



**STORMWATER
MANAGEMENT REPORT**

**MEIJER FRK
CITY OF FRANKLIN, IN**

Woolpert Project No. 074485

Submitted: June 29, 2015

STORMWATER MANAGEMENT REPORT

MEIJER FRK CITY OF FRANKLIN, IN

PREPARED FOR:

MEIJER, INC.

2929 WALKER AVE NW

GRAND RAPIDS, MI 49504

PREPARED BY:

WOOLPERT

7635 INTERACTIVE WAY, SUITE 100

INDIANAPOLIS, IN 46278

TABLE OF CONTENTS

Section 1 – Stormwater Management Report

Pre-Developed Conditions.....	3
Post-Developed Conditions	4
Water Quality	5
Conclusion.....	5

Section 2 – Drainage Exhibits

- Existing Drainage Exhibit
- Proposed Drainage Exhibit
- Storm Sewer Basin Map

Section 3 – Detention Calculations

Section 4 – Storm Sewer Sizing Calculations

Section 1 – Storm Water Management Report

STORMWATER MANAGEMENT REPORT

Meijer FRK City of Franklin, IN

Pre-Developed Conditions

Meijer, Inc. plans to develop a 24-acre parcel located at the southwest corner of US 31 and Commerce Drive in the City of Franklin, IN. The site will consist of a 192,940 SF Meijer main store and a 2,509 SF convenience store and gas station, parking areas, truck docks and other infrastructure improvements. The remaining areas of the parcel will be subdivided into outlots for future development.

Under the existing conditions, the site consists of undeveloped farmland with a ridge extending from the northeast to the southwest corners of the parcel. From the ridge, the ground is sloped to drain generally to the southeast and the northwest.

The existing parcel is composed of 5 watershed areas that all drain via overland flow. They are:

EX N = 8.20 ac. – Drains north to an existing storm sewer (N OUT) running west along the south side of Commerce Drive.

EX S = 16.64 ac. – Drains southeast (S OUT) to the existing INDOT R/W ditch along US 31 just north of Simon Road.

EX Off-site = 1.20 ac. – Drains east (S OUT) to the existing INDOT R/W ditch along US 31 just north of Simon Road, similarly to EX S.

EX SW = 0.40 ac. – Drains southwest to the Simon Rd. roadside ditch to the west.

EX NE = 0.33 ac. – Drains northeast to a storm sewer in Commerce Rd. running northeast through the US 31 intersection.

The existing soils onsite are Brookston silty clay loam (Br), Crosby silt loam, fine-loamy subsoil, 0 to 2 percent slopes (CrA), Miami silt loam, 2 to 6 percent slopes, eroded (MnB2), Miami silt loam, 6 to 12 percent slopes, eroded (MnC2).

Per FIRM Map number 18081C0139D, effective date August 2, 2007 the site is not located in any floodplain areas.

Post-Developed Conditions

The developed conditions for the overall property will include a 192,940 SF Meijer Store, a 2,509 SF convenience store and gas station, internal access drives, parking areas and associated utility, detention and water quality improvements.

The proposed Meijer improvements and increases in imperviousness will be detained in a proposed wet detention pond. This includes the Meijer store lot and the outlot at the northeast corner (developed condition). The southeast corner of the project, which includes an access drive and a lot to be developed by others, the gas station, and South Direct Discharge Basin will both outlet directly to the INDOT R/W ditch along US 31 at the southeast corner of the site. The calculations consider the southeast lot in the fully developed condition.

Per the City of Franklin and INDOT drainage requirements, the following are the allowable release rates for the proposed conditions are:

2yr. pre \leq 10 yr. post (City of Franklin)
10yr. pre \leq 100 yr. post (City of Franklin)
10yr. pre \leq 50 yr. post (INDOT)

Therefore the allowable release rates for the detention pond discharge points are as shown in Table 1.

Table 1:

RAINFALL EVENT	N OUT	S OUT
2yr. pre	1.80 cfs	N/A
10yr. pre	5.41 cfs	36.32 cfs

The proposed wet detention pond has been designed in accordance with City of Franklin drainage requirements to provide the required storage volume. The proposed runoff from the direct discharge area at the southeast corner of the site remains under the allowable discharge rate in the developed condition. The proposed peak release rates as they relate to the allowable are as shown in Tables 2 and 3:

Table 2 – Wet Detention Pond to N OUT:

RAINFALL EVENT	Allowable Release Rates	Proposed Release Rates
10yr. post	1.80 cfs	1.56 cfs
100yr. post	5.41 cfs	4.04 cfs

Table 3 – Direct Discharge to S OUT:

RAINFALL EVENT	Allowable Release Rates	Proposed Release Rates
50yr. post	36.32 cfs	28.18 cfs

Results: The proposed release rates are less than the allowable.

EX SW and EX NE were merged into proposed basins, therefore, allowable release rates were not determined as any flow going there pre-developed does not go there in the post-developed condition.

Proposed drainage calculations are located in Section 3 of this report. The Storm sewers were sized for a 10-year storm. Inlet capacity calculations are provided for the inlets receiving medium to high flow rates. Calculations are located in Section 4 of this report.

Water Quality

Water quality has been provided in accordance with City of Franklin requirements to provide the appropriate level of TSS removal. The wet detention will provide the appropriate amount of water quality for the Meijer Store lot per the ordinance. Water quality has been provided in accordance with City of Franklin requirements to provide the appropriate level of TSS removal. An Aqua-Swirl will provide the appropriate amount of water quality for the gas station lot per the ordinance. Calculations are as shown below:

Wet Pond

1.25" Rainfall Event Volume – 20% = 0.35 acre-ft

½" Direct Runoff Volume = 0.70 acre-ft

2" orifice invert: 756.00'

6" orifice invert: 756.58'

At 756.58', the wet detention pond provides 0.71 acre-ft of storage to be released through a proposed 2" orifice, thereby meeting the requirements of the ordinance.

Aqua-Swirl

Release rate to be treated: 1.14 cfs

Aqua-Swirl Treatment Rate for AS-3: 1.80 cfs

The AS-3 is capable of treating the water quality treatment rate, thereby meeting the requirements of the ordinance.

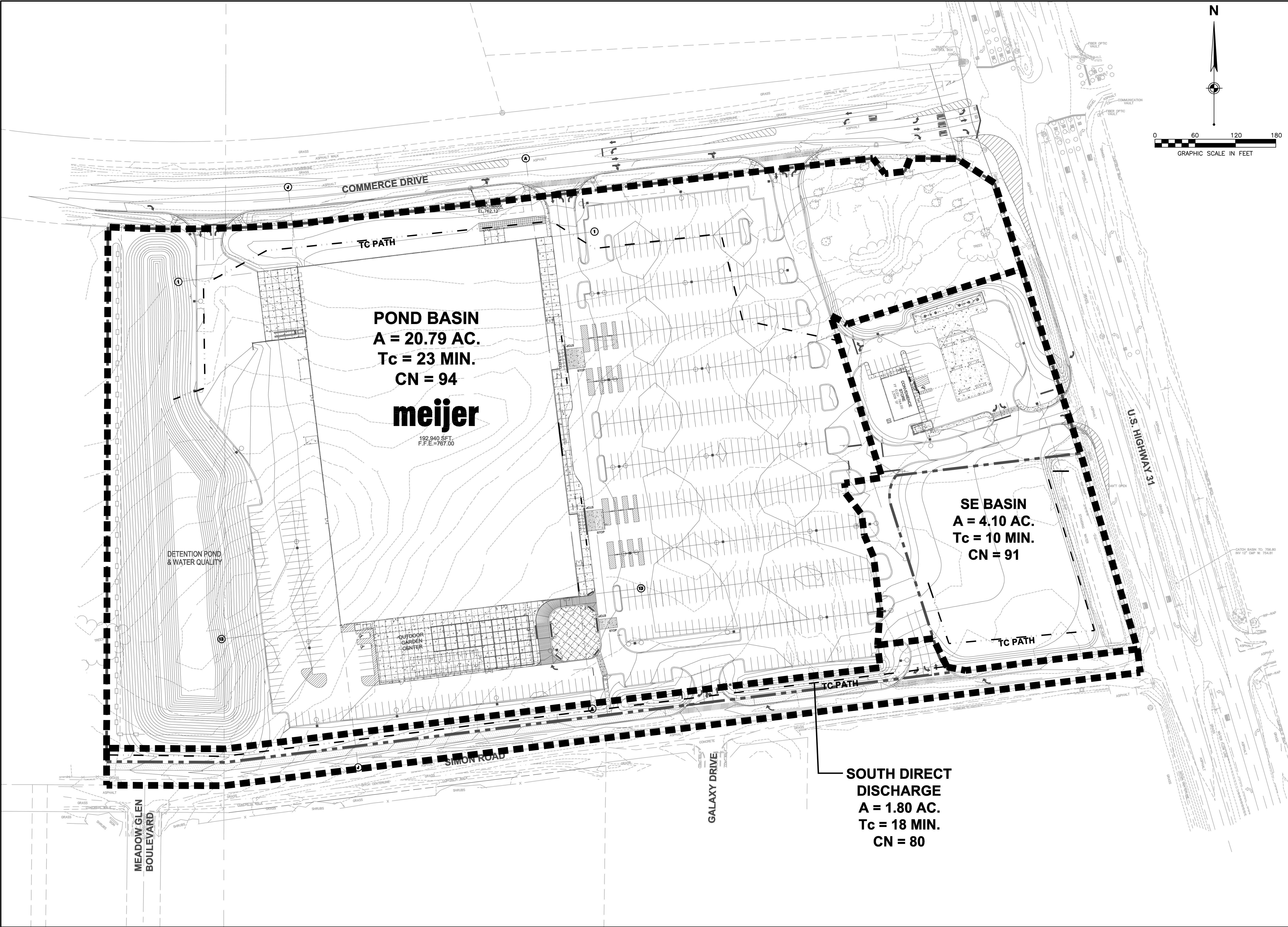
In the future, when the southeast outlot is developed, the owner/developer will need to provide water quality to the extent of the ordinance.


Conclusion

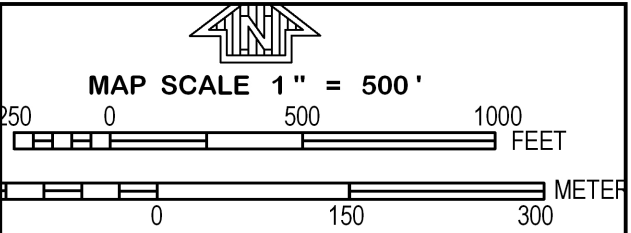
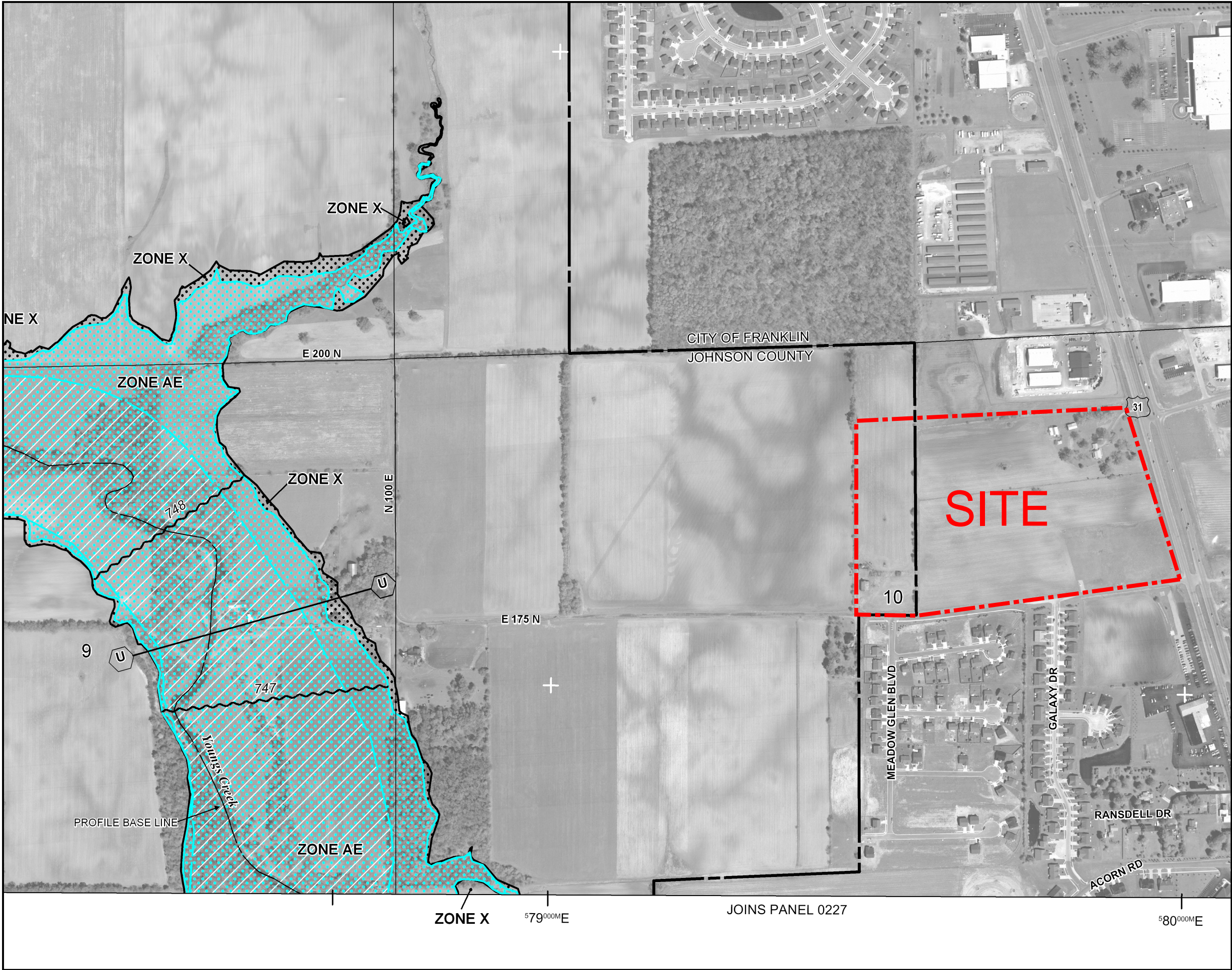
The proposed development has been designed to provide the sufficient storage volume in the detention pond to accommodate the proposed Meijer development. The future developed outlots at the southeast corner of the site are able to direct discharge into the INDOT ditch within the allowable release rate. The storm sewer has been designed for the 10 yr. rainfall event. Water quality is being provided in accordance with City of Franklin requirements. Therefore, no adverse impacts are anticipated with this development.

Section 2 – Drainage Exhibits

Layout Tab Name: PR-1, Images: frk.jpg, Outlot Site Plan - clip.jpg, Site.JPG, Xrefs: 74485-p.dwg, P-BLDG_FRK_revised.dwg, 74485-x.dwg
Last Saved By: conter, 6/29/2015 3:49:03 PM
G:\DE\clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR BASIN MAP.dwg Plotted By: Conter, Kelly Plotted: June 29, 2015, 3:58:37 PM



PROJECT No: 74485	<div>7635 Interactive Way Suite 100 Indianapolis, IN 46278 317.299.7500 FAX: 317.291.5805</div> <div> WOOLPERT</div>		<div>MEIJER FRK</div> <div>FRANKLIN, INDIANA</div> <div>PROPOSED DRAINAGE MAP</div>		SHEET NO.		PR-1									
PROJECT No: 74485		DATE 06/29/15		DES. KAC		DR. KAC		CKD. JRN		REVISION		DATE		No.		SEAL



NFIP

PANEL 0139D

FIRM
FLOOD INSURANCE RATE MAP
JOHNSON COUNTY,
INDIANA
AND INCORPORATED AREAS

PANEL 139 OF 352
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FRANKLIN, CITY OF	180114	0139	D
JOHNSON COUNTY	180111	0139	D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

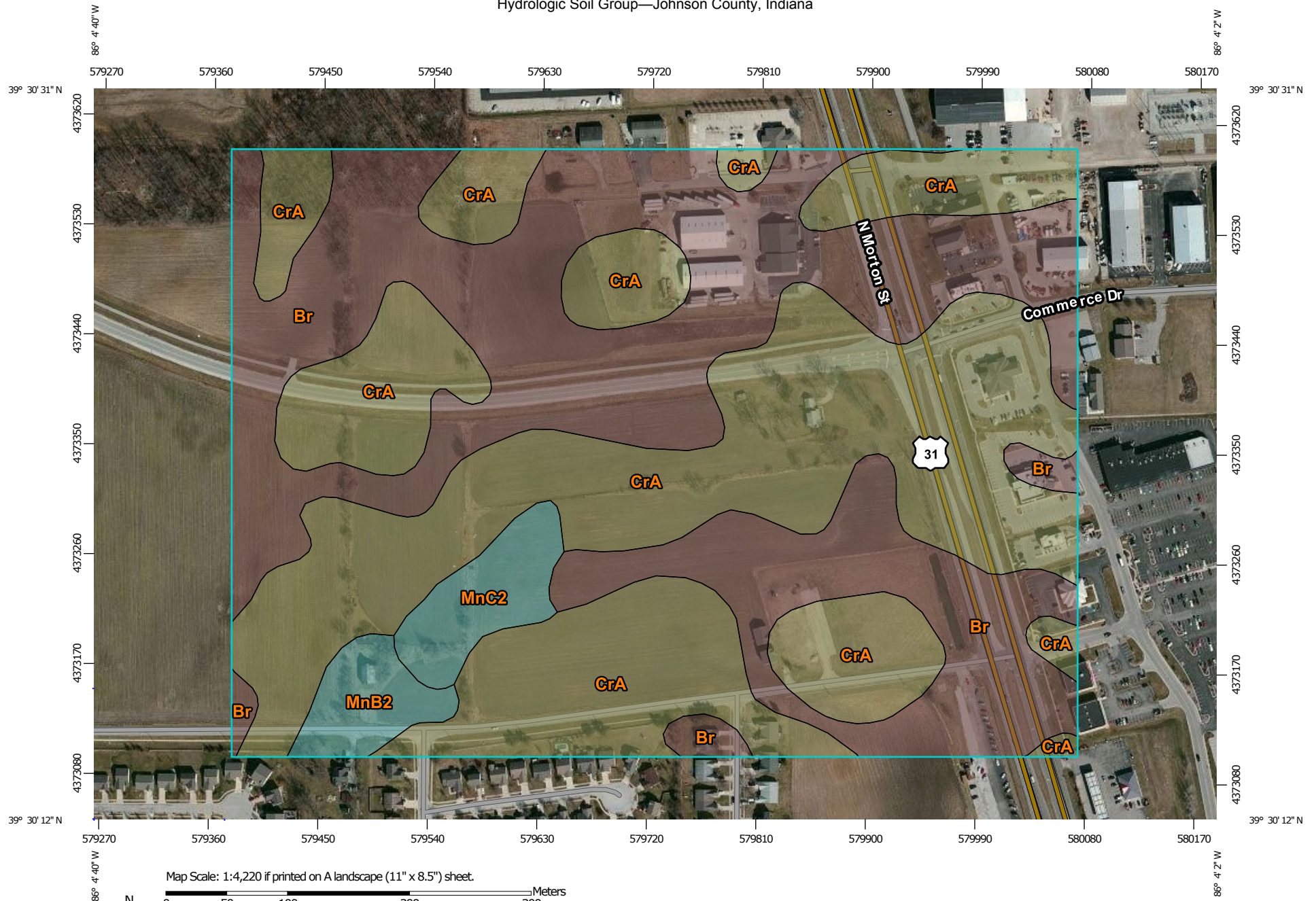


MAP NUMBER
18081C0139D
EFFECTIVE DATE
AUGUST 2, 2007

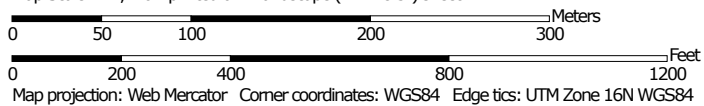
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Hydrologic Soil Group—Johnson County, Indiana



Map Scale: 1:4,220 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

8/20/2014
Page 1 of 4

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 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Johnson County, Indiana
 Survey Area Data: Version 21, Dec 21, 2013

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

Date(s) aerial images were photographed: Sep 17, 2011—Apr 9, 2012

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

Hydrologic Soil Group— Summary by Map Unit — Johnson County, Indiana (IN081)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Br	Brookston silty clay loam	B/D	37.0	43.1%
CrA	Crosby silt loam, fine-loamy subsoil, 0 to 2 percent slopes	C/D	44.3	51.6%
MnB2	Miami silt loam, 2 to 6 percent slopes, eroded	C	2.0	2.3%
MnC2	Miami silt loam, 6 to 12 percent slopes, eroded	C	2.6	3.0%
Totals for Area of Interest			85.9	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



NOAA Atlas 14, Volume 2, Version 3
Location name: Franklin, Indiana, US*
Latitude: 39.5058°, Longitude: -86.0715°
Elevation: 763 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.373 (0.333–0.422)	0.444 (0.396–0.502)	0.532 (0.472–0.601)	0.602 (0.532–0.679)	0.693 (0.609–0.782)	0.764 (0.666–0.864)	0.833 (0.720–0.945)	0.906 (0.775–1.03)	1.00 (0.844–1.15)	1.08 (0.892–1.24)
10-min	0.580 (0.517–0.656)	0.694 (0.618–0.783)	0.827 (0.734–0.934)	0.929 (0.822–1.05)	1.06 (0.931–1.20)	1.16 (1.01–1.31)	1.25 (1.08–1.42)	1.35 (1.16–1.54)	1.48 (1.24–1.69)	1.57 (1.30–1.81)
15-min	0.711 (0.634–0.804)	0.848 (0.755–0.958)	1.02 (0.902–1.15)	1.14 (1.01–1.29)	1.31 (1.15–1.48)	1.43 (1.25–1.62)	1.56 (1.35–1.77)	1.68 (1.44–1.92)	1.84 (1.55–2.11)	1.96 (1.62–2.26)
30-min	0.940 (0.839–1.06)	1.14 (1.01–1.28)	1.39 (1.24–1.57)	1.59 (1.40–1.79)	1.85 (1.62–2.09)	2.05 (1.79–2.32)	2.25 (1.94–2.55)	2.46 (2.10–2.80)	2.73 (2.30–3.13)	2.94 (2.43–3.39)
60-min	1.15 (1.02–1.30)	1.39 (1.24–1.57)	1.75 (1.55–1.97)	2.02 (1.79–2.28)	2.40 (2.11–2.71)	2.70 (2.35–3.05)	3.01 (2.60–3.41)	3.33 (2.85–3.80)	3.77 (3.17–4.33)	4.12 (3.42–4.76)
2-hr	1.34 (1.20–1.52)	1.62 (1.45–1.85)	2.04 (1.82–2.32)	2.38 (2.10–2.69)	2.85 (2.50–3.22)	3.24 (2.82–3.65)	3.65 (3.13–4.12)	4.08 (3.45–4.61)	4.68 (3.90–5.33)	5.17 (4.23–5.94)
3-hr	1.42 (1.27–1.62)	1.72 (1.53–1.95)	2.17 (1.93–2.46)	2.53 (2.24–2.86)	3.05 (2.67–3.44)	3.48 (3.01–3.93)	3.93 (3.37–4.46)	4.42 (3.73–5.02)	5.11 (4.21–5.85)	5.68 (4.59–6.54)
6-hr	1.70 (1.51–1.94)	2.05 (1.82–2.35)	2.59 (2.29–2.96)	3.03 (2.67–3.45)	3.66 (3.19–4.16)	4.19 (3.62–4.76)	4.76 (4.05–5.41)	5.37 (4.50–6.12)	6.26 (5.12–7.15)	6.98 (5.59–8.03)
12-hr	2.03 (1.82–2.30)	2.44 (2.19–2.77)	3.04 (2.72–3.44)	3.53 (3.14–3.98)	4.21 (3.71–4.73)	4.77 (4.17–5.36)	5.36 (4.63–6.03)	5.98 (5.09–6.75)	6.86 (5.72–7.79)	7.57 (6.21–8.65)
24-hr	2.43 (2.24–2.65)	2.91 (2.68–3.18)	3.57 (3.28–3.89)	4.08 (3.75–4.45)	4.78 (4.37–5.21)	5.32 (4.85–5.81)	5.88 (5.33–6.43)	6.45 (5.81–7.06)	7.22 (6.45–7.93)	7.82 (6.93–8.74)
2-day	2.85 (2.63–3.08)	3.41 (3.15–3.69)	4.16 (3.84–4.50)	4.74 (4.36–5.13)	5.52 (5.06–5.98)	6.13 (5.60–6.65)	6.75 (6.13–7.33)	7.38 (6.67–8.03)	8.22 (7.37–8.98)	8.87 (7.90–9.73)
3-day	3.05 (2.84–3.28)	3.65 (3.39–3.92)	4.42 (4.11–4.75)	5.02 (4.66–5.40)	5.83 (5.39–6.27)	6.46 (5.96–6.95)	7.10 (6.52–7.64)	7.75 (7.08–8.34)	8.61 (7.82–9.29)	9.27 (8.37–10.0)
4-day	3.26 (3.05–3.48)	3.89 (3.64–4.15)	4.69 (4.39–5.01)	5.31 (4.96–5.67)	6.14 (5.73–6.55)	6.79 (6.32–7.24)	7.45 (6.91–7.95)	8.12 (7.50–8.65)	9.00 (8.27–9.61)	9.68 (8.85–10.3)
7-day	3.86 (3.60–4.14)	4.59 (4.28–4.92)	5.51 (5.13–5.90)	6.24 (5.81–6.68)	7.22 (6.71–7.72)	8.00 (7.41–8.55)	8.79 (8.12–9.40)	9.59 (8.83–10.3)	10.7 (9.78–11.4)	11.5 (10.5–12.3)
10-day	4.41 (4.13–4.71)	5.23 (4.90–5.59)	6.26 (5.86–6.69)	7.07 (6.61–7.55)	8.17 (7.62–8.71)	9.03 (8.41–9.62)	9.90 (9.20–10.6)	10.8 (9.98–11.5)	12.0 (11.0–12.8)	12.9 (11.8–13.8)
20-day	6.04 (5.69–6.43)	7.15 (6.73–7.61)	8.43 (7.93–8.97)	9.42 (8.85–10.0)	10.7 (10.1–11.4)	11.8 (11.0–12.5)	12.8 (11.9–13.6)	13.8 (12.8–14.6)	15.1 (13.9–16.0)	16.0 (14.8–17.1)
30-day	7.44 (7.01–7.88)	8.76 (8.26–9.28)	10.2 (9.60–10.8)	11.3 (10.6–12.0)	12.7 (12.0–13.5)	13.8 (13.0–14.7)	14.9 (13.9–15.8)	16.0 (14.9–16.9)	17.3 (16.1–18.4)	18.4 (17.0–19.5)
45-day	9.43 (8.88–9.99)	11.1 (10.4–11.7)	12.8 (12.0–13.5)	14.1 (13.2–14.9)	15.7 (14.8–16.6)	17.0 (15.9–18.0)	18.2 (17.0–19.2)	19.3 (18.0–20.5)	20.8 (19.3–22.0)	21.8 (20.3–23.2)
60-day	11.3 (10.6–11.9)	13.2 (12.4–14.0)	15.1 (14.3–16.0)	16.6 (15.6–17.6)	18.5 (17.4–19.6)	19.9 (18.7–21.1)	21.3 (20.0–22.6)	22.6 (21.1–24.0)	24.3 (22.6–25.8)	25.5 (23.7–27.1)

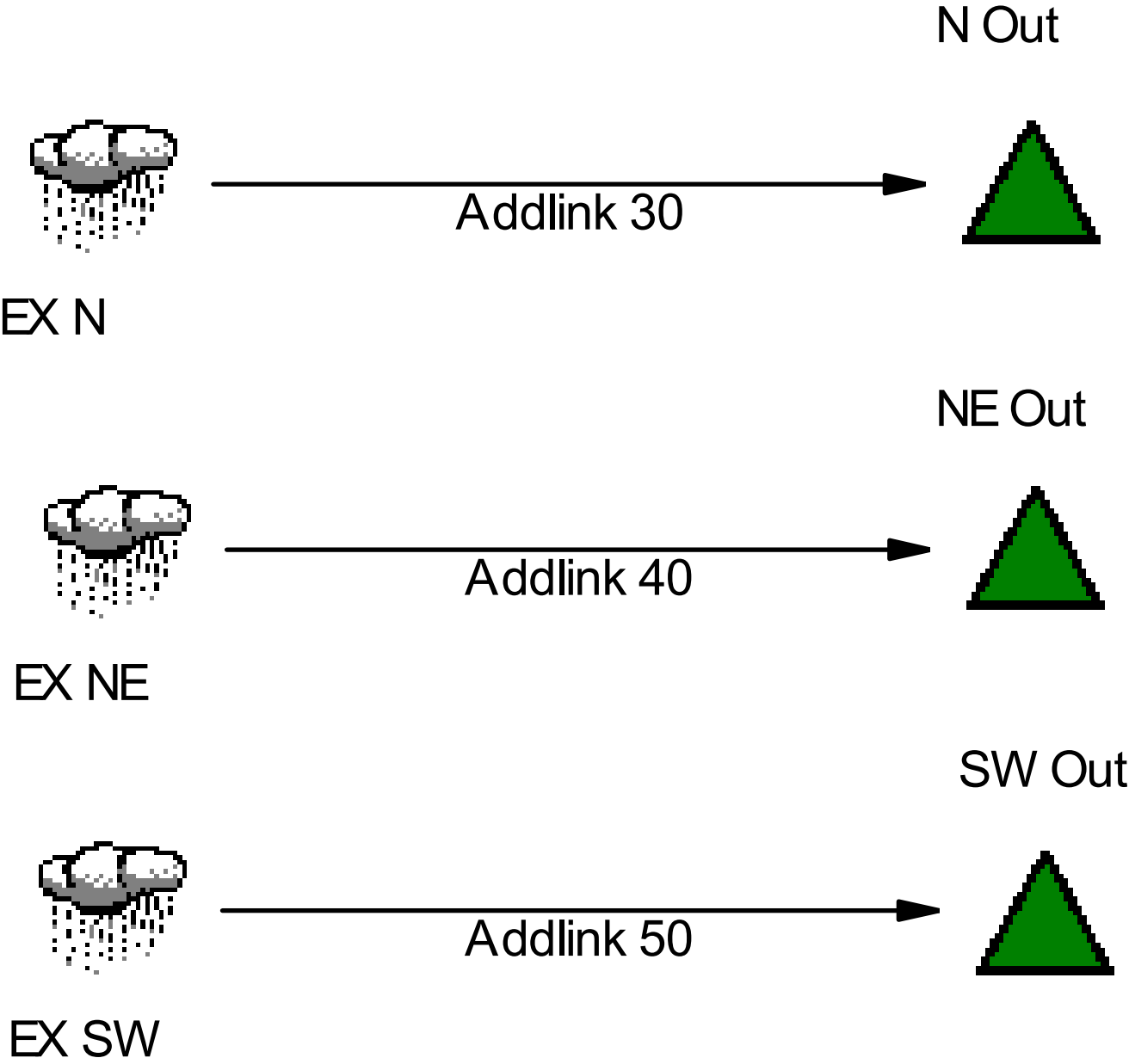
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

Section 3 – Detention Calculations

EXISTING DRAINAGE ANALYSIS



Job File: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX DRNG.PP
Rain Dir: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\

=====
JOB TITLE
=====

Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Existing Drainage Analysis
Project Comments:

Table of Contents

***** MASTER SUMMARY *****

Watershed..... Master Network Summary 1.01

***** DESIGN STORMS SUMMARY *****

Johnson2,10,100 Design Storms 2.01

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Johnson2,10,100

Return Event	Total Depth in	Rainfall Type	RNF ID
21	1.3900	Synthetic Curve	Indy HUFF 1Q 1hr
22	1.6200	Synthetic Curve	Indy HUFF 1Q 2hr
23	1.7200	Synthetic Curve	Indy HUFF 1Q 3hr
26	2.0500	Synthetic Curve	Indy HUFF 1Q 6hr
212	2.4400	Synthetic Curve	Indy HUFF 2Q 12h
224	2.9100	Synthetic Curve	Indy HUFF 3Q 24h
101	2.0200	Synthetic Curve	Indy HUFF 1Q 1hr
102	2.3800	Synthetic Curve	Indy HUFF 1Q 2hr
103	2.5300	Synthetic Curve	Indy HUFF 1Q 3hr
106	3.0300	Synthetic Curve	Indy HUFF 1Q 6hr
1012	3.5300	Synthetic Curve	Indy HUFF 2Q 12h
1024	4.0800	Synthetic Curve	Indy HUFF 3Q 24h
1001	3.0100	Synthetic Curve	Indy HUFF 1Q 1hr
1002	3.6500	Synthetic Curve	Indy HUFF 1Q 2hr
1003	3.9300	Synthetic Curve	Indy HUFF 1Q 3hr
1006	4.7600	Synthetic Curve	Indy HUFF 1Q 6hr
10012	5.3600	Synthetic Curve	Indy HUFF 2Q 12h
10024	5.8800	Synthetic Curve	Indy HUFF 3Q 24h

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
-----	----	-----	-----	--	-----	-----	-----	-----

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
EX N	AREA	2	.100		.5500	1.80		
EX N	AREA	2	.161		.7500	1.61		
EX N	AREA	2	.191		.9500	1.33		
EX N	AREA	2	.300		1.5500	1.20		
EX N	AREA	2	.450		5.4500	1.35		
EX N	AREA	2	.653		15.6000	1.33		
EX N	AREA	10	.290		.4500	5.41		
EX N	AREA	10	.426		.6500	4.66		
EX N	AREA	10	.487		.8000	3.79		
EX N	AREA	10	.707		1.5500	2.96		
EX N	AREA	10	.948		5.4000	2.83		
EX N	AREA	10	1.230		15.6000	2.36		
EX N	AREA	100	.698		.4000	13.82		
EX N	AREA	100	1.008		.5500	11.80		
EX N	AREA	100	1.152		.8000	9.42		
EX N	AREA	100	1.598		1.2500	6.74		
EX N	AREA	100	1.937		5.4000	5.61		
EX N	AREA	100	2.239		15.6000	4.03		

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
EX NE	AREA	2	.003		.5500	.05		
EX NE	AREA	2	.005		.8000	.05		
EX NE	AREA	2	.006		.9500	.04		
EX NE	AREA	2	.010		1.5500	.04		
EX NE	AREA	2	.016		5.4000	.05		
EX NE	AREA	2	.023		15.3500	.05		
EX NE	AREA	10	.010		.5000	.18		
EX NE	AREA	10	.015		.6500	.15		
EX NE	AREA	10	.017		.8500	.13		
EX NE	AREA	10	.025		1.5000	.10		
EX NE	AREA	10	.035		5.4000	.10		
EX NE	AREA	10	.046		15.5000	.09		
EX NE	AREA	100	.025		.4500	.47		
EX NE	AREA	100	.037		.6000	.42		
EX NE	AREA	100	.042		.8000	.34		
EX NE	AREA	100	.060		1.2500	.25		
EX NE	AREA	100	.073		5.4000	.21		
EX NE	AREA	100	.085		15.4000	.15		

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
EX SW	AREA	2	.004		.5000	.07		
EX SW	AREA	2	.006		.7000	.06		
EX SW	AREA	2	.008		1.0000	.05		
EX SW	AREA	2	.012		1.5500	.05		
EX SW	AREA	2	.019		5.3500	.06		
EX SW	AREA	2	.028		15.4000	.06		
EX SW	AREA	10	.012		.4500	.23		
EX SW	AREA	10	.018		.6000	.20		
EX SW	AREA	10	.021		.8000	.16		
EX SW	AREA	10	.031		1.5500	.13		
EX SW	AREA	10	.042		5.3500	.13		
EX SW	AREA	10	.055		15.3500	.11		
EX SW	AREA	100	.030		.3500	.61		
EX SW	AREA	100	.045		.5500	.53		
EX SW	AREA	100	.052		.7500	.42		
EX SW	AREA	100	.072		1.2500	.31		
EX SW	AREA	100	.088		5.3500	.26		
EX SW	AREA	100	.103		15.5500	.19		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*N OUT	JCT	2	.100		.5500	1.80		
*N OUT	JCT	2	.161		.7500	1.61		
*N OUT	JCT	2	.191		.9500	1.33		
*N OUT	JCT	2	.300		1.5500	1.20		
*N OUT	JCT	2	.450		5.4500	1.35		
*N OUT	JCT	2	.653		15.6000	1.33		
*N OUT	JCT	10	.290		.4500	5.41		
*N OUT	JCT	10	.426		.6500	4.66		
*N OUT	JCT	10	.487		.8000	3.79		
*N OUT	JCT	10	.707		1.5500	2.96		
*N OUT	JCT	10	.948		5.4000	2.83		
*N OUT	JCT	10	1.230		15.6000	2.36		
*N OUT	JCT	100	.698		.4000	13.82		
*N OUT	JCT	100	1.008		.5500	11.80		
*N OUT	JCT	100	1.152		.8000	9.42		
*N OUT	JCT	100	1.598		1.2500	6.74		
*N OUT	JCT	100	1.937		5.4000	5.61		
*N OUT	JCT	100	2.239		15.6000	4.03		

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*NE OUT	JCT	2	.003		.5500	.05		
*NE OUT	JCT	2	.005		.8000	.05		
*NE OUT	JCT	2	.006		.9500	.04		
*NE OUT	JCT	2	.010		1.5500	.04		
*NE OUT	JCT	2	.016		5.4000	.05		
*NE OUT	JCT	2	.023		15.3500	.05		
*NE OUT	JCT	10	.010		.5000	.18		
*NE OUT	JCT	10	.015		.6500	.15		
*NE OUT	JCT	10	.017		.8500	.13		
*NE OUT	JCT	10	.025		1.5000	.10		
*NE OUT	JCT	10	.035		5.4000	.10		
*NE OUT	JCT	10	.046		15.5000	.09		
*NE OUT	JCT	100	.025		.4500	.47		
*NE OUT	JCT	100	.037		.6000	.42		
*NE OUT	JCT	100	.042		.8000	.34		
*NE OUT	JCT	100	.060		1.2500	.25		
*NE OUT	JCT	100	.073		5.4000	.21		
*NE OUT	JCT	100	.085		15.4000	.15		

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*SW OUT	JCT	2	.004		.5000	.07		
*SW OUT	JCT	2	.006		.7000	.06		
*SW OUT	JCT	2	.008		1.0000	.05		
*SW OUT	JCT	2	.012		1.5500	.05		
*SW OUT	JCT	2	.019		5.3500	.06		
*SW OUT	JCT	2	.028		15.4000	.06		
*SW OUT	JCT	10	.012		.4500	.23		
*SW OUT	JCT	10	.018		.6000	.20		
*SW OUT	JCT	10	.021		.8000	.16		
*SW OUT	JCT	10	.031		1.5500	.13		
*SW OUT	JCT	10	.042		5.3500	.13		
*SW OUT	JCT	10	.055		15.3500	.11		
*SW OUT	JCT	100	.030		.3500	.61		
*SW OUT	JCT	100	.045		.5500	.53		
*SW OUT	JCT	100	.052		.7500	.42		
*SW OUT	JCT	100	.072		1.2500	.31		
*SW OUT	JCT	100	.088		5.3500	.26		
*SW OUT	JCT	100	.103		15.5500	.19		

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.01

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Existing Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 21

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 1hr
Storm Frequency = 2 yr
Total Rainfall Depth= 1.3900 in
Duration Multiplier = 1
Resulting Duration = 1.0000 hrs
Resulting Start Time= .0000 hrs Step= .0500 hrs End= 1.0000 hrs

Storm Tag Name = 22

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 2hr
Storm Frequency = 2 yr
Total Rainfall Depth= 1.6200 in
Duration Multiplier = 1
Resulting Duration = 2.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 2.0000 hrs

Storm Tag Name = 23

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 3hr
Storm Frequency = 2 yr
Total Rainfall Depth= 1.7200 in
Duration Multiplier = 1
Resulting Duration = 3.0000 hrs
Resulting Start Time= .0000 hrs Step= .1500 hrs End= 3.0000 hrs

Storm Tag Name = 26

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 6hr
Storm Frequency = 2 yr
Total Rainfall Depth= 2.0500 in
Duration Multiplier = 1
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

Storm Tag Name = 212

Data Type, File, ID = Synthetic Storm Indy HUFF 2Q 12h
Storm Frequency = 2 yr
Total Rainfall Depth= 2.4400 in
Duration Multiplier = 1
Resulting Duration = 12.0000 hrs
Resulting Start Time= .0000 hrs Step= .6000 hrs End= 12.0000 hrs

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.02

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Existing Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 224

Data Type, File, ID = Synthetic Storm Indy HUFF 3Q 24h
Storm Frequency = 2 yr
Total Rainfall Depth= 2.9100 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= 1.2000 hrs End= 24.0000 hrs

Storm Tag Name = 101

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 1hr
Storm Frequency = 10 yr
Total Rainfall Depth= 2.0200 in
Duration Multiplier = 1
Resulting Duration = 1.0000 hrs
Resulting Start Time= .0000 hrs Step= .0500 hrs End= 1.0000 hrs

Storm Tag Name = 102

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 2hr
Storm Frequency = 10 yr
Total Rainfall Depth= 2.3800 in
Duration Multiplier = 1
Resulting Duration = 2.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 2.0000 hrs

Storm Tag Name = 103

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 3hr
Storm Frequency = 10 yr
Total Rainfall Depth= 2.5300 in
Duration Multiplier = 1
Resulting Duration = 3.0000 hrs
Resulting Start Time= .0000 hrs Step= .1500 hrs End= 3.0000 hrs

Storm Tag Name = 106

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 6hr
Storm Frequency = 10 yr
Total Rainfall Depth= 3.0300 in
Duration Multiplier = 1
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.03

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Existing Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 1012

Data Type, File, ID = Synthetic Storm Indy HUFF 2Q 12h
Storm Frequency = 10 yr
Total Rainfall Depth= 3.5300 in
Duration Multiplier = 1
Resulting Duration = 12.0000 hrs
Resulting Start Time= .0000 hrs Step= .6000 hrs End= 12.0000 hrs

Storm Tag Name = 1024

Data Type, File, ID = Synthetic Storm Indy HUFF 3Q 24h
Storm Frequency = 10 yr
Total Rainfall Depth= 4.0800 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= 1.2000 hrs End= 24.0000 hrs

Storm Tag Name = 1001

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 1hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.0100 in
Duration Multiplier = 1
Resulting Duration = 1.0000 hrs
Resulting Start Time= .0000 hrs Step= .0500 hrs End= 1.0000 hrs

Storm Tag Name = 1002

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 2hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.6500 in
Duration Multiplier = 1
Resulting Duration = 2.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 2.0000 hrs

Storm Tag Name = 1003

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 3hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.9300 in
Duration Multiplier = 1
Resulting Duration = 3.0000 hrs
Resulting Start Time= .0000 hrs Step= .1500 hrs End= 3.0000 hrs

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.04

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Existing Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 1006

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 6hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.7600 in
Duration Multiplier = 1
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

Storm Tag Name = 10012

Data Type, File, ID = Synthetic Storm Indy HUFF 2Q 12h
Storm Frequency = 100 yr
Total Rainfall Depth= 5.3600 in
Duration Multiplier = 1
Resulting Duration = 12.0000 hrs
Resulting Start Time= .0000 hrs Step= .6000 hrs End= 12.0000 hrs

Storm Tag Name = 10024

Data Type, File, ID = Synthetic Storm Indy HUFF 3Q 24h
Storm Frequency = 100 yr
Total Rainfall Depth= 5.8800 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= 1.2000 hrs End= 24.0000 hrs

Index of Starting Page Numbers for ID Names

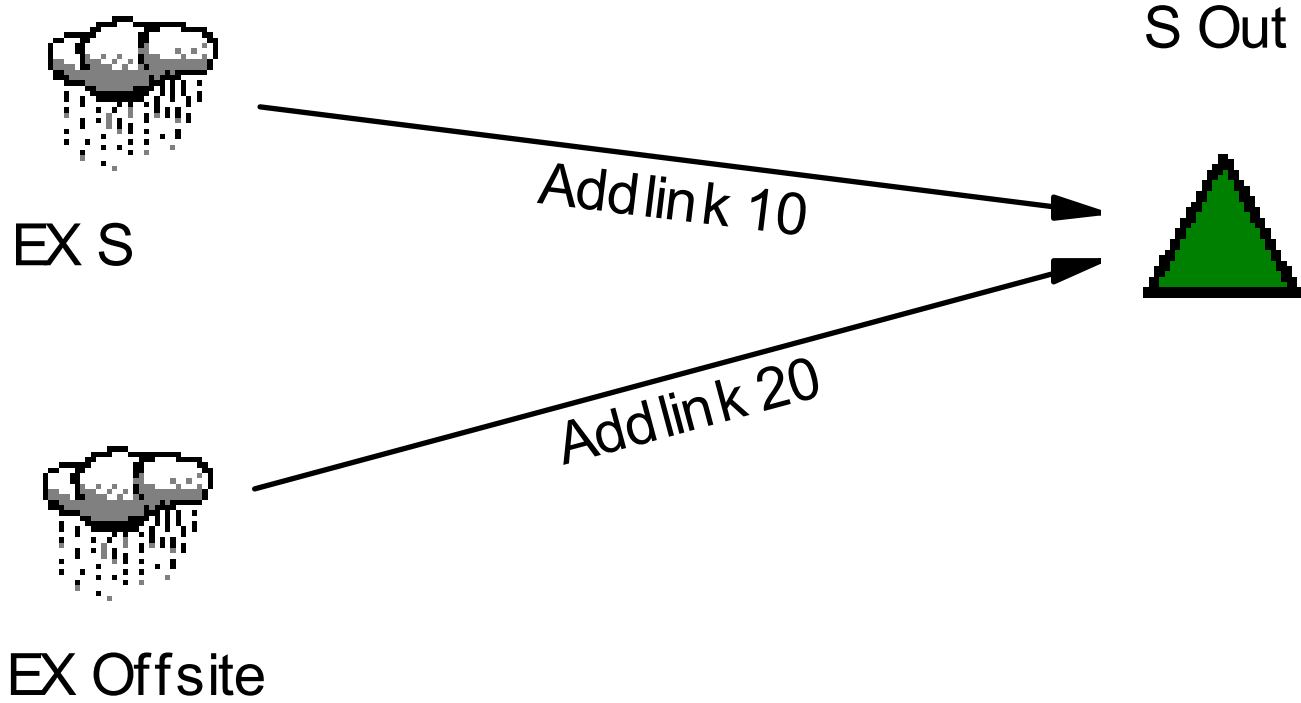
----- J -----

Johnson2,10,100... 2.01

----- W -----

Watershed... 1.01

EXISTING DRAINAGE ANALYSIS



Job File: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX-INDOT D
Rain Dir: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\

=====
JOB TITLE
=====

Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Existing Drainage Analysis
Project Comments:

Table of Contents

***** MASTER SUMMARY *****

Watershed..... Master Network Summary 1.01

***** DESIGN STORMS SUMMARY *****

Johnson2,10,100 Design Storms 2.01

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX-INDOT dr

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Johnson2,10,100

Return Event	Total Depth in	Rainfall Type	RNF ID
10224	4.0800	Synthetic Curve	TypeII 24hr

 MASTER NETWORK SUMMARY
 SCS Unit Hydrograph Method

 (*Node=Outfall; +Node=Diversion;)
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
EX OFFSITE	AREA	10	.219	--	12.1500	2.30		
EX S	AREA	10	2.497		12.0500	34.40		
*S OUT	JCT	10	2.715		12.0500	36.32		

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.01

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\EX-INDOT dr

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Existing Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 10224

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 4.0800 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Index of Starting Page Numbers for ID Names

----- J -----

Johnson2,10,100... 2.01

----- W -----

Watershed... 1.01

Project: Meijer FRK
 Location: Franklin
 Prepared by: KAC
 Date: 5/11/2015

Existing

N Storm Sewer Basin

	Area	CN	CN * A
Impervious	0.00	98	0.0
Br Type B/D Soil	1.96	80	156.8
CrA Type C Soil	4.42	74	327.1
MnB2 Type C Soil	0.00	74	0.0
MnC2 Type C Soil	1.82	74	134.7

Total: 8.20 618.6

Use CN: 75

Existing

SW Basin

	Area	CN	CN * A
Impervious	0.00	98	0.0
Br Type B/D Soil	0.00	80	0.0
CrA Type C Soil	0.00	74	0.0
MnB2 Type C Soil	0.20	74	14.8
MnC2 Type C Soil	0.20	74	14.8

Total: 0.40 29.6

Use CN: 74

Existing

S Basin

	Area	CN	CN * A
Impervious	0.31	98	30.4
Br Type B/D Soil	5.10	80	408.0
CrA Type C Soil	10.34	74	765.2
MnB2 Type C Soil	0.11	74	8.1
MnC2 Type C Soil	0.78	74	57.7

Total: 16.64 1269.4

Use CN: 76

Existing

NE Storm Sewer Basin

	Area	CN	CN * A
Impervious	0.00	98	0.0
Br Type B/D Soil	0.00	80	0.0
CrA Type C Soil	0.33	74	24.4
MnB2 Type C Soil	0.00	74	0.0
MnC2 Type C Soil	0.00	74	0.0

Total: 0.33 24.4

Use CN: 74

Existing

Offsite

	Area	CN	CN * A
Impervious	0.34	98	33.3
Br Type B/D Soil	0.08	80	6.4
CrA Type C Soil	0.74	74	54.8
MnB2 Type C Soil	0.04	74	3.0
MnC2 Type C Soil	0.00	74	0.0

Total: 1.20 97.4

Use CN: 81

Project: **Meijer FRK**
Location: **Franklin, IN**
Prepared By: CLH
Date: 5/13/2015

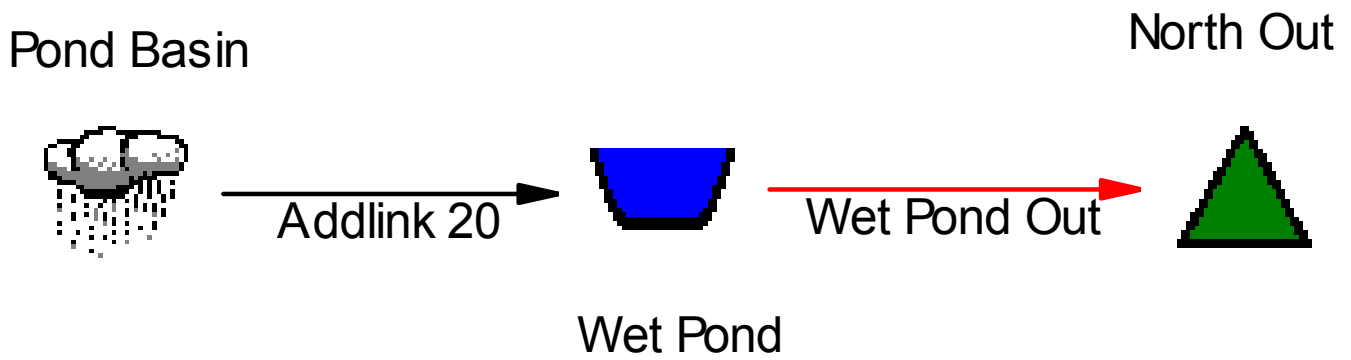
Existing	N Storm Sewer Basin	SW Basin	S Basin	NE Storm Sewer Basin	Offsite Basin
Surface description (table 3-1).....	Cultivated	Cultivated	Cultivated	Grass	Grass
Manning's roughness coeff, n (table 3-1)...	0.17	0.17	0.17	0.24	0.24
Flow length, L (total L<=300ft.).....ft.	100	100	100	100	100
Two-yr 24hr rainfall, P2.....in.	2.91	2.91	2.91	2.91	2.91
Land slope, s.....ft/ft	0.031	0.025	0.034	0.020	0.017
0.007 (nL) ^{0.8} Tt = ----- Computed Tt.....hr. P ² ^{0.5} S ^{0.4}	0.159	0.173	0.153	0.249	0.266

Surface description (PAVED or UNPAVED).....	unpaved	unpaved	unpaved	unpaved	unpaved
Flow length, L.....ft.	465	80	761	3	1350
Watercourse slope, s.....ft/ft	0.0203	0.0223	0.0094	0.0100	0.0082
Average velocity, V (figure 3-1).....ft/s	2.299	2.409	1.564	2.033	1.841
Tt = L/(3600 V).....Computed Tt..hr.	0.056	0.009	0.135	0.000	0.204

Velocity.....ft/s	0.00	0.00	2.52	0.00	0.00
Length.....ft	0	0	20	0	0
Tt=L/(3600v).....Computed Tt..hr	0.000	0.000	0.002	0.000	0.000

Watershed or subarea Tc or Tt.....hr	0.215	0.182	0.290	0.250	0.470
Watershed or subarea Tc or Tt.....min	13	11	17	15	28

PROPOSED DRAINAGE ANALYSIS



Job File: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR DRNG.PP
Rain Dir: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\

=====
JOB TITLE
=====

Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Proposed Drainage Analysis
Project Comments:

Table of Contents

***** MASTER SUMMARY *****

Watershed..... Master Network Summary 1.01

***** DESIGN STORMS SUMMARY *****

Johnson2,10,100 Design Storms 2.01

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Johnson2,10,100

Return Event	Total Depth in	Rainfall Type	RNF ID
-----	-----	-----	-----
21	1.3900	Synthetic Curve	Indy HUFF 1Q 1hr
22	1.6200	Synthetic Curve	Indy HUFF 1Q 2hr
23	1.7200	Synthetic Curve	Indy HUFF 1Q 3hr
26	2.0500	Synthetic Curve	Indy HUFF 1Q 6hr
212	2.4400	Synthetic Curve	Indy HUFF 2Q 12h
224	2.9100	Synthetic Curve	Indy HUFF 3Q 24h
101	2.0200	Synthetic Curve	Indy HUFF 1Q 1hr
102	2.3800	Synthetic Curve	Indy HUFF 1Q 2hr
103	2.5300	Synthetic Curve	Indy HUFF 1Q 3hr
106	3.0300	Synthetic Curve	Indy HUFF 1Q 6hr
1012	3.5300	Synthetic Curve	Indy HUFF 2Q 12h
1024	4.0800	Synthetic Curve	Indy HUFF 3Q 24h
1001	3.0100	Synthetic Curve	Indy HUFF 1Q 1hr
1002	3.6500	Synthetic Curve	Indy HUFF 1Q 2hr
1003	3.9300	Synthetic Curve	Indy HUFF 1Q 3hr
1006	4.7600	Synthetic Curve	Indy HUFF 1Q 6hr
10012	5.3600	Synthetic Curve	Indy HUFF 2Q 12h
10024	5.8800	Synthetic Curve	Indy HUFF 3Q 24h

 MASTER NETWORK SUMMARY
 SCS Unit Hydrograph Method

 (*Node=Outfall; +Node=Diversion;)
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
-----	----	-----	-----	--	-----	-----	-----	-----

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*NORTH OUT	JCT	2	.587		1.3500	.64		
*NORTH OUT	JCT	2	.946		1.9000	.78		
*NORTH OUT	JCT	2	1.105		3.3500	.82		
*NORTH OUT	JCT	2	1.636		4.6500	.98		
*NORTH OUT	JCT	2	2.276		9.1500	1.06		
*NORTH OUT	JCT	2	3.057		18.7000	1.25		
*NORTH OUT	JCT	10	1.585		1.5000	1.00		
*NORTH OUT	JCT	10	2.175		3.2500	1.25		
*NORTH OUT	JCT	10	2.424		2.5500	1.25		
*NORTH OUT	JCT	10	3.258		6.3000	1.38		
*NORTH OUT	JCT	10	4.100		9.8500	1.56		
*NORTH OUT	JCT	10	5.032		17.3500	1.56		
*NORTH OUT	JCT	100	3.220		1.4500	1.56		
*NORTH OUT	JCT	100	4.299		2.0500	1.73		
*NORTH OUT	JCT	100	4.775		2.3500	1.73		
*NORTH OUT	JCT	100	6.189		6.2500	3.05		
*NORTH OUT	JCT	100	7.216		9.4000	4.04		
*NORTH OUT	JCT	100	8.099	R	19.3500	3.92		

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
POND BASIN	AREA	2	1.451		.4500	25.19		
POND BASIN	AREA	2	1.810		.6000	20.43		
POND BASIN	AREA	2	1.969		.7500	16.19		
POND BASIN	AREA	2	2.500		.8000	12.45		
POND BASIN	AREA	2	3.139		4.9000	8.59		
POND BASIN	AREA	2	3.921		15.5500	6.15		
POND BASIN	AREA	10	2.449		.4500	43.71		
POND BASIN	AREA	10	3.038		.5500	35.48		
POND BASIN	AREA	10	3.287		.6000	28.45		
POND BASIN	AREA	10	4.121		.7500	22.57		
POND BASIN	AREA	10	4.963		4.9000	13.35		
POND BASIN	AREA	10	5.896		15.5500	8.90		
POND BASIN	AREA	100	4.084		.4500	74.11		
POND BASIN	AREA	100	5.162		.5000	62.28		
POND BASIN	AREA	100	5.638		.5500	51.69		
POND BASIN	AREA	100	7.052		.7500	41.45		
POND BASIN	AREA	100	8.079		4.8500	21.21		
POND BASIN	AREA	100	8.971		15.5500	13.07		

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
WET POND	IN	POND	2		.4500	25.19		
WET POND	IN	POND	2		.6000	20.43		
WET POND	IN	POND	2		.7500	16.19		
WET POND	IN	POND	2		.8000	12.45		
WET POND	IN	POND	2		4.9000	8.59		
WET POND	IN	POND	2		15.5500	6.15		
WET POND	IN	POND	10		.4500	43.71		
WET POND	IN	POND	10		.5500	35.48		
WET POND	IN	POND	10		.6000	28.45		
WET POND	IN	POND	10		.7500	22.57		
WET POND	IN	POND	10		4.9000	13.35		
WET POND	IN	POND	10		15.5500	8.90		
WET POND	IN	POND	100		.4500	74.11		
WET POND	IN	POND	100		.5000	62.28		
WET POND	IN	POND	100		.5500	51.69		
WET POND	IN	POND	100		.7500	41.45		
WET POND	IN	POND	100		4.8500	21.21		
WET POND	IN	POND	100		15.5500	13.07		

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
WET POND	OUT POND	2	.587		1.3500	.64	757.12	1.411
WET POND	OUT POND	2	.946		1.9000	.78	757.34	1.720
WET POND	OUT POND	2	1.105		3.3500	.82	757.42	1.832
WET POND	OUT POND	2	1.636		4.6500	.98	757.66	2.162
WET POND	OUT POND	2	2.276		9.1500	1.06	757.92	2.547
WET POND	OUT POND	2	3.057		18.7000	1.25	758.16	2.902
WET POND	OUT POND	10	1.585		1.5000	1.00	757.80	2.361
WET POND	OUT POND	10	2.175		3.2500	1.25	758.14	2.875
WET POND	OUT POND	10	2.424		2.5500	1.25	758.26	3.048
WET POND	OUT POND	10	3.258		6.3000	1.38	758.62	3.606
WET POND	OUT POND	10	4.100		9.8500	1.56	758.91	4.062
WET POND	OUT POND	10	5.032		17.3500	1.56	759.15	4.455
WET POND	OUT POND	100	3.220		1.4500	1.56	758.83	3.942
WET POND	OUT POND	100	4.299		2.0500	1.73	759.42	4.909
WET POND	OUT POND	100	4.775		2.3500	1.73	759.63	5.270
WET POND	OUT POND	100	6.189		6.2500	3.05	760.15	6.210
WET POND	OUT POND	100	7.216		9.4000	4.04	760.22	6.342
WET POND	OUT POND	100	8.099	R	19.3500	3.92	760.21	6.323

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.01

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Proposed Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 21

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 1hr
Storm Frequency = 2 yr
Total Rainfall Depth= 1.3900 in
Duration Multiplier = 1
Resulting Duration = 1.0000 hrs
Resulting Start Time= .0000 hrs Step= .0500 hrs End= 1.0000 hrs

Storm Tag Name = 22

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 2hr
Storm Frequency = 2 yr
Total Rainfall Depth= 1.6200 in
Duration Multiplier = 1
Resulting Duration = 2.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 2.0000 hrs

Storm Tag Name = 23

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 3hr
Storm Frequency = 2 yr
Total Rainfall Depth= 1.7200 in
Duration Multiplier = 1
Resulting Duration = 3.0000 hrs
Resulting Start Time= .0000 hrs Step= .1500 hrs End= 3.0000 hrs

Storm Tag Name = 26

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 6hr
Storm Frequency = 2 yr
Total Rainfall Depth= 2.0500 in
Duration Multiplier = 1
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

Storm Tag Name = 212

Data Type, File, ID = Synthetic Storm Indy HUFF 2Q 12h
Storm Frequency = 2 yr
Total Rainfall Depth= 2.4400 in
Duration Multiplier = 1
Resulting Duration = 12.0000 hrs
Resulting Start Time= .0000 hrs Step= .6000 hrs End= 12.0000 hrs

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.02

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Proposed Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 224

Data Type, File, ID = Synthetic Storm Indy HUFF 3Q 24h
Storm Frequency = 2 yr
Total Rainfall Depth= 2.9100 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= 1.2000 hrs End= 24.0000 hrs

Storm Tag Name = 101

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 1hr
Storm Frequency = 10 yr
Total Rainfall Depth= 2.0200 in
Duration Multiplier = 1
Resulting Duration = 1.0000 hrs
Resulting Start Time= .0000 hrs Step= .0500 hrs End= 1.0000 hrs

Storm Tag Name = 102

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 2hr
Storm Frequency = 10 yr
Total Rainfall Depth= 2.3800 in
Duration Multiplier = 1
Resulting Duration = 2.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 2.0000 hrs

Storm Tag Name = 103

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 3hr
Storm Frequency = 10 yr
Total Rainfall Depth= 2.5300 in
Duration Multiplier = 1
Resulting Duration = 3.0000 hrs
Resulting Start Time= .0000 hrs Step= .1500 hrs End= 3.0000 hrs

Storm Tag Name = 106

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 6hr
Storm Frequency = 10 yr
Total Rainfall Depth= 3.0300 in
Duration Multiplier = 1
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.03

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Proposed Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 1012

Data Type, File, ID = Synthetic Storm Indy HUFF 2Q 12h
Storm Frequency = 10 yr
Total Rainfall Depth= 3.5300 in
Duration Multiplier = 1
Resulting Duration = 12.0000 hrs
Resulting Start Time= .0000 hrs Step= .6000 hrs End= 12.0000 hrs

Storm Tag Name = 1024

Data Type, File, ID = Synthetic Storm Indy HUFF 3Q 24h
Storm Frequency = 10 yr
Total Rainfall Depth= 4.0800 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= 1.2000 hrs End= 24.0000 hrs

Storm Tag Name = 1001

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 1hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.0100 in
Duration Multiplier = 1
Resulting Duration = 1.0000 hrs
Resulting Start Time= .0000 hrs Step= .0500 hrs End= 1.0000 hrs

Storm Tag Name = 1002

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 2hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.6500 in
Duration Multiplier = 1
Resulting Duration = 2.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 2.0000 hrs

Storm Tag Name = 1003

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 3hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.9300 in
Duration Multiplier = 1
Resulting Duration = 3.0000 hrs
Resulting Start Time= .0000 hrs Step= .1500 hrs End= 3.0000 hrs

Type.... Design Storms
Name.... Johnson2,10,100

Page 2.04

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR drng.ppw

Title... Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Proposed Drainage Analysis
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 1006

Data Type, File, ID = Synthetic Storm Indy HUFF 1Q 6hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.7600 in
Duration Multiplier = 1
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

Storm Tag Name = 10012

Data Type, File, ID = Synthetic Storm Indy HUFF 2Q 12h
Storm Frequency = 100 yr
Total Rainfall Depth= 5.3600 in
Duration Multiplier = 1
Resulting Duration = 12.0000 hrs
Resulting Start Time= .0000 hrs Step= .6000 hrs End= 12.0000 hrs

Storm Tag Name = 10024

Data Type, File, ID = Synthetic Storm Indy HUFF 3Q 24h
Storm Frequency = 100 yr
Total Rainfall Depth= 5.8800 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= 1.2000 hrs End= 24.0000 hrs

Index of Starting Page Numbers for ID Names

----- J -----

Johnson2,10,100... 2.01

----- W -----

Watershed... 1.01

PROPOSED DRAINAGE ANALYSIS

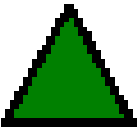
S Dir Disch



Addlink 40



Addlink 10



South Out

SE Basin

Job File: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR-INDOT D
Rain Dir: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\

=====
JOB TITLE
=====

Project Date: 5/11/2015
Project Engineer: Canter
Project Title: Meijer FRK - Proposed Drainage Analysis
Project Comments:

Table of Contents

***** MASTER SUMMARY *****

Watershed..... Master Network Summary 1.01

***** DESIGN STORMS SUMMARY *****

Johnson2,10,100 Design Storms 2.01

***** RAINFALL DATA *****

TypeII 24hr.... 50224
Synthetic Curve 3.01

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR-INDOT dr

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Johnson2,10,100

Return Event	Total Depth in	Rainfall Type	RNF ID
50224	5.3200	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
S DIR DISCH	AREA	50	.476	--	12.0500	6.31		
SE BASIN	AREA	50	1.467		12.0000	22.44		
*SOUTH OUT	JCT	50	1.943		12.0000	28.18		

Type.... Design Storms

Page 2.01

Name.... Johnson2,10,100

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR-INDOT dr

Title... Project Date: 5/11/2015

Project Engineer: Canter

Project Title: Meijer FRK - Proposed Drainage Analysis

Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 50224

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 50 yr

Total Rainfall Depth= 5.3200 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Name.... TypeII 24hr Tag: 50224

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR-INDOT dr

CUMULATIVE RAINFALL FRACTIONS					
Time	Output Time increment = .1000 hrs				
hrs	Time on left represents time for first value in each row.				
<hr/>					
.0000	.000	.001	.002	.003	.004
.5000	.005	.006	.007	.008	.009
1.0000	.011	.012	.013	.014	.015
1.5000	.016	.017	.018	.020	.021
2.0000	.022	.023	.024	.026	.027
2.5000	.028	.029	.031	.032	.033
3.0000	.035	.036	.037	.038	.040
3.5000	.041	.042	.044	.045	.047
4.0000	.048	.049	.051	.052	.054
4.5000	.055	.057	.058	.060	.061
5.0000	.063	.065	.066	.068	.070
5.5000	.071	.073	.075	.076	.078
6.0000	.080	.082	.084	.085	.087
6.5000	.089	.091	.093	.095	.097
7.0000	.099	.101	.103	.105	.107
7.5000	.109	.111	.113	.116	.118
8.0000	.120	.122	.125	.127	.130
8.5000	.132	.135	.138	.141	.144
9.0000	.147	.150	.153	.157	.160
9.5000	.163	.166	.170	.173	.177
10.0000	.181	.185	.189	.194	.199
10.5000	.204	.209	.215	.221	.228
11.0000	.235	.243	.251	.261	.271
11.5000	.283	.307	.354	.431	.568
12.0000	.663	.682	.699	.713	.725
12.5000	.735	.743	.751	.759	.766
13.0000	.772	.778	.784	.789	.794
13.5000	.799	.804	.808	.812	.816
14.0000	.820	.824	.827	.831	.834
14.5000	.838	.841	.844	.847	.850
15.0000	.854	.856	.859	.862	.865
15.5000	.868	.870	.873	.875	.878
16.0000	.880	.882	.885	.887	.889
16.5000	.891	.893	.895	.898	.900
17.0000	.902	.904	.906	.908	.910
17.5000	.912	.914	.915	.917	.919
18.0000	.921	.923	.925	.926	.928
18.5000	.930	.931	.933	.935	.936
19.0000	.938	.939	.941	.942	.944
19.5000	.945	.947	.948	.949	.951
20.0000	.952	.953	.955	.956	.957
20.5000	.958	.960	.961	.962	.964
21.0000	.965	.966	.967	.968	.970
21.5000	.971	.972	.973	.975	.976

Type.... Synthetic Curve

Page 3.02

Name.... TypeII 24hr Tag: 50224

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\PR-INDOT dr

CUMULATIVE RAINFALL FRACTIONS					
Time	Output Time increment = .1000 hrs				
hrs	Time on left represents time for first value in each row.				
22.0000	.977	.978	.979	.981	.982
22.5000	.983	.984	.985	.986	.988
23.0000	.989	.990	.991	.992	.993
23.5000	.994	.996	.997	.998	.999
24.0000	1.000				

Index of Starting Page Numbers for ID Names

----- J -----

Johnson2,10,100... 2.01

----- T -----

TypeII 24hr 50224... 3.01

----- W -----

Watershed... 1.01

Project: Meijer FRK
 Location: Franklin
 Prepared by: KAC
 Date: 5/11/2015

Proposed
Pond Basin

	Area	CN	CN * A
Impervious	16.74	98	1640.5
Grass (Type C)	4.42	74	327.1
Water	1.18	100	118.0

Total: 22.34 2085.6

Use CN: 93

Proposed
South Direct Discharge Basin

	Area	CN	CN * A
Impervious	0.41	98	40.2
Grass (Type C)	1.19	74	88.1
Water	0.00	100	0.0

Total: 1.60 128.2

Use CN: 80

Proposed
SE Basin

	Area	CN	CN * A
Impervious	1.81	98	177.4
Grass (Type C)	0.61	74	45.1
Water	0.00	100	0.0

Total: 2.42 222.5

Use CN: 92

Project: **Meijer FRK**
Location: **Franklin, IN**
Prepared By: CLH
Date: 5/13/2015

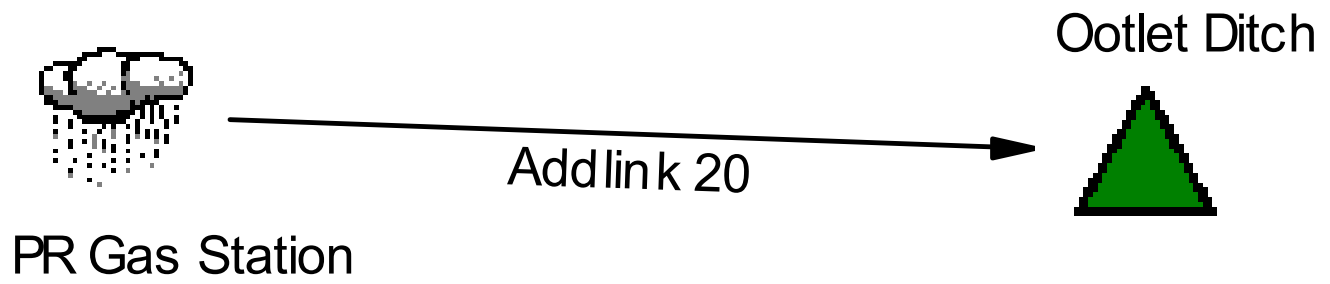
Existing	N Storm Sewer Basin	SW Basin	S Basin	NE Storm Sewer Basin	Offsite Basin
Surface description (table 3-1).....	Cultivated	Cultivated	Cultivated	Grass	Grass
Manning's roughness coeff, n (table 3-1)..	0.17	0.17	0.17	0.24	0.24
Flow length, L (total L<=300ft.).....ft.	100	100	100	100	100
Two-yr 24hr rainfall, P2.....in.	2.91	2.91	2.91	2.91	2.91
Land slope, s.....ft/ft	0.031	0.025	0.034	0.020	0.017
0.007 (nL) ^{0.8} Tt = ----- Computed Tt.....hr. P ² ^{0.5} S ^{0.4}	0.159	0.173	0.153	0.249	0.266

Surface description (PAVED or UNPAVED).....	unpaved	unpaved	unpaved	unpaved	unpaved
Flow length, L.....ft.	465	80	761	3	1350
Watercourse slope, s.....ft/ft	0.0203	0.0223	0.0094	0.0100	0.0082
Average velocity, V (figure 3-1).....ft/s	2.299	2.409	1.564	2.033	1.841
Tt = L/(3600 V).....Computed Tt..hr.	0.056	0.009	0.135	0.000	0.204

Velocity.....ft/s	0.00	0.00	2.52	0.00	0.00
Length.....ft	0	0	20	0	0
Tt=L/(3600v).....Computed Tt..hr	0.000	0.000	0.002	0.000	0.000

Watershed or subarea Tc or Tt.....hr	0.215	0.182	0.290	0.250	0.470
Watershed or subarea Tc or Tt.....min	13	11	17	15	28

PROPOSED WATER QUALITY ANALYSIS



Job File: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\WATER QUAL
Rain Dir: G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\

=====
JOB TITLE
=====

Project Date: 11/11/2014
Project Engineer: Nierzwicki
Project Title: Meijer FRK - Proposed Drainage Analysis
Project Comments:

Table of Contents

***** MASTER SUMMARY *****

Watershed..... Master Network Summary 1.01

***** DESIGN STORMS SUMMARY *****

Johnson2,10,100 Design Storms 2.01

***** RAINFALL DATA *****

TypeII 24hr.... 1
Synthetic Curve 3.01

***** TC CALCULATIONS *****

PR GAS STATION.. Tc Calcs 4.01

***** CN CALCULATIONS *****

PR GAS STATION.. Runoff CN-Area 5.01

Name.... Watershed

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\Water Quali

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Johnson2,10,100

Return Event	Total Depth in	Rainfall Type	RNF ID
1	1.0000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*OOTLET DITCH	JCT	1	.065		11.9000	1.14		
PR GAS STATION	AREA	1	.065		11.9000	1.14		

Type.... Design Storms

Page 2.01

Name.... Johnson2,10,100

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\Water Quali

Title... Project Date: 11/11/2014

Project Engineer: Nierzwicki

Project Title: Meijer FRK - Proposed Drainage Analysis

Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Johnson2,10,100

Storm Tag Name = 1

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 1 yr

Total Rainfall Depth= 1.0000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Name.... TypeII 24hr Tag: 1

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\Water Quali

CUMULATIVE RAINFALL FRACTIONS					
Time	Output Time increment = .1000 hrs				
hrs	Time on left represents time for first value in each row.				
<hr/>					
.0000	.000	.001	.002	.003	.004
.5000	.005	.006	.007	.008	.009
1.0000	.011	.012	.013	.014	.015
1.5000	.016	.017	.018	.020	.021
2.0000	.022	.023	.024	.026	.027
2.5000	.028	.029	.031	.032	.033
3.0000	.035	.036	.037	.038	.040
3.5000	.041	.042	.044	.045	.047
4.0000	.048	.049	.051	.052	.054
4.5000	.055	.057	.058	.060	.061
5.0000	.063	.065	.066	.068	.070
5.5000	.071	.073	.075	.076	.078
6.0000	.080	.082	.084	.085	.087
6.5000	.089	.091	.093	.095	.097
7.0000	.099	.101	.103	.105	.107
7.5000	.109	.111	.113	.116	.118
8.0000	.120	.122	.125	.127	.130
8.5000	.132	.135	.138	.141	.144
9.0000	.147	.150	.153	.157	.160
9.5000	.163	.166	.170	.173	.177
10.0000	.181	.185	.189	.194	.199
10.5000	.204	.209	.215	.221	.228
11.0000	.235	.243	.251	.261	.271
11.5000	.283	.307	.354	.431	.568
12.0000	.663	.682	.699	.713	.725
12.5000	.735	.743	.751	.759	.766
13.0000	.772	.778	.784	.789	.794
13.5000	.799	.804	.808	.812	.816
14.0000	.820	.824	.827	.831	.834
14.5000	.838	.841	.844	.847	.850
15.0000	.854	.856	.859	.862	.865
15.5000	.868	.870	.873	.875	.878
16.0000	.880	.882	.885	.887	.889
16.5000	.891	.893	.895	.898	.900
17.0000	.902	.904	.906	.908	.910
17.5000	.912	.914	.915	.917	.919
18.0000	.921	.923	.925	.926	.928
18.5000	.930	.931	.933	.935	.936
19.0000	.938	.939	.941	.942	.944
19.5000	.945	.947	.948	.949	.951
20.0000	.952	.953	.955	.956	.957
20.5000	.958	.960	.961	.962	.964
21.0000	.965	.966	.967	.968	.970
21.5000	.971	.972	.973	.975	.976

Type.... Synthetic Curve

Page 3.02

Name.... TypeII 24hr Tag: 1

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\Water Quali

CUMULATIVE RAINFALL FRACTIONS					
Output Time increment = .1000 hrs					
Time hrs	Time on left represents time for first value in each row.				
-----	-----				
22.0000	.977	.978	.979	.981	.982
22.5000	.983	.984	.985	.986	.988
23.0000	.989	.990	.991	.992	.993
23.5000	.994	.996	.997	.998	.999
24.0000	1.000				

Type.... Tc Calcs
Name.... PR GAS STATION

Page 4.01

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\Water Quali

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: User Defined

Segment #1 Time: .0833 hrs

=====
Total Tc: .0833 hrs
=====

Type.... Tc Calcs
Name.... PR GAS STATION

Page 4.02

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\Water Quali

Tc Equations used...

==== User Defined =====

Tc = Value entered by user

Where: Tc = Time of concentration

Type.... Runoff CN-Area
Name.... PR GAS STATION

File.... G:\DE\Clients\Meijer\074485 - Meijer FRK - Franklin, IN\ENG\Detention\Water Quali

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
-----	-----	-----	-----	-----	-----
Weighted CN	98	.980			98.00

COMPOSITE AREA & WEIGHTED CN ---> .980 98.00 (98)
.....

Index of Starting Page Numbers for ID Names

----- J -----

Johnson2,10,100... 2.01

----- P -----

PR GAS STATION... 4.01, 5.01

----- T -----

TypeII 24hr 1... 3.01

----- W -----

Watershed... 1.01

Weir Report

Detention Pond Emergency Spillway

Trapezoidal Weir

Crest = Sharp
Bottom Length (ft) = 48.00
Total Depth (ft) = 1.75
Side Slope (z:1) = 4.00

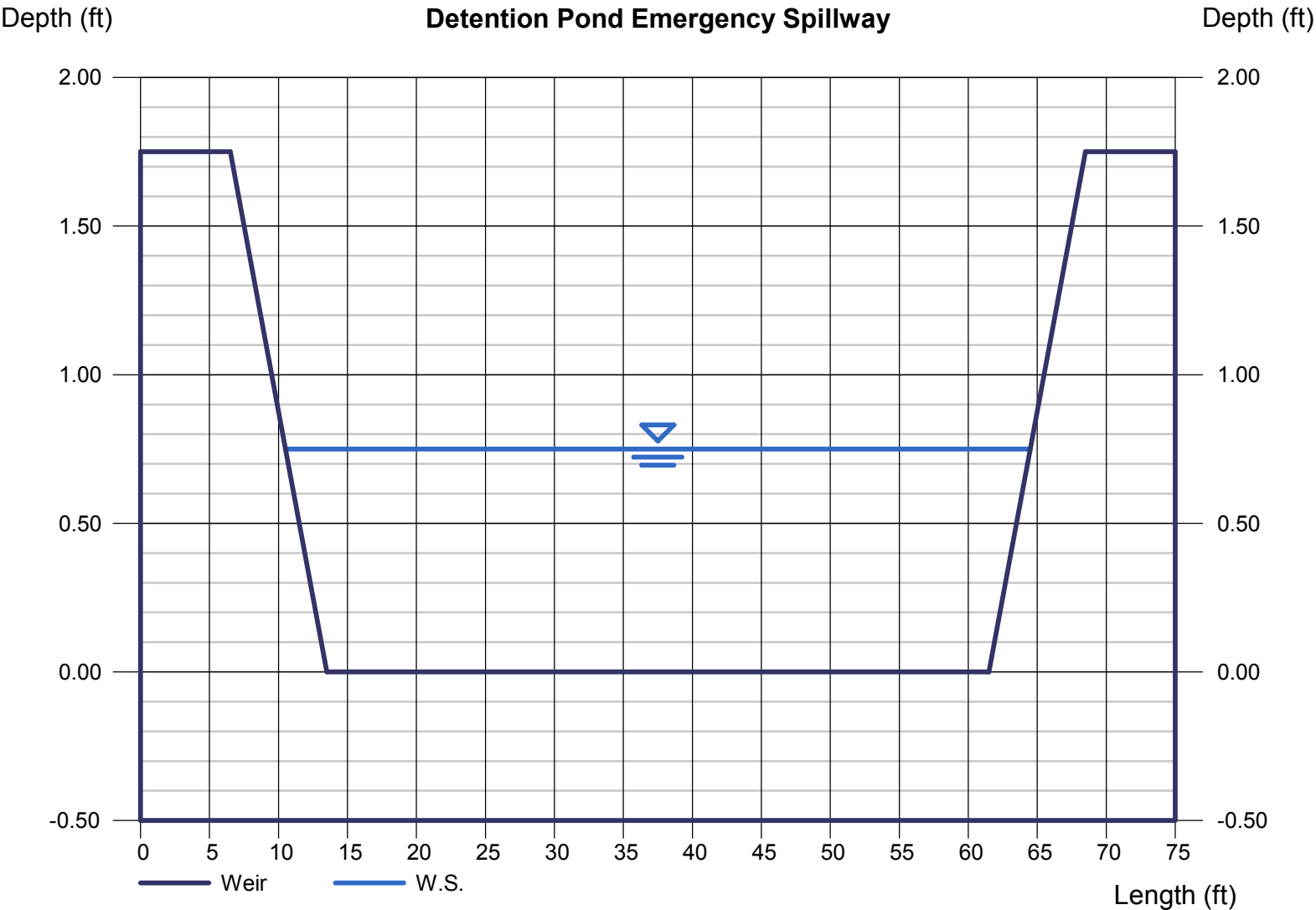
Highlighted

Depth (ft) = 0.75
Q (cfs) = 101.48
Area (sqft) = 38.25
Velocity (ft/s) = 2.65
Top Width (ft) = 54.00

Calculations

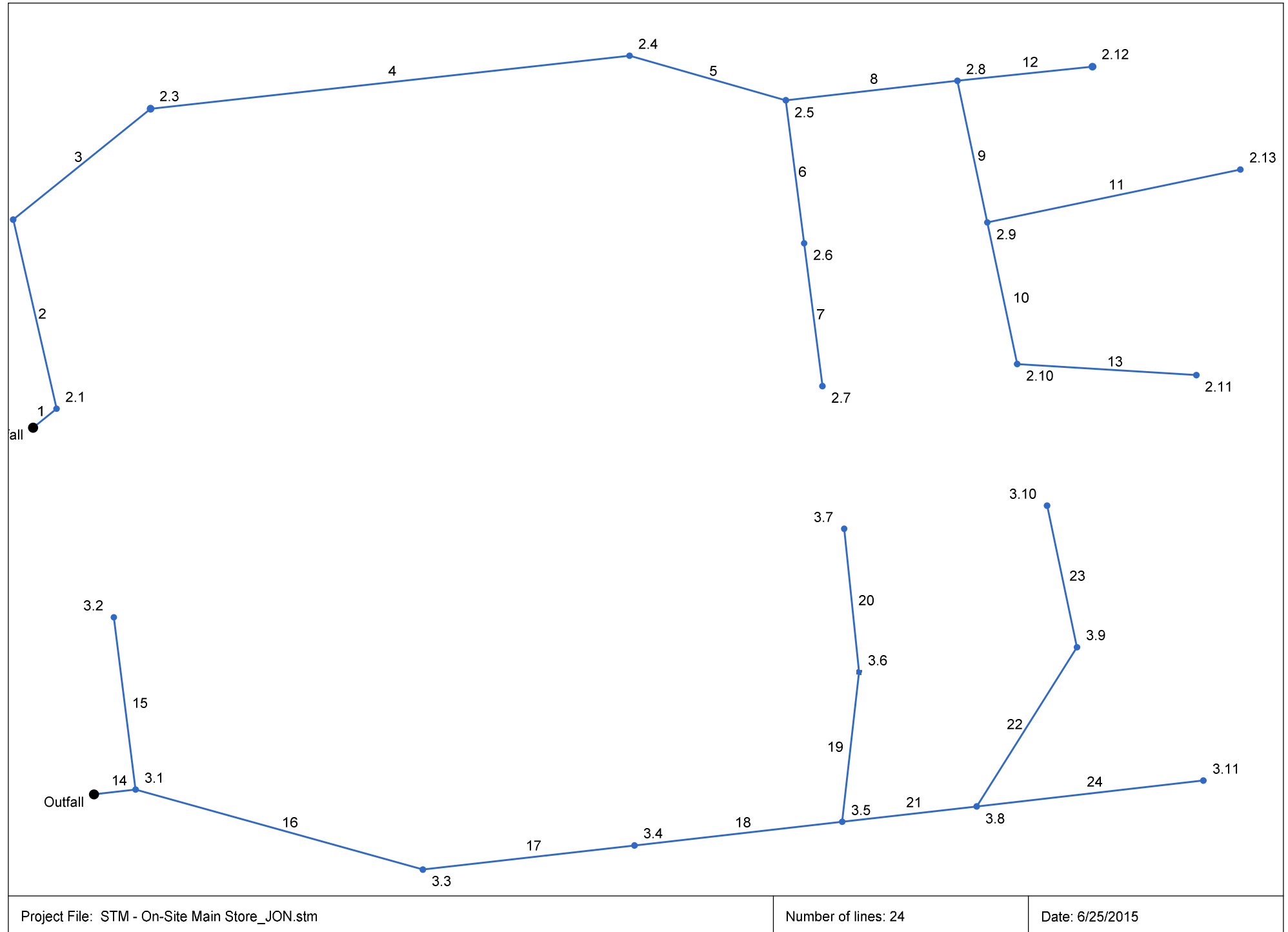
Weir Coeff. Cw = 3.10
Compute by: Q vs Depth
No. Increments = 7

*Q100 = 75.96 cfs
1.25 x Q100 = 94.95 cfs < 101.48 cfs
Depth at Qemergency < 0.75 feet



Section 4 – Storm Sewer Sizing Calculations

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2013 Plan MAIN STORE



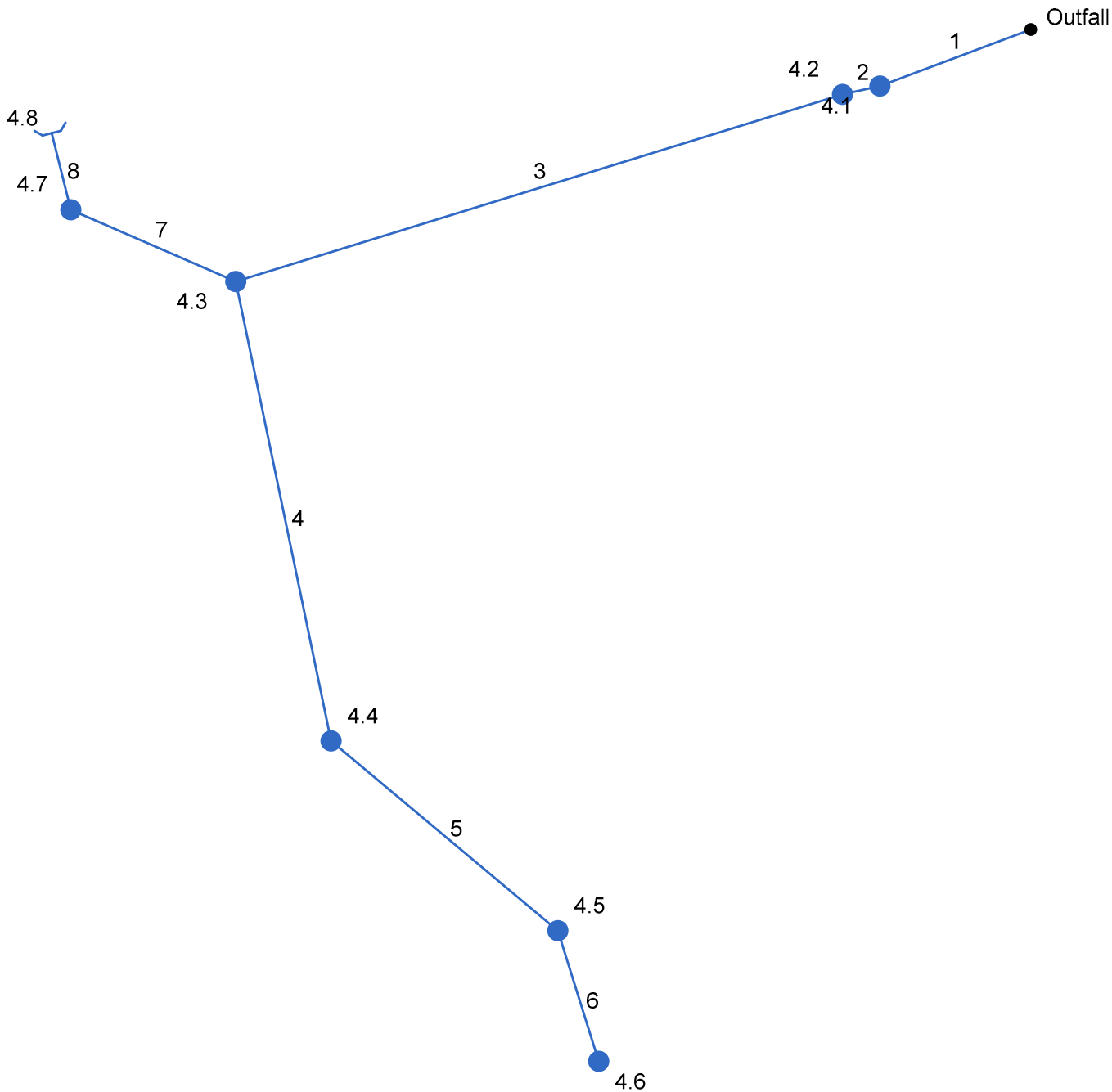
Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	26.30	2.82	9.05	0.89	2.51	7.47	5.0	17.6	4.3	32.14	48.54	3.38	48	0.11	756.00	756.03	758.84	758.86	760.58	763.08	2.1-2.0
2	1	174.72	0.64	6.23	0.76	0.49	4.96	5.0	16.7	4.4	21.94	29.85	3.12	36	0.20	756.03	756.38	759.10	759.27	763.08	761.04	2.2-2.1
3	2	154.07	0.79	5.59	0.90	0.71	4.48	5.0	15.8	4.5	20.34	33.11	2.91	36	0.25	756.38	756.76	759.48	759.61	761.04	765.02	2.3-2.2
4	3	410.92	0.03	4.80	0.85	0.03	3.77	5.0	13.3	4.9	18.62	33.55	3.02	36	0.25	756.76	757.80	759.69	759.97	765.02	765.76	2.4-2.3
5	4	139.05	0.62	4.77	0.80	0.50	3.74	5.0	12.8	5.0	18.89	20.58	4.75	30	0.25	758.38	758.73	760.27	760.62	765.76	764.48	2.5-2.4
6	5	130.00	0.68	1.38	0.84	0.57	1.16	5.0	5.6	7.0	8.07	8.44	5.21	18	0.65	759.84	760.68	761.16	761.84	764.48	764.48	2.6-2.5
7	6	130.00	0.70	0.70	0.84	0.59	0.59	5.0	5.0	7.2	4.24	4.46	3.52	15	0.48	760.81	761.43	762.07	762.58	764.48	764.48	2.7-2.6
8	5	147.30	0.48	2.77	0.78	0.37	2.09	5.0	12.1	5.2	10.80	11.34	3.55	24	0.25	759.25	759.62	761.16	761.44	764.48	764.48	2.8-2.5
9	8	130.38	0.57	1.68	0.81	0.46	1.25	5.0	11.3	5.3	6.70	10.10	2.28	24	0.20	759.90	760.16	761.76	761.85	764.48	764.48	2.9-2.8
10	9	130.38	0.63	0.83	0.80	0.50	0.55	5.0	10.6	5.5	3.05	4.08	2.60	15	0.40	760.65	761.17	761.98	762.24	764.48	764.42	2.10-2.9
11	9	220.88	0.28	0.28	0.85	0.24	0.24	5.0	5.0	7.2	1.72	1.61	2.23	12	0.20	761.03	761.48	761.98	762.43	764.48	764.04	2.13-2.9
12	8	115.79	0.61	0.61	0.75	0.46	0.46	10.0	10.0	5.6	2.58	2.88	2.51	15	0.20	760.77	761.00	761.76	761.96	764.48	765.88	2.12-2.8
13	10	153.00	0.20	0.20	0.25	0.05	0.05	5.0	5.0	7.2	0.36	2.19	0.75	12	0.38	761.42	762.00	762.41	762.45	764.42	765.00	2.10-2.11
14	End	35.70	1.11	7.17	0.88	0.98	5.87	5.0	11.4	5.3	31.21	44.55	4.08	42	0.20	756.00	756.07	758.61	758.65	760.08	764.79	3.1-3.0
15	14	156.57	1.20	1.20	0.87	1.04	1.04	5.0	5.0	7.2	7.53	8.43	5.39	18	0.65	758.74	759.75	759.85	760.86	764.79	763.62	3.2-3.1
16	14	255.24	0.81	4.86	0.78	0.63	3.85	5.0	10.0	5.6	21.62	26.07	3.31	36	0.15	756.35	756.74	759.05	759.28	764.79	765.88	3.3-3.1
17	16	181.63	0.65	4.05	0.78	0.51	3.22	5.0	9.0	5.9	18.95	29.69	2.98	36	0.20	756.74	757.10	759.40	759.52	765.88	765.35	3.4-3.3
18	17	178.26	0.26	3.40	0.73	0.19	2.71	5.0	8.1	6.1	16.60	18.43	3.86	30	0.20	757.50	757.86	759.59	759.87	765.35	763.27	3.5-3.4
19	18	136.00	0.67	1.38	0.84	0.56	1.16	5.0	5.9	6.9	7.95	10.08	3.55	24	0.20	759.02	759.29	760.36	760.63	763.27	764.00	3.6-3.5
20	19	130.00	0.71	0.71	0.84	0.60	0.60	5.0	5.0	7.2	4.30	5.21	3.29	18	0.25	760.43	760.75	761.47	761.79	764.00	764.25	3.7-3.6
21	18	115.42	0.23	1.76	0.67	0.15	1.36	5.0	7.4	6.3	8.61	13.31	3.09	24	0.35	758.40	758.80	760.22	760.34	763.27	763.23	3.8-3.5
22	21	167.29	0.68	1.31	0.81	0.55	1.06	5.0	5.7	6.9	7.34	8.12	4.77	18	0.60	759.17	760.17	760.56	761.28	763.23	763.68	3.9-3.8
Project File: STM - On-Site Main Store_JON.stm																Number of lines: 24				Run Date: 6/25/2015		
NOTES:Intensity = 54.67 / (Inlet time + 8.40) ^ 0.78 ; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID									
Line	To Line		Incr (ac)	Total (ac)		Incr (min)	Total (min)	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)										
23	22	130.38	0.63	0.63	0.81	0.51	0.51	5.0	5.0	7.2	3.68	4.31	3.09	15	0.44	760.42	761.00	761.74	762.12	763.68	764.25	3.10-3.9									
24	21	194.56	0.22	0.22	0.66	0.15	0.15	5.0	5.0	7.2	1.05	1.98	1.40	12	0.31	759.26	759.86	760.56	760.71	763.23	762.86	3.11-3.8									

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2013 Plan GAS STATION



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)	
1	End	34.04	0.00	1.73	0.00	0.00	1.09	0.0	11.1	5.4	5.87	8.04	4.03	18	0.50	750.07	750.24	751.29	751.34	752.49	761.60	Pipe - (105)
2	1	8.14	0.26	1.73	0.85	0.22	1.09	5.0	11.0	5.4	5.88	7.98	4.11	18	0.49	750.24	750.28	751.39	751.40	761.60	762.20	Pipe - (104)
3	2	134.28	0.00	1.47	0.00	0.00	0.87	0.0	10.5	5.5	4.80	4.94	4.57	15	0.50	750.53	751.20	751.53	752.19	762.20	762.68	Pipe - (103)
4	3	99.61	0.29	0.51	0.80	0.23	0.42	5.0	6.2	6.7	2.82	5.82	2.95	15	0.69	751.20	751.89	752.52	752.65	762.68	763.00	Pipe - (102)
5	4	62.60	0.12	0.22	0.85	0.10	0.19	5.0	5.6	7.0	1.30	2.72	2.76	12	0.50	752.14	752.45	752.85	752.95	763.00	763.93	Pipe - (101)
6	5	29.00	0.10	0.10	0.85	0.09	0.09	5.0	5.0	7.2	0.61	2.77	1.95	12	0.52	752.45	752.60	753.10	752.93	763.93	763.93	Pipe - (100)
7	3	38.03	0.35	0.96	0.85	0.30	0.45	5.0	10.3	5.6	2.51	2.73	3.19	12	0.50	751.45	751.64	752.52	752.64	762.68	762.21	Pipe - (107)
8	7	16.83	0.61	0.61	0.25	0.15	0.15	10.0	10.0	5.6	0.86	2.66	1.09	12	0.48	751.64	751.72	752.84	752.84	762.21	753.39	Pipe - (106)
Project File: STM - On-Site--Gas Station.stm																Number of lines: 8				Run Date: 6/25/2015		
NOTES:Intensity = 54.67 / (Inlet time + 8.40) ^ 0.78 ; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Meijer Franklin

Weighted C Calculations

5/12/2015
BA, KAC

CM 2.1

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.69
Roof	0.90	2.14
Total Area =		2.83

Weighted C Value = 0.89

CM 2.2

Cover Type	C Value	Area (ac.)
Grass	0.25	0.09
Pavement	0.85	0.54
Roof	0.90	0.00
Total Area =		0.63

Weighted C Value = 0.76

CM 2.4

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.03
Roof	0.90	0.00
Total Area =		0.03

Weighted C Value = 0.85

CM 2.5

Cover Type	C Value	Area (ac.)
Grass	0.25	0.05
Pavement	0.85	0.57
Roof	0.90	0.00
Total Area =		0.62

Weighted C Value = 0.80

CM 2.6

Cover Type	C Value	Area (ac.)
Grass	0.25	0.01
Pavement	0.85	0.67
Roof	0.90	0.00
Total Area =		0.68

Weighted C Value = 0.84

CM 2.7

Cover Type	C Value	Area (ac.)
Grass	0.25	0.02
Pavement	0.85	0.69
Roof	0.90	0.00
Total Area =		0.70

Weighted C Value = 0.84

CM 2.8

Cover Type	C Value	Area (ac.)
Grass	0.25	0.06
Pavement	0.85	0.42
Roof	0.90	0.00
Total Area =		0.48

Weighted C Value = 0.78

CM 2.9

Cover Type	C Value	Area (ac.)
Grass	0.25	0.04
Pavement	0.85	0.53
Roof	0.90	0.00
Total Area =		0.57

Weighted C Value = 0.81

CM 2.10

Cover Type	C Value	Area (ac.)
Grass	0.25	0.05
Pavement	0.85	0.58
Roof	0.90	0.00
Total Area =		0.63

Weighted C Value = 0.80

CM 2.11

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.28
Roof	0.90	0.00
Total Area =		0.28

Weighted C Value = 0.85

CM 2.13

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.26
Roof	0.90	0.00
Total Area =		0.26

Weighted C Value = 0.85

CM 2.14

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.29
Roof	0.90	0.00
Total Area =		0.29

Weighted C Value = 0.85

CM 2.15

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.07
Roof	0.90	0.00
Total Area =		0.07

Weighted C Value = 0.85

CM 2.16

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.08
Roof	0.90	0.00
Total Area =		0.08

Weighted C Value = 0.85

CM 2.19

Cover Type	C Value	Area (ac.)
Grass	0.25	0.02
Pavement	0.85	0.16
Roof	0.90	0.00
Total Area =		0.18

Weighted C Value = 0.78

CM 3.1

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.39
Roof	0.90	0.72
Total Area =		1.11

Weighted C Value = 0.88

Meijer Franklin

Weighted C Calculations

5/12/2015
BA, KAC

CM 3.3

Cover Type	C Value	Area (ac.)
Grass	0.25	0.10
Pavement	0.85	0.71
Roof	0.90	0.00
Total Area =		0.81

Weighted C Value = 0.78

CM 3.4

Cover Type	C Value	Area (ac.)
Grass	0.25	0.08
Pavement	0.85	0.57
Roof	0.90	0.00
Total Area =		0.65

Weighted C Value = 0.78

CM 3.5

Cover Type	C Value	Area (ac.)
Grass	0.25	0.05
Pavement	0.85	0.21
Roof	0.90	0.00
Total Area =		0.26

Weighted C Value = 0.73

CM 3.6

Cover Type	C Value	Area (ac.)
Grass	0.25	0.01
Pavement	0.85	0.66
Roof	0.90	0.00
Total Area =		0.67

Weighted C Value = 0.84

CM 3.7

Cover Type	C Value	Area (ac.)
Grass	0.25	0.01
Pavement	0.85	0.71
Roof	0.90	0.00
Total Area =		0.71

Weighted C Value = 0.85

CM 3.8

Cover Type	C Value	Area (ac.)
Grass	0.25	0.07
Pavement	0.85	0.16
Roof	0.90	0.00
Total Area =		0.23

Weighted C Value = 0.67

CM 3.9

Cover Type	C Value	Area (ac.)
Grass	0.25	0.04
Pavement	0.85	0.64
Roof	0.90	0.00
Total Area =		0.68

Weighted C Value = 0.81

CM 3.10

Cover Type	C Value	Area (ac.)
Grass	0.25	0.05
Pavement	0.85	0.64
Roof	0.90	0.00
Total Area =		0.69

Weighted C Value = 0.81

CM 3.11

Cover Type	C Value	Area (ac.)
Grass	0.25	0.07
Pavement	0.85	0.15
Roof	0.90	0.00
Total Area =		0.22

Weighted C Value = 0.66

CM 5.1

Cover Type	C Value	Area (ac.)
Grass	0.25	0.09
Pavement	0.85	0.39
Roof	0.90	0.00
Total Area =		0.48

Weighted C Value = 0.74

CM 5.2

Cover Type	C Value	Area (ac.)
Grass	0.25	0.11
Pavement	0.85	0.13
Roof	0.90	0.00
Total Area =		0.24

Weighted C Value = 0.58

CM 5.3

Cover Type	C Value	Area (ac.)
Grass	0.25	0.20
Pavement	0.85	0.16
Roof	0.90	0.00
Total Area =		0.36

Weighted C Value = 0.52

CM 5.4

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.11
Roof	0.90	0.00
Total Area =		0.11

Weighted C Value = 0.85

CM 6.1

Cover Type	C Value	Area (ac.)
Grass	0.25	0.00
Pavement	0.85	0.15
Roof	0.90	0.00
Total Area =		0.15

Weighted C Value = 0.85

CM 6.2

Cover Type	C Value	Area (ac.)
Grass	0.25	0.16
Pavement	0.85	0.38
Roof	0.90	0.00
Total Area =		0.54

Weighted C Value = 0.67

CM 6.3

Cover Type	C Value	Area (ac.)
Grass	0.25	0.05
Pavement	0.85	0.27
Roof	0.90	0.00
Total Area =		0.32

Weighted C Value = 0.76

Meijer Franklin
Weighted C Calculations

CM 6.5

Cover Type	C Value	Area (ac.)
Grass	0.25	0.54
Pavement	0.85	0.14
Roof	0.90	0.00
Total Area =		0.68

Weighted C Value = 0.37

CM EX1

Cover Type	C Value	Area (ac.)
Grass	0.25	0.46
Pavement	0.85	0.05
Roof	0.90	0.00
Total Area =		0.51

Weighted C Value = 0.31

CM EX4

Cover Type	C Value	Area (ac.)
Grass	0.25	0.31
Pavement	0.85	0.03
Roof	0.90	0.00
Total Area =		0.34

Weighted C Value = 0.30

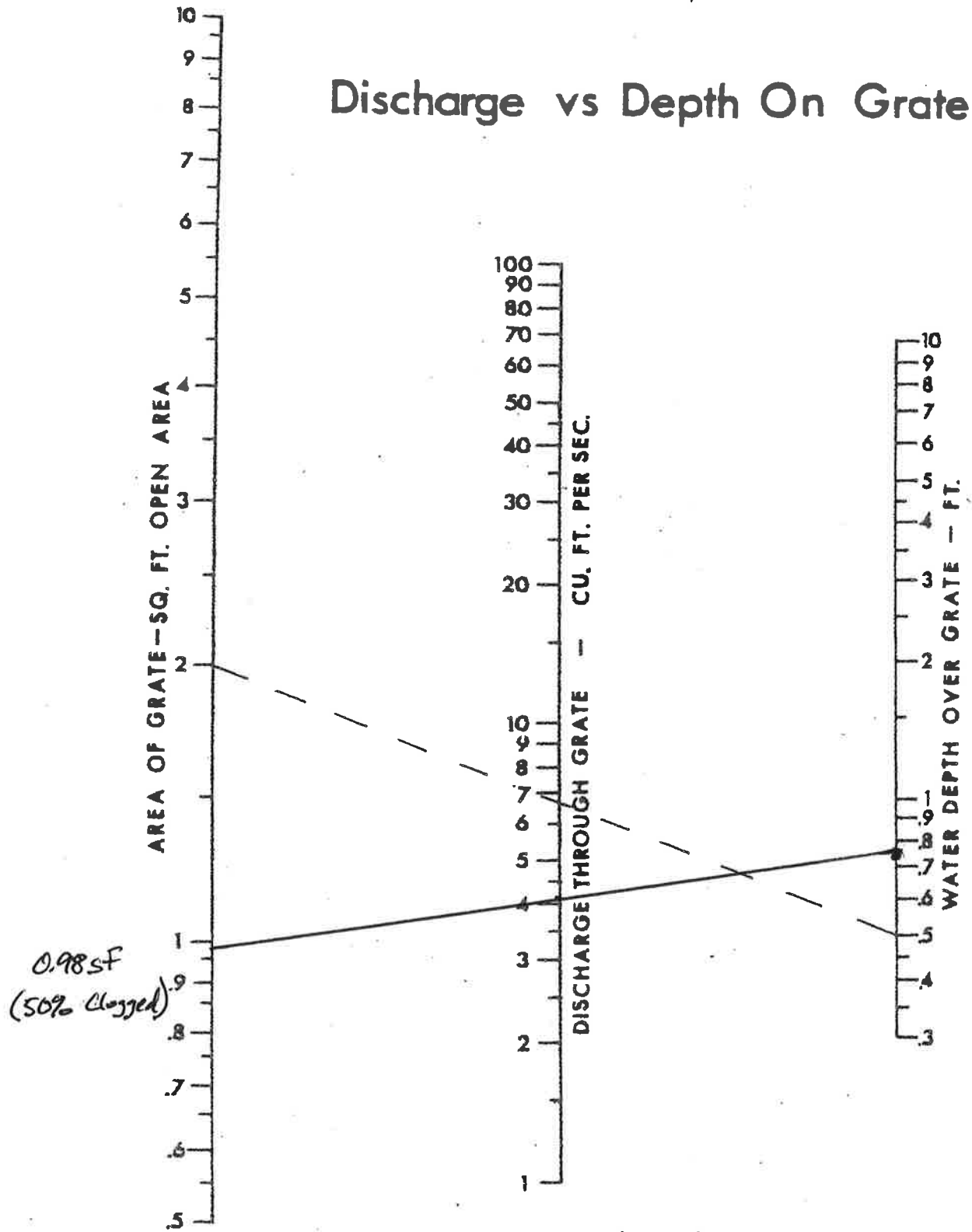
STORM SEWER PIPE VELOCITY

MINIMUM PIPE SLOPE FOR FULL FLOW VELOCITY OF 2.5 FT/S (n=0.013)

12"	0.31%
15"	0.23%
18"	0.18%
24"	0.13%
30"	0.10%
36"	0.08%
42"	0.06%
48"	0.05%

STR 2.1
 $Q_o = 4.10 \text{ cfs}$
 Depth = 9" max.

Discharge vs Depth On Grate



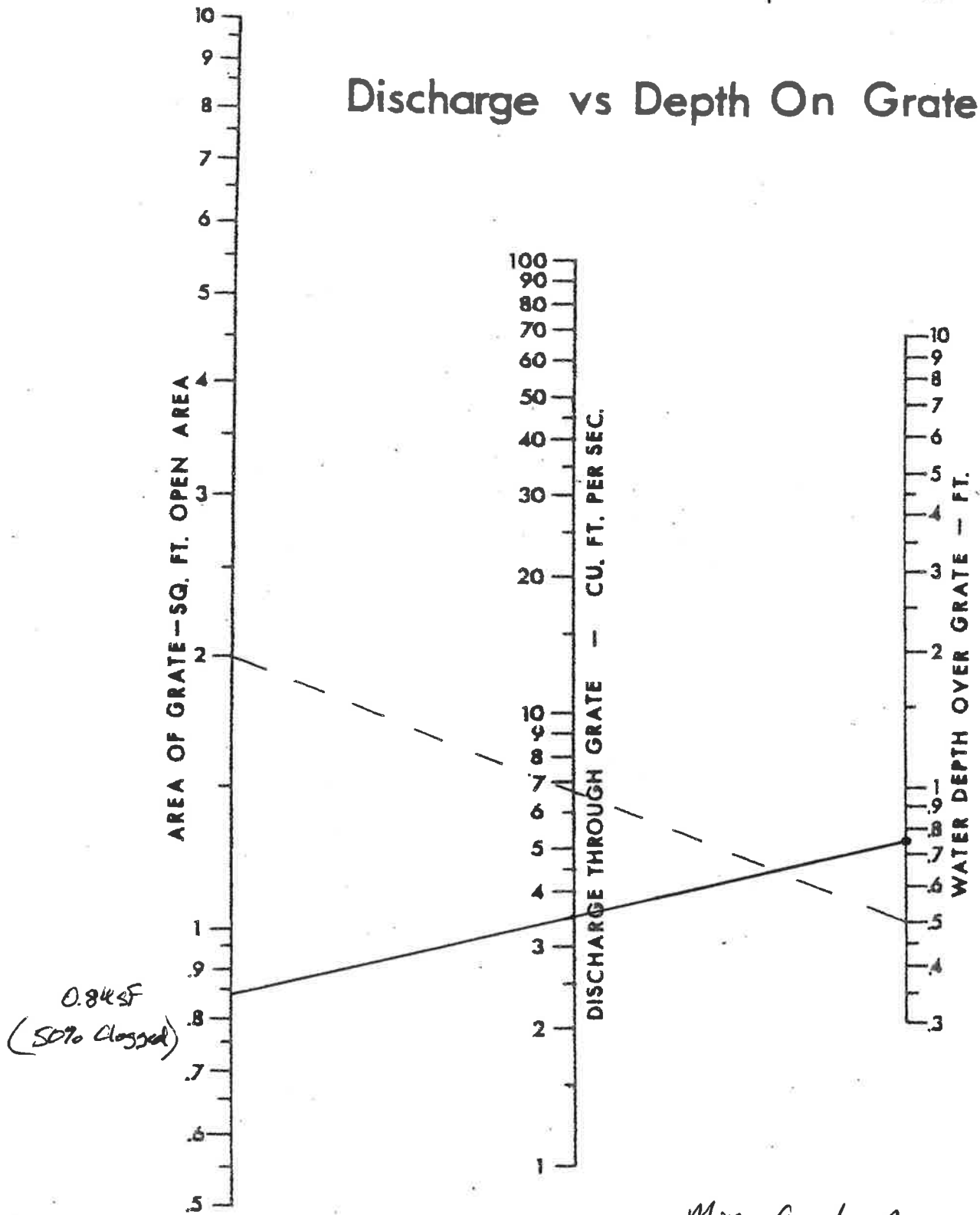
Min. Grate Area
 = 1.96 SF

STR 2.2

$Q_{10} = 3.51 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate



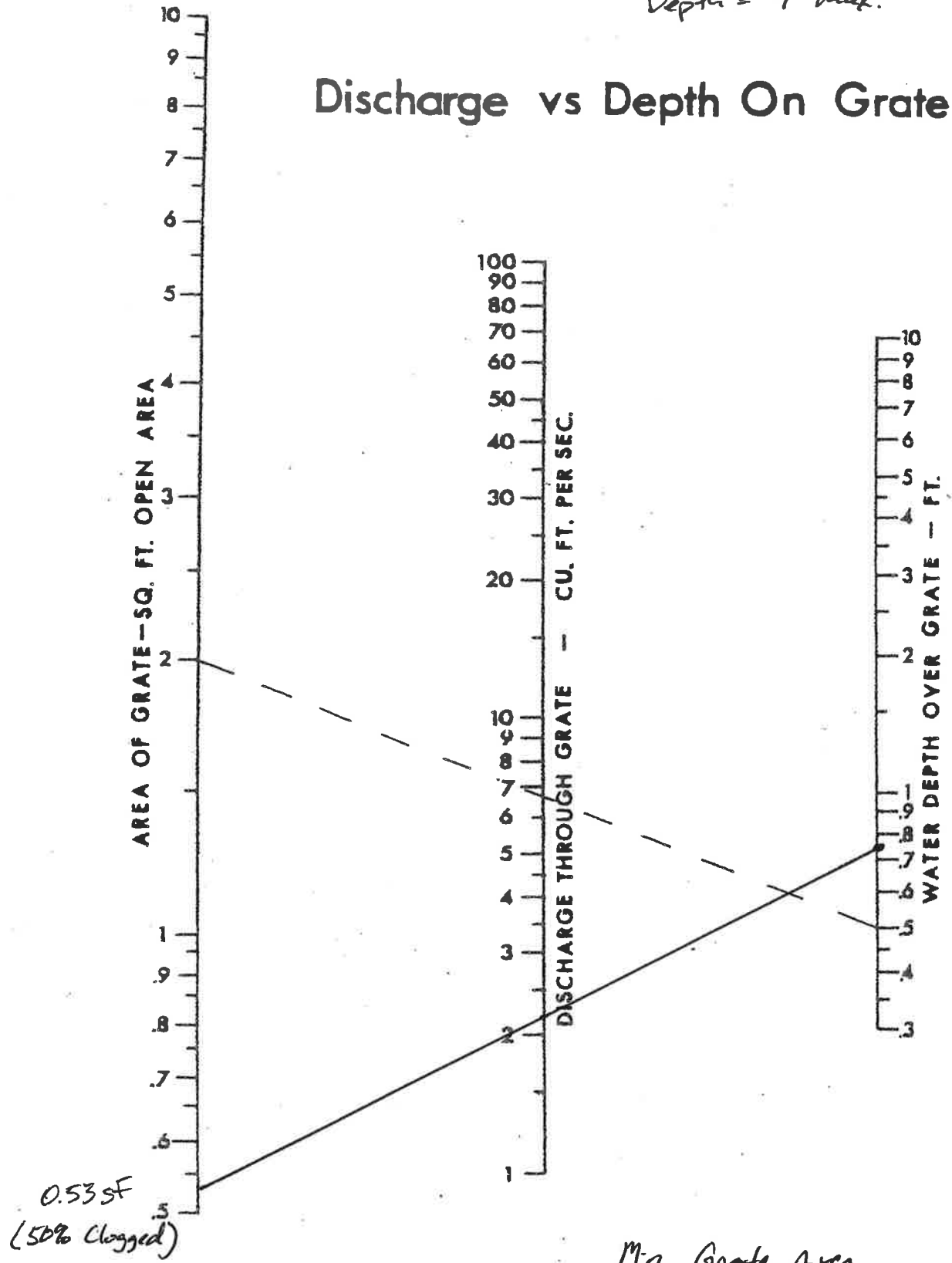
Min. Grate Area
= 1.68 SF

STR 2.5

$Q_{10} = 2.21 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate



0.53 SF
(50% clogged)

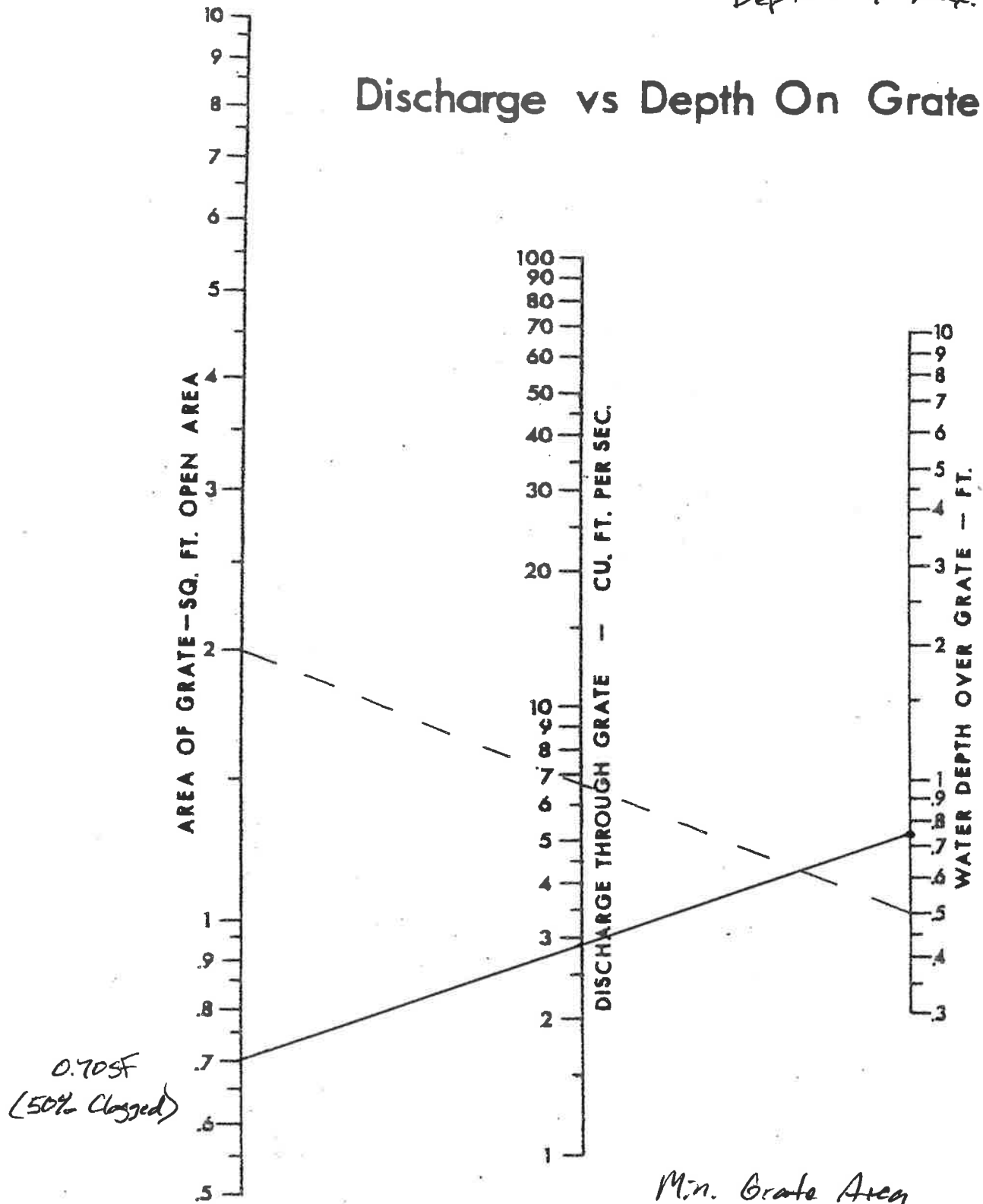
Min. Grate Area
= 1.06 SF

STR 2.6

$Q_{10} = 2.40 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate



0.70 SF
(50% Clogged)

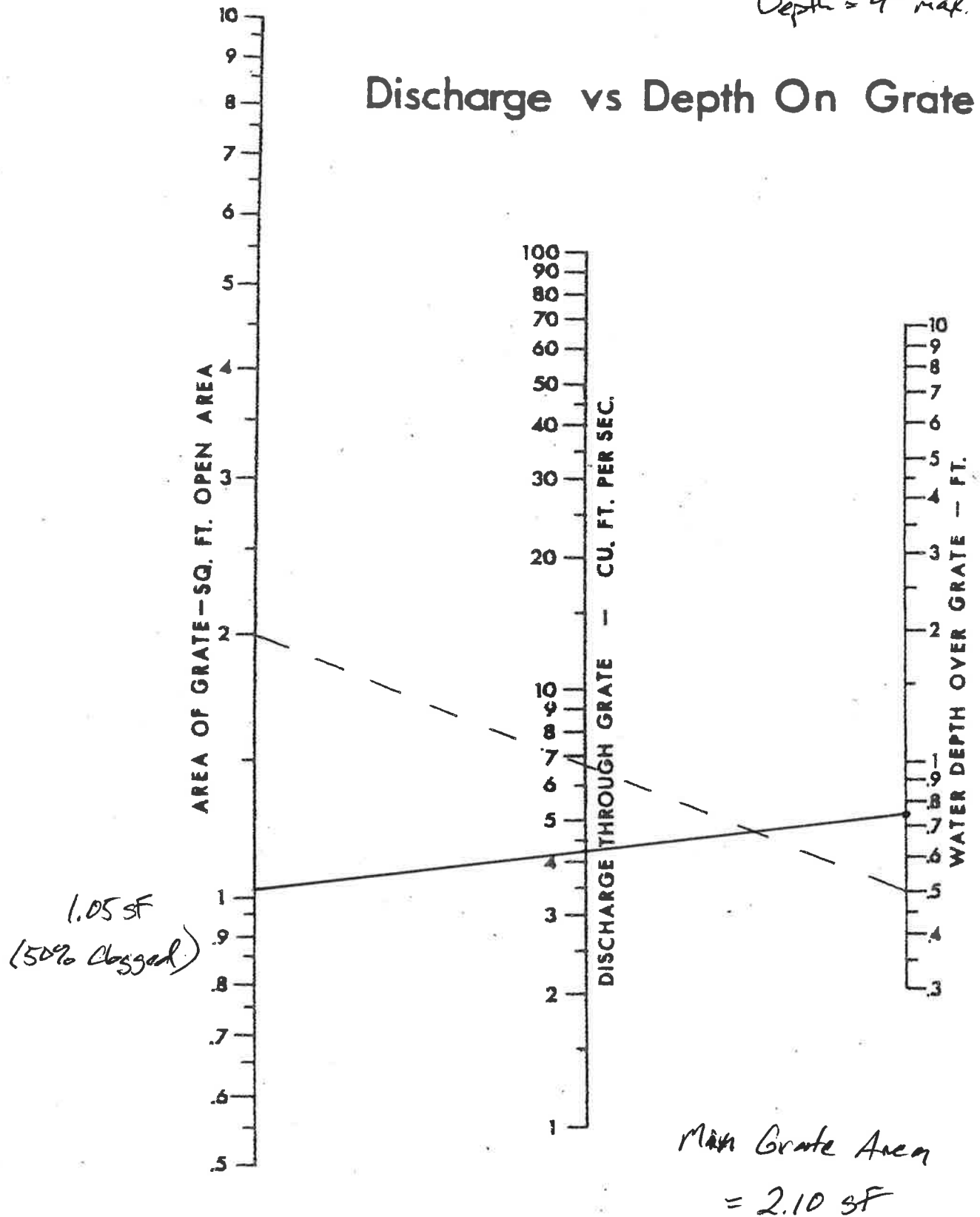
Min. Grate Area
= 1.40 SF

STR 2.7

$Q_{10} = 4.24 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate

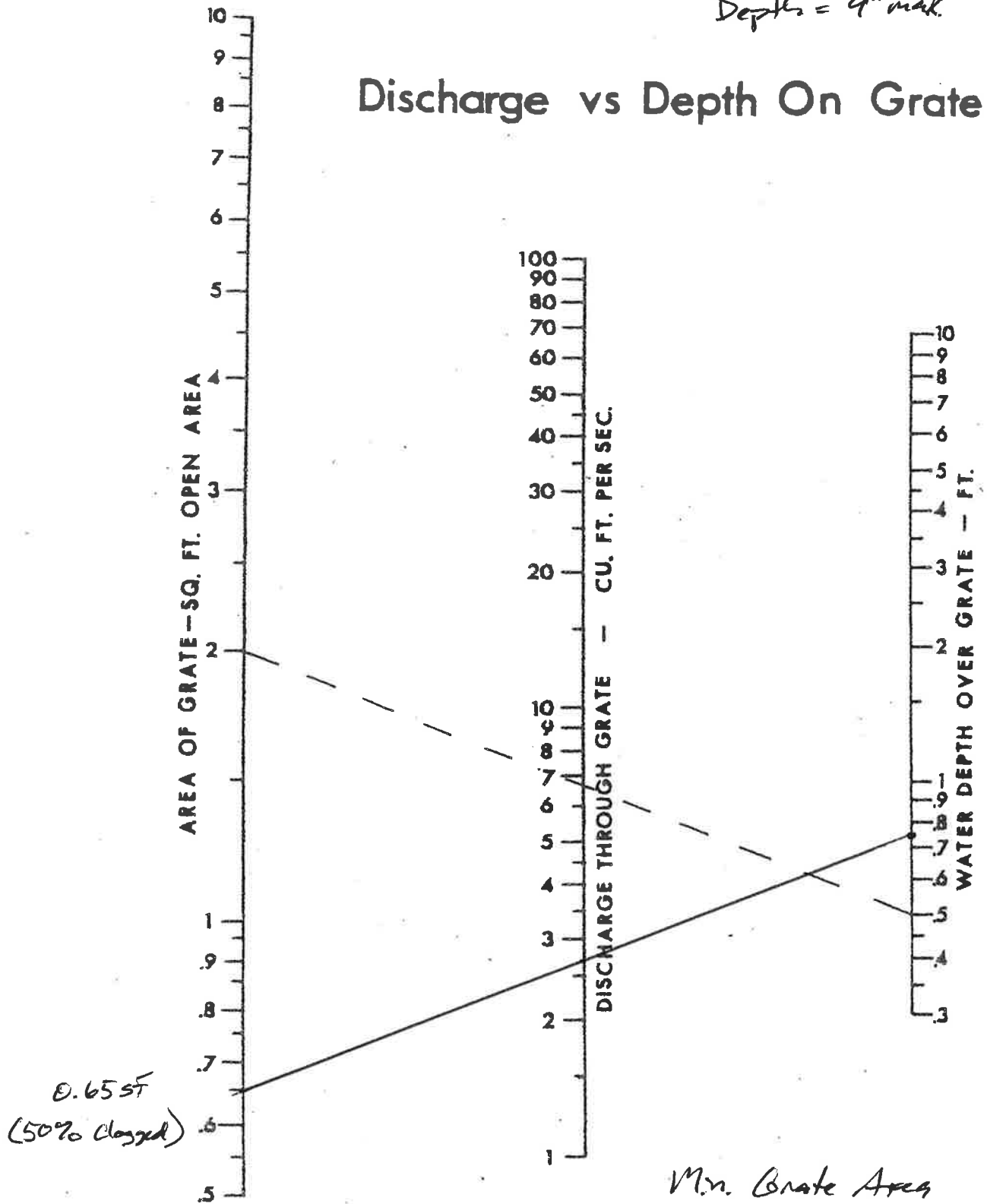


STR 2.8

$Q_{10} = 2.70 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate



0.65 SF
(50% closed)

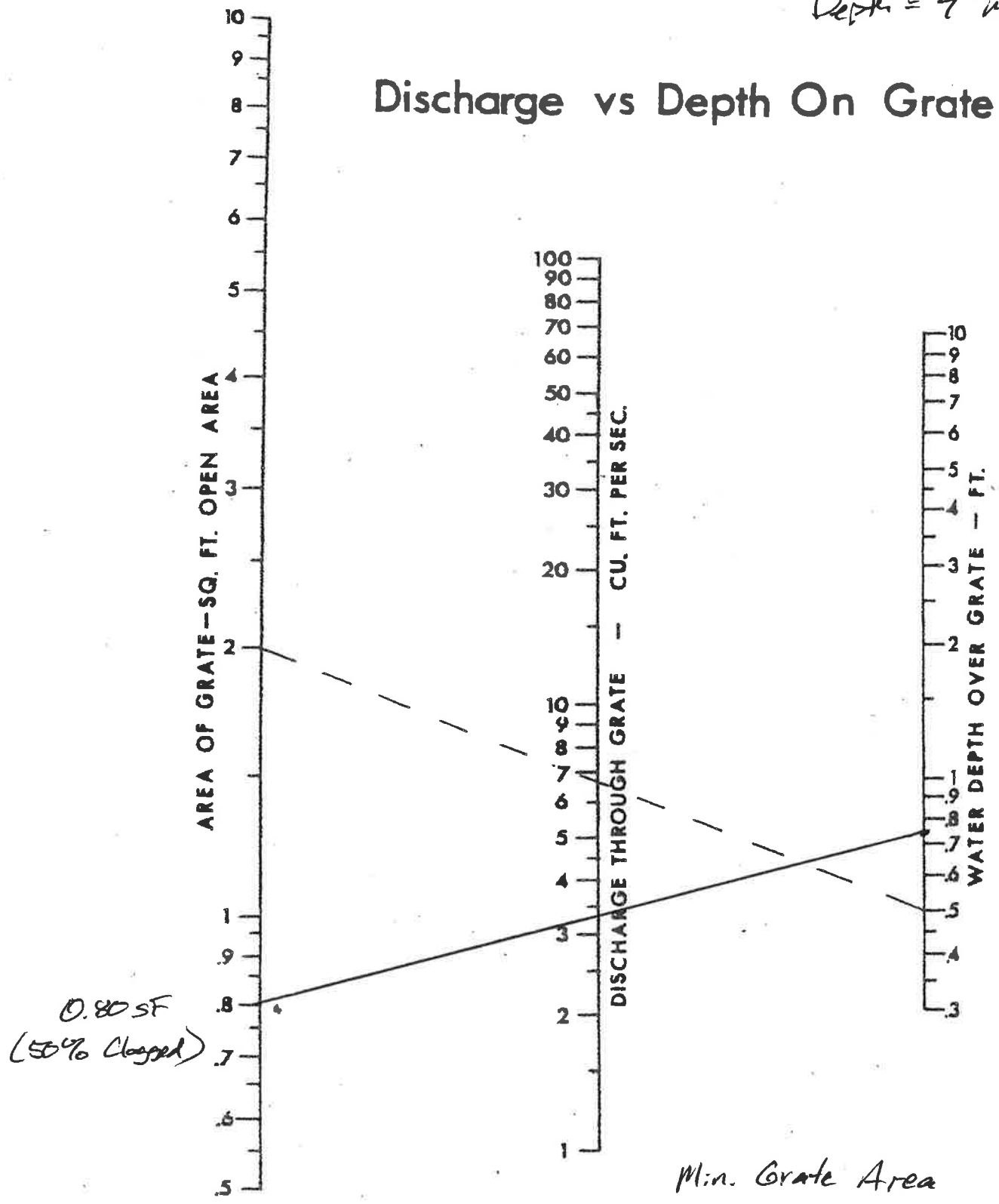
Min. Grate Area
= 1.30 SF

STR 2.9

$Q_{10} = 3.33 \text{ FS}$

Depth = 9" max.

Discharge vs Depth On Grate



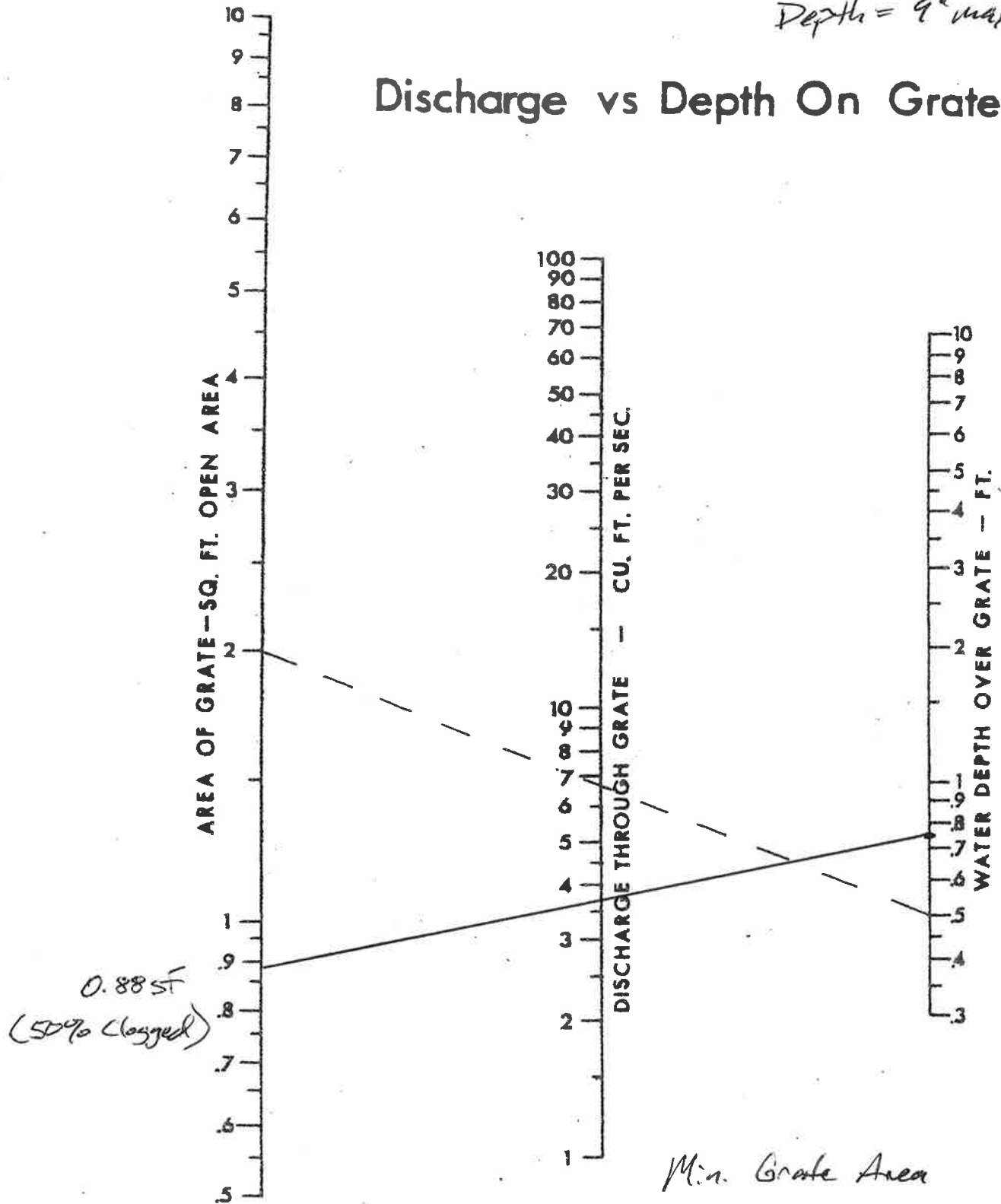
Min. Grate Area
= 1.60 SF

STR 2.10

$Q_{10} = 3.63 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate



Min. Grate Area

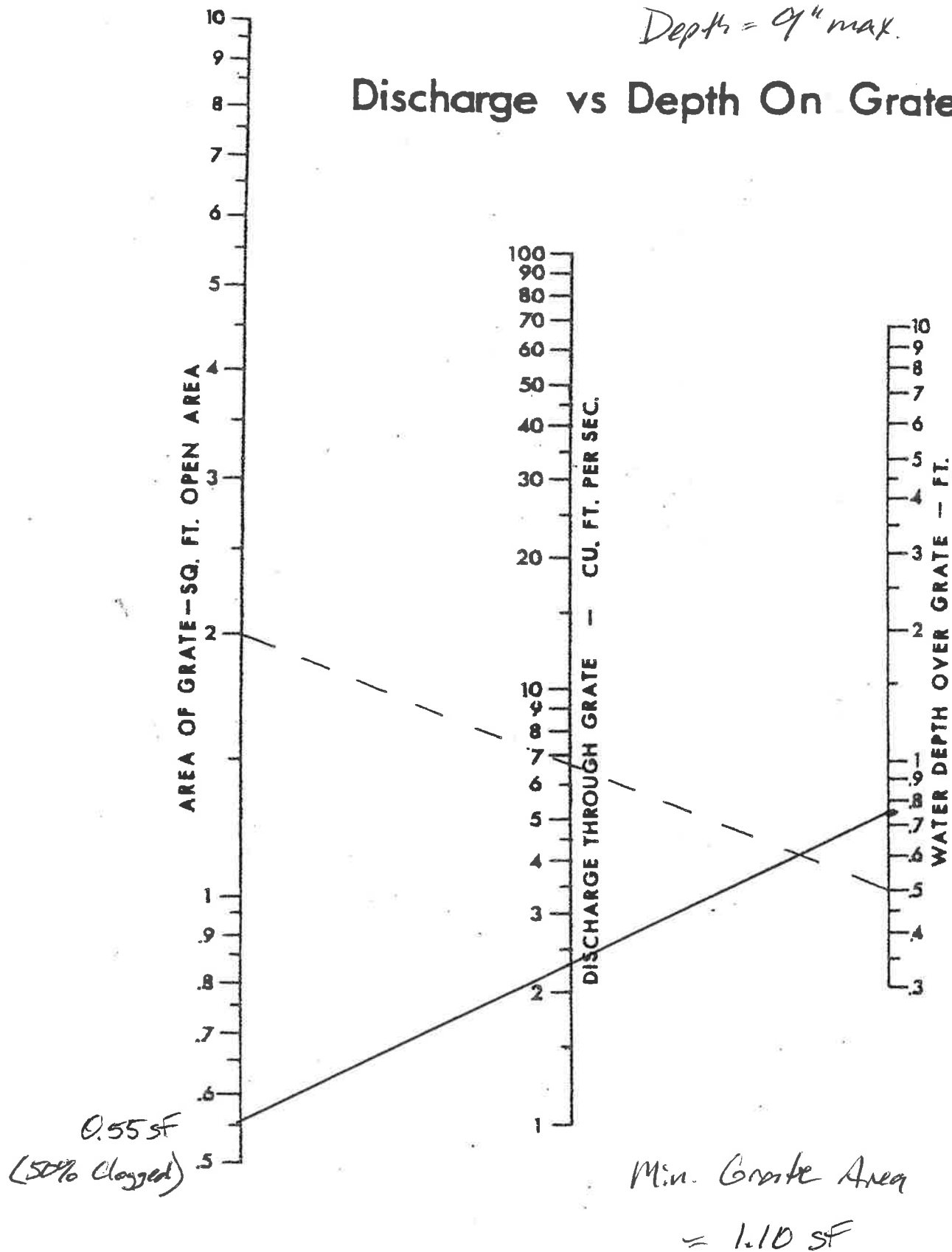
= 1.76 SF

STR 3.1

$$Q_{10} = 2.32 \text{ cfs}$$

Depth = 9" max.

Discharge vs Depth On Grate

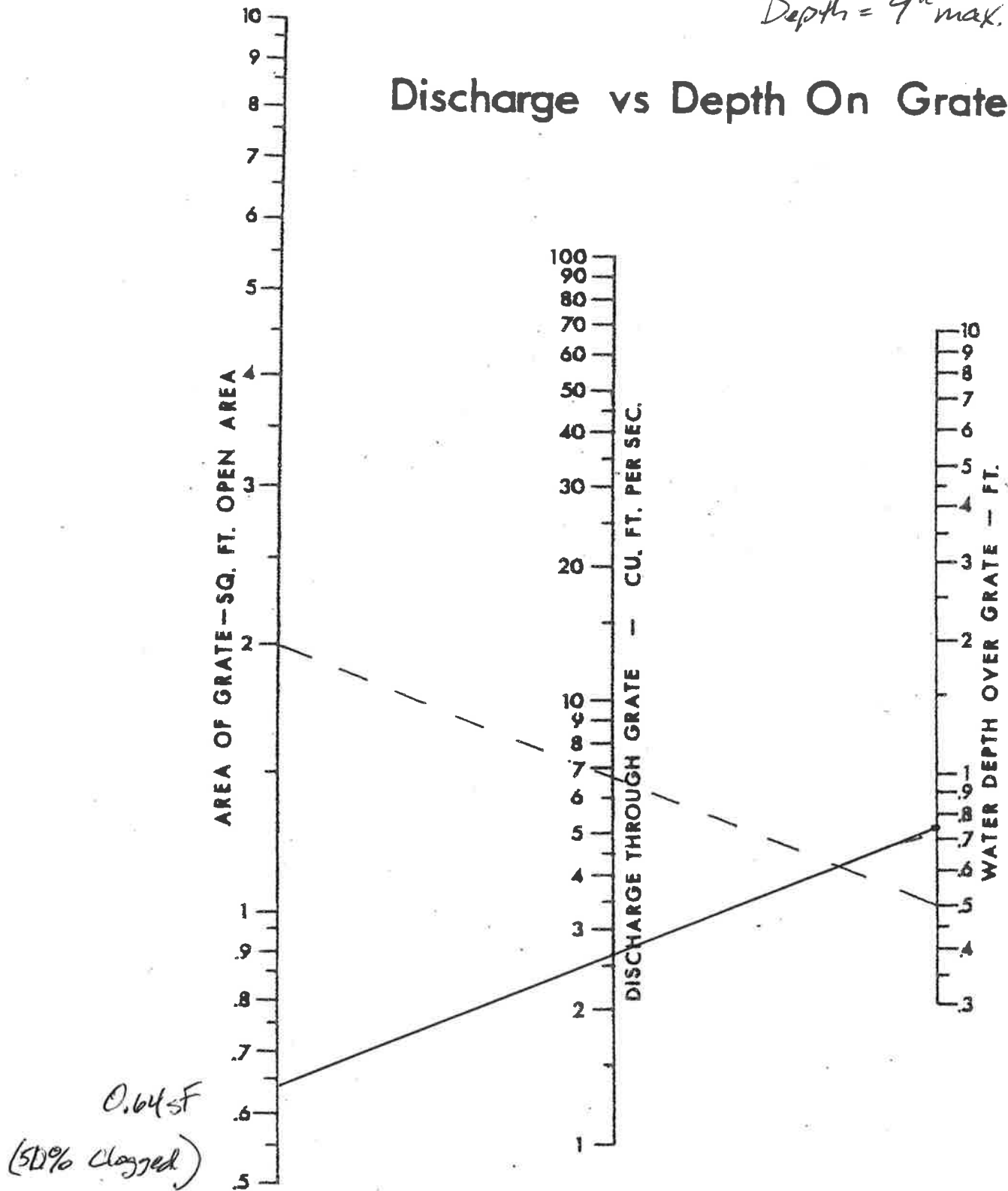


STR 3.2

$Q_{10} = 2.62 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate



0.64 cfs
(50% clogged)

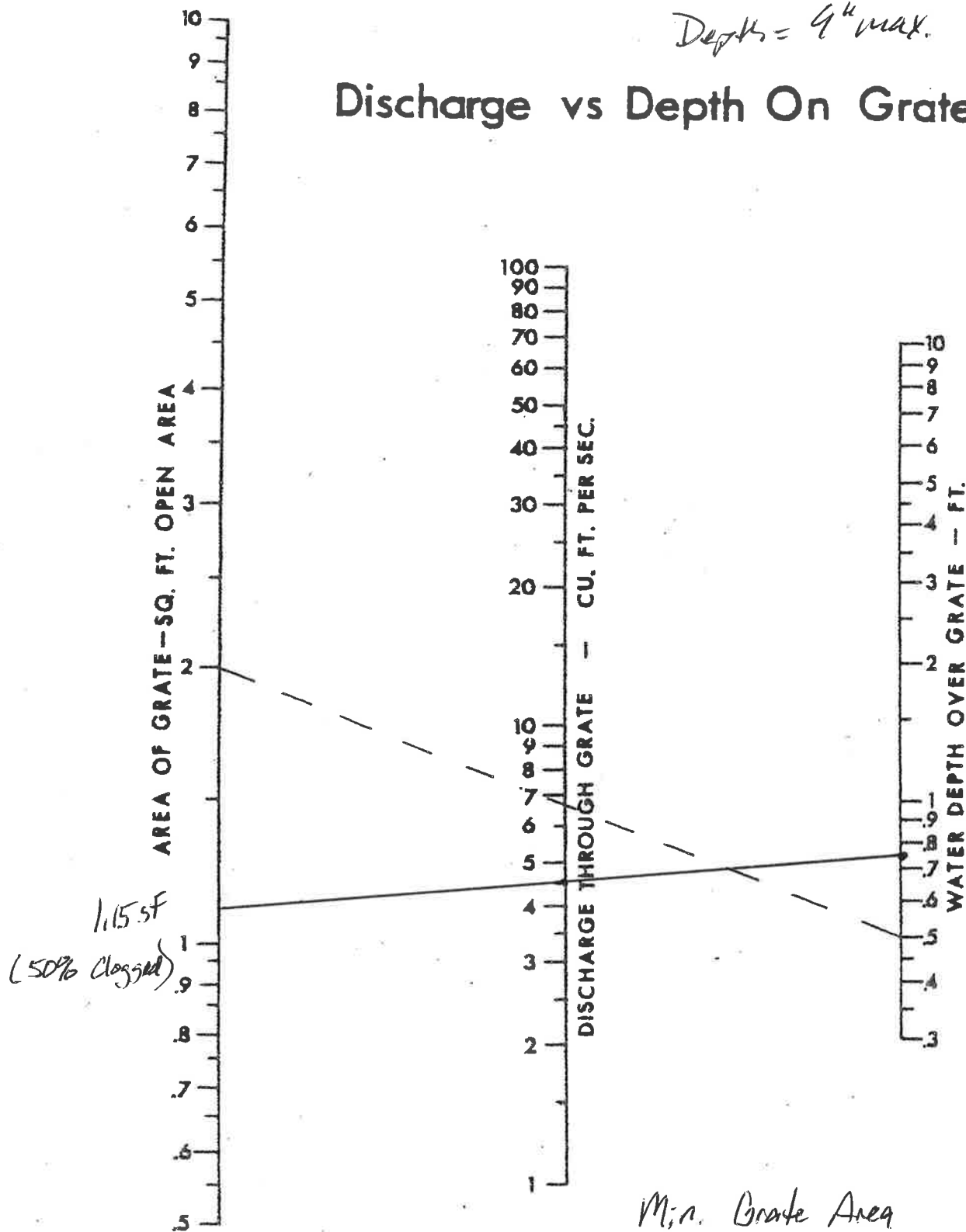
Min. Grate Area
= 1.28 SF

STR 3.3

$Q_{10} = 4.56 \text{ CFS}$

Depth = 4" max.

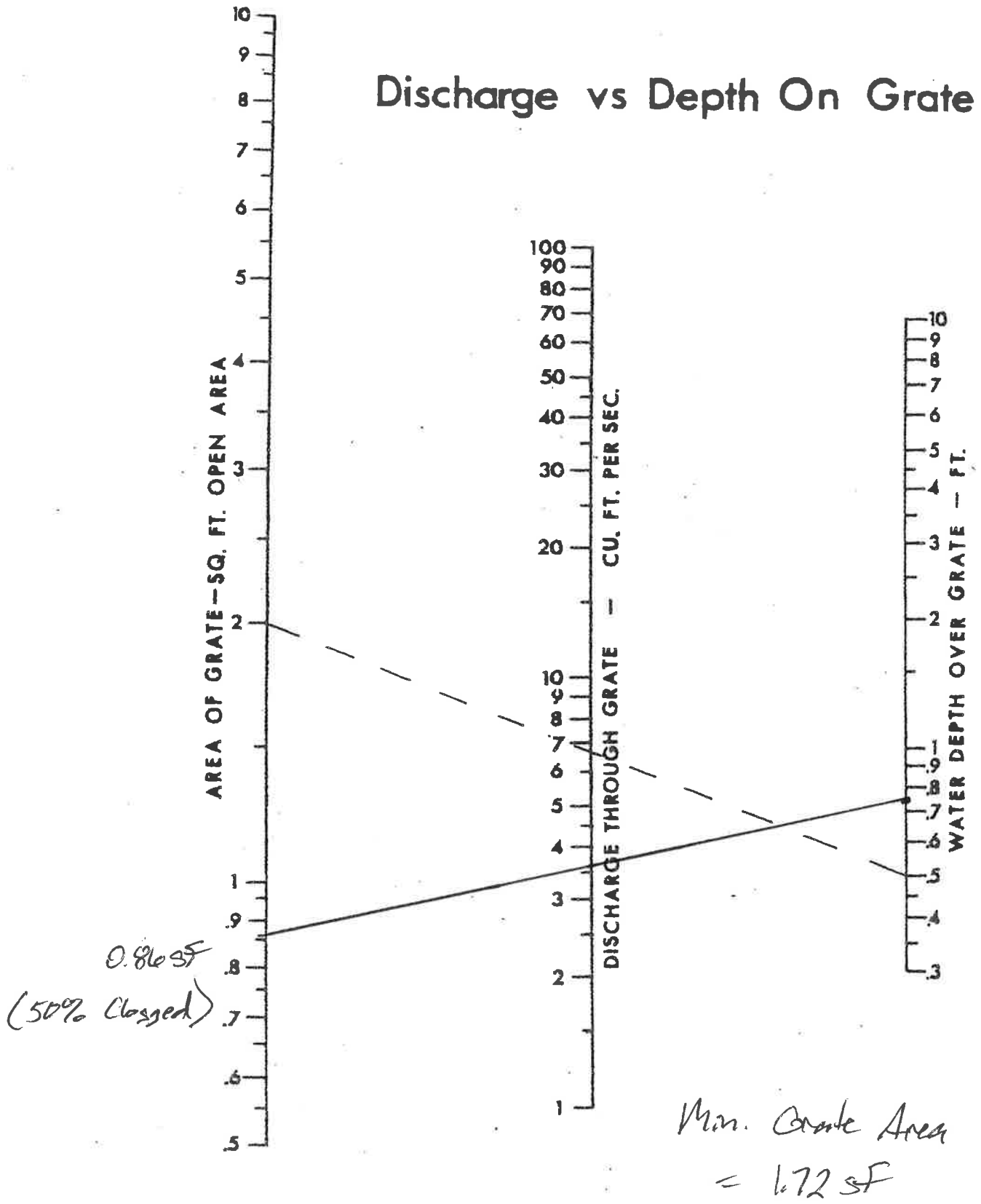
Discharge vs Depth On Grate



$$S_{12} = 3.4$$

$$Q_{10} = 3.66 \text{ cfs}$$

Discharge vs Depth On Grate

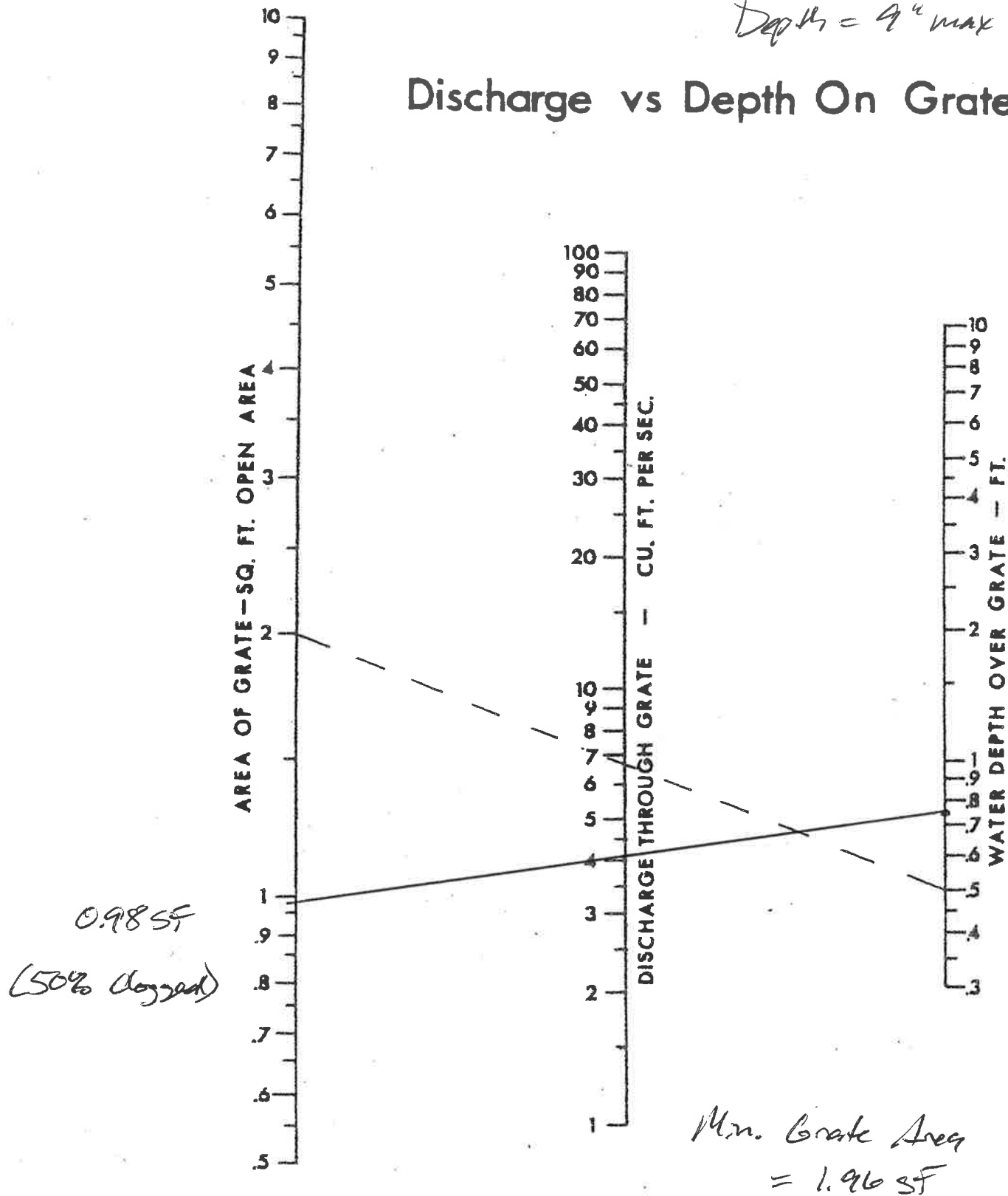


STR 3.6

$Q_{10} = 4.06 \text{ cfs}$

Depth = 9" max

Discharge vs Depth On Grate

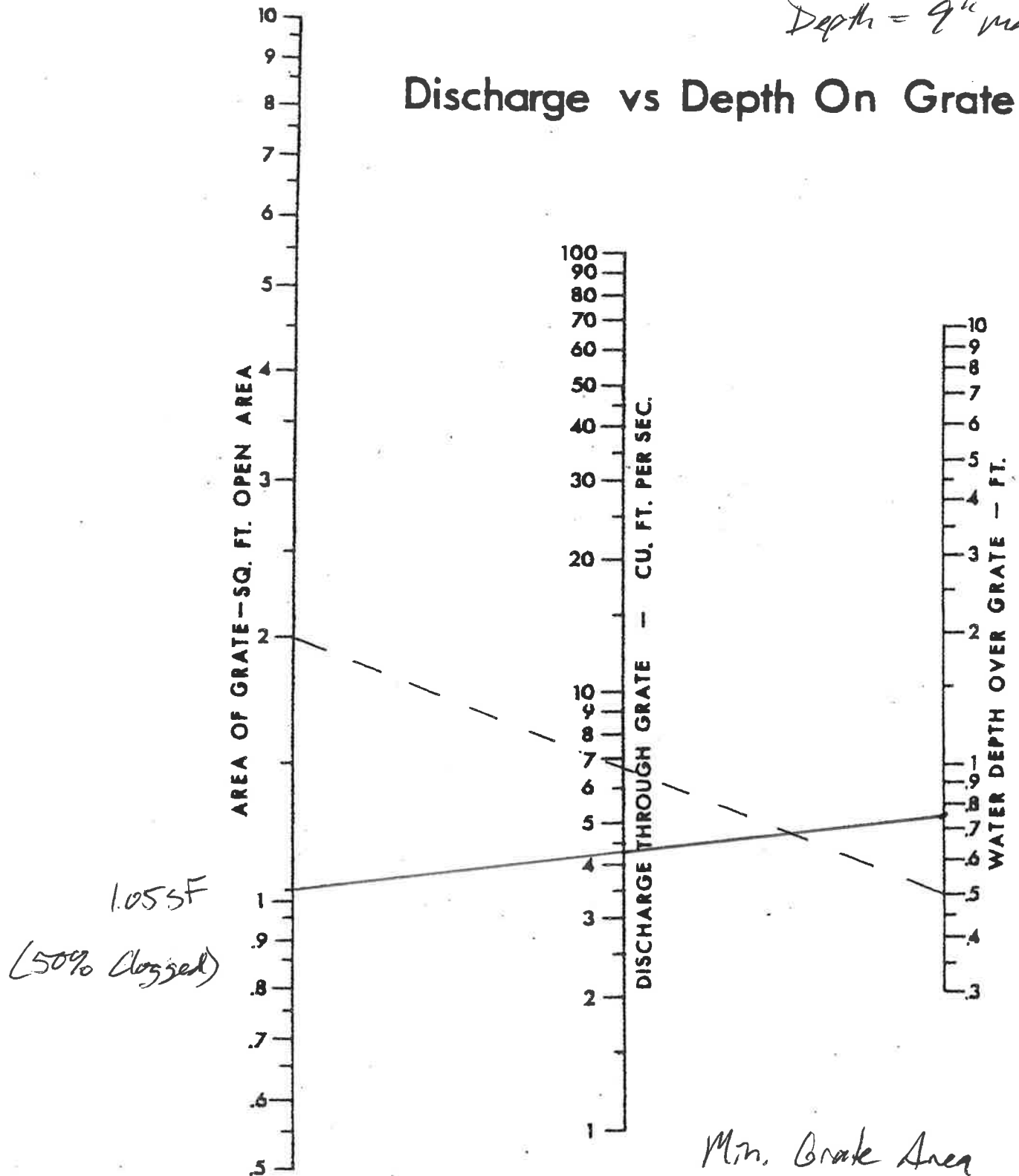


STR 3.7

$Q_{10} = 4.30 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate



1.05 SF
(50% clogged)

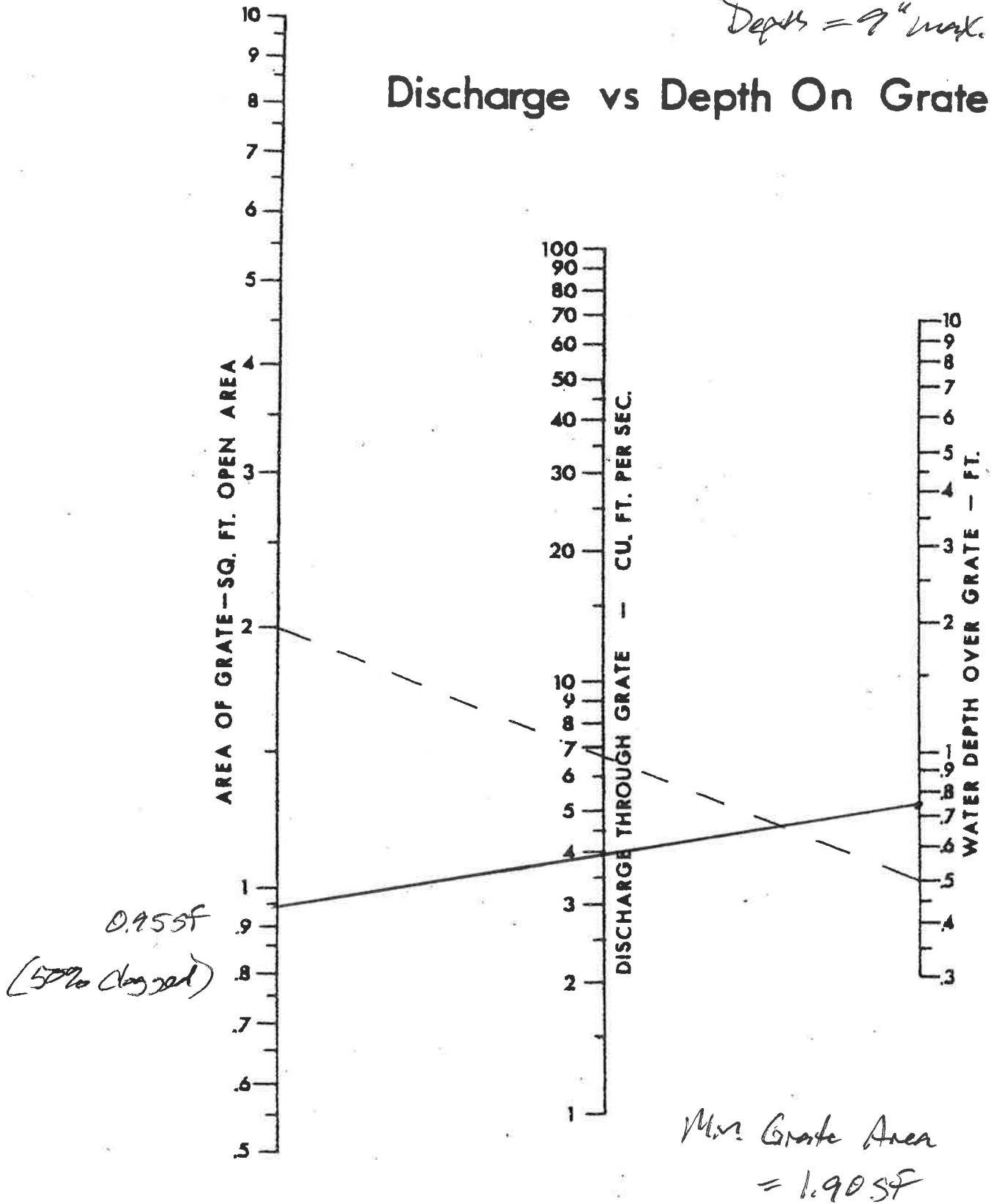
Min. Grate Area
= 2.10 SF

STR 3.9

$Q_{10} = 3.97 \text{ cfs}$

Depth = 9" max.

Discharge vs Depth On Grate

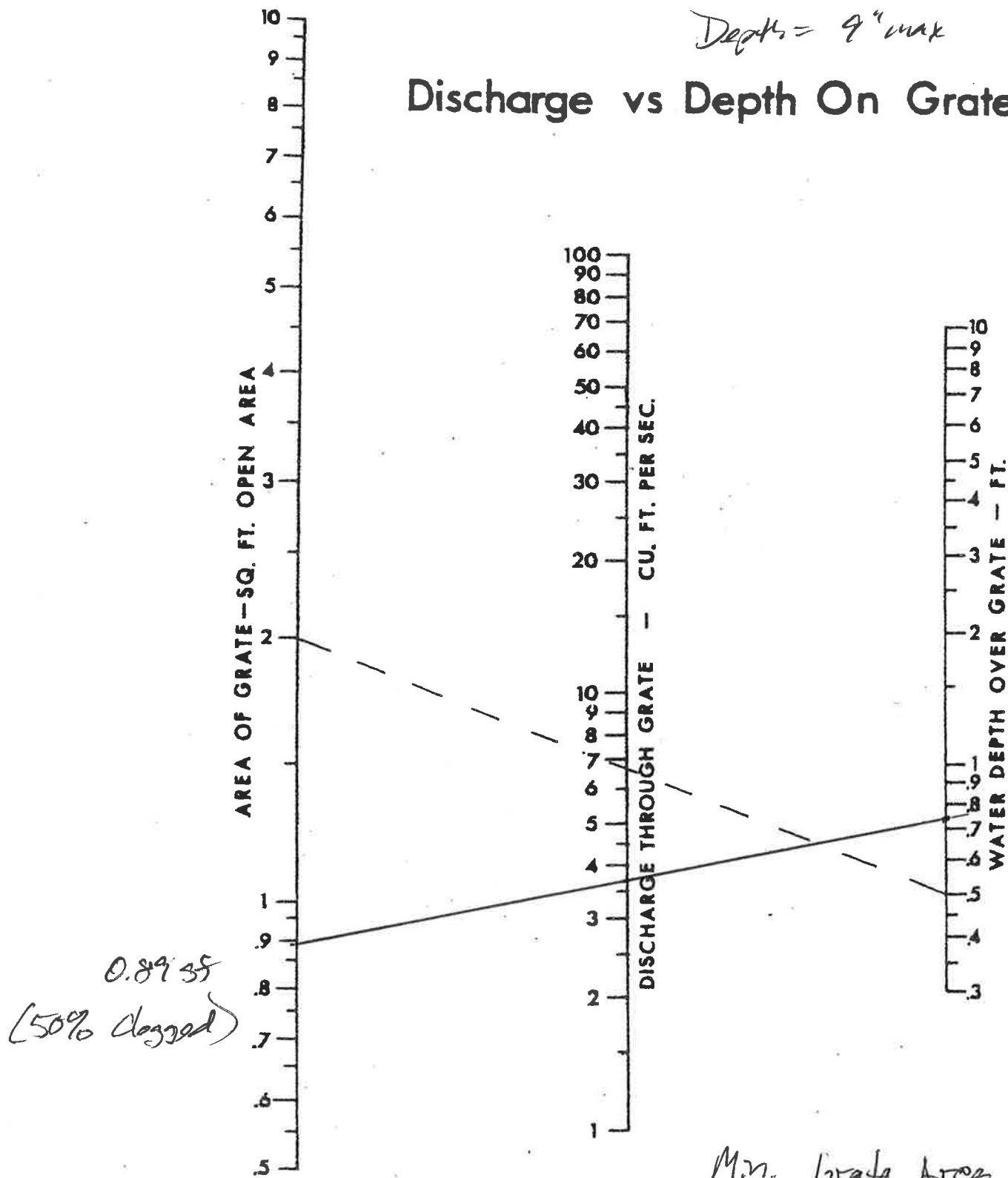


STR 3.10

$Q_{10} = 3.68 \text{ cfs}$

Depth = 9" max

Discharge vs Depth On Grate



Min. Grate Area
= 1.78 sf