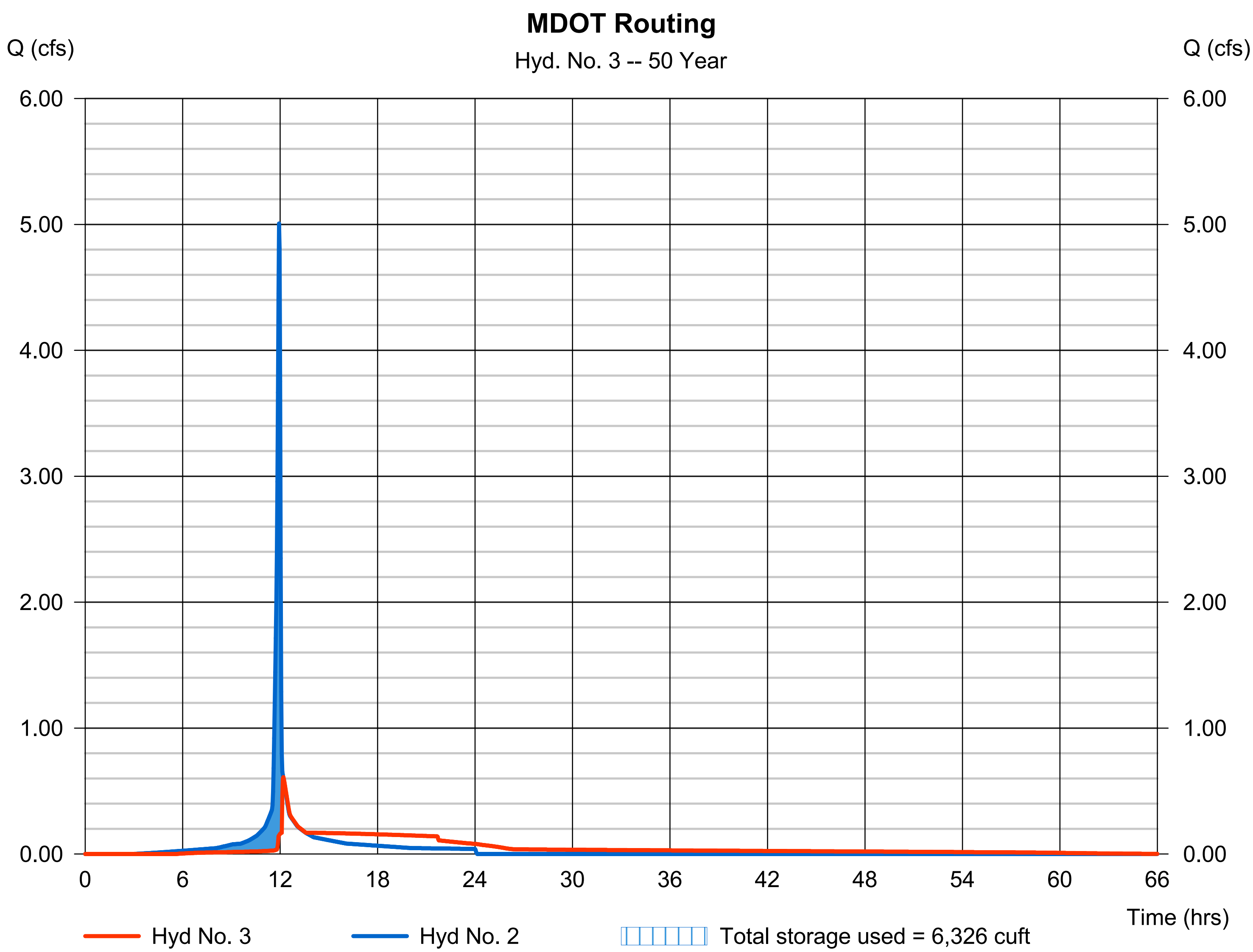


## Hyd. No. 3

MDOT Routing

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.611 cfs |
| Storm frequency | = 50 yrs | Time to peak | = 12.20 hrs |
| Time interval | = 2 min | Hyd. volume | = 10,892 cuft |
| Inflow hyd. No. | = 2 - Proposed Routed | Max. Elevation | = 663.00 ft |
| Reservoir name | = SC 740 Chambers | Max. Storage | = 6,326 cuft |

Storage Indication method used. Outflow includes exfiltration.



# Hydrograph Report

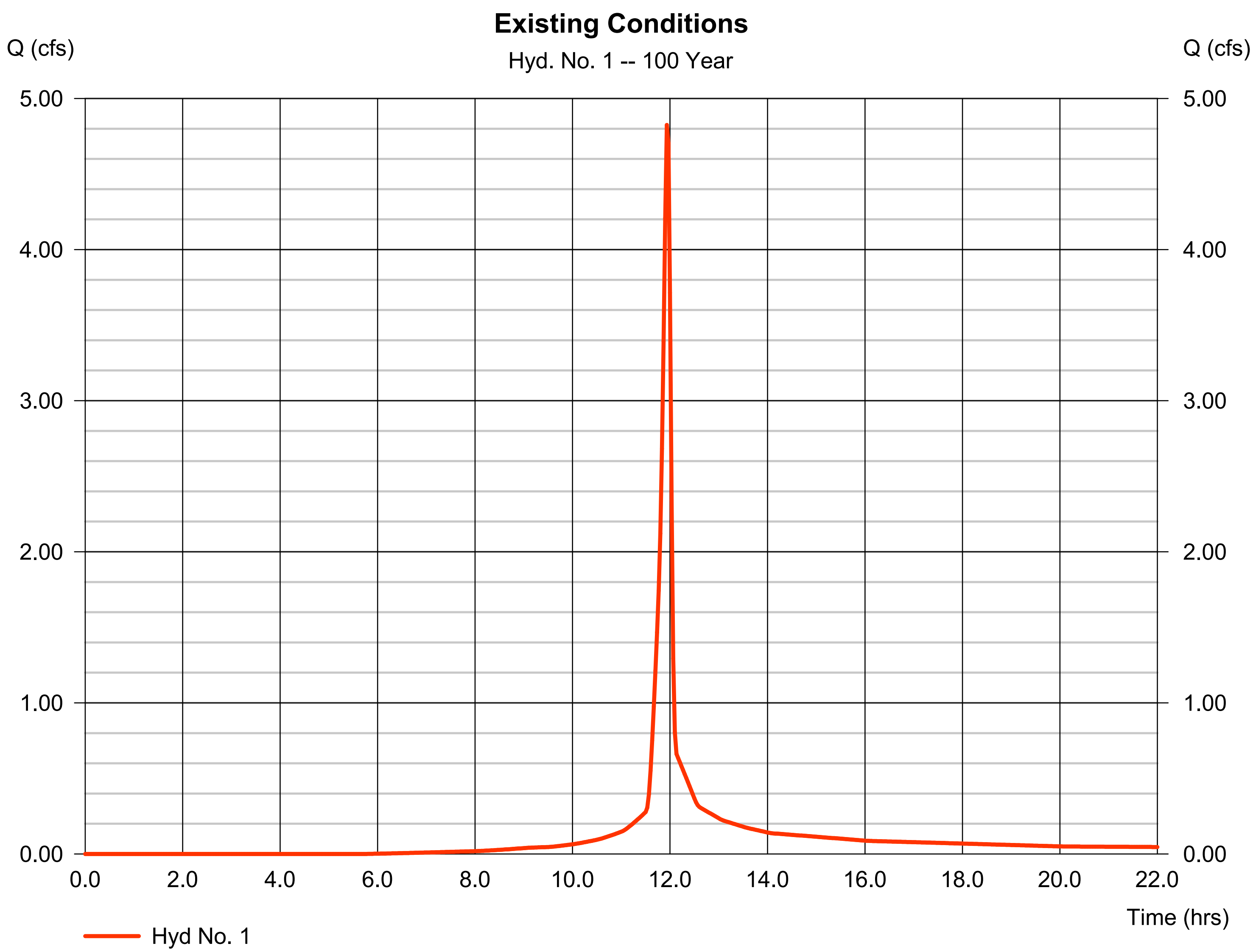
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 1

Existing Conditions

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 4.825 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 9,974 cuft |
| Drainage area | = 0.860 ac | Curve number | = 84* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 5.15 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.860 x 84)] / 0.860



# Hydrograph Report

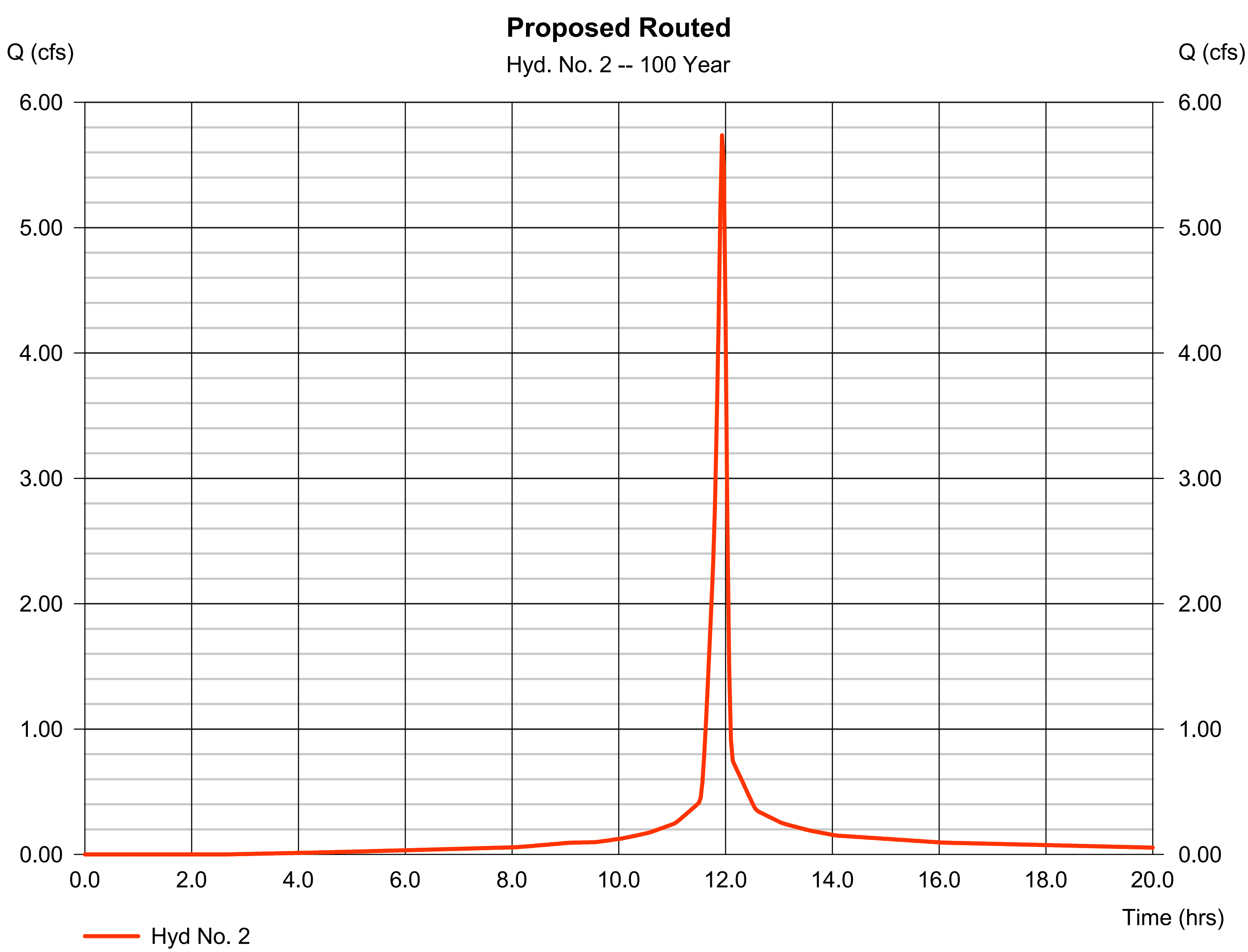
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 | Friday, 09 / 14 / 2018

## Hyd. No. 2

Proposed Routed

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 5.737 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 11.93 hrs |
| Time interval | = 2 min | Hyd. volume | = 12,717 cuft |
| Drainage area | = 0.860 ac | Curve number | = 93* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 6.00 min |
| Total precip. | = 5.15 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.330 x 84) + (0.530 x 98)] / 0.860



# Hydrograph Report

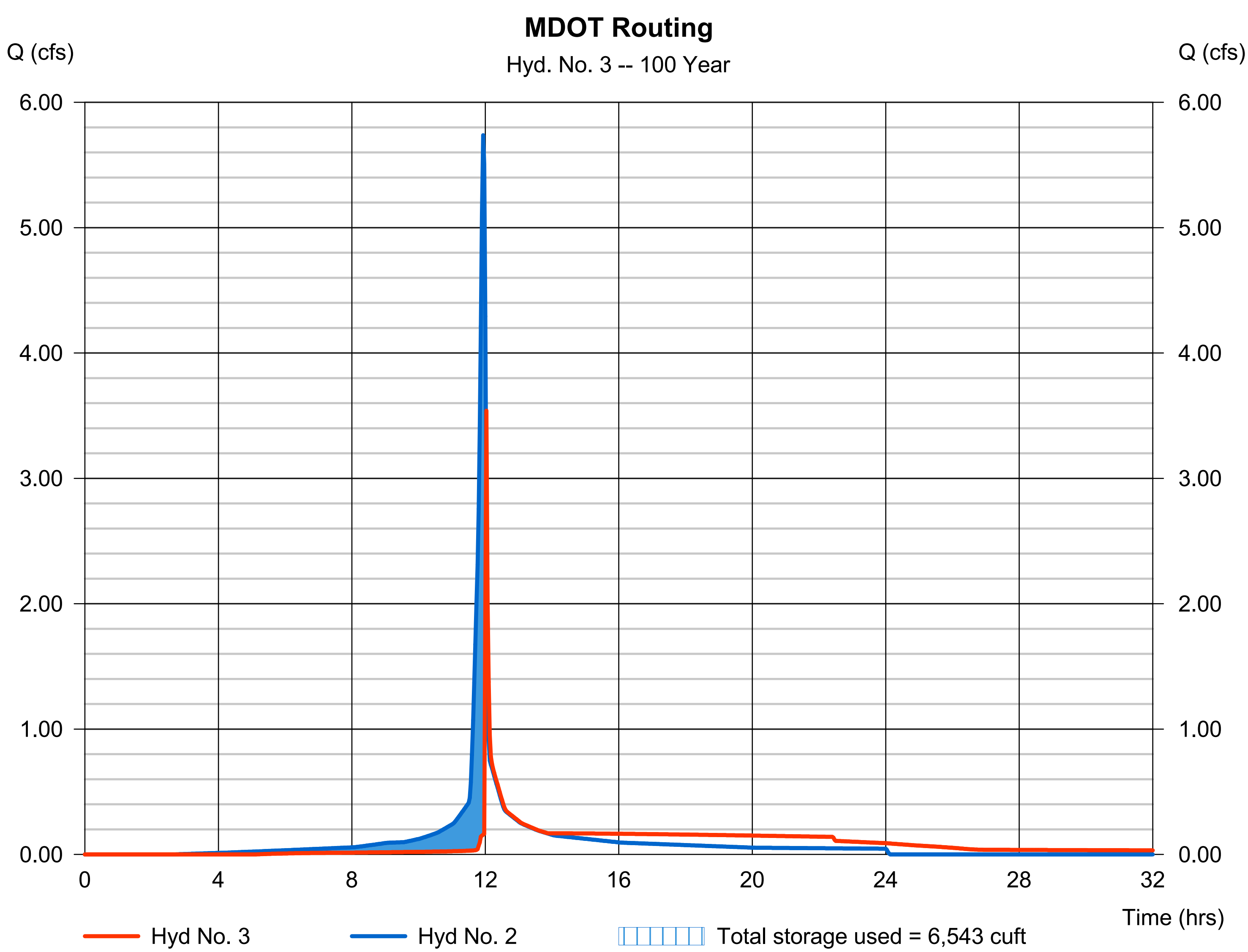
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Friday, 09 / 14 / 2018

## Hyd. No. 3

MDOT Routing

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 3.540 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 12.03 hrs |
| Time interval | = 2 min | Hyd. volume | = 12,615 cuft |
| Inflow hyd. No. | = 2 - Proposed Routed | Max. Elevation | = 663.03 ft |
| Reservoir name | = SC 740 Chambers | Max. Storage | = 6,543 cuft |

Storage Indication method used. Outflow includes exfiltration.



| PROJECT INFORMATION | |
|---|---|
| ENGINEERED PRODUCT MANAGER: | CHRIS OWEN<br>248-431-1361<br>CHRIS.OWEN@ADS-PIPE.COM |
| ADS SALES REP: | RANDY NOSEK<br>810-348-8914<br>RANDY.NOSEK@ADS-PIPE.COM |
| PROJECT NO: | S085845 |

ADVANCED DRAINAGE SYSTEMS, INC.

# TACO BELL

## WESTLAND, MI

## STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740 OR SC-310.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. 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.
5. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418-16 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITYAND THEY SHALL BE TESTED AT A RATE OF ONE (1) TEST PER SHIFT, BUT NOT TO EXCEED 260 PIECES OF CHAMBER (7' LONG EACH PIECE) OR END CAPS BY WAYNE COUNTY OR AN INDEPENDENT THIRD PARTY.
9. A WAYNE COUNTY OR AN INDPENDENT THIRD PARTY CERTIFICATION SHALL BE PROVIDED WITH EACH TESTED SHIPMENT.

**A WAYNE COUNTY PERMIT ENGINEER/INSPECTOR MUST OBSERVE INSTALLATION OF THE UNDERGROUND DETENTION SYSTEM. CONTACT WAYNE COUNT PERMIT OFFICE AT (734) 595-6504 X 2009.**

## IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310/SC-740 SYSTEM

1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-780 CONSTRUCTION GUIDE".
3. 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.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. 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

1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. 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 THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY 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

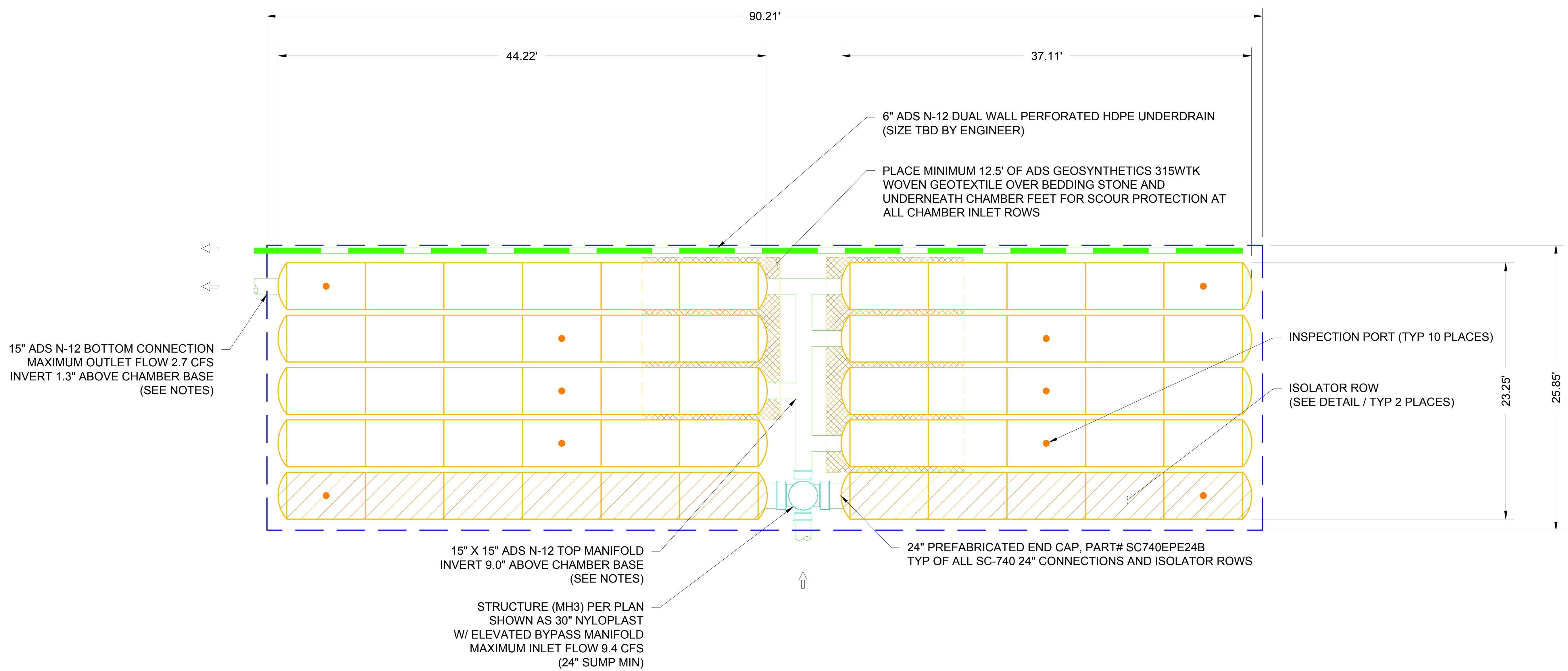
| | |
|---|---|
| 55 | STORMTECH SC-740 CHAMBERS |
| 20 | STORMTECH SC-740 END CAPS |
| 6 | STONE ABOVE (in) |
| 6 | STONE BELOW (in) |
| 25 | % STONE VOID |
| **3936** | **INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)** |
| 2332 | SYSTEM AREA (ft²) |
| 232 | SYSTEM PERIMETER (ft) |

## PROPOSED ELEVATIONS

| | |
|---|---|
| 668.40 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED) |
| 662.40 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC) |
| 661.90 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC) |
| 661.90 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT) |
| 661.90 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT) |
| 660.90 | TOP OF STONE |
| 660.40 | TOP OF SC-740 CHAMBER |
| 658.65 | 15" TOP MANIFOLD INVERT |
| 657.91 | 24" ISOLATOR ROW CONNECTION INVERT |
| 657.90 | BOTTOM OF SC-740 CHAMBER |
| 657.40 | UNDERDRAIN INVERT |
| 657.40 | BOTTOM OF STONE |

## 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.
- WAYNE COUNTY OR THIRD INDEPENDENT PARTY CERTIFICATION SHALL BE PROVIDED WITH EACH TESTED SHIPMENT.




TACO BELL
WESTLAND, MI

DATE: 05-18-18 DRAWN: SMQ
PROJECT #: S085845 CHECKED: CLD

| REV | DWN | CKD | DESCRIPTION |
|---|---|---|---|

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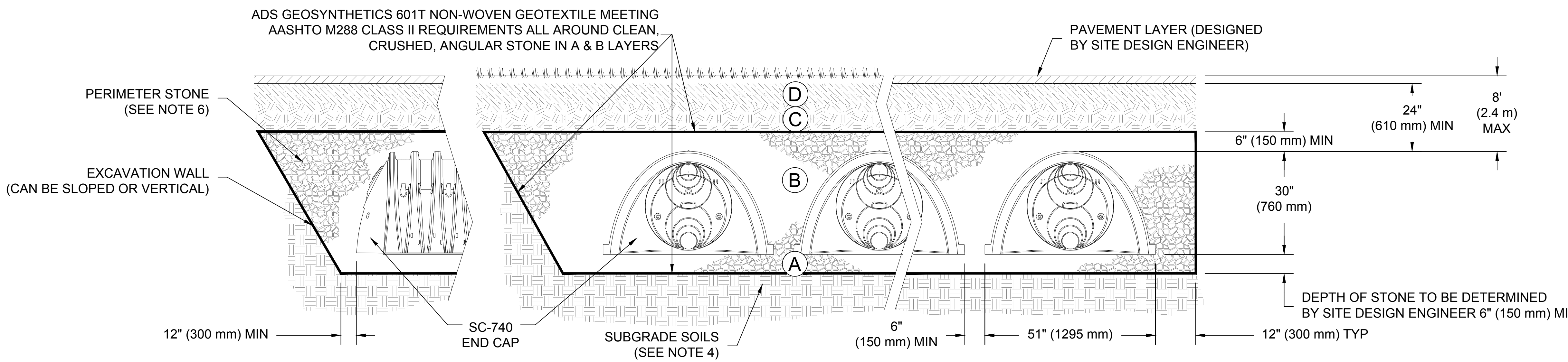
4640 TRUEMAN BLVD
HILLIARD, OH 43026

0 10' 20'

# ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

| MATERIAL LOCATION | | DESCRIPTION | AASHTO MATERIAL CLASSIFICATIONS | COMPACTION / DENSITY REQUIREMENT |
|---|---|---|---|---|
| D | **FINAL FILL:** 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 | **INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 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.<br><br>MOST PAVEMENT SUBGRADE MATERIALS CAN BE USED IN LIEU OF THIS LAYER. | N/A | BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% MAX UNIT WEIGHT (SEE NOTES). ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN). |
| B | **EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE. | CLEAN, CRUSHED, ANGULAR STONE, NOMINAL DISTRIBUTION SIZE ¾ - 2" (19 mm - 51 mm) | 4AA, 6A, 6AA, WAYNE COUNTY 3" X 1" | NO COMPACTION REQUIRED. THE MAXIMUM UNIT WEIGHT SHALL BE DETERMINED MY MICHIGAN CONE OR AASHTO T-180. |
| A | **FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER. | CLEAN, CRUSHED, ANGULAR STONE, NOMINAL DISTRIBUTION SIZE ¾ - 2" (19 MM - 51 MM) | 4AA, 6A, 6AA, WAYNE COUNTY 3" X 1" | PLATE COMPACT OR ROLL TO ACHIEVE A 95% MAX UNIT WEIGHT (SEE NOTES). |

PLEASE NOTE:
1. THE LISTED MDOT DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR 6A STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR MDOT 6A STONE".
2. AS AN ALTERNATE TO PROCTOR TESTING AND FIELD DENSITY MEASUREMENTS ON OPEN GRADED STONE, STORMTECH COMPACTION REQUIREMENTS ARE MET FOR "A" LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (229 mm) (MAX.) LIFTS USING TWO FULL PASSES WITH AN APPROPRIATE COMPACTOR ONE TEST PER LIFT OF BACKFILL PER 200 LINEAL FEET OR LESS OF TRENCH.




## NOTES:

1. SC-740 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. 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.
5. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
6. 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.

TACO BELL
WESTLAND, MI

DATE: 05-18-18 DRAWN: SMQ
PROJECT #: S085845 CHECKED: CLD

| REV | DWN | CKD | DESCRIPTION |
|---|---|---|---|

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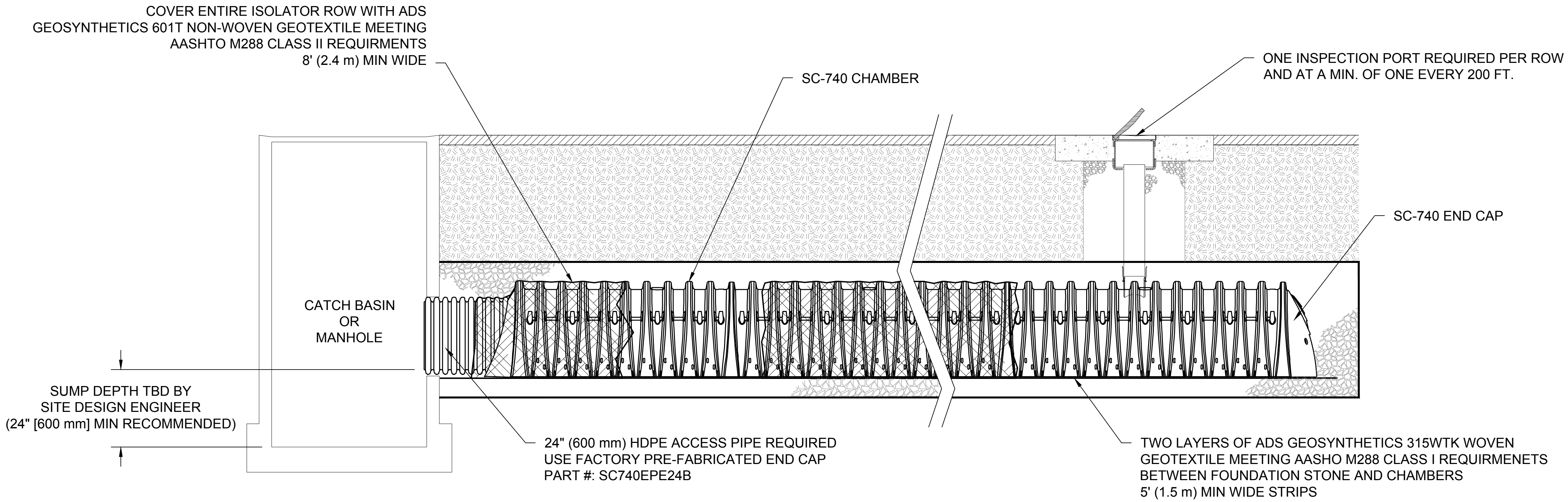



**SC-740 ISOLATOR ROW DETAIL**

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.

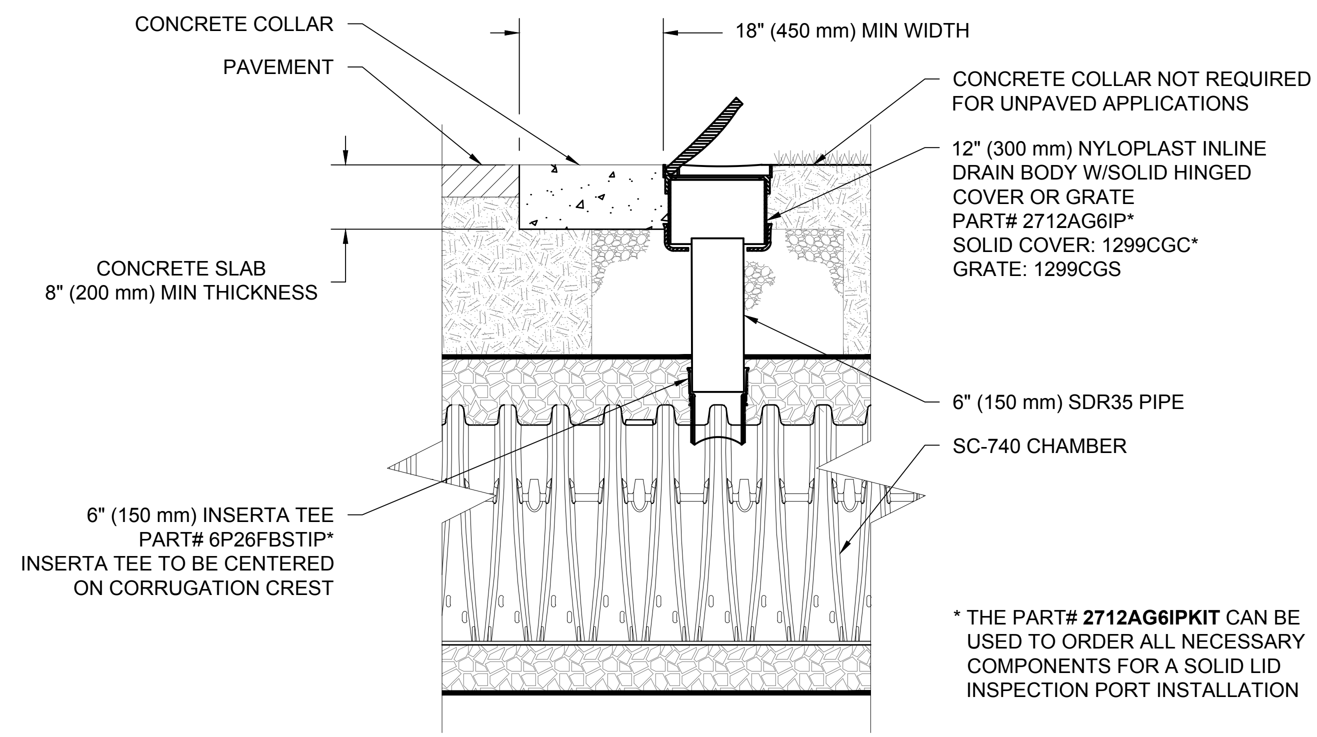
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

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.




* THE PART# **2712AG6IPKIT** CAN BE USED TO ORDER ALL NECESSARY COMPONENTS FOR A SOLID LID INSPECTION PORT INSTALLATION

**SC-740 6" INSPECTION PORT DETAIL**

NTS

TACO BELL
WESTLAND, MI

DATE: 05-18-18 | DRAWN: SMQ
PROJECT #: S085845 | CHECKED: CLD

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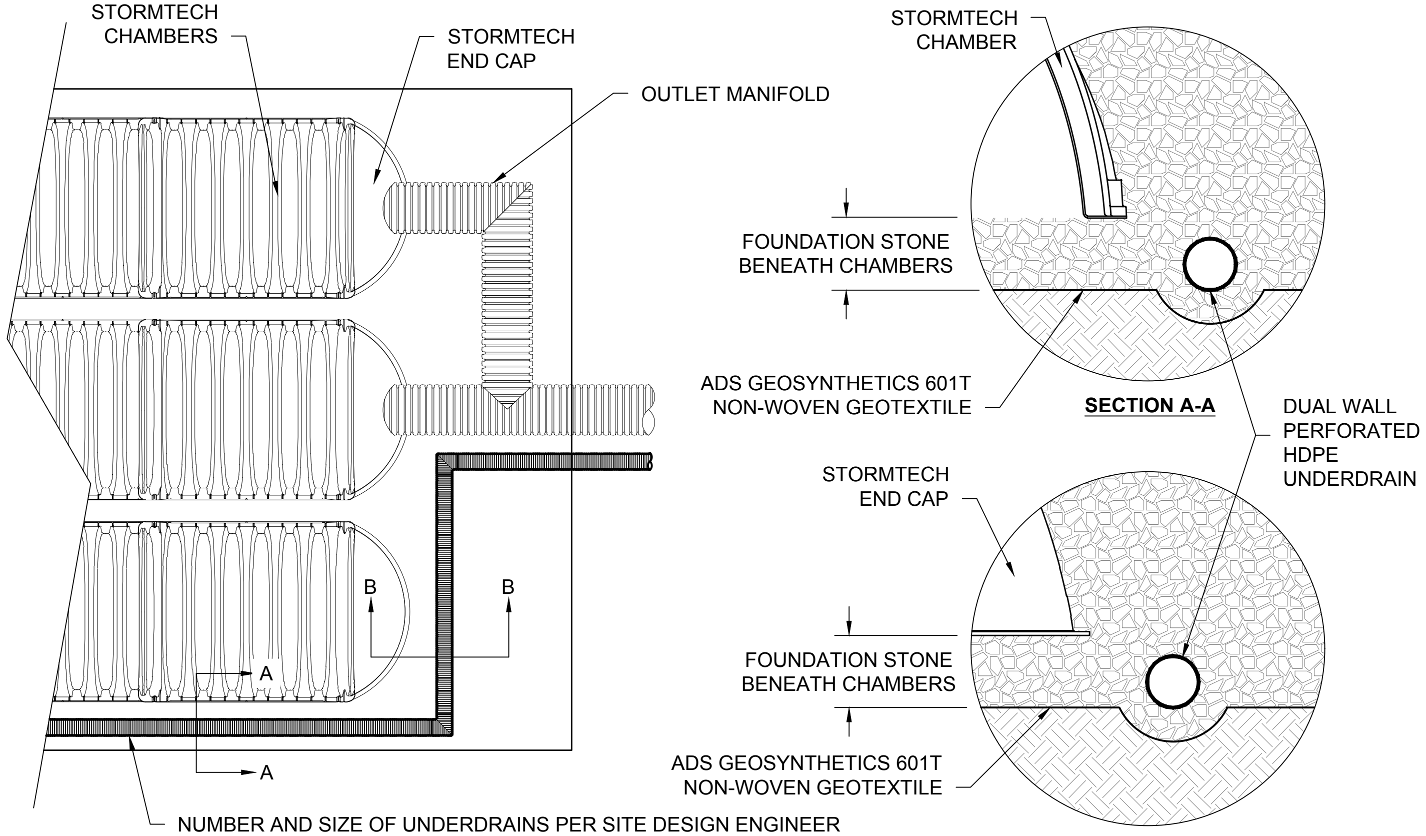
SHEET 4 OF 6

# UNDERDRAIN DETAIL

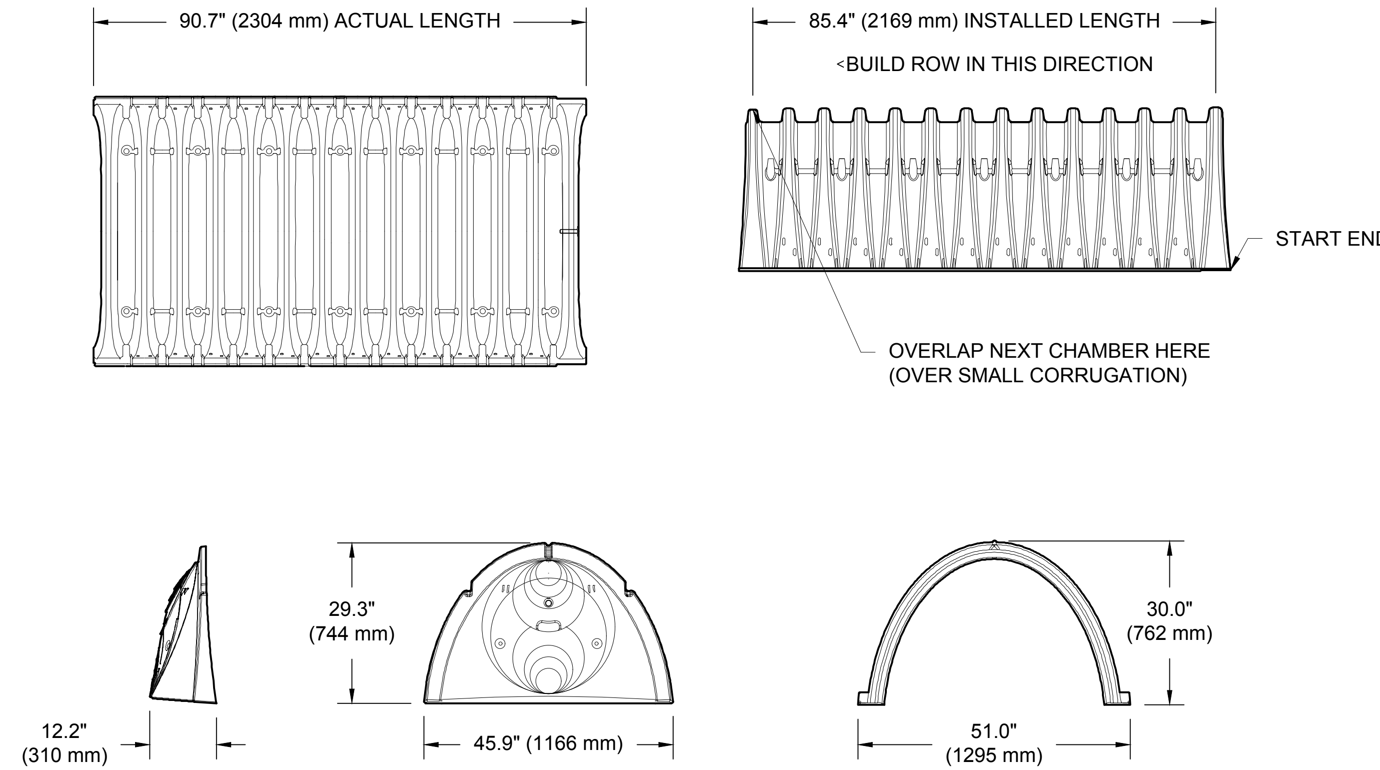
NTS




NUMBER AND SIZE OF UNDERDRAINS PER SITE DESIGN ENGINEER
4" (100 mm) TYP FOR SC-310 & SC-160LP SYSTEMS
6" (150 mm) TYP FOR SC-740, DC-780, MC-3500 & MC-4500 SYSTEMS

# SC-740 TECHNICAL SPECIFICATION

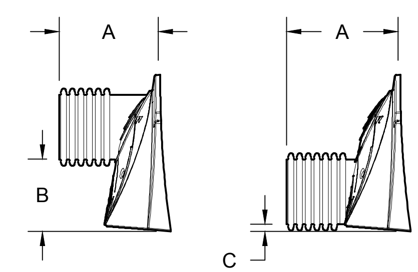
NTS




**NOMINAL CHAMBER SPECIFICATIONS**

| | | |
|---|---|---|
| SIZE (W X H X INSTALLED LENGTH) | 51.0" X 30.0" X 85.4" | (1295 mm X 762 mm X 2169 mm) |
| CHAMBER STORAGE | 45.9 CUBIC FEET | (1.30 m³) |
| MINIMUM INSTALLED STORAGE* | 74.9 CUBIC FEET | (2.12 m³) |
| WEIGHT | 75.0 lbs. | (33.6 kg) |

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS




PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

| PART # | STUB | A | B | C |
|---|---|---|---|---|
| SC740EPE06T / SC740EPE06TPC | 6" (150 mm) | 10.9" (277 mm) | 18.5" (470 mm) | --- |
| SC740EPE06B / SC740EPE06BPC | | | --- | 0.5" (13 mm) |
| SC740EPE08T /SC740EPE08TPC | 8" (200 mm) | 12.2" (310 mm) | 16.5" (419 mm) | --- |
| SC740EPE08B / SC740EPE08BPC | | | --- | 0.6" (15 mm) |
| SC740EPE10T / SC740EPE10TPC | 10" (250 mm) | 13.4" (340 mm) | 14.5" (368 mm) | --- |
| SC740EPE10B / SC740EPE10BPC | | | --- | 0.7" (18 mm) |
| SC740EPE12T / SC740EPE12TPC | 12" (300 mm) | 14.7" (373 mm) | 12.5" (318 mm) | --- |
| SC740EPE12B / SC740EPE12BPC | | | --- | 1.2" (30 mm) |
| SC740EPE15T / SC740EPE15TPC | 15" (375 mm) | 18.4" (467 mm) | 9.0" (229 mm) | --- |
| SC740EPE15B / SC740EPE15BPC | | | --- | 1.3" (33 mm) |
| SC740EPE18T / SC740EPE18TPC | 18" (450 mm) | 19.7" (500 mm) | 5.0" (127 mm) | --- |
| SC740EPE18B / SC740EPE18BPC | | | --- | 1.6" (41 mm) |
| SC740EPE24B* | 24" (600 mm) | 18.5" (470 mm) | --- | 0.1" (3 mm) |

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

TACO BELL
WESTLAND, MI

DATE: 05-18-18 DRAWN: SMQ
PROJECT #: S085845 CHECKED: CLD

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(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

| REV | DWN | CKD | DESCRIPTION |
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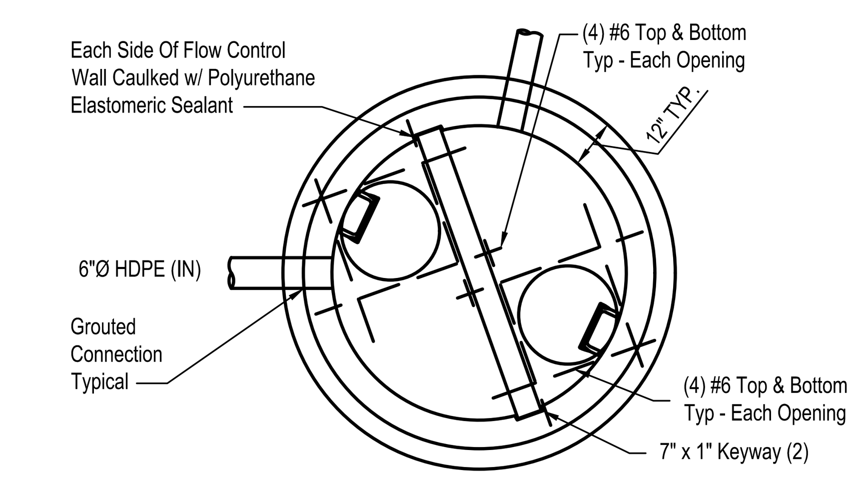
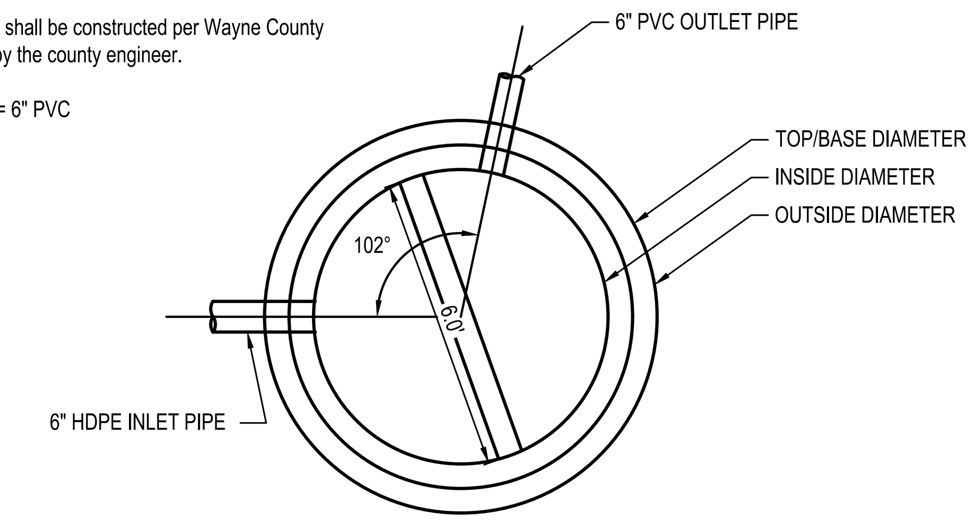
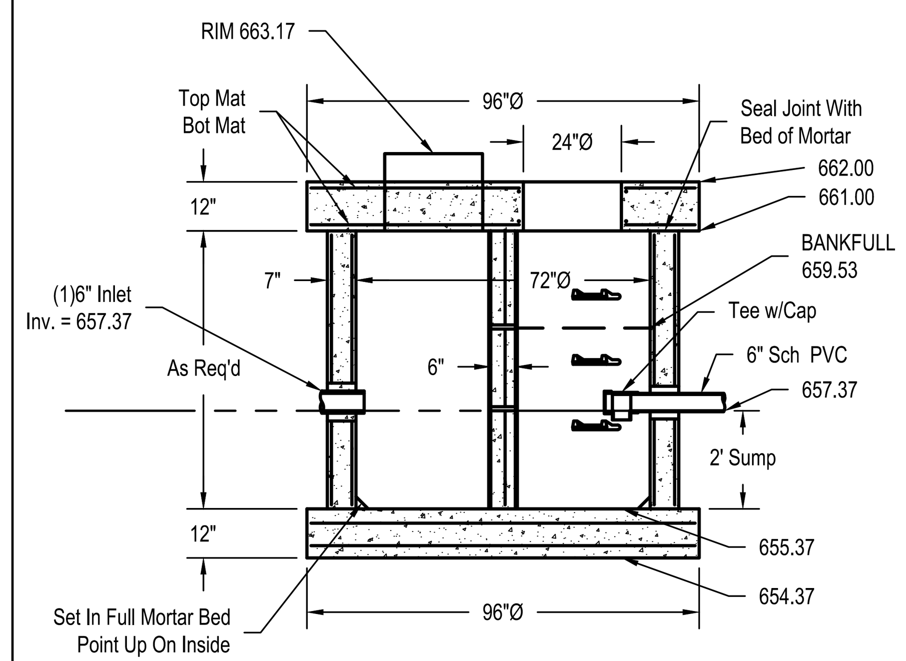
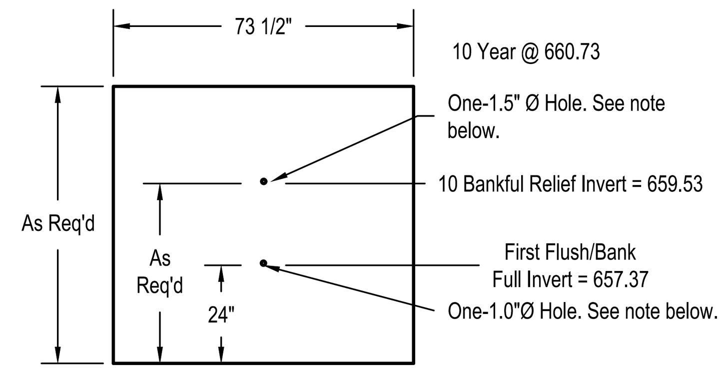



1. The manufacturer of the flow restrictor shall contact the Wayne County Testing Office at (734) 595-6504 Ext. 2015 at least 72 hours prior to fabrication to schedule inspection during fabrication.
2. The outlet control structure shall be constructed per Wayne County detail FR-1 or as directed by the county engineer.
3. Inlet = 12" HDPE & Outlet = 6" PVC



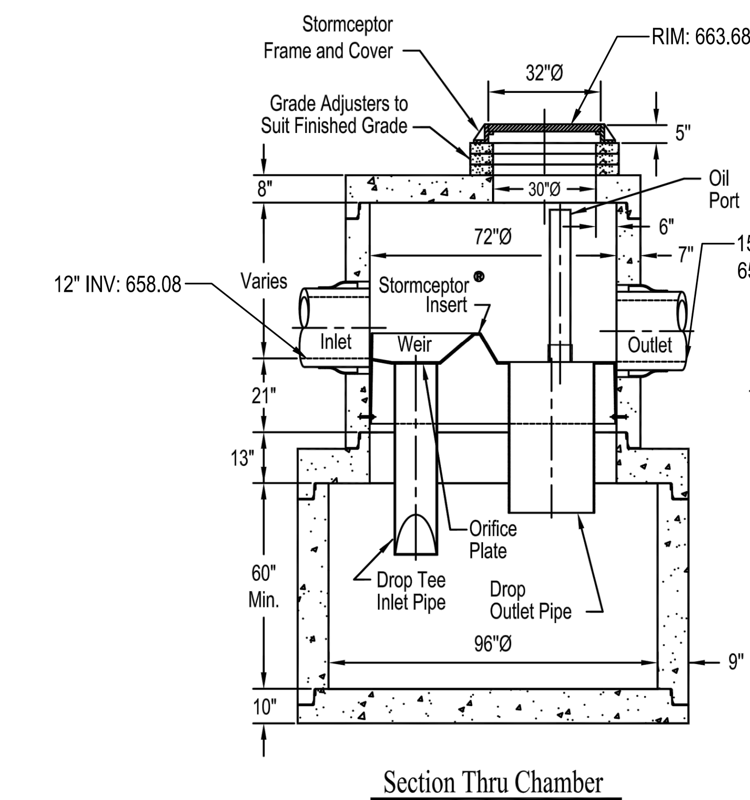



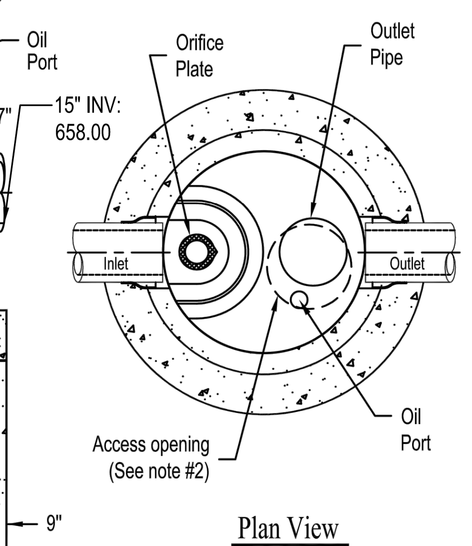

Note:
Contractor shall install 1" dia. PVC pipe through center wall at the elevations shown to allow for the relief of stormwater. Contractor shall install a down-turn elbow on the inlet side of the wall for plugging protection.

## OUTLET CONTROL STRUCTURE (MH 1)

N.T.S.

## STC 2400 Precast Concrete Stormceptor®
## (2400 U.S. Gallon Capacity)

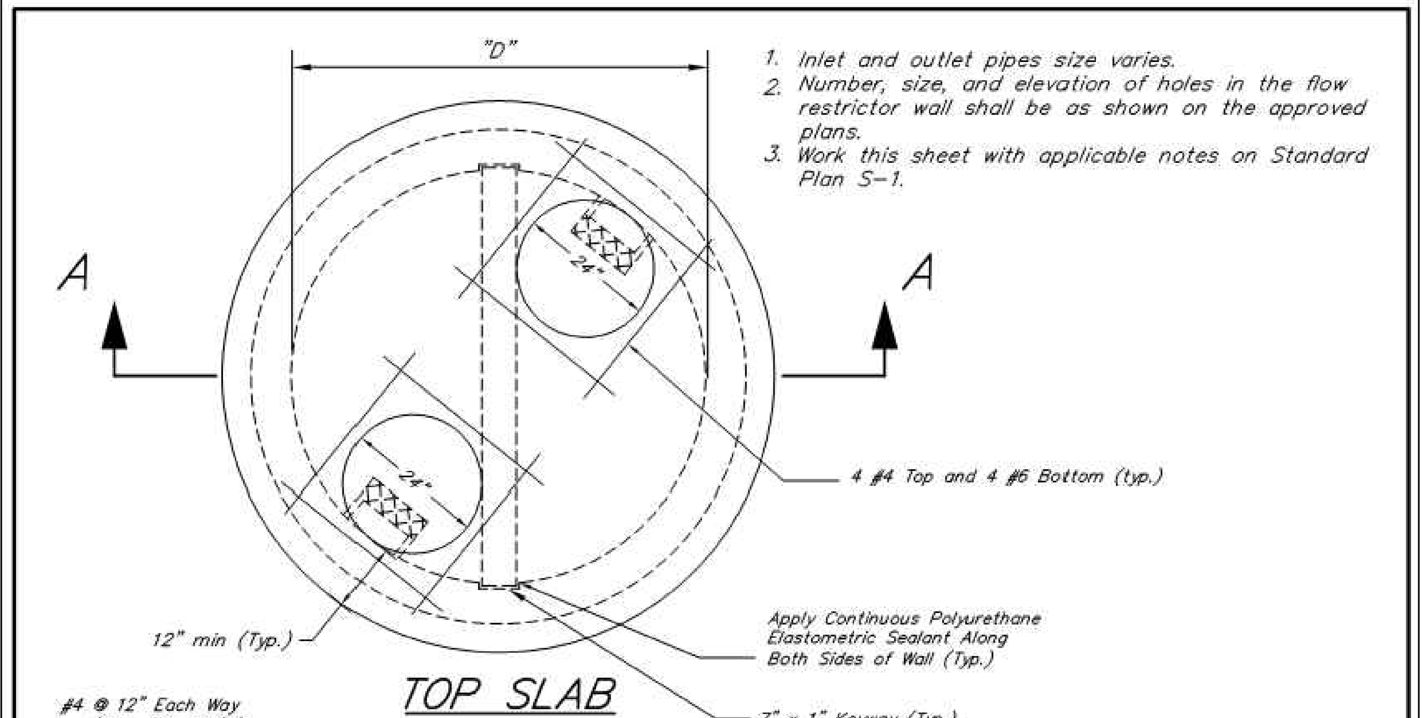


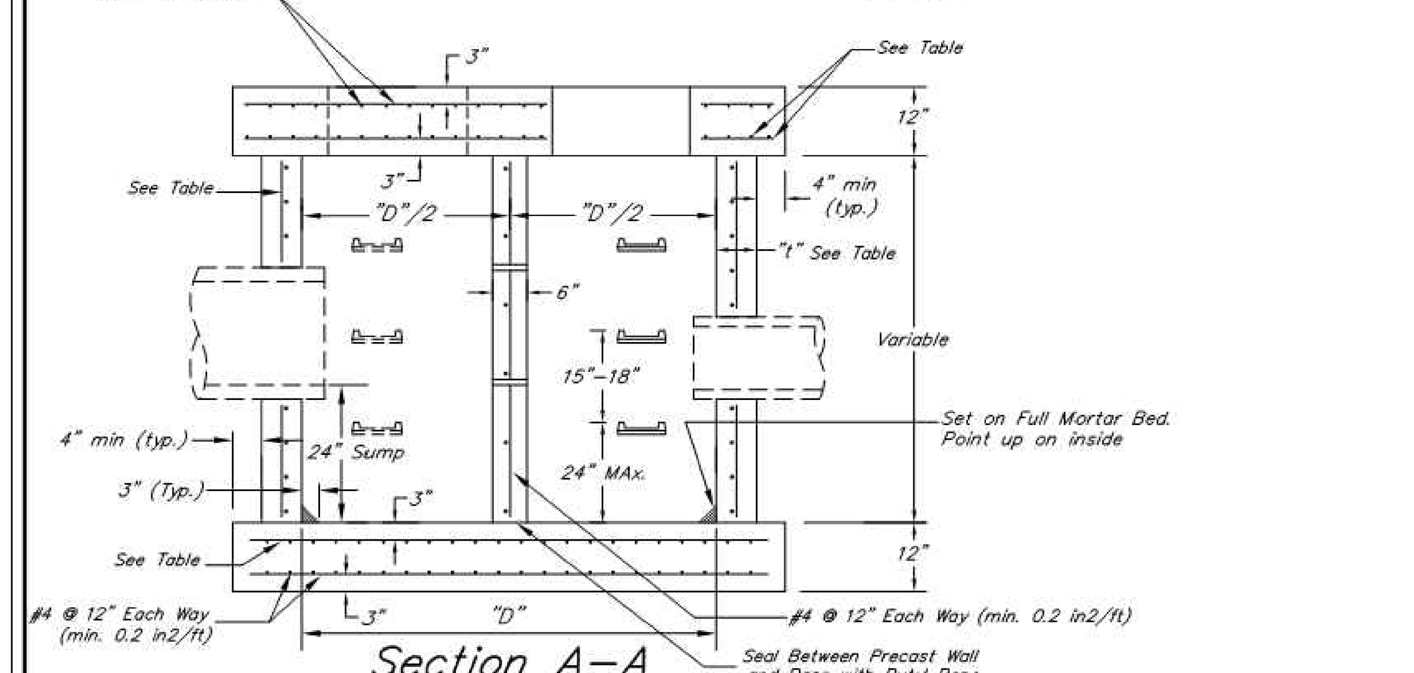

NOTE:
THE STORMCEPTOR STRUCTURE MUST BE FABRICATED AS PER SHOP DRAWINGS THAT HAVE BEEN APPROVED BY WAYNE COUNTY. THE MANUFACTURER MUST CONTACT WAYNE COUNTY TESTING OFFICE AT (734) 595-6504 x2015 AT LEAST 3 WORKING DAYS PRIOR TO FABRICATION TO SCHEDULE INSPECTION DURING FABRICATION.

Notes:
1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #5753115, #5849181, #6068765, #6371690, #7582216, #7666303.
4. Contact a Concrete Pipe Division representative for further details not listed on this drawing.

Rinker 031




1. Inlet and outlet pipes size varies.
2. Number, size, and elevation of holes in the flow restrictor wall shall be as shown on the approved plans.
3. Work this sheet with applicable notes on Standard Plan S-1.




| STRUCTURE DIAMETER "D" | TOP SLAB REINFORCEMENT (BOTTOM LAYER) | | BOTTOM SLAB REINFORCEMENT (TOP LAYER) | | WALL | |
|---|---|---|---|---|---|---|
| | BAR SIZE AND SPACING (E/W) | STEEL AREA IN2/FT | BAR SIZE AND SPACING (E/W) | STEEL AREA IN2/FT | THICKNESS "t" | STEEL AREA IN2/FT |
| 72" | #6 @ 10" | 0.53 | #5 @ 12" | 0.31 | 7" | 0.24 |
| 84" | #6 @ 9" | 0.59 | #4 @ 6" | 0.40 | 7" | 0.24 |
| 96" | #6 @ 8" | 0.66 | #6 @ 12" | 0.44 | 8" | 0.30 |

## FLOW RESTRICTOR WITH NO OVER FLOW

REVISION DATE:

DIRECTOR OF ENGINEERING

DIVISION PERMIT ENGINEER

WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES
ENGINEERING DIVISION/PERMIT OFFICE
PERMIT STANDARDS

## PRECAST FLOW RESTRICTOR STRUCTURE

SCALE: NOT TO SCALE

FR-1

SHEET 1 OF 1

NOTE: THIS IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL SIGNED COPY FOR PUBLICATION IS KEPT ON FILE AT THE WAYNE COUNTY ENGINEERING OFFICES.

### 10. Installation

The installation of the concrete Stormceptor should conform in general to state highway, or local specifications for the installation of manholes. Selected sections of a general specification that are applicable are summarized in the following sections.

#### 10.1. Excavation

Excavation for the installation of the Stormceptor should conform to state highway, or local specifications. Topsoil removed during the excavation for the Stormceptor should be stockpiled in designated areas and should not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the Stormceptor should conform to state highway or local specifications.

The Stormceptor should not be installed on frozen ground. Excavation should extend a minimum of 12 inches (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

In areas with a high water table, continuous dewatering may be required to ensure that the excavation is stable and free of water.

#### 10.2. Backfilling

Backfill material should conform to state highway or local specifications. Backfill material should be placed in uniform layers not exceeding 12 inches (300mm) in depth and compacted to state highway or local specifications.

### 11. Stormceptor Construction Sequence

The concrete Stormceptor is installed in sections in the following sequence:

1. Aggregate base
2. Base slab
3. Lower chamber sections
4. Upper chamber section with fiberglass insert
5. Connect inlet and outlet pipes
6. Assembly of fiberglass insert components (drop tee, riser pipe, oil cleanout port and orifice plate
7. Remainder of upper chamber
8. Frame and access cover

The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

Adjustment of the Stormceptor can be performed by lifting the upper sections free of the excavated area, re-leveling the base and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary. Once the Stormceptor has been constructed, any lift holes must be plugged with mortar.

### 12. Maintenance

#### 12.1. Health and Safety

The Stormceptor System has been designed considering safety first. It is recommended that confined space entry protocols be followed if entry to the unit is required. In addition, the fiberglass insert has the following health and safety features:

- Designed to withstand the weight of personnel
- A safety grate is located over the 24 inch (600 mm) riser pipe opening
- Ladder rungs can be provided for entry into the unit, if required

#### 12.2. Maintenance Procedures

Maintenance of the Stormceptor system is performed using vacuum trucks. No entry into the unit is required for maintenance (in most cases). The vacuum service industry is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean a Stormceptor will vary based on the size of unit and transportation distances.

The need for maintenance can be determined easily by inspecting the unit from the surface. The depth of oil in the unit can be determined by inserting a dipstick in the oil inspection/cleanout port.

Similarly, the depth of sediment can be measured from the surface without entry into the Stormceptor via a dipstick tube equipped with a ball valve. This tube would be inserted through the riser pipe. Maintenance should be performed once the sediment depth exceeds the guideline values provided in the Table 4.

**Table 4. Sediment Depths indicating required servicing.**

| Sediment Depths Indicating Required Servicing * | |
|---|---|
| Model | Sediment Depth inches (mm) |
| 450i | 8 (200) |
| 900 | 8 (200) |
| 1200 | 10 (250) |
| 1800 | 15 (381) |
| 2400 | 12 (300) |
| 3600 | 17 (430) |
| 4800 | 15 (380) |
| 6000 | 18 (460) |
| 7200 | 15 (381) |
| 11000 | 17 (380) |
| 13000 | 20 (500) |
| 16000 | 17 (380) |
| * based on 15% of the Stormceptor unit's total storage | |

Although annual servicing is recommended, the frequency of maintenance may need to be increased or reduced based on local conditions (i.e. if the unit is filling up with sediment more quickly than projected, maintenance may be required semi-annually; conversely once the site has stabilized maintenance may only be required every two or three years).

Oil is removed through the oil inspection/cleanout port and sediment is removed through the riser pipe. Alternatively oil could be removed from the 24 inches (600 mm) opening if water is removed from the lower chamber to lower the oil level below the drop pipes.

**The following procedures should be taken when cleaning out Stormceptor:**

1. Check for oil through the oil cleanout port
2. Remove any oil separately using a small portable pump
3. Decant the water from the unit to the sanitary sewer, if permitted by the local regulating authority, or into a separate containment tank
4. Remove the sludge from the bottom of the unit using the vacuum truck
5. Re-fill Stormceptor with water where required by the local jurisdiction

#### 12.3. Submerged Stormceptor

Careful attention should be paid to maintenance of the Submerged Stormceptor System. In cases where the storm drain system is submerged, there is a requirement to plug both the inlet and outlet pipes to economically clean out the unit.

#### 12.4. Hydrocarbon Spills

The Stormceptor is often installed in areas where the potential for spills is great. The Stormceptor System should be cleaned immediately after a spill occurs by a licensed liquid waste hauler.

#### 12.5. Disposal

Requirements for the disposal of material from the Stormceptor System are similar to that of any other stormwater Best Management Practice (BMP) where permitted. Disposal options for the sediment may range from disposal in a sanitary trunk sewer upstream of a sewage treatment plant, to disposal in a sanitary landfill site. Petroleum waste products collected in the Stormceptor (free oil/chemical/fuel spills) should be removed by a licensed waste management company.

#### 12.6. Oil Sheens

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (<10 mg/L). Stormceptor will remove over 98% of all free oil spills from storm sewer systems for dry weather or frequently occurring runoff events.

The appearance of a sheen at the outlet with high influent oil concentrations does not mean the unit is not working to this level of removal. In addition, if the influent oil is emulsified the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified conditions.

GPD GROUP
Professional Corporation
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 Fax: 330.572.2102

ISSUED FOR BID 07/30/18

| | |
|---|---|
| CONTRACT DATE: | XX.XX.XX |
| BUILDING TYPE: | T40M-O |
| PLAN VERSION: | JAN 18 |
| SITE NUMBER: | 312720/446548 |
| STORE NUMBER: | 2017088.72 |

TACO BELL

20779 13 MILE RD.
WESTLAND, MI

MODERN EXPLORER
T40 - OPEN KITCHEN

**OUTLET STRUCTURE DETAILS**

**C-145**

StormTech®

Detention • Retention • Water Quality

An ADS company

# Isolator® Row O&M Manual

SC-740

MC-3500

MC-4500

THE MOST ***ADVANCED*** NAME IN WATER MANAGEMENT SOLUTIONS™

ADS®

# THE ISOLATOR® ROW

**INTRODUCTION**
An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

**THE ISOLATOR ROW**
The Isolator Row is a row of StormTech chambers, either SC-160LP, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160LP, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

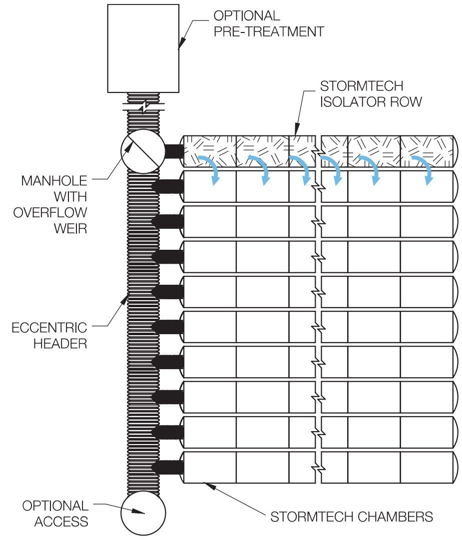
The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

*Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.*

**Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.**

**StormTech Isolator Row with Overflow Spillway** (not to scale)



# ISOLATOR ROW INSPECTION/MAINTENANCE

## INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

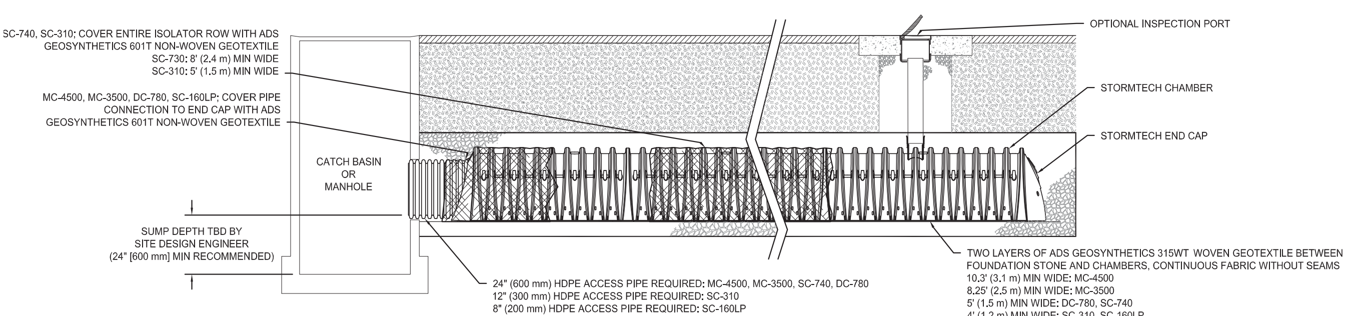
## MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

### **StormTech Isolator Row** (not to scale)

*Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.*




ADS

# ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

**STEP 1**

Inspect Isolator Row for sediment.

A) Inspection ports (if present)
- i. Remove lid from floor box frame
- ii. Remove cap from inspection riser
- iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
- iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Rows
- i. Remove cover from manhole at upstream end of Isolator Row
- ii. Using a flashlight, inspect down Isolator Row through outlet pipe
  1. Mirrors on poles or cameras may be used to avoid a confined space entry
  2. Follow OSHA regulations for confined space entry if entering manhole
- iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

**STEP 2**

Clean out Isolator Row using the JetVac process.

A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

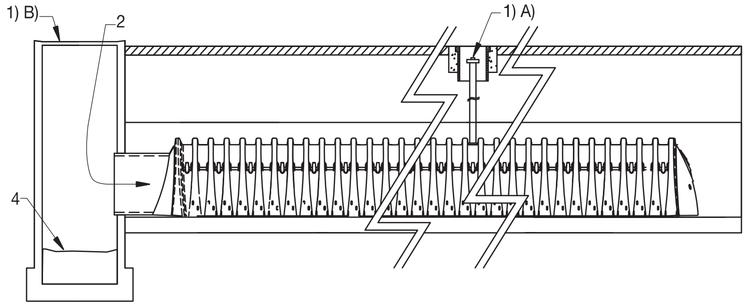
C) Vacuum manhole sump as required

**STEP 3**

Replace all caps, lids and covers, record observations and actions.

**STEP 4**

Inspect & clean catch basins and manholes upstream of the StormTech system.




## SAMPLE MAINTENANCE LOG

| Date | Stadia Rod Readings: Fixed point to chamber bottom (1) | Stadia Rod Readings: Fixed point to top of sediment (2) | Sediment Depth (1)–(2) | Observations/Actions | Inspector |
|---|---|---|---|---|---|
| 3/15/11 | 6.3 ft | none | | New installation. Fixed point is CI frame at grade | DJM |
| 9/24/11 | | 6.2 | 0.1 ft | Some grit felt | SM |
| 6/20/13 | | 5.8 | 0.5 ft | Mucky feel, debris visible in manhole and in Isolator Row, maintenance due | NV |
| 7/7/13 | 6.3 ft | | 0 | System jetted and vacuumed | DJM |



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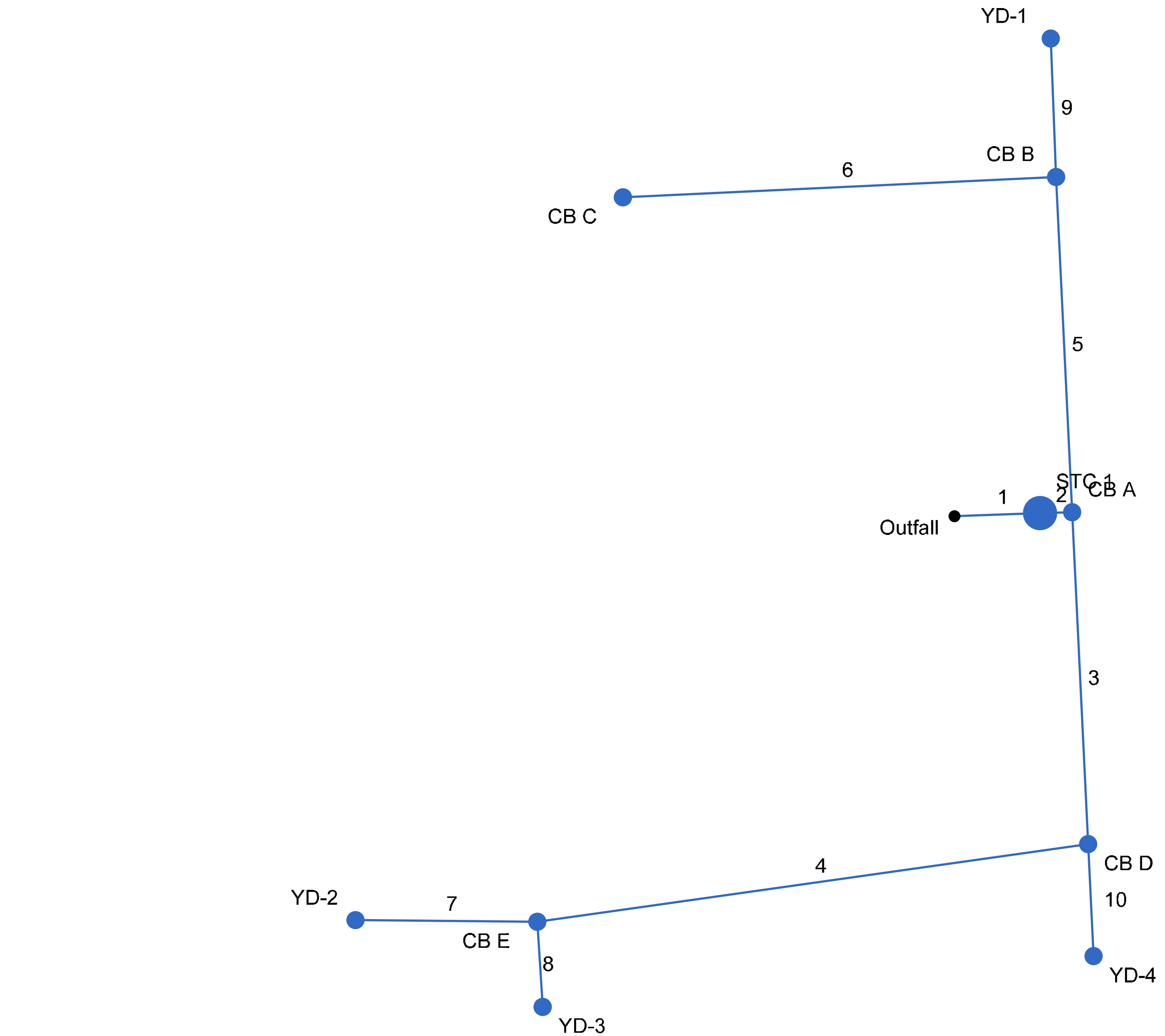
1-800-821-6710 www.ads-pipe.com

**Section 5**

# Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan




| Project File: Stormsewer_for plans.stm | Number of lines: 10 | Date: 6/18/2018 |
| --- | --- | --- |

Storm Sewers v10.514

# Storm Sewer Inventory Report



| Line No. | Alignment | | | | Flow Data | | | | Physical Data | | | | | | | | Line ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dnstr Line No. | Line Length (ft) | Defl angle (deg) | Junc Type | Known Q (cfs) | Drng Area (ac) | Runoff Coeff (C) | Inlet Time (min) | Invert El Dn (ft) | Line Slope (%) | Invert El Up (ft) | Line Size (in) | Line Shape | N Value (n) | J-Loss Coeff (K) | Inlet/ Rim El (ft) | |
| 10 | 3 | 21.000 | 0.089 | Genr | 0.00 | 0.04 | 0.25 | 15.0 | 659.04 | 0.71 | 659.19 | 8 | Cir | 0.012 | 1.00 | 661.80 | P-223 (1) (2) |
| 9 | 5 | 26.000 | 0.089 | Genr | 0.00 | 0.08 | 0.25 | 15.0 | 659.29 | 4.77 | 660.53 | 8 | Cir | 0.012 | 1.00 | 663.20 | P-223 (1) (3) |
| 8 | 4 | 16.000 | -84.274 | Genr | 0.00 | 0.04 | 0.25 | 15.0 | 659.62 | 0.69 | 659.73 | 8 | Cir | 0.012 | 1.00 | 662.00 | P-223 (1) (1) |
| 7 | 4 | 34.000 | 8.572 | Genr | 0.00 | 0.04 | 0.25 | 15.0 | 659.62 | 0.71 | 659.86 | 8 | Cir | 0.012 | 1.00 | 662.00 | P-223 (1) |
| 6 | 5 | 81.075 | -90.000 | Genr | 0.00 | 0.12 | 0.64 | 15.0 | 659.36 | 1.00 | 660.17 | 6 | Cir | 0.012 | 1.00 | 663.00 | P-220 |
| 5 | 2 | 62.914 | -91.348 | Genr | 0.00 | 0.14 | 0.78 | 15.0 | 658.50 | 1.10 | 659.19 | 8 | Cir | 0.012 | 1.50 | 663.00 | P-219 |
| 4 | 3 | 104.000 | 84.663 | Genr | 0.00 | 0.10 | 0.95 | 15.0 | 658.81 | 0.78 | 659.62 | 12 | Cir | 0.012 | 1.49 | 663.20 | P-222 |
| 3 | 2 | 62.306 | 88.652 | Genr | 0.00 | 0.13 | 0.87 | 15.0 | 658.27 | 0.71 | 658.71 | 12 | Cir | 0.012 | 1.49 | 662.79 | P-221 |
| 2 | 1 | 6.600 | 0.815 | Genr | 0.00 | 0.17 | 0.84 | 15.0 | 658.08 | 1.36 | 658.17 | 12 | Cir | 0.012 | 1.50 | 662.84 | P-218 |
| 1 | End | 15.863 | -2.171 | MH | 0.00 | 0.00 | 0.00 | 15.0 | 657.85 | 0.95 | 658.00 | 15 | Cir | 0.012 | 0.15 | 663.62 | P-217 |

Project File: Stormsewer_for plans.stm | Number of lines: 10 | Date: 6/18/2018

# Structure Report



| Struct No. | Structure ID | Junction Type | Rim Elev (ft) | Structure | | | Line Out | | | Line In | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Shape | Length (ft) | Width (ft) | Size (in) | Shape | Invert (ft) | Size (in) | Shape | Invert (ft) |
| 10 | YD-4 | Generic | 661.80 | Cir | 3.00 | 3.00 | 8 | Cir | 659.19 | | | |
| 9 | YD-1 | Generic | 663.20 | Cir | 3.00 | 3.00 | 8 | Cir | 660.53 | | | |
| 8 | YD-3 | Generic | 662.00 | Cir | 3.00 | 3.00 | 8 | Cir | 659.73 | | | |
| 7 | YD-2 | Generic | 662.00 | Cir | 3.00 | 3.00 | 8 | Cir | 659.86 | | | |
| 6 | CB C | Generic | 663.00 | Cir | 3.00 | 3.00 | 6 | Cir | 660.17 | | | |
| 5 | CB B | Generic | 663.00 | Cir | 3.00 | 3.00 | 8 | Cir | 659.19 | 6<br>8 | Cir<br>Cir | 659.36<br>659.29 |
| 4 | CB E | Generic | 663.20 | Cir | 3.00 | 3.00 | 12 | Cir | 659.62 | 8<br>8 | Cir<br>Cir | 659.62<br>659.62 |
| 3 | CB D | Generic | 662.79 | Cir | 3.00 | 3.00 | 12 | Cir | 658.71 | 12<br>8 | Cir<br>Cir | 658.81<br>659.04 |
| 2 | CB A | Generic | 662.84 | Cir | 3.00 | 3.00 | 12 | Cir | 658.17 | 12<br>8 | Cir<br>Cir | 658.27<br>658.50 |
| 1 | STC 1 | Manhole | 663.62 | Cir | 6.00 | 6.00 | 15 | Cir | 658.00 | 12 | Cir | 658.08 |

Project File: Stormsewer_for plans.stm | Number of Structures: 10 | Run Date: 6/18/2018

# Storm Sewer Summary Report



| Line No. | Line ID | Flow rate (cfs) | Line Size (in) | Line shape | Line length (ft) | Invert EL Dn (ft) | Invert EL Up (ft) | Line Slope (%) | HGL Down (ft) | HGL Up (ft) | Minor loss (ft) | HGL Junct (ft) | Dns Line No. | Junction Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | P-223 (1) (2) | 0.04 | 8 | Cir | 21.000 | 659.04 | 659.19 | 0.714 | 659.39 | 659.28 | 0.03 | 659.28 | 3 | Generic |
| 9 | P-223 (1) (3) | 0.09 | 8 | Cir | 26.000 | 659.29 | 660.53 | 4.769 | 659.63 | 660.66 | n/a | 660.66 j | 5 | Generic |
| 8 | P-223 (1) (1) | 0.04 | 8 | Cir | 16.000 | 659.62 | 659.73 | 0.687 | 659.90 | 659.82 | 0.03 | 659.82 | 4 | Generic |
| 7 | P-223 (1) | 0.04 | 8 | Cir | 34.000 | 659.62 | 659.86 | 0.706 | 659.90 | 659.95 | n/a | 659.95 j | 4 | Generic |
| 6 | P-220 | 0.33 | 6 | Cir | 81.075 | 659.36 | 660.17 | 0.999 | 659.63 | 660.46 | 0.12 | 660.46 | 5 | Generic |
| 5 | P-219 | 0.85 | 8 | Cir | 62.914 | 658.50 | 659.19 | 1.097 | 659.30 | 659.63 | n/a | 659.63 j | 2 | Generic |
| 4 | P-222 | 0.44 | 12 | Cir | 104.000 | 658.81 | 659.62 | 0.779 | 659.39 | 659.90 | n/a | 659.90 j | 3 | Generic |
| 3 | P-221 | 0.86 | 12 | Cir | 62.306 | 658.27 | 658.71 | 0.706 | 659.30 | 659.32 | 0.07 | 659.39 | 2 | Generic |
| 2 | P-218 | 2.07 | 12 | Cir | 6.600 | 658.08 | 658.17 | 1.363 | 659.11 | 659.13 | 0.17 | 659.30 | 1 | Generic |
| 1 | P-217 | 2.07 | 15 | Cir | 15.863 | 657.85 | 658.00 | 0.946 | 659.10 | 659.11 | 0.01 | 659.11 | End | Manhole |

| Project File: Stormsewer_for plans.stm | Number of lines: 10 | Run Date: 6/18/2018 |
|---|---|---|

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

# Storm Sewer Tabulation



| Station | | Len | Drng Area | | Rnoff coeff | Area x C | | Tc | | Rain (I) | Total flow | Cap full | Vel | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line | To Line | | Incr | Total | | Incr | Total | Inlet | Syst | | | | | Size | Slope | Dn | Up | Dn | Up | Dn | Up | |
| | | (ft) | (ac) | (ac) | (C) | | | (min) | (min) | (in/hr) | (cfs) | (cfs) | (ft/s) | (in) | (%) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | |
| 10 | 3 | 21.000 | 0.04 | 0.04 | 0.25 | 0.01 | 0.01 | 15.0 | 15.0 | 4.3 | 0.04 | 1.11 | 0.84 | 8 | 0.71 | 659.04 | 659.19 | 659.39 | 659.28 | 662.79 | 661.80 | P-223 (1) (2) |
| 9 | 5 | 26.000 | 0.08 | 0.08 | 0.25 | 0.02 | 0.02 | 15.0 | 15.0 | 4.3 | 0.09 | 2.86 | 1.11 | 8 | 4.77 | 659.29 | 660.53 | 659.63 | 660.66 | 663.00 | 663.20 | P-223 (1) (3) |
| 8 | 4 | 16.000 | 0.04 | 0.04 | 0.25 | 0.01 | 0.01 | 15.0 | 15.0 | 4.3 | 0.04 | 1.08 | 0.88 | 8 | 0.69 | 659.62 | 659.73 | 659.90 | 659.82 | 663.20 | 662.00 | P-223 (1) (1) |
| 7 | 4 | 34.000 | 0.04 | 0.04 | 0.25 | 0.01 | 0.01 | 15.0 | 15.0 | 4.3 | 0.04 | 1.10 | 0.88 | 8 | 0.71 | 659.62 | 659.86 | 659.90 | 659.95 | 663.20 | 662.00 | P-223 (1) |
| 6 | 5 | 81.075 | 0.12 | 0.12 | 0.64 | 0.08 | 0.08 | 15.0 | 15.0 | 4.3 | 0.33 | 0.61 | 2.96 | 6 | 1.00 | 659.36 | 660.17 | 659.63 | 660.46 | 663.00 | 663.00 | P-220 |
| 5 | 2 | 62.914 | 0.14 | 0.34 | 0.78 | 0.11 | 0.21 | 15.0 | 16.7 | 4.1 | 0.85 | 1.37 | 2.98 | 8 | 1.10 | 658.50 | 659.19 | 659.30 | 659.63 | 662.84 | 663.00 | P-219 |
| 4 | 3 | 104.000 | 0.10 | 0.18 | 0.95 | 0.10 | 0.12 | 15.0 | 19.6 | 3.8 | 0.44 | 3.40 | 1.73 | 12 | 0.78 | 658.81 | 659.62 | 659.39 | 659.90 | 662.79 | 663.20 | P-222 |
| 3 | 2 | 62.306 | 0.13 | 0.35 | 0.87 | 0.11 | 0.24 | 15.0 | 22.3 | 3.6 | 0.86 | 3.24 | 1.40 | 12 | 0.71 | 658.27 | 658.71 | 659.30 | 659.32 | 662.84 | 662.79 | P-221 |
| 2 | 1 | 6.600 | 0.17 | 0.86 | 0.84 | 0.14 | 0.59 | 15.0 | 23.1 | 3.5 | 2.07 | 4.50 | 2.66 | 12 | 1.36 | 658.08 | 658.17 | 659.11 | 659.13 | 663.62 | 662.84 | P-218 |
| 1 | End | 15.863 | 0.00 | 0.86 | 0.00 | 0.00 | 0.59 | 15.0 | 23.1 | 3.5 | 2.07 | 6.80 | 1.74 | 15 | 0.95 | 657.85 | 658.00 | 659.10 | 659.11 | 0.00 | 663.62 | P-217 |

Project File: Stormsewer_for plans.stm | Number of lines: 10 | Run Date: 6/18/2018

NOTES:Intensity = 148.29 / (Inlet time + 19.70) ^ 1.00; Return period =Yrs. 10 ; c = cir e = ellip b = box

# FL-DOT Report



Date: 6/18/2018
Frequency: 10 yrs
Proj: Stormsewer_for plans

Drainage Area: C1 = 0.2, C2 = 0.5, C3 = 0.9

| Line No | To Line | Type of struc | n - Value | Len (ft) | Drainage Area Incre-ment (ac) | Drainage Area Sub-Total (ac) | Drainage Area Sum CA | Time of conc (min) | Time of Flow in sect (min) | Inten (I) (in/hr) | Total CA | Add Q / Total Flow / Q (cfs) | Inlet elev (ft) | Elev of HGL / Elev of Crown / Elev of Invert Up (ft) | Down (ft) | Fall (ft) | Rise / Span / Size (in) | HGL / Pipe / Slope (%) | ADD / Full Flow Vel (ft/s) | Cap (cfs) | Line description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 3 | Genr | 0.012 | 21.000 | 0.00 | 0.00 | 0.00 | 15.00 | 2.81 | 4.35 | 0.01 | 0.00 | 661.80 | 659.28 | 659.39 | -0.10 | 8 | -0.48 | 0.84 | 0.04 | P-223 (1) (2) |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.04 | | 659.86 | 659.71 | | 8 | 0.71 | 3.17 | 1.11 | |
| --- | --- | | | | 0.00 | 0.00 | 0.00 | | | | | | | 659.19 | 659.04 | 0.15 | Cir | | | | |
| 9 | 5 | Genr | 0.012 | 26.000 | 0.00 | 0.00 | 0.00 | 15.00 | 1.74 | 4.35 | 0.02 | 0.00 | 663.20 | 660.66 | 659.63 | 1.04 | 8 | 3.99 | 1.11 | 0.09 | P-223 (1) (3) |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.09 | | 661.20 | 659.96 | | 8 | 4.77 | 8.19 | 2.86 | |
| --- | --- | | | | 0.00 | 0.00 | 0.00 | | | | | | | 660.53 | 659.29 | 1.24 | Cir | | | | |
| 8 | 4 | Genr | 0.012 | 16.000 | 0.00 | 0.00 | 0.00 | 15.00 | 2.14 | 4.35 | 0.01 | 0.00 | 662.00 | 659.82 | 659.90 | -0.07 | 8 | -0.44 | 0.88 | 0.04 | P-223 (1) (1) |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.04 | | 660.40 | 660.29 | | 8 | 0.69 | 3.11 | 1.08 | |
| --- | --- | | | | 0.00 | 0.00 | 0.00 | | | | | | | 659.73 | 659.62 | 0.11 | Cir | | | | |
| 7 | 4 | Genr | 0.012 | 34.000 | 0.00 | 0.00 | 0.00 | 15.00 | 4.55 | 4.35 | 0.01 | 0.00 | 662.00 | 659.95 | 659.90 | 0.06 | 8 | 0.17 | 0.88 | 0.04 | P-223 (1) |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.04 | | 660.53 | 660.29 | | 8 | 0.71 | 3.15 | 1.10 | |
| --- | --- | | | | 0.00 | 0.00 | 0.00 | | | | | | | 659.86 | 659.62 | 0.24 | Cir | | | | |
| 6 | 5 | Genr | 0.012 | 81.075 | 0.00 | 0.00 | 0.00 | 15.00 | 0.79 | 4.35 | 0.08 | 0.00 | 663.00 | 660.46 | 659.63 | 0.84 | 6 | 1.03 | 2.96 | 0.33 | P-220 |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.33 | | 660.67 | 659.86 | | 6 | 1.00 | 3.09 | 0.61 | |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | | | 660.17 | 659.36 | 0.81 | Cir | | | | |
| 5 | 2 | Genr | 0.012 | 62.914 | 0.00 | 0.00 | 0.00 | 16.74 | 0.41 | 4.14 | 0.21 | 0.00 | 663.00 | 659.63 | 659.30 | 0.33 | 8 | 0.53 | 2.98 | 0.85 | P-219 |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.85 | | 659.86 | 659.17 | | 8 | 1.10 | 3.93 | 1.37 | |
| --- | --- | | | | 0.00 | 0.00 | 0.00 | | | | | | | 659.19 | 658.50 | 0.69 | Cir | | | | |
| 4 | 3 | Genr | 0.012 | 104.000 | 0.00 | 0.00 | 0.00 | 19.55 | 2.74 | 3.84 | 0.12 | 0.00 | 663.20 | 659.90 | 659.39 | 0.51 | 12 | 0.49 | 1.73 | 0.44 | P-222 |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.44 | | 660.62 | 659.81 | | 12 | 0.78 | 4.34 | 3.40 | |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | | | 659.62 | 658.81 | 0.81 | Cir | | | | |
| 3 | 2 | Genr | 0.012 | 62.306 | 0.00 | 0.00 | 0.00 | 22.29 | 0.81 | 3.60 | 0.24 | 0.00 | 662.79 | 659.32 | 659.30 | 0.02 | 12 | 0.03 | 1.40 | 0.86 | P-221 |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 0.86 | | 659.71 | 659.27 | | 12 | 0.71 | 4.13 | 3.24 | |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | | | 658.71 | 658.27 | 0.44 | Cir | | | | |
| 2 | 1 | Genr | 0.012 | 6.600 | 0.00 | 0.00 | 0.00 | 23.09 | 0.03 | 3.53 | 0.59 | 0.00 | 662.84 | 659.13 | 659.11 | 0.01 | 12 | 0.22 | 2.66 | 2.07 | P-218 |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 2.07 | | 659.17 | 659.08 | | 12 | 1.36 | 5.74 | 4.50 | |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | | | 658.17 | 658.08 | 0.09 | Cir | | | | |
| 1 | End | MH | 0.012 | 15.863 | 0.00 | 0.00 | 0.00 | 23.13 | 0.13 | 3.53 | 0.59 | 0.00 | 663.62 | 659.11 | 659.10 | 0.01 | 15 | 0.05 | 1.74 | 2.07 | P-217 |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | 2.07 | | 659.25 | 659.10 | | 15 | 0.95 | 5.54 | 6.80 | |
| | | | | | 0.00 | 0.00 | 0.00 | | | | | | | 658.00 | 657.85 | 0.15 | Cir | | | | |

NOTES: Intensity = 148.29 / (Inlet time + 19.70) ^ 1.00 (in/hr) ; Time of flow in section is based on full flow.

Project File: Stormsewer_for plans.stm

# MyReport



| Line No. | Area Dn (sqft) | Area Up (sqft) | Byp Ln No | Coeff C1 (C) | Coeff C2 (C) | Coeff C3 (C) | Capac Full (cfs) | Crit Depth (ft) | Cross Sl, Sw (ft/ft) | Cross Sl, Sx (ft/ft) | Curb Len (ft) | Defl Ang (Deg) | Depth Dn (ft) | Depth Up (ft) | DnStm Ln No | Drng Area (ac) | Easting X (ft) | EGL Dn (ft) | EGL Up (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 0.03 | 0.03 | Sag | 0.20 | 0.50 | 0.90 | 1.11 | 0.09 | 0.050 | 0.020 | .... | 0.089 | 0.35 | 0.09** | 3 | 0.04 | 13382139.11 | 659.42 | 659.32 |
| 9 | 0.05 | 0.05 | Sag | 0.20 | 0.50 | 0.90 | 2.86 | 0.13 | 0.050 | 0.020 | .... | 0.089 | 0.34 | 0.13** | 5 | 0.08 | 13382131.06 | 659.67 | 660.71 |
| 8 | 0.03 | 0.03 | Sag | 0.20 | 0.50 | 0.90 | 1.08 | 0.09 | 0.050 | 0.020 | .... | -84.274 | 0.27 | 0.09** | 4 | 0.04 | 13382035.82 | 659.93 | 659.86 |
| 7 | 0.03 | 0.03 | Sag | 0.20 | 0.50 | 0.90 | 1.10 | 0.09 | 0.050 | 0.020 | .... | 8.572 | 0.27 | 0.09** | 4 | 0.04 | 13382001.18 | 659.93 | 659.99 |
| 6 | 0.11 | 0.12 | Sag | 0.20 | 0.50 | 0.90 | 0.61 | 0.29 | 0.050 | 0.020 | .... | -90.000 | 0.27 | 0.29** | 5 | 0.12 | 13382051.26 | 659.75 | 660.58 |
| 5 | 0.24 | 0.24 | Sag | 0.20 | 0.50 | 0.90 | 1.37 | 0.44 | 0.050 | 0.020 | .... | -91.348 | 0.67 | 0.44** | 2 | 0.14 | 13382132.24 | 659.39 | 659.82 |
| 4 | 0.18 | 0.18 | Sag | 0.20 | 0.50 | 0.90 | 3.40 | 0.27 | 0.050 | 0.020 | .... | 84.663 | 0.58 | 0.27** | 3 | 0.10 | 13382035.17 | 659.48 | 659.99 |
| 3 | 0.79 | 0.50 | Sag | 0.20 | 0.50 | 0.90 | 3.24 | 0.39 | 0.050 | 0.020 | .... | 88.652 | 1.00 | 0.61 | 2 | 0.13 | 13382138.15 | 659.31 | 659.36 |
| 2 | 0.79 | 0.77 | Sag | 0.20 | 0.50 | 0.90 | 4.50 | 0.61 | 0.050 | 0.020 | .... | 0.815 | 1.00 | 0.96 | 1 | 0.17 | 13382135.21 | 659.22 | 659.24 |
| 1 | 1.23 | 1.15 | n/a | 0.20 | 0.50 | 0.90 | 6.80 | 0.57 | .... | .... | .... | -2.171 | 1.25 | 1.11 | Outfall | 0.00 | 13382128.61 | 659.14 | 659.16 |

Project File: Stormsewer_for plans.stm | Number of lines: 10 | Date: 6/18/2018

NOTES: ** Critical depth

# MyReport



| Energy Loss (ft) | Flow Rate (cfs) | Sf Ave (ft/ft) | Sf Dn (ft/ft) | Grate Area (sqft) | Grate Len (ft) | Grate Width (ft) | Gnd/Rim El Dn (ft) | Gnd/Rim El Up (ft) | Gutter Depth (ft) | Gutter Slope (ft/ft) | Gutter Spread (ft) | Gutter Width (ft) | HGL Dn (ft) | HGL Up (ft) | HGL Jnct (ft) | HGL Jmp Dn (ft) | HGL Jmp Up (ft) | Incr CxA | Incr Q (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.04 | 0.000 | 0.000 | .... | .... | .... | 662.79 | 661.80 | 0.30 | Sag | 12.00 | 2.00 | 659.39 | 659.28 | 659.28 | .... | .... | 0.01 | 0.04 |
| 0.000 | 0.09 | 0.000 | 0.000 | .... | .... | .... | 663.00 | 663.20 | 0.30 | Sag | 12.00 | 2.00 | 659.63 | 660.66 j | 660.66 | 659.67 | 659.65 | 0.02 | 0.09 |
| 0.000 | 0.04 | 0.000 | 0.000 | .... | .... | .... | 663.20 | 662.00 | 0.30 | Sag | 12.00 | 2.00 | 659.90 | 659.82 | 659.82 | .... | .... | 0.01 | 0.04 |
| 0.000 | 0.04 | 0.000 | 0.000 | .... | .... | .... | 663.20 | 662.00 | 0.30 | Sag | 12.00 | 2.00 | 659.90 | 659.95 j | 659.95 | 659.89 | 659.88 | 0.01 | 0.04 |
| 0.000 | 0.33 | 0.000 | 0.000 | .... | .... | .... | 663.00 | 663.00 | 0.30 | Sag | 12.00 | 2.00 | 659.63 | 660.46 | 660.46 | .... | .... | 0.08 | 0.33 |
| 0.362 | 0.85 | 0.575 | 0.425 | .... | .... | .... | 662.84 | 663.00 | 0.30 | Sag | 12.00 | 2.00 | 659.30 | 659.63 j | 659.63 | 659.40 | 659.26 | 0.11 | 0.47 |
| 0.000 | 0.44 | 0.000 | 0.000 | .... | .... | .... | 662.79 | 663.20 | 0.30 | Sag | 12.00 | 2.00 | 659.39 | 659.90 j | 659.90 | 659.36 | 659.31 | 0.10 | 0.41 |
| 0.048 | 0.86 | 0.077 | 0.049 | .... | .... | .... | 662.84 | 662.79 | 0.30 | Sag | 12.00 | 2.00 | 659.30 | 659.32 | 659.39 | .... | .... | 0.11 | 0.49 |
| 0.018 | 2.07 | 0.269 | 0.288 | .... | .... | .... | 663.62 | 662.84 | 0.30 | Sag | 12.00 | 2.00 | 659.11 | 659.13 | 659.30 | .... | .... | 0.14 | 0.62 |
| 0.013 | 2.07 | 0.083 | 0.088 | .... | .... | .... | 0.00 | 663.62 | .... | .... | .... | .... | 659.10 | 659.11 | 659.11 | .... | .... | 0.00 | 0.00 |

Project File: Stormsewer_for plans.stm | Number of lines: 10 | Date: 6/18/2018

NOTES: ** Critical depth

# MyReport



| Inlet Depth (ft) | Inlet Eff (%) | Inlet ID | Inlet Loc | (ft) | Inlet Time (min) | i Sys (in/hr) | i Inlet (in/hr) | Invert Dn (ft) | Invert Up (ft) | Jump Loc (ft) | Jump Len (ft) | Vel Hd Jmp Dn (ft) | Vel Hd Jmp Up (ft) | J-Loss Coeff | Junct Type | Known Q (cfs) | Cost RCP | Cost CMP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.30 | 100 | YD-4 | Sag | | 15.0 | 4.35 | 4.35 | 659.04 | 659.19 | .... | .... | 0.00 | 0.00 | 1.00 z | Generic | 0.00 | 100 | 90 |
| 0.30 | 100 | YD-1 | Sag | | 15.0 | 4.35 | 4.35 | 659.29 | 660.53 | 5.20 | 0.67 | 0.05 | 0.20 | 1.00 z | Generic | 0.00 | 100 | 90 |
| 0.30 | 100 | YD-3 | Sag | | 15.0 | 4.35 | 4.35 | 659.62 | 659.73 | .... | .... | 0.00 | 0.00 | 1.00 z | Generic | 0.00 | 100 | 90 |
| 0.30 | 100 | YD-2 | Sag | | 15.0 | 4.35 | 4.35 | 659.62 | 659.86 | 23.80 | 0.51 | 0.03 | 0.04 | 1.00 z | Generic | 0.00 | 100 | 90 |
| 0.30 | 100 | CB C | Sag | | 15.0 | 4.35 | 4.35 | 659.36 | 660.17 | .... | .... | 0.00 | 0.00 | 1.00 z | Generic | 0.00 | 100 | 90 |
| 0.30 | 100 | CB B | Sag | | 15.0 | 4.14 | 4.35 | 658.50 | 659.19 | 31.46 | 2.77 | 0.12 | 0.27 | 1.50 z | Generic | 0.00 | 100 | 90 |
| 0.30 | 100 | CB E | Sag | | 15.0 | 3.84 | 4.35 | 658.81 | 659.62 | 31.20 | 1.53 | 0.07 | 0.14 | 1.49 z | Generic | 0.00 | 3,012 | 2,711 |
| 0.30 | 100 | CB D | Sag | | 15.0 | 3.60 | 4.35 | 658.27 | 658.71 | .... | .... | 0.00 | 0.00 | 1.49 | Generic | 0.00 | 1,980 | 1,782 |
| 0.30 | 100 | CB A | Sag | | 15.0 | 3.53 | 4.35 | 658.08 | 658.17 | .... | .... | 0.00 | 0.00 | 1.50 | Generic | 0.00 | 315 | 284 |
| .... | .... | STC 1 | Sag | | 15.0 | 3.53 | 0.00 | 657.85 | 658.00 | .... | .... | 0.00 | 0.00 | 0.15 | MH | 0.00 | 585 | 527 |

| Project File: Stormsewer_for plans.stm | Number of lines: 10 | Date: 6/18/2018 |
|---|---|---|

NOTES: Intensity = 148.29 / (Inlet time + 19.70) ^ 1.00 -- Return period = 10 Yrs. ; ** Critical depth

# MyReport



| Cost PVC | Line ID | Line Length (ft) | Line Size (in) | Line Slope (%) | Line Type | Local Depr (in) | n-val Gutter | n-val Pipe | Minor Loss (ft) | Northing Y (ft) | Pipe Travel (min) | Q Byp (cfs) | Q Capt (cfs) | Q Carry (cfs) | Line Rise (in) | Runoff Coeff (C) | Line Span (in) | Area A1 (ac) | Area A2 (ac) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 85 | P-223 (1) (2) | 21.000 | 8 | 0.71 | Cir | 0.0 | .... | 0.012 | 0.03 | 301824.48 | 2.81 | 0.00 | 0.04 | 0.00 | 8 | 0.25 | 8 | 0.00 | 0.00 |
| 85 | P-223 (1) (3) | 26.000 | 8 | 4.77 | Cir | 0.0 | .... | 0.012 | n/a | 301996.51 | 1.74 | 0.00 | 0.09 | 0.00 | 8 | 0.25 | 8 | 0.00 | 0.00 |
| 85 | P-223 (1) (1) | 16.000 | 8 | 0.69 | Cir | 0.0 | .... | 0.012 | 0.03 | 301814.92 | 2.14 | 0.00 | 0.04 | 0.00 | 8 | 0.25 | 8 | 0.00 | 0.00 |
| 85 | P-223 (1) | 34.000 | 8 | 0.71 | Cir | 0.0 | .... | 0.012 | n/a | 301831.22 | 4.55 | 0.00 | 0.04 | 0.00 | 8 | 0.25 | 8 | 0.00 | 0.00 |
| 85 | P-220 | 81.075 | 6 | 1.00 | Cir | 0.0 | .... | 0.012 | 0.12 | 301966.71 | 0.79 | 0.00 | 0.33 | 0.00 | 6 | 0.64 | 6 | 0.00 | 0.00 |
| 85 | P-219 | 62.914 | 8 | 1.10 | Cir | 0.0 | .... | 0.012 | n/a | 301970.54 | 0.41 | 0.00 | 0.47 | 0.00 | 8 | 0.78 | 8 | 0.00 | 0.00 |
| 2,560 | P-222 | 104.000 | 12 | 0.78 | Cir | 0.0 | .... | 0.012 | n/a | 301830.91 | 2.74 | 0.00 | 0.41 | 0.00 | 12 | 0.95 | 12 | 0.00 | 0.00 |
| 1,683 | P-221 | 62.306 | 12 | 0.71 | Cir | 0.0 | .... | 0.012 | 0.07 | 301845.46 | 0.81 | 0.00 | 0.49 | 0.00 | 12 | 0.87 | 12 | 0.00 | 0.00 |
| 268 | P-218 | 6.600 | 12 | 1.36 | Cir | 0.0 | .... | 0.012 | 0.17 | 301907.69 | 0.03 | 0.00 | 0.62 | 0.00 | 12 | 0.84 | 12 | 0.00 | 0.00 |
| 497 | P-217 | 15.863 | 15 | 0.95 | Cir | .... | .... | 0.012 | 0.01 | 301907.54 | 0.13 | .... | .... | .... | 15 | 0.00 | 15 | 0.00 | 0.00 |

Project File: Stormsewer_for plans.stm | Number of lines: 10 | Date: 6/18/2018

NOTES: ** Critical depth

# MyReport

| Area A3 (ac) | Tc (min) | Throat Ht (in) | Total Area (ac) | Total CxA | Total Runoff (cfs) | Vel Ave (ft/s) | Vel Dn (ft/s) | Vel Hd Dn (ft) | Vel Hd Up (ft) | Vel Up (ft/s) | Cover Dn (ft) | Cover Up (ft) | Storage (cft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 15.0 | .... | 0.04 | 0.01 | 0.04 | 0.84 | 0.24 | 0.03 | 0.03 | 1.44 | 3.08 | 1.94 | 2.15 |
| 0.00 | 15.0 | .... | 0.08 | 0.02 | 0.09 | 1.11 | 0.49 | 0.05 | 0.05 | 1.74 | 3.04 | 2.00 | 2.89 |
| 0.00 | 15.0 | .... | 0.04 | 0.01 | 0.04 | 0.88 | 0.32 | 0.03 | 0.03 | 1.44 | 2.91 | 1.60 | 1.28 |
| 0.00 | 15.0 | .... | 0.04 | 0.01 | 0.04 | 0.88 | 0.32 | 0.03 | 0.03 | 1.44 | 2.91 | 1.47 | 2.73 |
| 0.00 | 15.0 | .... | 0.12 | 0.08 | 0.33 | 2.96 | 3.13 | 0.12 | 0.12 | 2.80 | 3.14 | 2.33 | 9.16 |
| 0.00 | 16.7 | .... | 0.34 | 0.21 | 0.85 | 2.98 | 2.44 | 0.09 | 0.19 | 3.52 | 3.67 | 3.14 | 20.34 |
| 0.00 | 19.6 | .... | 0.18 | 0.12 | 0.44 | 1.73 | 0.94 | 0.10 | 0.10 | 2.52 | 2.98 | 2.58 | 33.23 |
| 0.00 | 22.3 | .... | 0.35 | 0.24 | 0.86 | 1.40 | 1.09 | 0.02 | 0.05 | 1.71 | 3.57 | 3.08 | 41.87 |
| 0.00 | 23.1 | .... | 0.86 | 0.59 | 2.07 | 2.66 | 2.64 | 0.11 | 0.11 | 2.67 | 4.54 | 3.67 | 5.17 |
| 0.00 | 23.1 | .... | 0.86 | 0.59 | 2.07 | 1.74 | 1.69 | 0.04 | 0.05 | 1.80 | n/a | 4.37 | 18.96 |

Project File: Stormsewer_for plans.stm | Number of lines: 10 | Date: 6/18/2018

NOTES: ** Critical depth

# Storm Sewer Inlet Time Tabulation

| Line No. | Line ID | Tc Method | Sheet Flow n-Value | Sheet Flow flow Length (ft) | Sheet Flow 2-yr 24h P (in) | Sheet Flow Land Slope (%) | Sheet Flow Travel Time (min) | Shallow Concentrated Flow flow Length (ft) | Shallow Concentrated Flow Water Slope (%) | Shallow Concentrated Flow Surf Descr | Shallow Concentrated Flow Ave Vel (ft/s) | Shallow Concentrated Flow Travel Time (min) | Channel Flow X-sec Area (sqft) | Channel Flow Wetted Perim (ft) | Channel Flow Chan Slope (%) | Channel Flow n-Value | Channel Flow Vel | Channel Flow flow Length (ft) | Channel Flow Travel Time (min) | Total Travel Time (min) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | P-223 (1) (2) | User | | | | | | | | | | | | | | | | | | 15.00 |
| 9 | P-223 (1) (3) | User | | | | | | | | | | | | | | | | | | 15.00 |
| 8 | P-223 (1) (1) | User | | | | | | | | | | | | | | | | | | 15.00 |
| 7 | P-223 (1) | User | | | | | | | | | | | | | | | | | | 15.00 |
| 6 | P-220 | User | | | | | | | | | | | | | | | | | | 15.00 |
| 5 | P-219 | User | | | | | | | | | | | | | | | | | | 15.00 |
| 4 | P-222 | User | | | | | | | | | | | | | | | | | | 15.00 |
| 3 | P-221 | User | | | | | | | | | | | | | | | | | | 15.00 |
| 2 | P-218 | User | | | | | | | | | | | | | | | | | | 15.00 |
| 1 | P-217 | User | | | | | | | | | | | | | | | | | | 15.00 |

| | | | |
|---|---|---|---|
| Project File: Stormsewer_for plans.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 10 | Date: 6/18/2018 |

# Hydraulic Grade Line Computations



| Line | Size | Q | Downstream | | | | | | | | Len | Upstream | | | | | | | | Check | | JL coeff | Minor loss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Invert elev | HGL elev | Depth | Area | Vel | Vel head | EGL elev | Sf | | Invert elev | HGL elev | Depth | Area | Vel | Vel head | EGL elev | Sf | Ave Sf | Enrgy loss | | |
| (1) | (in) (2) | (cfs) (3) | (ft) (4) | (ft) (5) | (ft) (6) | (sqft) (7) | (ft/s) (8) | (ft) (9) | (ft) (10) | (%) (11) | (ft) (12) | (ft) (13) | (ft) (14) | (ft) (15) | (sqft) (16) | (ft/s) (17) | (ft) (18) | (ft) (19) | (%) (20) | (%) (21) | (ft) (22) | (K) (23) | (ft) (24) |
| 10 | 8 | 0.04 | 659.04 | 659.39 | 0.35 | 0.03 | 0.24 | 0.03 | 659.42 | 0.000 | 21.000 | 659.19 | 659.28 | 0.09** | 0.03 | 1.44 | 0.03 | 659.32 | 0.000 | 0.000 | n/a | 1.00 | 0.03 |
| 9 | 8 | 0.09 | 659.29 | 659.63 | 0.34 | 0.05 | 0.49 | 0.05 | 659.67 | 0.000 | 26.000 | 660.53 | 660.66 j | 0.13** | 0.05 | 1.74 | 0.05 | 660.71 | 0.000 | 0.000 | n/a | 1.00 | n/a |
| 8 | 8 | 0.04 | 659.62 | 659.90 | 0.27 | 0.03 | 0.32 | 0.03 | 659.93 | 0.000 | 16.000 | 659.73 | 659.82 | 0.09** | 0.03 | 1.44 | 0.03 | 659.86 | 0.000 | 0.000 | n/a | 1.00 | 0.03 |
| 7 | 8 | 0.04 | 659.62 | 659.90 | 0.27 | 0.03 | 0.32 | 0.03 | 659.93 | 0.000 | 34.000 | 659.86 | 659.95 j | 0.09** | 0.03 | 1.44 | 0.03 | 659.99 | 0.000 | 0.000 | n/a | 1.00 | 0.03 |
| 6 | 6 | 0.33 | 659.36 | 659.63 | 0.27 | 0.11 | 3.13 | 0.12 | 659.75 | 0.000 | 81.075 | 660.17 | 660.46 | 0.29** | 0.12 | 2.80 | 0.12 | 660.58 | 0.000 | 0.000 | n/a | 1.00 | 0.12 |
| 5 | 8 | 0.85 | 658.50 | 659.30 | 0.67 | 0.24 | 2.44 | 0.09 | 659.39 | 0.425 | 62.914 | 659.19 | 659.63 j | 0.44** | 0.24 | 3.52 | 0.19 | 659.82 | 0.725 | 0.575 | n/a | 1.50 | n/a |
| 4 | 12 | 0.44 | 658.81 | 659.39 | 0.58 | 0.18 | 0.94 | 0.10 | 659.48 | 0.000 | 104.000 | 659.62 | 659.90 j | 0.27** | 0.18 | 2.52 | 0.10 | 659.99 | 0.000 | 0.000 | n/a | 1.49 | n/a |
| 3 | 12 | 0.86 | 658.27 | 659.30 | 1.00 | 0.79 | 1.09 | 0.02 | 659.31 | 0.049 | 62.306 | 658.71 | 659.32 | 0.61 | 0.50 | 1.71 | 0.05 | 659.36 | 0.105 | 0.077 | 0.048 | 1.49 | 0.07 |
| 2 | 12 | 2.07 | 658.08 | 659.11 | 1.00 | 0.79 | 2.64 | 0.11 | 659.22 | 0.288 | 6.600 | 658.17 | 659.13 | 0.96 | 0.77 | 2.67 | 0.11 | 659.24 | 0.251 | 0.269 | 0.018 | 1.50 | 0.17 |
| 1 | 15 | 2.07 | 657.85 | 659.10 | 1.25 | 1.23 | 1.69 | 0.04 | 659.14 | 0.088 | 15.863 | 658.00 | 659.11 | 1.11 | 1.15 | 1.80 | 0.05 | 659.16 | 0.078 | 0.083 | 0.013 | 0.15 | 0.01 |

| | | |
|---|---|---|
| Project File: Stormsewer_for plans.stm | Number of lines: 10 | Run Date: 6/18/2018 |

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

# Hydraflow HGL Computation Procedure



## General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

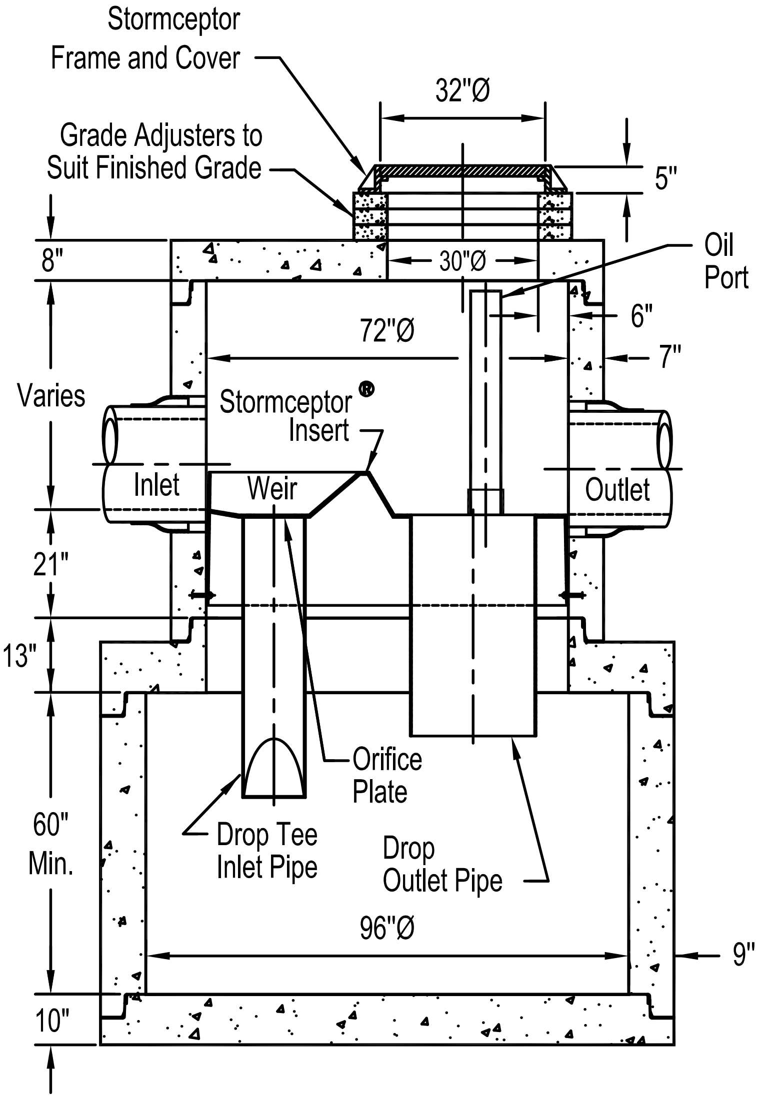
Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

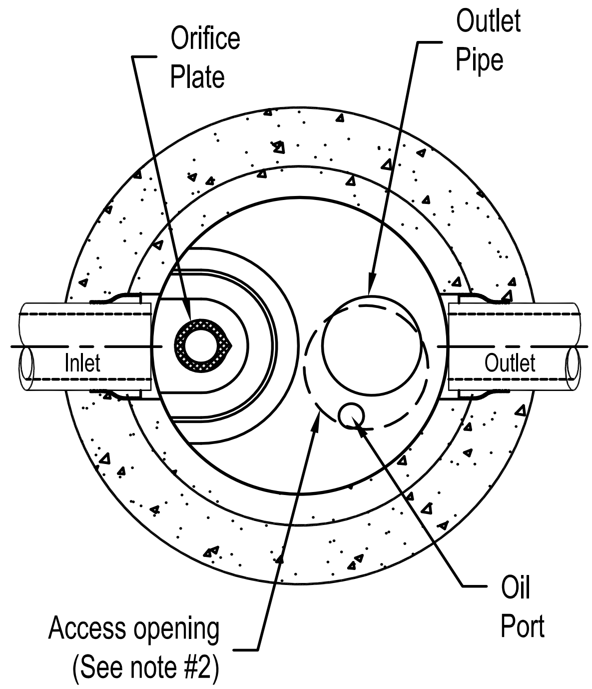
Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

# Section 6

# STC 2400 Precast Concrete Stormceptor®
# (2400 U.S. Gallon Capacity)




Section Thru Chamber




Plan View

Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #5753115, #5849181, #6068765, #6371690, #7582216, #7666303.
4. Contact a Concrete Pipe Division representative for further details not listed on this drawing.