WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

# STORMWATER MANAGEMENT REPORT

## MEIJER FRK
## CITY OF FRANKLIN, IN

Woolpert Project No. 074485

Submitted: November 13, 2014

Revised: December 8, 2014

# 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

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-Storm Sewer Basin Map

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**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 22 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 one 1.21 acre outlot.

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 STORM) running west along the south side of Carmel Drive.
EX E = 6.42 ac. – Drains east (E OUT) to an existing wet pond along US 31 in the parcel southeast of the Meijer parcel.
EX S = 6.62 ac. – Drains south (S OUT) to the Simon Rd. roadside ditch and ultimately east to the existing wet pond along US 31 similarly to EX E.
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 one wet detention pond and one dry detention pond. Per the City of Franklin drainage requirements, the following are the allowable release rates for the detention ponds are:

2yr. pre ≤ 10 yr. post
10yr. pre ≤ 100 yr. post

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

**Table 1:**

| RAINFALL EVENT | N STORM | S OUT |
|---|---|---|
| 2yr. pre | 1.79 cfs | 1.21 cfs |
| 10yr. pre | 5.39 cfs | 3.88 cfs |

The proposed wet and dry detention ponds have been designed in accordance with City of Franklin drainage requirements to provide the required storage volume. 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 STORM:**

| RAINFALL EVENT | Allowable Release Rates | Proposed Release Rates |
|---|---|---|
| 10yr. post | 1.79 cfs | 1.57 cfs |
| 100yr. post | 5.39 cfs | 5.21 cfs |

**Table 3 – Dry Detention Pond and Direct Discharge to S OUT:**

| RAINFALL EVENT | Allowable Release Rates | Proposed Release Rates |
|---|---|---|
| 10yr. post | 1.21 cfs | 0.86 cfs |
| 100yr. post | 3.88 cfs | 1.39 cfs |

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

There is also a presently undisturbed outlot that has been designed to direct discharge in the fully developed condition without the necessity of detention. The allowable and proposed release rates for this basin are as shown in Table 4.

**Table 4 – East Direct Discharge to E OUT:**

| RAINFALL EVENT | Allowable Release Rates | Proposed Release Rates |
|---|---|---|
| 2 yr. | 1.51 cfs | 1.13 cfs |
| 10yr. | 4.36 cfs | 2.34 cfs |
| 100yr. | 10.68 cfs | 4.63 cfs |

**Results: The proposed release rates are less than the allowable in all rainfall events.**

The watershed area from the south and east discharge points to the existing wet pond has been reduced from 13.04 acres to 2.71 acres, thereby greatly reducing the overall runoff volume.

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. 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 per the ordinance. Calculations are as shown below:

**Wet Pond**
1.25" Rainfall Event Volume – 20% = 0.18 acre-ft
½" Direct Runoff Volume = 0.64 acre-ft

2" orifice invert: 756.00'
6" orifice invert: 756.58'

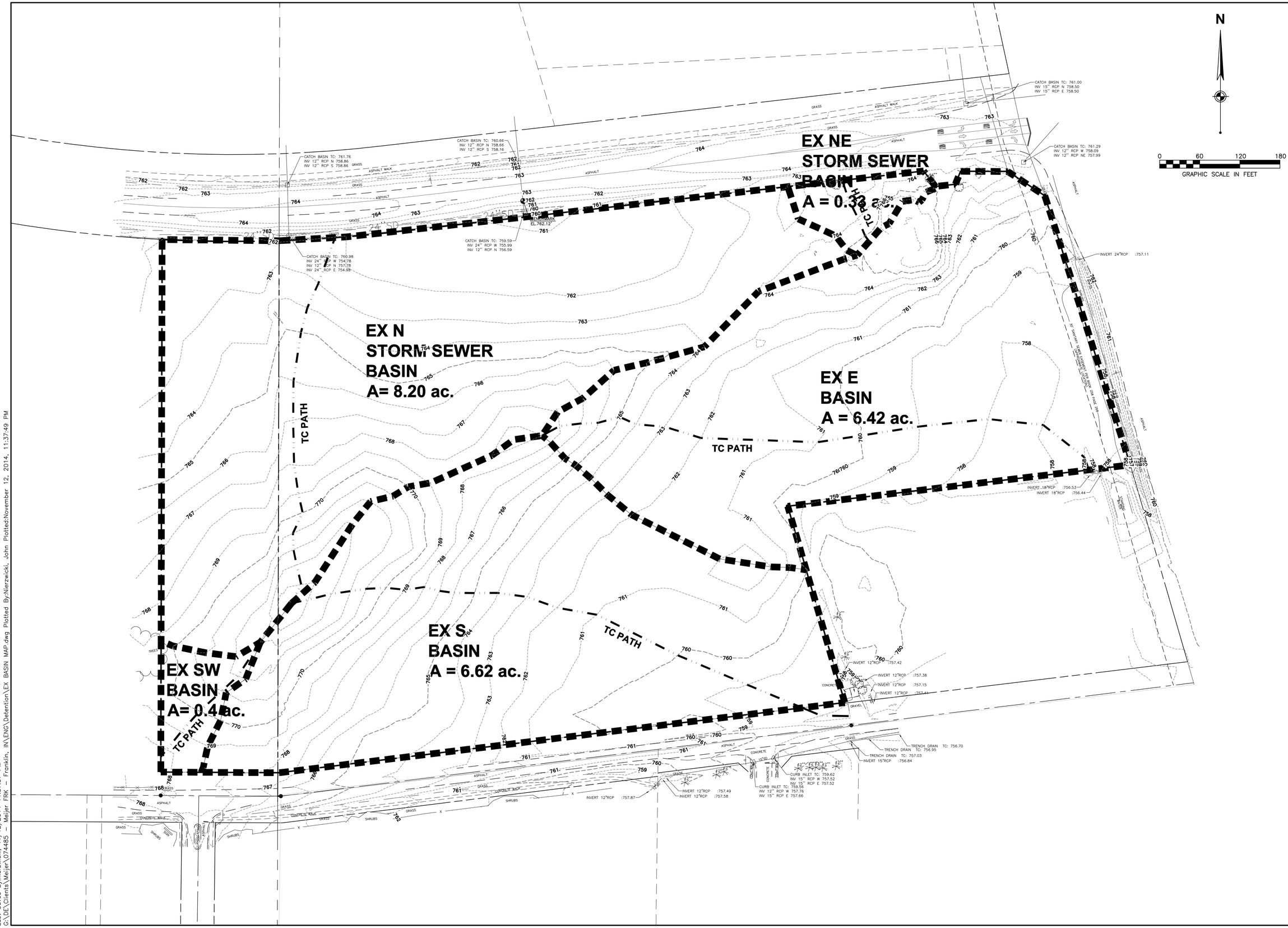
At 756.58', the wet detention pond provides 0.71 acre-ft of storage to be released through a proposed 2" orifice, thereby meeting the requirements of the ordinance.

In the future, when the east outlet 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 ponds to accommodate the proposed Meijer development and future fully developed outlot. 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




| No. | DATE | REVISION |
|---|---|---|
| | | |

PROJECT No: 74485
DATE 09/18/14
DES. KAC
DR. KAC
CKD. JRN


WOOLPERT
7635 Interactive Way
Suite 100
Indianapolis, IN 46278
317.299.7500
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# MEIJER FRK

FRANKLIN, INDIANA

## EXISTING DRAINAGE MAP

SHEET NO.

EX-1


Layout Tab Name: EX-1, Images: frk.JPG: , Xrefs: 74485-x.dwg
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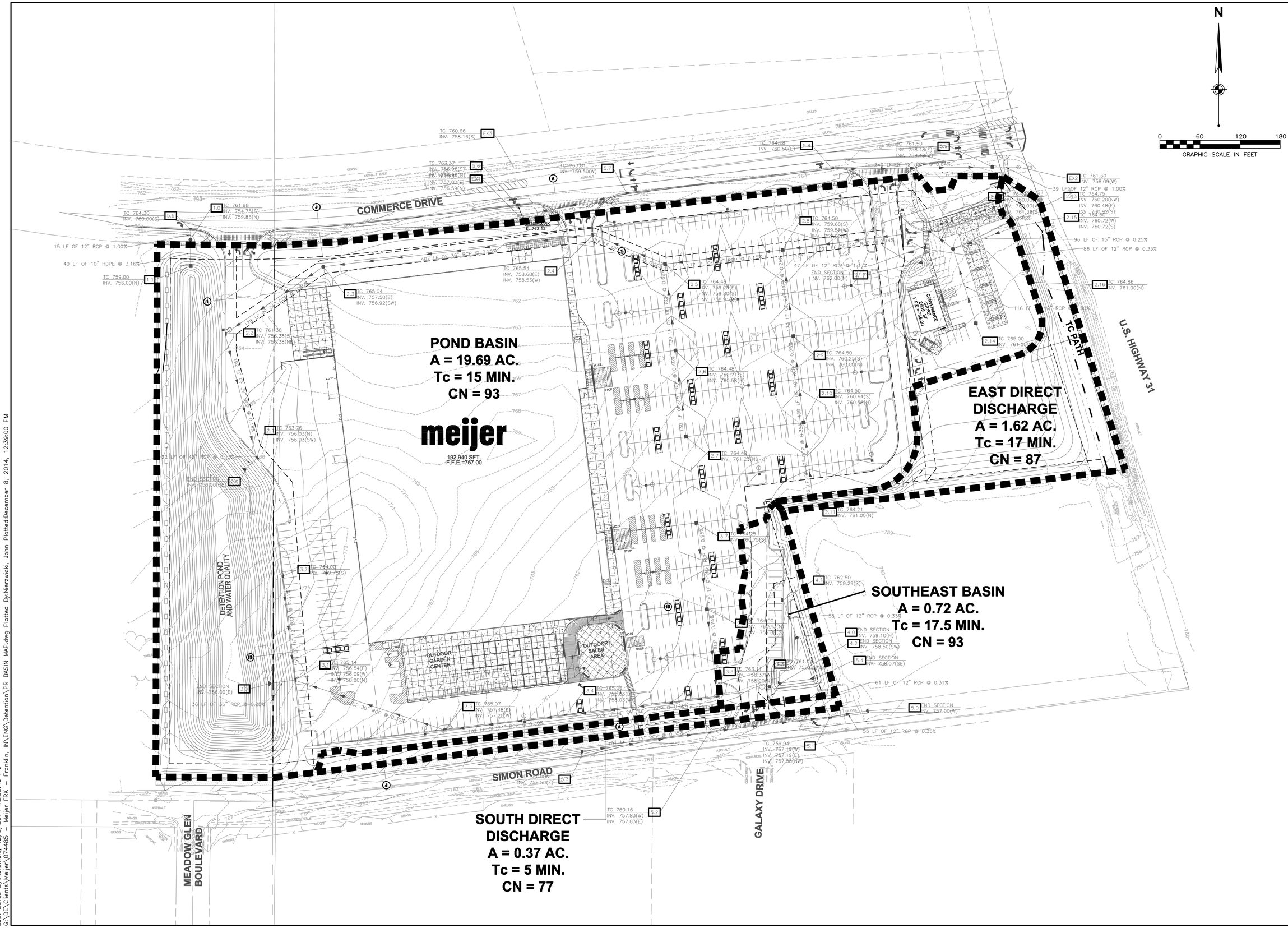


| No. | DATE | REVISION |
|---|---|---|
| | | |

PROJECT No: 74485
DATE 09/18/14
DES. KAC
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MEIJER FRK

FRANKLIN, INDIANA

PROPOSED DRAINAGE MAP

SHEET NO.

PR-1


Layout Tab Name: PR-1, Images: frk.JPG; Site.JPG; , Xrefs: 74485-p.dwg; P-BLDG_FRK.dwg; 74485-x.dwg; 74485-u.dwg
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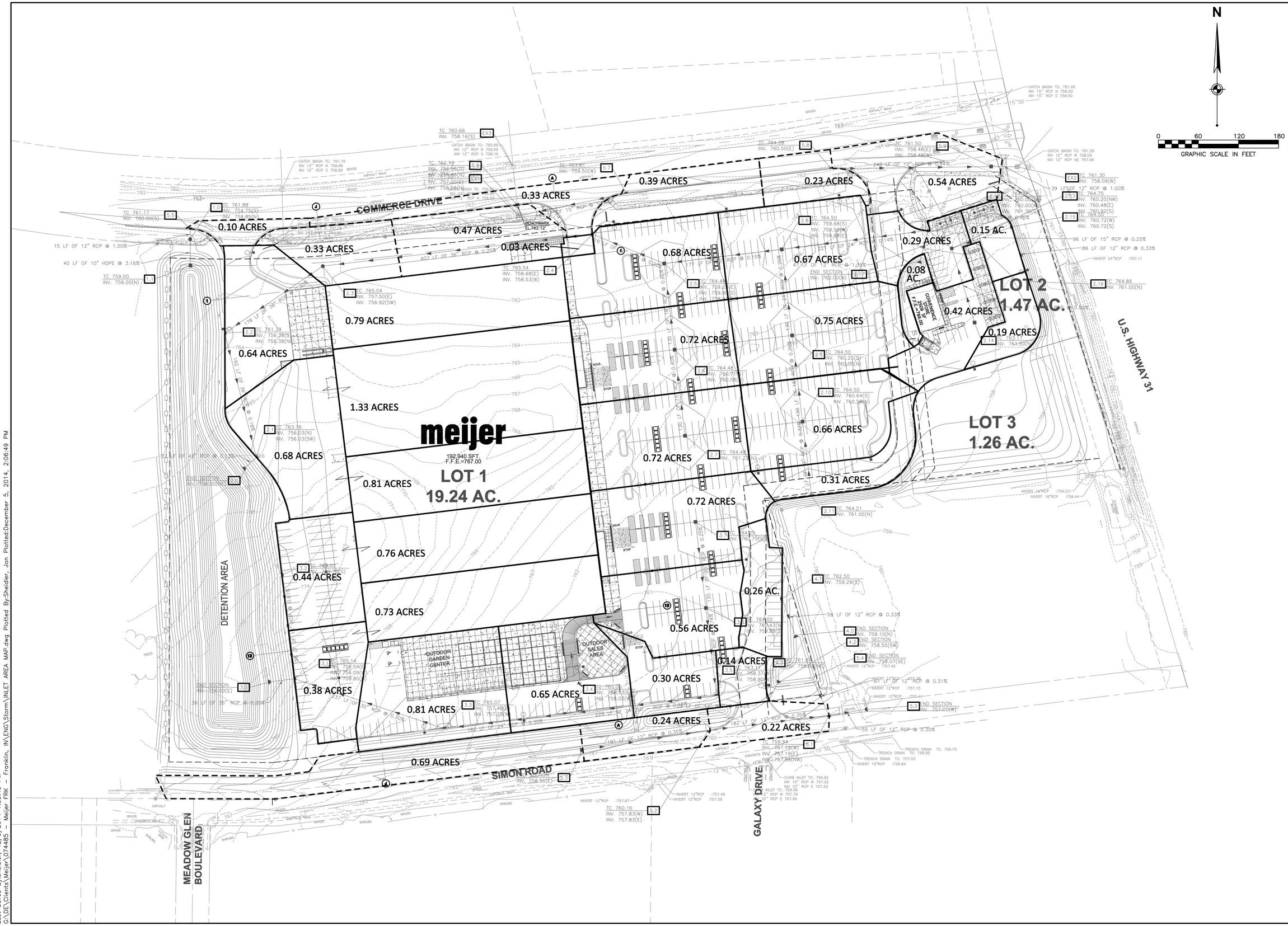


| No. | DATE | REVISION |
|---|---|---|
| | | |

PROJECT No: 74485
DATE 12/08/14
DES. JRS
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MEIJER FRK

FRANKLIN, INDIANA

INLET AREA MAP

SHEET NO.

PR-2


Layout Tab Name: PR-2, Images: frk.JPG; Site.JPG; , Xrefs: 74485-p.dwg; P-BLDG_FRK.dwg; 74485-x.dwg; 74485-u.dwg
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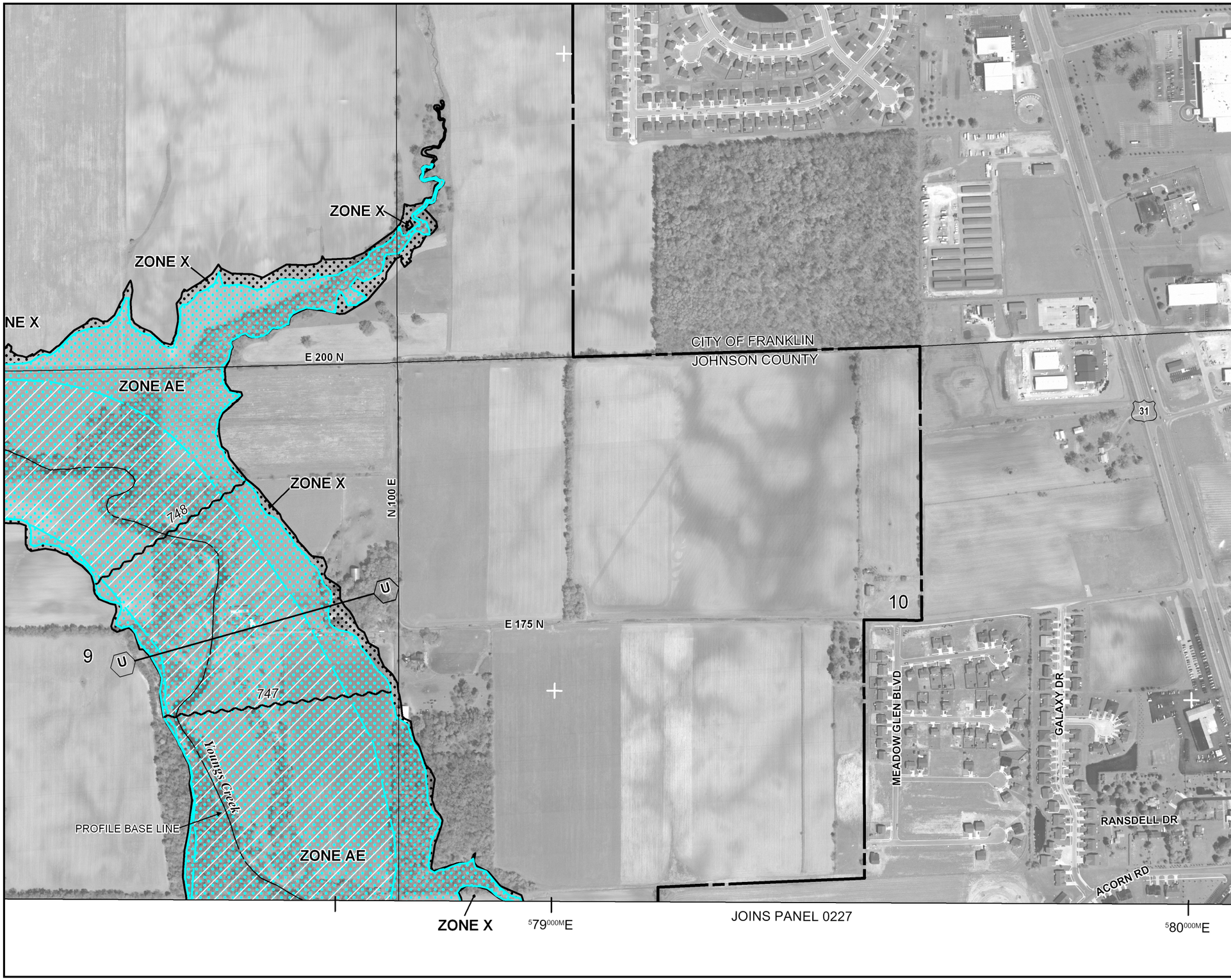



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER 0 150 300

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

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.

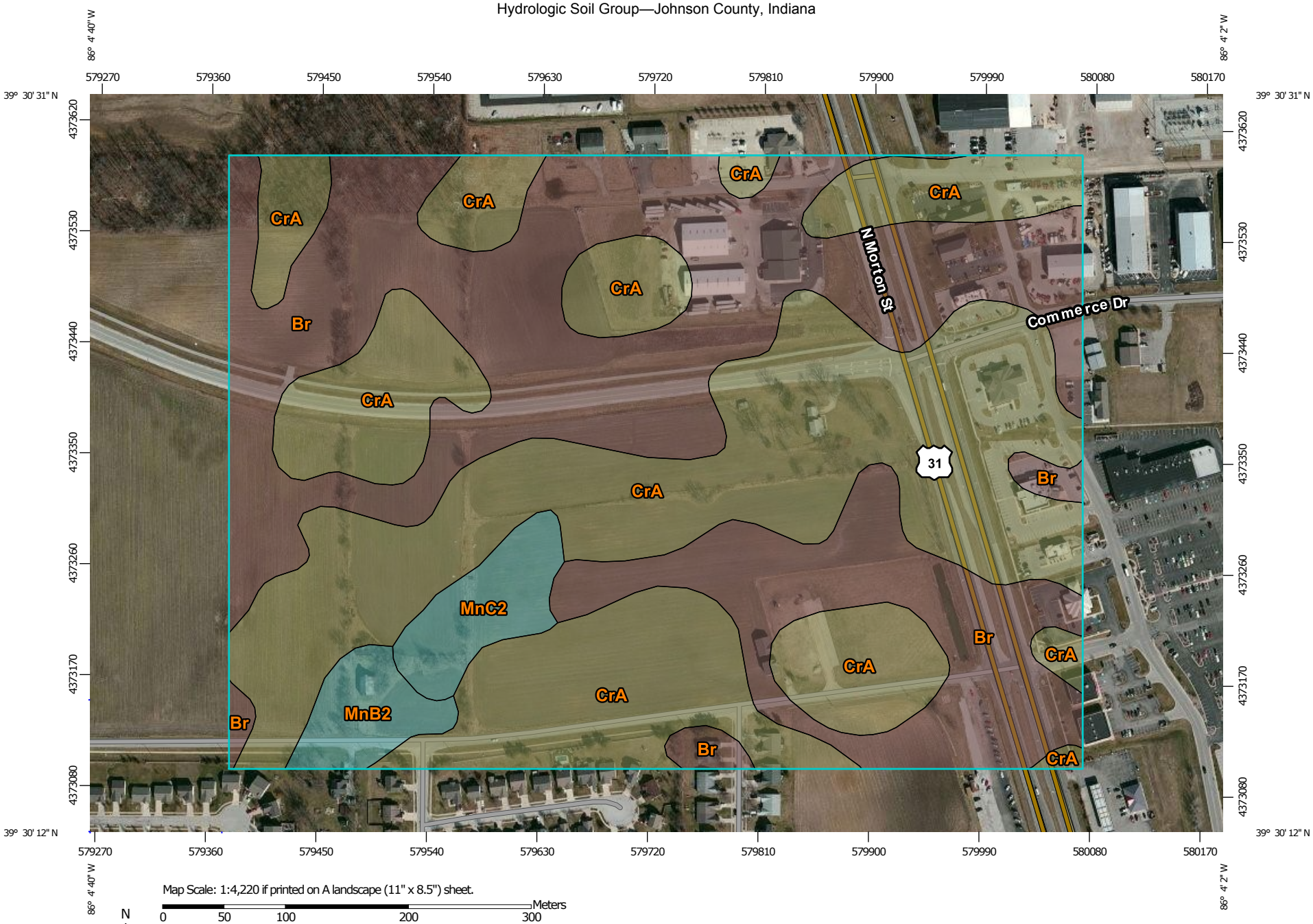
**MAP NUMBER**
**18081C0139D**

**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.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N 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 1:15,800.

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_&_aerials

## 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.

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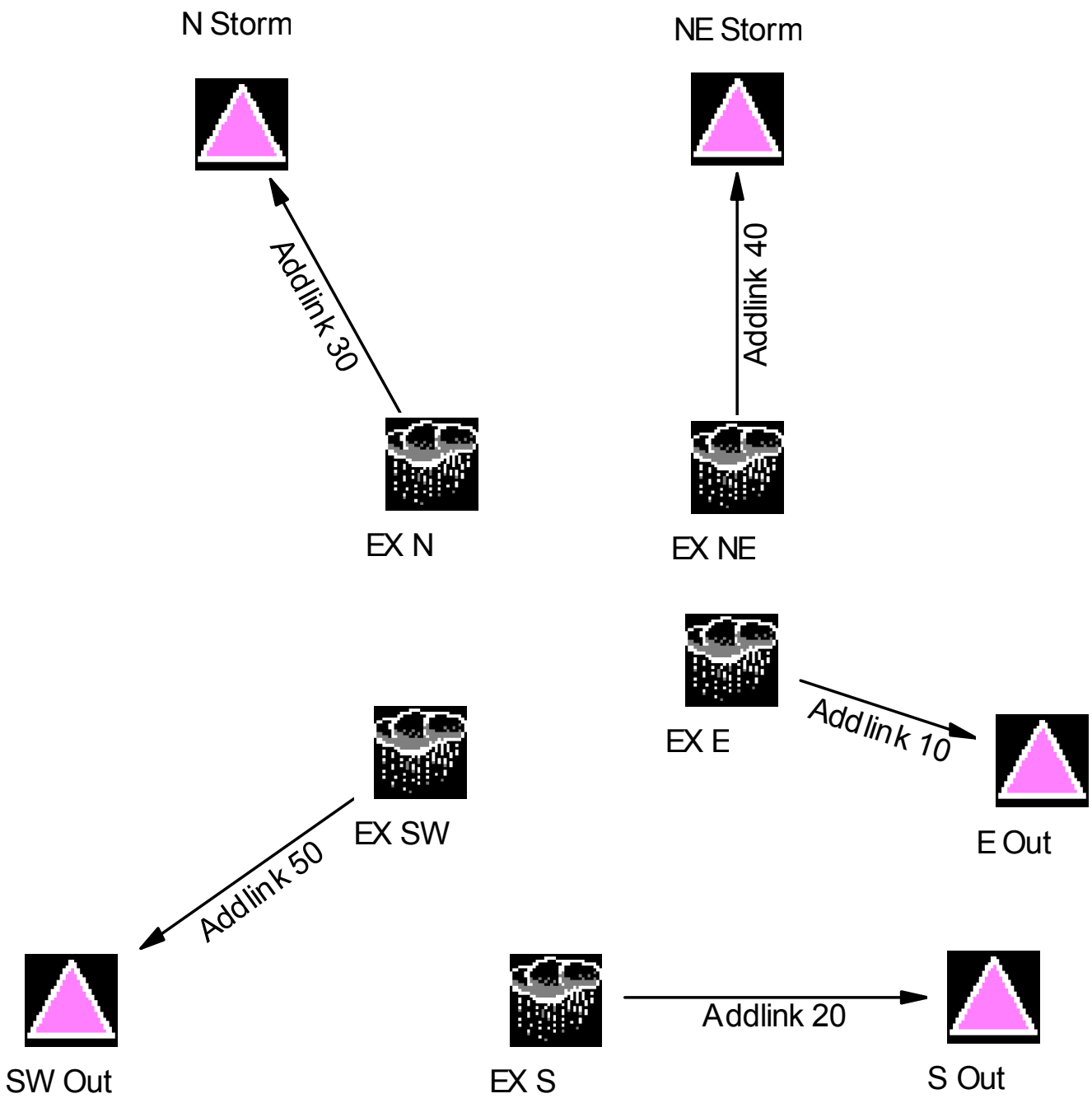
## PF graphical

# Section 3 – Detention Calculations

EXISTING DRAINAGE ANALYSIS



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

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

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

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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 |
|---|---|---|---|---|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|---|
| *E OUT | JCT | 2 | .089 | | .5500 | 1.51 | | |
| *E OUT | JCT | 2 | .140 | | .8000 | 1.37 | | |
| *E OUT | JCT | 2 | .164 | | 1.0000 | 1.14 | | |
| *E OUT | JCT | 2 | .254 | | 1.6000 | 1.01 | | |
| *E OUT | JCT | 2 | .376 | | 5.4500 | 1.12 | | |
| *E OUT | JCT | 2 | .540 | | 15.6000 | 1.08 | | |
| *E OUT | JCT | 10 | .246 | | .5000 | 4.36 | | |
| *E OUT | JCT | 10 | .356 | | .7000 | 3.79 | | |
| *E OUT | JCT | 10 | .406 | | .8500 | 3.11 | | |
| *E OUT | JCT | 10 | .584 | | 1.5500 | 2.42 | | |
| *E OUT | JCT | 10 | .777 | | 5.4500 | 2.29 | | |
| *E OUT | JCT | 10 | 1.003 | | 15.6000 | 1.90 | | |
| *E OUT | JCT | 100 | .577 | | .4500 | 10.68 | | |
| *E OUT | JCT | 100 | .826 | | .6000 | 9.36 | | |
| *E OUT | JCT | 100 | .940 | | .8000 | 7.59 | | |
| *E OUT | JCT | 100 | 1.297 | | 1.3000 | 5.45 | | |
| *E OUT | JCT | 100 | 1.566 | | 5.4000 | 4.48 | | |
| *E OUT | JCT | 100 | 1.805 | | 15.6000 | 3.21 | | |

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 E | AREA | 2 | .089 | | .5500 | 1.51 | | |
| EX E | AREA | 2 | .140 | | .8000 | 1.37 | | |
| EX E | AREA | 2 | .164 | | 1.0000 | 1.14 | | |
| EX E | AREA | 2 | .254 | | 1.6000 | 1.01 | | |
| EX E | AREA | 2 | .376 | | 5.4500 | 1.12 | | |
| EX E | AREA | 2 | .540 | | 15.6000 | 1.08 | | |
| EX E | AREA | 10 | .246 | | .5000 | 4.36 | | |
| EX E | AREA | 10 | .356 | | .7000 | 3.79 | | |
| EX E | AREA | 10 | .406 | | .8500 | 3.11 | | |
| EX E | AREA | 10 | .584 | | 1.5500 | 2.42 | | |
| EX E | AREA | 10 | .777 | | 5.4500 | 2.29 | | |
| EX E | AREA | 10 | 1.003 | | 15.6000 | 1.90 | | |
| EX E | AREA | 100 | .577 | | .4500 | 10.68 | | |
| EX E | AREA | 100 | .826 | | .6000 | 9.36 | | |
| EX E | AREA | 100 | .940 | | .8000 | 7.59 | | |
| EX E | AREA | 100 | 1.297 | | 1.3000 | 5.45 | | |
| EX E | AREA | 100 | 1.566 | | 5.4000 | 4.48 | | |
| EX E | AREA | 100 | 1.805 | | 15.6000 | 3.21 | | |

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 | 1.79 | | |
| EX N | AREA | 2 | .161 | | .7500 | 1.60 | | |
| EX N | AREA | 2 | .191 | | .9500 | 1.33 | | |
| EX N | AREA | 2 | .300 | | 1.5500 | 1.19 | | |
| EX N | AREA | 2 | .450 | | 5.4500 | 1.35 | | |
| EX N | AREA | 2 | .653 | | 15.6000 | 1.33 | | |
| EX N | AREA | 10 | .290 | | .4500 | 5.39 | | |
| EX N | AREA | 10 | .426 | | .6500 | 4.65 | | |
| EX N | AREA | 10 | .487 | | .8500 | 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 | 13.75 | | |
| EX N | AREA | 100 | 1.008 | | .5500 | 11.78 | | |
| EX N | AREA | 100 | 1.152 | | .8000 | 9.40 | | |
| EX N | AREA | 100 | 1.598 | | 1.2500 | 6.73 | | |
| EX N | AREA | 100 | 1.937 | | 5.4000 | 5.61 | | |
| EX N | AREA | 100 | 2.239 | | 15.6000 | 4.03 | | |

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 | .004 | | .5500 | .06 | | |
| EX NE | AREA | 2 | .006 | | .8000 | .06 | | |
| EX NE | AREA | 2 | .007 | | .9500 | .05 | | |
| EX NE | AREA | 2 | .011 | | 1.5500 | .04 | | |
| EX NE | AREA | 2 | .017 | | 5.3000 | .05 | | |
| EX NE | AREA | 2 | .025 | | 15.5000 | .05 | | |
| EX NE | AREA | 10 | .011 | | .5000 | .19 | | |
| EX NE | AREA | 10 | .016 | | .6500 | .17 | | |
| EX NE | AREA | 10 | .018 | | .8000 | .14 | | |
| EX NE | AREA | 10 | .027 | | 1.5000 | .11 | | |
| EX NE | AREA | 10 | .036 | | 5.4500 | .11 | | |
| EX NE | AREA | 10 | .047 | | 15.5000 | .09 | | |
| EX NE | AREA | 100 | .027 | | .4000 | .50 | | |
| EX NE | AREA | 100 | .039 | | .6000 | .44 | | |
| EX NE | AREA | 100 | .044 | | .8000 | .36 | | |
| EX NE | AREA | 100 | .062 | | 1.2500 | .26 | | |
| EX NE | AREA | 100 | .075 | | 5.4000 | .22 | | |
| EX NE | AREA | 100 | .087 | | 15.4000 | .16 | | |

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 S | AREA | 2 | .071 | | .5500 | 1.21 | | |
| EX S | AREA | 2 | .117 | | .9500 | 1.13 | | |
| EX S | AREA | 2 | .140 | | 1.0500 | .95 | | |
| EX S | AREA | 2 | .224 | | 1.6000 | .86 | | |
| EX S | AREA | 2 | .340 | | 5.4500 | 1.01 | | |
| EX S | AREA | 2 | .498 | | 15.6000 | 1.02 | | |
| EX S | AREA | 10 | .216 | | .5000 | 3.88 | | |
| EX S | AREA | 10 | .321 | | .7000 | 3.39 | | |
| EX S | AREA | 10 | .369 | | .8500 | 2.79 | | |
| EX S | AREA | 10 | .541 | | 1.5500 | 2.24 | | |
| EX S | AREA | 10 | .730 | | 5.4500 | 2.18 | | |
| EX S | AREA | 10 | .953 | | 15.6000 | 1.84 | | |
| EX S | AREA | 100 | .534 | | .4500 | 9.99 | | |
| EX S | AREA | 100 | .777 | | .6000 | 8.87 | | |
| EX S | AREA | 100 | .891 | | .8000 | 7.19 | | |
| EX S | AREA | 100 | 1.245 | | 1.3000 | 5.21 | | |
| EX S | AREA | 100 | 1.514 | | 5.4000 | 4.39 | | |
| EX S | AREA | 100 | 1.754 | | 15.6000 | 3.19 | | |

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 |
|---|---|---|---|---|---|---|---|---|
| EX SW | AREA | 2 | .004 | | .5000 | .07 | | |
| EX SW | AREA | 2 | .006 | | .7000 | .06 | | |
| EX SW | AREA | 2 | .008 | | .9500 | .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 | | 15.5500 | .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 STORM | JCT | 2 | .100 | | .5500 | 1.79 | | |
| *N STORM | JCT | 2 | .161 | | .7500 | 1.60 | | |
| *N STORM | JCT | 2 | .191 | | .9500 | 1.33 | | |
| *N STORM | JCT | 2 | .300 | | 1.5500 | 1.19 | | |
| *N STORM | JCT | 2 | .450 | | 5.4500 | 1.35 | | |
| *N STORM | JCT | 2 | .653 | | 15.6000 | 1.33 | | |
| *N STORM | JCT | 10 | .290 | | .4500 | 5.39 | | |
| *N STORM | JCT | 10 | .426 | | .6500 | 4.65 | | |
| *N STORM | JCT | 10 | .487 | | .8500 | 3.79 | | |
| *N STORM | JCT | 10 | .707 | | 1.5500 | 2.96 | | |
| *N STORM | JCT | 10 | .948 | | 5.4000 | 2.83 | | |
| *N STORM | JCT | 10 | 1.230 | | 15.6000 | 2.36 | | |
| *N STORM | JCT | 100 | .698 | | .4000 | 13.75 | | |
| *N STORM | JCT | 100 | 1.008 | | .5500 | 11.78 | | |
| *N STORM | JCT | 100 | 1.152 | | .8000 | 9.40 | | |
| *N STORM | JCT | 100 | 1.598 | | 1.2500 | 6.73 | | |
| *N STORM | JCT | 100 | 1.937 | | 5.4000 | 5.61 | | |
| *N STORM | JCT | 100 | 2.239 | | 15.6000 | 4.03 | | |

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 STORM | JCT | 2 | .004 | | .5500 | .06 | | |
| *NE STORM | JCT | 2 | .006 | | .8000 | .06 | | |
| *NE STORM | JCT | 2 | .007 | | .9500 | .05 | | |
| *NE STORM | JCT | 2 | .011 | | 1.5500 | .04 | | |
| *NE STORM | JCT | 2 | .017 | | 5.3000 | .05 | | |
| *NE STORM | JCT | 2 | .025 | | 15.5000 | .05 | | |
| *NE STORM | JCT | 10 | .011 | | .5000 | .19 | | |
| *NE STORM | JCT | 10 | .016 | | .6500 | .17 | | |
| *NE STORM | JCT | 10 | .018 | | .8000 | .14 | | |
| *NE STORM | JCT | 10 | .027 | | 1.5000 | .11 | | |
| *NE STORM | JCT | 10 | .036 | | 5.4500 | .11 | | |
| *NE STORM | JCT | 10 | .047 | | 15.5000 | .09 | | |
| *NE STORM | JCT | 100 | .027 | | .4000 | .50 | | |
| *NE STORM | JCT | 100 | .039 | | .6000 | .44 | | |
| *NE STORM | JCT | 100 | .044 | | .8000 | .36 | | |
| *NE STORM | JCT | 100 | .062 | | 1.2500 | .26 | | |
| *NE STORM | JCT | 100 | .075 | | 5.4000 | .22 | | |
| *NE STORM | JCT | 100 | .087 | | 15.4000 | .16 | | |

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 OUT | JCT | 2 | .071 | | .5500 | 1.21 | | |
| *S OUT | JCT | 2 | .117 | | .9500 | 1.13 | | |
| *S OUT | JCT | 2 | .140 | | 1.0500 | .95 | | |
| *S OUT | JCT | 2 | .224 | | 1.6000 | .86 | | |
| *S OUT | JCT | 2 | .340 | | 5.4500 | 1.01 | | |
| *S OUT | JCT | 2 | .498 | | 15.6000 | 1.02 | | |
| *S OUT | JCT | 10 | .216 | | .5000 | 3.88 | | |
| *S OUT | JCT | 10 | .321 | | .7000 | 3.39 | | |
| *S OUT | JCT | 10 | .369 | | .8500 | 2.79 | | |
| *S OUT | JCT | 10 | .541 | | 1.5500 | 2.24 | | |
| *S OUT | JCT | 10 | .730 | | 5.4500 | 2.18 | | |
| *S OUT | JCT | 10 | .953 | | 15.6000 | 1.84 | | |
| *S OUT | JCT | 100 | .534 | | .4500 | 9.99 | | |
| *S OUT | JCT | 100 | .777 | | .6000 | 8.87 | | |
| *S OUT | JCT | 100 | .891 | | .8000 | 7.19 | | |
| *S OUT | JCT | 100 | 1.245 | | 1.3000 | 5.21 | | |
| *S OUT | JCT | 100 | 1.514 | | 5.4000 | 4.39 | | |
| *S OUT | JCT | 100 | 1.754 | | 15.6000 | 3.19 | | |

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 |
|---|---|---|---|---|---|---|---|---|
| *SW OUT | JCT | 2 | .004 | | .5000 | .07 | | |
| *SW OUT | JCT | 2 | .006 | | .7000 | .06 | | |
| *SW OUT | JCT | 2 | .008 | | .9500 | .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 | | 15.5500 | .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 | | |

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

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

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

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

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::


----------------------------------------------------------------------


Segment #1:  Tc: User Defined

                                         Segment #1 Time:     .2750 hrs
----------------------------------------------------------------------

                                               ========================
                                                Total Tc:     .2750 hrs
                                               ========================
```

---

Tc Equations used...

---

==== User Defined ==========

Tc = Value entered by user

Where: Tc = Time of concentration

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::


----------------------------------------------------------------------


Segment #1:  Tc: User Defined

                                         Segment #1 Time:     .2190 hrs
----------------------------------------------------------------------

                                               ========================
                                                Total Tc:     .2190 hrs
                                               ========================
```

---

Tc Equations used...

---

==== User Defined ==========

Tc = Value entered by user

Where: Tc = Time of concentration

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

---

Segment #1: Tc: User Defined

Segment #1 Time: .2500 hrs

---

==========
Total Tc: .2500 hrs
==========

---

Tc Equations used...

---

==== User Defined ==========

Tc = Value entered by user

Where: Tc = Time of concentration

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::


----------------------------------------------------------------------


Segment #1:  Tc: User Defined

                                          Segment #1 Time:     .2500 hrs
----------------------------------------------------------------------

                                                 ========================
                                                  Total Tc:     .2500 hrs
                                                 ========================
```

---

Tc Equations used...

---

==== User Defined ==========

Tc = Value entered by user

Where: Tc = Time of concentration

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

---

Segment #1: Tc: User Defined

Segment #1 Time: .1880 hrs

---

==========
Total Tc: .1880 hrs
==========

---

Tc Equations used...

---

==== User Defined ==========

Tc = Value entered by user

Where: Tc = Time of concentration

RUNOFF CURVE NUMBER DATA

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Other Agricultural Lands - Pasture, | 77 | 6.420 | | | 77.00 |

COMPOSITE AREA & WEIGHTED CN ---> 6.420 77.00 (77)

RUNOFF CURVE NUMBER DATA

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Other Agricultural Lands - Pasture, | 76 | 8.200 | | | 76.00 |
| COMPOSITE AREA & WEIGHTED CN ---> | | 8.200 | | | 76.00 (76) |

RUNOFF CURVE NUMBER DATA

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Other Agricultural Lands - Pasture, | 75 | .330 | | | 75.00 |
| COMPOSITE AREA & WEIGHTED CN ---> | | .330 | | | 75.00 (75) |

RUNOFF CURVE NUMBER DATA

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Other Agricultural Lands - Pasture, | 75 | 6.620 | | | 75.00 |
| COMPOSITE AREA & WEIGHTED CN ---> | | 6.620 | | | 75.00 (75) |

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

RUNOFF CURVE NUMBER DATA

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Other Agricultural Lands - Pasture, | 74 | .400 | | | 74.00 |

COMPOSITE AREA & WEIGHTED CN ---> .400 74.00 (74)

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----- J -----
Johnson2,10,100... 2.01

----- W -----
Watershed... 1.01

Project: Meijer FRK
Location: Franklin
Prepared by: MRA
Date: 8/21/2014

Existing
**N Storm Sewer Basin**

| | Area | CN | CN * A |
|---|---|---|---|
| Impervious | 0 | 98 | 0 |
| Br Type B/D Soil | 2.1 | 80 | 168 |
| CrA Type C Soil | 4.6 | 74 | 340.4 |
| MnB2 Type C Soil | 0 | 74 | 0 |
| MnC2 Type C Soil | 1.5 | 74 | 111 |
| | | | 0 |
| **Total:** | 8.2 | | 619.4 |
| | | **Use CN:** | 76 |

Existing
**SW Basin**

| | Area | CN | CN * A |
|---|---|---|---|
| Impervious | 0 | 98 | 0 |
| Br Type B/D Soil | 0 | 80 | 0 |
| CrA Type C Soil | 0 | 74 | 0 |
| MnB2 Type C Soil | 0.2 | 74 | 14.8 |
| MnC2 Type C Soil | 0.2 | 74 | 14.8 |
| | | | 0 |
| **Total:** | 0.4 | | 29.6 |
| | | **Use CN:** | 74 |

Existing
**S Basin**

| | Area | CN | CN * A |
|---|---|---|---|
| Impervious | 0 | 98 | 0 |
| Br Type B/D Soil | 1.23 | 80 | 98.4 |
| CrA Type C Soil | 4.48 | 74 | 331.52 |
| MnB2 Type C Soil | 0.14 | 74 | 10.36 |
| MnC2 Type C Soil | 0.77 | 74 | 56.98 |
| | | | 0 |
| **Total:** | 6.62 | | 497.26 |
| | | **Use CN:** | 75 |

Existing
**E Basin**

| | Area | CN | CN * A |
|---|---|---|---|
| Impervious | 0.09 | 98 | 8.82 |
| Br Type B/D Soil | 2.36 | 80 | 188.8 |
| CrA Type C Soil | 3.97 | 74 | 293.78 |
| MnB2 Type C Soil | 0 | 74 | 0 |
| MnC2 Type C Soil | 0 | 74 | 0 |
| | | | 0 |
| **Total:** | 6.42 | | 491.4 |
| | | **Use CN:** | 77 |

Existing
**NE Storm Sewer Basin**

| | Area | CN | CN * A |
|---|---|---|---|
| Impervious | 0.01 | 98 | 0.98 |
| Br Type B/D Soil | 0 | 80 | 0 |
| CrA Type C Soil | 0.32 | 74 | 23.68 |
| MnB2 Type C Soil | 0 | 74 | 0 |
| MnC2 Type C Soil | 0 | 74 | 0 |
| | | | 0 |
| **Total:** | 0.33 | | 24.66 |
| | | **Use CN:** | 75 |

Project: **Meijer FRK**
Location: **Franklin, IN**
Prepared By: **KAC**
Date: 11/13/2014

| | Existing N Storm Sewer Basin | Existing SW Basin | Existing S Basin | Existing E Basin | Existing NE Storm Sewer Basin |
|---|---|---|---|---|---|
| Surface description (table 3-1)..... | Cultivated | Cultivated | Cultivated | Cultivated | Grass |
| Manning's roughness coeff., n (table 3-1).. | 0.17 | 0.17 | 0.17 | 0.17 | 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 | 0.03 | 0.025 | 0.035 | 0.035 | 0.02 |
| 0.007 (nL)^0.8<br>Tt = ---------- Computed Tt.....hr.<br>P2^0.5 S^0.4 | 0.161 | 0.173 | 0.151 | 0.151 | 0.249 |

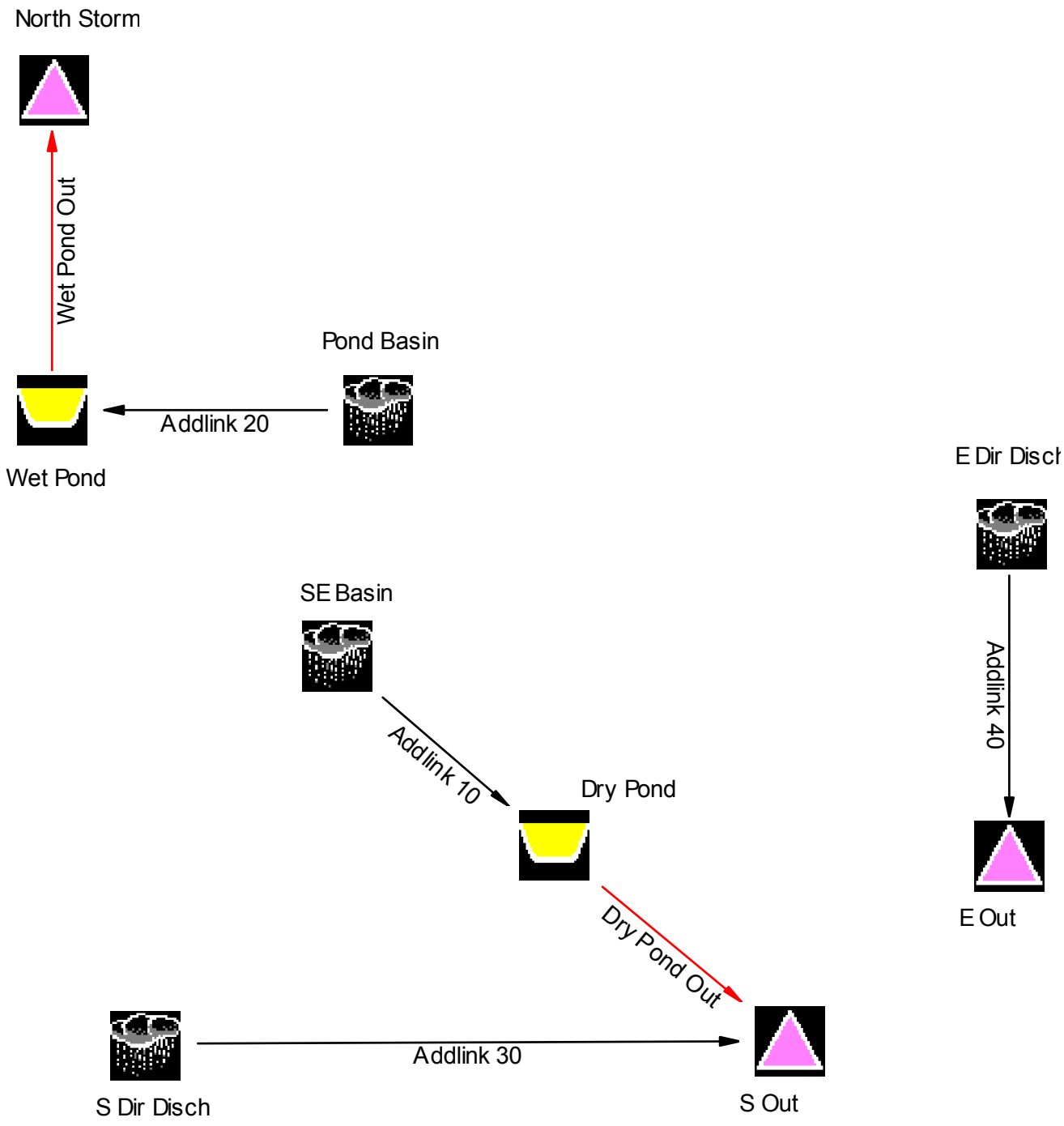
| | | | | | |
|---|---|---|---|---|---|
| Surface description (PAVED or UNPAVED)..... | unpaved | unpaved | unpaved | unpaved | unpaved |
| Flow length, L.....ft. | 338 | 128 | 750 | 761 | 3 |
| Watercourse slope, s.....ft/ft | 0.0104 | 0.0215 | 0.01615 | 0.0112 | 0.01 |
| Average velocity, V (figure 3-1).....ft/s | 1.645402607 | 2.365782099 | 2.050415021 | 1.707514981 | 2.03282 |
| Tt = L/(3600 V).....Computed Tt..hr. | 0.057 | 0.015 | 0.102 | 0.124 | 0.000 |

| | | | | | |
|---|---|---|---|---|---|
| Bottom Width.....ft | | | | | |
| Depth.....ft | | | | | |
| Left Side Slope ?:1 | | | | | |
| Right Side Slope ?:1 | | | | | |
| Cross sectional flow area, a.....ft^2 | 0 | 0 | 0 | 0 | 0 |
| Wetted perimeter, Pw.....ft | 0 | 0 | 0 | 0 | 0 |
| Hydraulic radius, r=a/Pw Compute r....ft | 0 | 0 | 0 | 0 | 0 |
| Channel slope,s.....ft/ft | | | | | |
| Manning's roughness coeff.,n.. (See next sheet) | | | | | |
| V =(1.49 r^2/3 s^1/2)/n Computed V...ft/s | 0 | 0 | 0 | 0 | 0 |
| Flow length, L .....ft. | | | | | |
| Tt = L/(3600 V).....Computed Tt..hr. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| | | | | | |
|---|---|---|---|---|---|
| Velocity.....ft/s | | | | | |
| Length.....ft | | | | | |
| Tt=L/(3600v).....Computed Tt..hr | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| | | | | | |
|---|---|---|---|---|---|
| Watershed or subarea Tc or Tt.....hr | 0.218 | 0.188 | 0.253 | 0.275 | 0.250 |
| Watershed or subarea Tc or Tt.....min | 13 | 11 | 15 | 17 | 15 |

PROPOSED DRAINAGE ANALYSIS



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

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

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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 |
|---|---|---|---|---|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|---|
| DRY POND IN | POND | 2 | .025 | | .4500 | .47 | | |
| DRY POND IN | POND | 2 | .034 | | .6000 | .39 | | |
| DRY POND IN | POND | 2 | .039 | | .8000 | .31 | | |
| DRY POND IN | POND | 2 | .053 | | 1.2500 | .22 | | |
| DRY POND IN | POND | 2 | .072 | | 5.4000 | .21 | | |
| DRY POND IN | POND | 2 | .095 | | 15.3500 | .17 | | |
| DRY POND IN | POND | 10 | .052 | | .4000 | 1.02 | | |
| DRY POND IN | POND | 10 | .069 | | .5500 | .81 | | |
| DRY POND IN | POND | 10 | .076 | | .7500 | .63 | | |
| DRY POND IN | POND | 10 | .101 | | .7000 | .46 | | |
| DRY POND IN | POND | 10 | .127 | | 4.8000 | .36 | | |
| DRY POND IN | POND | 10 | .157 | | 15.3500 | .27 | | |
| DRY POND IN | POND | 100 | .100 | | .3500 | 2.04 | | |
| DRY POND IN | POND | 100 | .134 | | .5000 | 1.64 | | |
| DRY POND IN | POND | 100 | .149 | | .5000 | 1.28 | | |
| DRY POND IN | POND | 100 | .195 | | .7000 | 1.07 | | |
| DRY POND IN | POND | 100 | .228 | | 4.8000 | .64 | | |
| DRY POND IN | POND | 100 | .258 | | 15.5000 | .42 | | |

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 |
|---|---|---|---|---|---|---|---|---|
| DRY POND | OUT POND | 2 | .025 | | .5500 | .43 | 758.61 | .003 |
| DRY POND | OUT POND | 2 | .034 | | .7000 | .37 | 758.56 | .002 |
| DRY POND | OUT POND | 2 | .039 | | .8500 | .30 | 758.51 | .002 |
| DRY POND | OUT POND | 2 | .053 | | 1.4500 | .22 | 758.45 | .001 |
| DRY POND | OUT POND | 2 | .072 | | 5.4000 | .21 | 758.43 | .001 |
| DRY POND | OUT POND | 2 | .095 | | 15.3500 | .17 | 758.40 | .001 |
| DRY POND | OUT POND | 10 | .052 | | .6000 | .63 | 759.03 | .012 |
| DRY POND | OUT POND | 10 | .069 | | .8500 | .60 | 758.94 | .009 |
| DRY POND | OUT POND | 10 | .076 | | .8000 | .56 | 758.77 | .005 |
| DRY POND | OUT POND | 10 | .101 | | 1.3000 | .43 | 758.61 | .003 |
| DRY POND | OUT POND | 10 | .127 | | 4.9500 | .36 | 758.56 | .002 |
| DRY POND | OUT POND | 10 | .157 | | 15.4500 | .27 | 758.49 | .002 |
| DRY POND | OUT POND | 100 | .100 | | .8000 | .82 | 759.74 | .040 |
| DRY POND | OUT POND | 100 | .134 | | 1.0500 | .82 | 759.73 | .040 |
| DRY POND | OUT POND | 100 | .149 | | 1.1500 | .78 | 759.57 | .032 |
| DRY POND | OUT POND | 100 | .195 | | 1.5500 | .72 | 759.32 | .022 |
| DRY POND | OUT POND | 100 | .228 | | 5.4000 | .59 | 758.89 | .008 |
| DRY POND | OUT POND | 100 | .258 | | 15.4000 | .42 | 758.60 | .003 |

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 |
|---|---|---|---|---|---|---|---|---|
| E DIR DISCH | AREA | 2 | .062 | | .4500 | 1.13 | | |
| E DIR DISCH | AREA | 2 | .084 | | .6000 | .93 | | |
| E DIR DISCH | AREA | 2 | .094 | | .8000 | .74 | | |
| E DIR DISCH | AREA | 2 | .128 | | 1.3000 | .53 | | |
| E DIR DISCH | AREA | 2 | .170 | | 5.4000 | .49 | | |
| E DIR DISCH | AREA | 2 | .224 | | 15.5000 | .40 | | |
| E DIR DISCH | AREA | 10 | .124 | | .4000 | 2.34 | | |
| E DIR DISCH | AREA | 10 | .164 | | .6000 | 1.90 | | |
| E DIR DISCH | AREA | 10 | .180 | | .7500 | 1.48 | | |
| E DIR DISCH | AREA | 10 | .238 | | .7500 | 1.09 | | |
| E DIR DISCH | AREA | 10 | .298 | | 4.8500 | .84 | | |
| E DIR DISCH | AREA | 10 | .366 | | 15.5500 | .62 | | |
| E DIR DISCH | AREA | 100 | .236 | | .4000 | 4.63 | | |
| E DIR DISCH | AREA | 100 | .313 | | .5500 | 3.77 | | |
| E DIR DISCH | AREA | 100 | .347 | | .5500 | 2.98 | | |
| E DIR DISCH | AREA | 100 | .451 | | .7000 | 2.46 | | |
| E DIR DISCH | AREA | 100 | .528 | | 4.8500 | 1.46 | | |
| E DIR DISCH | AREA | 100 | .594 | | 15.4500 | .95 | | |

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 |
|---|---|---|---|---|---|---|---|---|
| *E OUT | JCT | 2 | .062 | | .4500 | 1.13 | | |
| *E OUT | JCT | 2 | .084 | | .6000 | .93 | | |
| *E OUT | JCT | 2 | .094 | | .8000 | .74 | | |
| *E OUT | JCT | 2 | .128 | | 1.3000 | .53 | | |
| *E OUT | JCT | 2 | .170 | | 5.4000 | .49 | | |
| *E OUT | JCT | 2 | .224 | | 15.5000 | .40 | | |
| *E OUT | JCT | 10 | .124 | | .4000 | 2.34 | | |
| *E OUT | JCT | 10 | .164 | | .6000 | 1.90 | | |
| *E OUT | JCT | 10 | .180 | | .7500 | 1.48 | | |
| *E OUT | JCT | 10 | .238 | | .7500 | 1.09 | | |
| *E OUT | JCT | 10 | .298 | | 4.8500 | .84 | | |
| *E OUT | JCT | 10 | .366 | | 15.5500 | .62 | | |
| *E OUT | JCT | 100 | .236 | | .4000 | 4.63 | | |
| *E OUT | JCT | 100 | .313 | | .5500 | 3.77 | | |
| *E OUT | JCT | 100 | .347 | | .5500 | 2.98 | | |
| *E OUT | JCT | 100 | .451 | | .7000 | 2.46 | | |
| *E OUT | JCT | 100 | .528 | | 4.8500 | 1.46 | | |
| *E OUT | JCT | 100 | .594 | | 15.4500 | .95 | | |

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 STORM | JCT | 2 | .402 | | 1.1000 | .41 | | |
| *NORTH STORM | JCT | 2 | .731 | | 2.2500 | .67 | | |
| *NORTH STORM | JCT | 2 | .877 | | 2.9500 | .78 | | |
| *NORTH STORM | JCT | 2 | 1.369 | | 6.1500 | .89 | | |
| *NORTH STORM | JCT | 2 | 1.964 | | 7.6000 | .98 | | |
| *NORTH STORM | JCT | 2 | 2.694 | | 17.6000 | 1.06 | | |
| *NORTH STORM | JCT | 10 | 1.324 | | 1.0500 | .98 | | |
| *NORTH STORM | JCT | 10 | 1.872 | | 1.8500 | 1.06 | | |
| *NORTH STORM | JCT | 10 | 2.103 | | 3.2500 | 1.13 | | |
| *NORTH STORM | JCT | 10 | 2.882 | | 6.1000 | 1.27 | | |
| *NORTH STORM | JCT | 10 | 3.671 | | 12.1000 | 1.41 | | |
| *NORTH STORM | JCT | 10 | 4.548 | | 18.1500 | 1.59 | | |
| *NORTH STORM | JCT | 100 | 2.851 | | 1.3500 | 1.33 | | |
| *NORTH STORM | JCT | 100 | 3.863 | | 2.2500 | 3.12 | | |
| *NORTH STORM | JCT | 100 | 4.308 | | 3.1500 | 4.51 | | |
| *NORTH STORM | JCT | 100 | 5.638 | | 5.1000 | 5.13 | | |
| *NORTH STORM | JCT | 100 | 6.605 | | 8.0000 | 5.21 | | |
| *NORTH STORM | JCT | 100 | 7.446 | | 18.0500 | 5.21 | | |

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 | 1.266 | | .3500 | 25.59 | | |
| POND BASIN | AREA | 2 | 1.595 | | .5000 | 19.38 | | |
| POND BASIN | AREA | 2 | 1.741 | | .6500 | 14.72 | | |
| POND BASIN | AREA | 2 | 2.232 | | .7000 | 11.98 | | |
| POND BASIN | AREA | 2 | 2.827 | | 4.8500 | 7.91 | | |
| POND BASIN | AREA | 2 | 3.557 | | 15.6000 | 5.72 | | |
| POND BASIN | AREA | 10 | 2.187 | | .3500 | 45.91 | | |
| POND BASIN | AREA | 10 | 2.735 | | .4000 | 34.54 | | |
| POND BASIN | AREA | 10 | 2.966 | | .4500 | 27.84 | | |
| POND BASIN | AREA | 10 | 3.746 | | .7000 | 22.19 | | |
| POND BASIN | AREA | 10 | 4.535 | | 4.8500 | 12.46 | | |
| POND BASIN | AREA | 10 | 5.411 | | 15.6000 | 8.34 | | |
| POND BASIN | AREA | 100 | 3.715 | | .3000 | 80.20 | | |
| POND BASIN | AREA | 100 | 4.726 | | .4000 | 63.52 | | |
| POND BASIN | AREA | 100 | 5.172 | | .4000 | 53.24 | | |
| POND BASIN | AREA | 100 | 6.502 | | .6500 | 41.75 | | |
| POND BASIN | AREA | 100 | 7.469 | | 4.8000 | 20.02 | | |
| POND BASIN | AREA | 100 | 8.310 | | 15.6000 | 12.31 | | |

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 | 2 | .005 | | .3500 | .10 | | |
| S DIR DISCH | AREA | 2 | .008 | | .5500 | .09 | | |
| S DIR DISCH | AREA | 2 | .009 | | .7500 | .07 | | |
| S DIR DISCH | AREA | 2 | .015 | | 1.5000 | .06 | | |
| S DIR DISCH | AREA | 2 | .022 | | 5.4000 | .07 | | |
| S DIR DISCH | AREA | 2 | .031 | | 15.5000 | .06 | | |
| S DIR DISCH | AREA | 10 | .014 | | .3000 | .31 | | |
| S DIR DISCH | AREA | 10 | .021 | | .5000 | .25 | | |
| S DIR DISCH | AREA | 10 | .023 | | .7500 | .20 | | |
| S DIR DISCH | AREA | 10 | .034 | | 1.5000 | .15 | | |
| S DIR DISCH | AREA | 10 | .045 | | 5.4000 | .14 | | |
| S DIR DISCH | AREA | 10 | .058 | | 15.3000 | .11 | | |
| S DIR DISCH | AREA | 100 | .033 | | .2500 | .77 | | |
| S DIR DISCH | AREA | 100 | .048 | | .5000 | .59 | | |
| S DIR DISCH | AREA | 100 | .054 | | .6000 | .45 | | |
| S DIR DISCH | AREA | 100 | .075 | | .6000 | .38 | | |
| S DIR DISCH | AREA | 100 | .090 | | 5.4000 | .26 | | |
| S DIR DISCH | AREA | 100 | .104 | | 15.4000 | .18 | | |

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 OUT | JCT | 2 | .030 | | .5000 | .52 | | |
| *S OUT | JCT | 2 | .042 | | .7000 | .45 | | |
| *S OUT | JCT | 2 | .048 | | .9000 | .37 | | |
| *S OUT | JCT | 2 | .068 | | 1.4500 | .28 | | |
| *S OUT | JCT | 2 | .093 | | 5.4000 | .27 | | |
| *S OUT | JCT | 2 | .126 | | 15.5500 | .23 | | |
| *S OUT | JCT | 10 | .066 | | .3500 | .86 | | |
| *S OUT | JCT | 10 | .089 | | .5000 | .81 | | |
| *S OUT | JCT | 10 | .099 | | .7500 | .75 | | |
| *S OUT | JCT | 10 | .135 | | 1.2000 | .56 | | |
| *S OUT | JCT | 10 | .172 | | 5.4000 | .49 | | |
| *S OUT | JCT | 10 | .215 | | 15.5000 | .38 | | |
| *S OUT | JCT | 100 | .133 | | .3000 | 1.39 | | |
| *S OUT | JCT | 100 | .181 | | .5000 | 1.29 | | |
| *S OUT | JCT | 100 | .203 | | .7500 | 1.18 | | |
| *S OUT | JCT | 100 | .269 | | 1.5000 | 1.03 | | |
| *S OUT | JCT | 100 | .318 | | 5.4000 | .85 | | |
| *S OUT | JCT | 100 | .362 | | 15.4500 | .60 | | |

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 |
|---|---|---|---|---|---|---|---|---|
| SE BASIN | AREA | 2 | .025 | | .4500 | .47 | | |
| SE BASIN | AREA | 2 | .034 | | .6000 | .39 | | |
| SE BASIN | AREA | 2 | .039 | | .8000 | .31 | | |
| SE BASIN | AREA | 2 | .053 | | 1.2500 | .22 | | |
| SE BASIN | AREA | 2 | .072 | | 5.4000 | .21 | | |
| SE BASIN | AREA | 2 | .095 | | 15.3500 | .17 | | |
| SE BASIN | AREA | 10 | .052 | | .4000 | 1.02 | | |
| SE BASIN | AREA | 10 | .069 | | .5500 | .81 | | |
| SE BASIN | AREA | 10 | .076 | | .7500 | .63 | | |
| SE BASIN | AREA | 10 | .101 | | .7000 | .46 | | |
| SE BASIN | AREA | 10 | .127 | | 4.8000 | .36 | | |
| SE BASIN | AREA | 10 | .157 | | 15.3500 | .27 | | |
| SE BASIN | AREA | 100 | .100 | | .3500 | 2.04 | | |
| SE BASIN | AREA | 100 | .134 | | .5000 | 1.64 | | |
| SE BASIN | AREA | 100 | .149 | | .5000 | 1.28 | | |
| SE BASIN | AREA | 100 | .195 | | .7000 | 1.07 | | |
| SE BASIN | AREA | 100 | .228 | | 4.8000 | .64 | | |
| SE BASIN | AREA | 100 | .258 | | 15.5000 | .42 | | |

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 | 1.266 | | .3500 | 25.59 | | |
| WET POND IN | POND | 2 | 1.595 | | .5000 | 19.38 | | |
| WET POND IN | POND | 2 | 1.741 | | .6500 | 14.72 | | |
| WET POND IN | POND | 2 | 2.232 | | .7000 | 11.98 | | |
| WET POND IN | POND | 2 | 2.827 | | 4.8500 | 7.91 | | |
| WET POND IN | POND | 2 | 3.557 | | 15.6000 | 5.72 | | |
| WET POND IN | POND | 10 | 2.187 | | .3500 | 45.91 | | |
| WET POND IN | POND | 10 | 2.735 | | .4000 | 34.54 | | |
| WET POND IN | POND | 10 | 2.966 | | .4500 | 27.84 | | |
| WET POND IN | POND | 10 | 3.746 | | .7000 | 22.19 | | |
| WET POND IN | POND | 10 | 4.535 | | 4.8500 | 12.46 | | |
| WET POND IN | POND | 10 | 5.411 | | 15.6000 | 8.34 | | |
| WET POND IN | POND | 100 | 3.715 | | .3000 | 80.20 | | |
| WET POND IN | POND | 100 | 4.726 | | .4000 | 63.52 | | |
| WET POND IN | POND | 100 | 5.172 | | .4000 | 53.24 | | |
| WET POND IN | POND | 100 | 6.502 | | .6500 | 41.75 | | |
| WET POND IN | POND | 100 | 7.469 | | 4.8000 | 20.02 | | |
| WET POND IN | POND | 100 | 8.310 | | 15.6000 | 12.31 | | |

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 | .402 | | 1.1000 | .41 | 756.99 | 1.244 |
| WET POND | OUT POND | 2 | .731 | | 2.2500 | .67 | 757.21 | 1.532 |
| WET POND | OUT POND | 2 | .877 | | 2.9500 | .78 | 757.28 | 1.634 |
| WET POND | OUT POND | 2 | 1.369 | | 6.1500 | .89 | 757.51 | 1.950 |
| WET POND | OUT POND | 2 | 1.964 | | 7.6000 | .98 | 757.75 | 2.291 |
| WET POND | OUT POND | 2 | 2.694 | | 17.6000 | 1.06 | 758.01 | 2.674 |
| WET POND | OUT POND | 10 | 1.324 | | 1.0500 | .98 | 757.63 | 2.119 |
| WET POND | OUT POND | 10 | 1.872 | | 1.8500 | 1.06 | 757.96 | 2.597 |
| WET POND | OUT POND | 10 | 2.103 | | 3.2500 | 1.13 | 758.07 | 2.759 |
| WET POND | OUT POND | 10 | 2.882 | | 6.1000 | 1.27 | 758.41 | 3.271 |
| WET POND | OUT POND | 10 | 3.671 | | 12.1000 | 1.41 | 758.70 | 3.734 |
| WET POND | OUT POND | 10 | 4.548 | | 18.1500 | 1.59 | 758.88 | 4.015 |
| WET POND | OUT POND | 100 | 2.851 | | 1.3500 | 1.33 | 758.62 | 3.607 |
| WET POND | OUT POND | 100 | 3.863 | | 2.2500 | 3.12 | 759.16 | 4.471 |
| WET POND | OUT POND | 100 | 4.308 | | 3.1500 | 4.51 | 759.28 | 4.674 |
| WET POND | OUT POND | 100 | 5.638 | | 5.1000 | 5.13 | 759.42 | 4.917 |
| WET POND | OUT POND | 100 | 6.605 | | 8.0000 | 5.21 | 759.55 | 5.131 |
| WET POND | OUT POND | 100 | 7.446 | | 18.0500 | 5.21 | 759.55 | 5.134 |

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 = 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

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 = 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

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 = 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

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 = 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

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

---

Segment #1: Tc: TR-55 Sheet

Mannings n .2400
Hydraulic Length 100.00 ft
2yr, 24hr P 2.9100 in
Slope .030000 ft/ft

Avg.Velocity .13 ft/sec

Segment #1 Time: .2121 hrs

---

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 372.00 ft
Slope .008100 ft/ft
Unpaved

Avg.Velocity 1.45 ft/sec

Segment #2 Time: .0712 hrs

---

==========
Total Tc: .2832 hrs
==========

---

```
-----------------------------------------------------------------------
Tc Equations used...
-----------------------------------------------------------------------


==== SCS TR-55 Sheet Flow ==============================================

     Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

     Where:  Tc = Time of concentration, hrs
             n  = Mannings n
             Lf = Flow length, ft
             P  = 2yr, 24hr Rain depth, inches
             Sf = Slope, %


==== SCS TR-55 Shallow Concentrated Flow ===============================

     Unpaved surface:
     V  = 16.1345 * (Sf**0.5)

     Paved surface:
     V  = 20.3282 * (Sf**0.5)

     Tc = (Lf / V) / (3600sec/hr)

     Where:  V  = Velocity, ft/sec
             Sf = Slope, ft/ft
             Tc = Time of concentration, hrs
             Lf = Flow length, ft
```

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

---

Segment #1: Tc: User Defined

Segment #1 Time: .2500 hrs

---

==========
Total Tc: .2500 hrs
==========

---

Tc Equations used...

---

==== User Defined ==========

Tc = Value entered by user

Where: Tc = Time of concentration

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::


----------------------------------------------------------------------


Segment #1:  Tc: User Defined

                                         Segment #1 Time:     .0833 hrs
----------------------------------------------------------------------

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

---

```
 ----------------------------------------------------------------------
 Tc Equations used...
 ----------------------------------------------------------------------


 ==== User Defined ====================================================

      Tc = Value entered by user

      Where:  Tc = Time of concentration
```

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

---

Segment #1: Tc: TR-55 Sheet

| | | |
|---|---|---|
| Mannings n | .2400 | |
| Hydraulic Length | 86.00 | ft |
| 2yr, 24hr P | 2.9100 | in |
| Slope | .015000 | ft/ft |

| | | |
|---|---|---|
| Avg.Velocity | .10 | ft/sec |

Segment #1 Time: .2480 hrs

---

==========
Total Tc: .2480 hrs
==========

---

```
 ----------------------------------------------------------------------
 Tc Equations used...
 ----------------------------------------------------------------------


 ==== SCS TR-55 Sheet Flow ============================================

      Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

      Where:  Tc = Time of concentration, hrs
              n  = Mannings n
              Lf = Flow length, ft
              P  = 2yr, 24hr Rain depth, inches
              Sf = Slope, %
```

RUNOFF CURVE NUMBER DATA
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | %UC | Adjusted CN |
|---|---|---|---|---|---|
| impervious | 98 | .910 | | | 98.00 |
| pervious | 74 | .710 | | | 74.00 |

COMPOSITE AREA & WEIGHTED CN ---> 1.620 87.48 (87)
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

RUNOFF CURVE NUMBER DATA

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Impervious Areas - Paved parking lo | 98 | 15.940 | | | 98.00 |
| Open space (Lawns,parks etc.) - Goo | 74 | 3.750 | | | 74.00 |
| COMPOSITE AREA & WEIGHTED CN ---> | | 19.690 | | | 93.43 (93) |

RUNOFF CURVE NUMBER DATA

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Impervious Areas - Paved parking lo | 98 | .040 | | | 98.00 |
| Open space (Lawns,parks etc.) - Goo | 74 | .330 | | | 74.00 |
| COMPOSITE AREA & WEIGHTED CN ---> | | .370 | | | 76.59 (77) |

RUNOFF CURVE NUMBER DATA

| Soil/Surface Description | CN | Area acres | Impervious Adjustment %C | Impervious Adjustment %UC | Adjusted CN |
|---|---|---|---|---|---|
| Impervious Areas - Paved parking lo | 98 | .350 | | | 98.00 |
| Open space (Lawns,parks etc.) - Goo | 74 | .370 | | | 74.00 |
| COMPOSITE AREA & WEIGHTED CN ---> | | .720 | | | 85.67 (86) |

| Elevation (ft) | Planimeter (sq.in) | Area (acres) | A1+A2+sqr(A1*A2) (acres) | Volume (ac-ft) | Volume Sum (ac-ft) |
|---|---|---|---|---|---|
| 758.10 | ----- | .0010 | .0000 | .000 | .000 |
| 759.00 | ----- | .0300 | .0365 | .011 | .011 |
| 760.00 | ----- | .0600 | .1324 | .044 | .055 |
| 761.00 | ----- | .0900 | .2235 | .074 | .130 |
| 762.00 | ----- | .1300 | .3282 | .109 | .239 |

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

| Elevation (ft) | Planimeter (sq.in) | Area (acres) | A1+A2+sqr(A1*A2) (acres) | Volume (ac-ft) | Volume Sum (ac-ft) |
|---|---|---|---|---|---|
| 756.00 | ----- | 1.1800 | .0000 | .000 | .000 |
| 757.00 | ----- | 1.3300 | 3.7628 | 1.254 | 1.254 |
| 758.00 | ----- | 1.4800 | 4.2130 | 1.404 | 2.659 |
| 759.00 | ----- | 1.6300 | 4.6632 | 1.554 | 4.213 |
| 760.00 | ----- | 1.8200 | 5.1724 | 1.724 | 5.937 |
| 761.00 | ----- | 2.0000 | 5.7279 | 1.909 | 7.846 |
| 762.00 | ----- | 2.5700 | 6.8372 | 2.279 | 10.125 |

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 758.10 ft
Increment = .05 ft
Max. Elev.= 762.00 ft

```
*********************************************
                OUTLET CONNECTIVITY
*********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

| Structure | No. | | Outfall | E1, ft | E2, ft |
|---|---|---|---|---|---|
| Culvert-Circular | 1 | ---> | TW | 758.100 | 762.000 |
| TW SETUP, DS Channel | | | | | |

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = 1
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         1
Barrel Diameter   =     .5000 ft
Upstream Invert   =    758.10 ft
Dnstream Invert   =    757.61 ft
Horiz. Length     =     61.00 ft
Barrel Length     =     61.00 ft
Barrel Slope      =    .00803 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .2000  (forward entrance loss)
Kb                =   .078805  (per ft of full flow)
Kr                =     .2000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0045
Inlet Control M   =    2.0000
Inlet Control c   =    .03170
Inlet Control Y   =     .6900
T1 ratio (HW/D)   =     1.165
T2 ratio (HW/D)   =     1.193
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    758.68 ft  --->  Flow =       .49 cfs
At T2 Elev =    758.70 ft  --->  Flow =       .56 cfs
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 756.00 ft
Increment = .05 ft
Max. Elev.= 762.00 ft

**********
OUTLET CONNECTIVITY
**********

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

| Structure | No. | | Outfall | E1, ft | E2, ft |
|---|---|---|---|---|---|
| Orifice-Circular | 2 | ---> | 4 | 756.580 | 762.000 |
| Inlet Box | 3 | ---> | 4 | 759.000 | 762.000 |
| Orifice-Circular | 1 | ---> | 4 | 756.000 | 762.000 |
| Culvert-Circular | 4 | ---> | TW | 756.000 | 762.000 |
| TW SETUP, DS Channel | | | | | |

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = 2
Structure Type    = Orifice-Circular
------------------------------------
# of Openings     =         1
Invert Elev.      =    756.58 ft
Diameter          =     .5000 ft
Orifice Coeff.    =      .600


Structure ID      = 3
Structure Type    = Inlet Box
------------------------------------
# of Openings     =         1
Invert Elev.      =    759.00 ft
Orifice Area      =    4.0000 sq.ft
Orifice Coeff.    =      .600
Weir Length       =      8.00 ft
Weir Coeff.       =     3.330
K, Reverse        =     1.000
Mannings n        =     .0000
Kev,Charged Riser =      .000
Weir Submergence  = No


Structure ID      = 1
Structure Type    = Orifice-Circular
------------------------------------
# of Openings     =         1
Invert Elev.      =    756.00 ft
Diameter          =     .1667 ft
Orifice Coeff.    =      .600
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = 4
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         1
Barrel Diameter   =     .8333 ft
Upstream Invert   =    756.00 ft
Dnstream Invert   =    754.75 ft
Horiz. Length     =     40.00 ft
Barrel Length     =     40.02 ft
Barrel Slope      =    .03125 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .2000  (forward entrance loss)
Kb                =   .039880  (per ft of full flow)
Kr                =     .2000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0045
Inlet Control M   =    2.0000
Inlet Control c   =    .03170
Inlet Control Y   =     .6900
T1 ratio (HW/D)   =      .000
T2 ratio (HW/D)   =     1.182
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    756.00 ft  --->  Flow =      1.74 cfs
At T2 Elev =    756.98 ft  --->  Flow =      1.99 cfs


Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .10 cfs
Max.  Q tolerance =    .10 cfs
```

Index of Starting Page Numbers for ID Names

----- D -----
DRY POND... 5.01
Dry Pond Out... 6.01

----- E -----
E DIR DISCH... 3.01, 4.01

----- J -----
Johnson2,10,100... 2.01

----- P -----
POND BASIN... 3.03, 4.02

----- S -----
S DIR DISCH... 3.05, 4.03
SE BASIN... 3.07, 4.04

----- W -----
Watershed... 1.01
WET POND... 5.02
Wet Pond Out... 6.04

# Worksheet for Emergency Spillway

## Project Description

| | |
|---|---|
| Solve For | Crest Length |

## Input Data

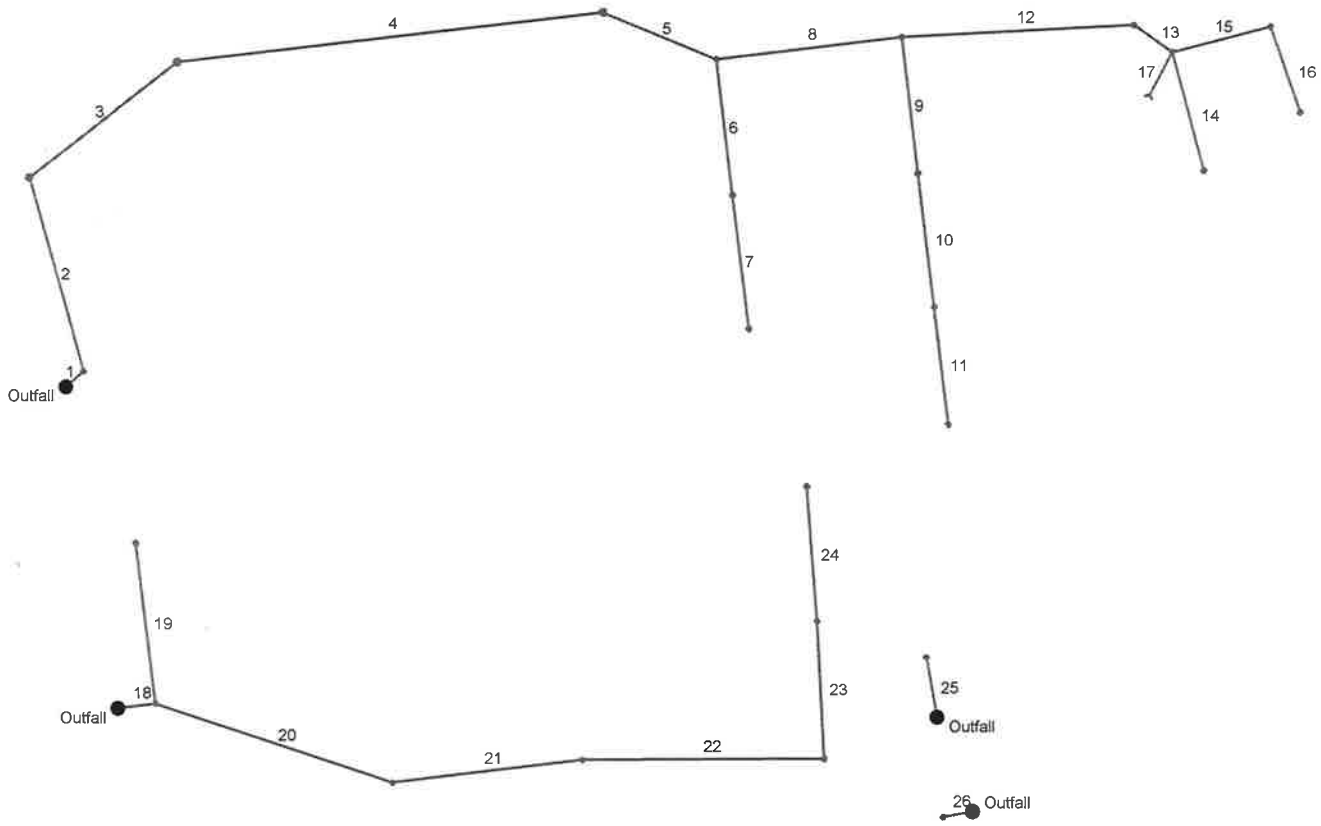
| | | | |
|---|---|---|---|
| Discharge | 100.25 | ft³/s | 1.25x80.20 = 100.25 cfs |
| Headwater Elevation | 760.56 | ft | |
| Crest Elevation | 759.55 | ft | |
| Weir Coefficient | 3.33 | US | |

## Results

| | | |
|---|---|---|
| Crest Length | 29.66 | ft |
| Headwater Height Above Crest | 1.01 | ft |
| Flow Area | 29.96 | ft² |
| Velocity | 3.35 | ft/s |
| Wetted Perimeter | 31.68 | ft |
| Top Width | 29.66 | ft |

# Section 4 – Storm Sewer Sizing Calculations

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




| Project File: STM - Meijer.stm | Number of lines: 26 | Date: 12/8/2014 |
|---|---|---|

Storm Sewers v10.00

# 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 | (ft) | Incr (ac) | Total (ac) | (C) | Incr | Total | Inlet (min) | Syst (min) | (in/hr) | (cfs) | (cfs) | (ft/s) | Size (in) | Slope (%) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | |
| 26 | End | 28.600 | 0.14 | 0.14 | 0.76 | 0.11 | 0.11 | 5.0 | 5.0 | 7.2 | 0.77 | 2.50 | 2.82 | 12 | 0.42 | 758.50 | 758.62 | 758.87 | 759.01 | 0.00 | 760.83 | 4.3-4.2 |
| 25 | End | 58.000 | 0.26 | 0.26 | 0.80 | 0.21 | 0.21 | 5.0 | 5.0 | 7.2 | 1.50 | 2.21 | 3.06 | 12 | 0.33 | 759.10 | 759.29 | 759.69 | 759.90 | 763.42 | 762.29 | 4.1-4.0 |
| 24 | 23 | 130.000 | 0.72 | 0.72 | 0.84 | 0.60 | 0.60 | 5.0 | 5.0 | 7.2 | 4.36 | 3.47 | 3.55 | 15 | 0.25 | 760.43 | 760.75 | 761.68 | 762.19 | 764.00 | 764.50 | 3.7-3.6 |
| 23 | 22 | 132.500 | 0.56 | 1.28 | 0.84 | 0.47 | 1.08 | 5.0 | 5.6 | 7.0 | 7.49 | 9.78 | 5.33 | 18 | 0.74 | 758.90 | 759.88 | 760.07 | 760.94 | 762.90 | 764.00 | 3.6-3.5 |
| 22 | 21 | 228.740 | 0.30 | 1.58 | 0.73 | 0.22 | 1.29 | 5.0 | 6.1 | 6.8 | 8.76 | 9.45 | 3.41 | 24 | 0.15 | 758.03 | 758.37 | 759.55 | 759.89 | 764.56 | 762.90 | 3.5-3.4 |
| 21 | 20 | 181.707 | 0.65 | 2.23 | 0.85 | 0.55 | 1.85 | 5.0 | 7.5 | 6.3 | 11.64 | 13.48 | 4.52 | 24 | 0.30 | 757.48 | 758.03 | 759.08 | 759.50 | 764.57 | 764.56 | 3.4-3.3 |
| 20 | 18 | 236.984 | 0.81 | 3.04 | 0.85 | 0.69 | 2.54 | 5.0 | 8.4 | 6.1 | 15.36 | 24.15 | 3.89 | 30 | 0.30 | 756.55 | 757.25 | 758.69 | 758.94 | 764.64 | 764.57 | 3.3-3.1 |
| 19 | 18 | 156.500 | 1.20 | 1.20 | 0.89 | 1.07 | 1.07 | 5.0 | 5.0 | 7.2 | 7.70 | 8.86 | 5.65 | 18 | 0.61 | 758.80 | 759.75 | 759.88 | 760.83 | 764.64 | 763.50 | 3.2-3.1 |
| 18 | End | 35.800 | 1.11 | 5.35 | 0.89 | 0.99 | 4.59 | 5.0 | 9.6 | 5.7 | 26.25 | 36.23 | 4.50 | 36 | 0.25 | 756.00 | 756.09 | 758.33 | 758.37 | 760.50 | 764.64 | 3.1-3.0 |
| 17 | 13 | 47.240 | 0.08 | 0.08 | 0.33 | 0.03 | 0.03 | 5.0 | 5.0 | 7.2 | 0.19 | 4.49 | 2.42 | 12 | 1.35 | 761.36 | 762.00 | 761.50 | 762.18 | 764.75 | 763.00 | 2.17-2.12 |
| 16 | 15 | 86.060 | 0.19 | 0.19 | 0.85 | 0.16 | 0.16 | 5.0 | 5.0 | 7.2 | 1.16 | 2.20 | 2.02 | 12 | 0.33 | 760.72 | 761.00 | 761.53 | 761.61 | 764.21 | 764.65 | 2.16-2.15 |
| 15 | 13 | 95.700 | 0.15 | 0.34 | 0.85 | 0.13 | 0.29 | 5.0 | 6.0 | 6.8 | 1.97 | 3.50 | 2.89 | 15 | 0.25 | 760.48 | 760.72 | 761.17 | 761.39 | 764.75 | 764.21 | 2.15-2.13 |
| 14 | 13 | 116.130 | 0.42 | 0.42 | 0.86 | 0.36 | 0.36 | 5.0 | 5.0 | 7.2 | 2.60 | 2.73 | 3.95 | 12 | 0.50 | 760.92 | 761.50 | 761.70 | 762.28 | 764.75 | 765.00 | 2.14-2.13 |
| 13 | 12 | 44.580 | 0.00 | 0.84 | 0.00 | 0.00 | 0.68 | 0.0 | 8.2 | 6.1 | 4.12 | 16.41 | 2.74 | 24 | 0.45 | 760.00 | 760.20 | 761.82 | 760.91 | 764.00 | 764.75 | 2.13-2.12 |
| 12 | 8 | 221.060 | 0.29 | 1.13 | 0.83 | 0.24 | 0.92 | 5.0 | 8.8 | 5.9 | 5.45 | 9.32 | 1.79 | 24 | 0.14 | 759.68 | 760.00 | 761.69 | 761.79 | 764.50 | 764.00 | 2.12-2.11 |
| 11 | 10 | 112.470 | 0.31 | 0.31 | 0.77 | 0.24 | 0.24 | 5.0 | 5.0 | 7.2 | 1.72 | 2.18 | 2.19 | 12 | 0.32 | 760.64 | 761.00 | 762.18 | 762.40 | 764.50 | 764.00 | 2.11-2.10 |
| 10 | 9 | 130.000 | 0.66 | 0.97 | 0.81 | 0.53 | 0.77 | 5.0 | 5.9 | 6.9 | 5.31 | 5.73 | 3.01 | 18 | 0.25 | 760.25 | 760.58 | 761.87 | 762.16 | 764.50 | 764.50 | 2.10-2.9 |
| 9 | 8 | 130.000 | 0.75 | 1.72 | 0.83 | 0.62 | 1.40 | 5.0 | 6.6 | 6.6 | 9.23 | 12.16 | 2.99 | 24 | 0.25 | 759.68 | 760.00 | 761.69 | 761.85 | 764.50 | 764.50 | 2.9-2.8 |
| 8 | 5 | 177.296 | 0.67 | 3.52 | 0.82 | 0.55 | 2.86 | 5.0 | 10.6 | 5.5 | 15.69 | 17.34 | 3.81 | 30 | 0.15 | 759.25 | 759.52 | 761.23 | 761.46 | 764.48 | 764.50 | 2.8-2.5 |
| 7 | 6 | 130.000 | 0.72 | 0.72 | 0.84 | 0.60 | 0.60 | 5.0 | 5.0 | 7.2 | 4.36 | 4.42 | 3.80 | 15 | 0.40 | 760.71 | 761.23 | 761.87 | 762.29 | 764.48 | 764.48 | 2.7-2.6 |
| 6 | 5 | 130.000 | 0.72 | 1.44 | 0.84 | 0.60 | 1.21 | 5.0 | 5.6 | 7.0 | 8.42 | 8.81 | 5.17 | 18 | 0.60 | 759.80 | 760.58 | 761.23 | 761.80 | 764.48 | 764.48 | 2.6-2.5 |

Project File: STM - Meijer.stm | Number of lines: 26 | Run Date: 12/8/2014

NOTES:Intensity = 54.67 / (Inlet time + 8.40) ^ 0.78; Return period =Yrs. 10 ; c = cir e = ellip b = box

# Storm Sewer Tabulation

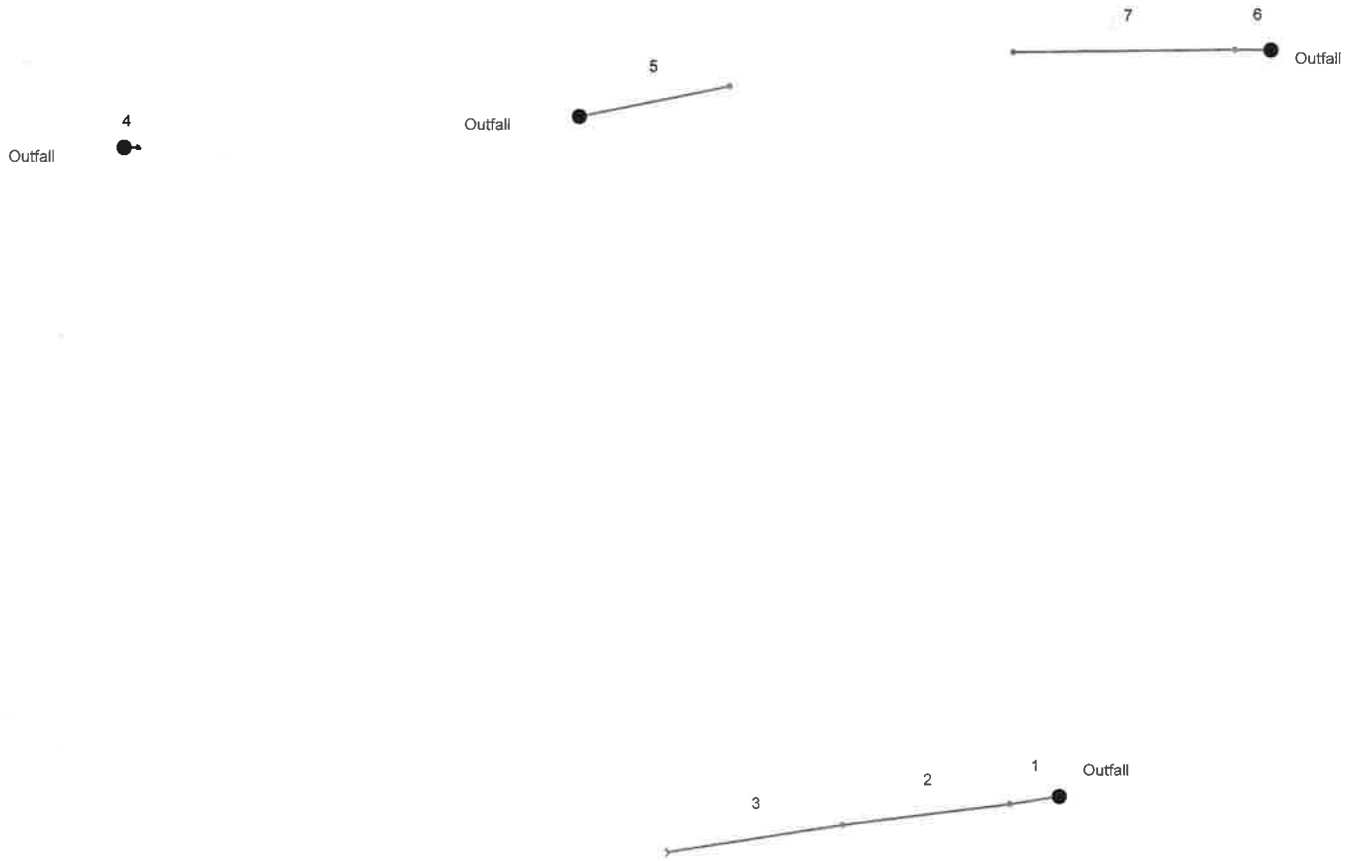


| Station | | Len | Drng Area | | Rnoff coeff | Area x C | | Tc | | Rain (I) | Total flow | Cap full | Vel | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line | To Line | (ft) | Incr (ac) | Total (ac) | (C) | Incr | Total | Inlet (min) | Syst (min) | (in/hr) | (cfs) | (cfs) | (ft/s) | Size (in) | Slope (%) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | |
| 5 | 4 | 115.933 | 0.68 | 5.64 | 0.82 | 0.56 | 4.63 | 5.0 | 11.4 | 5.3 | 24.58 | 32.18 | 5.01 | 36 | 0.20 | 758.68 | 758.91 | 760.64 | 760.87 | 765.33 | 764.48 | 2.5-2.4 |
| 4 | 3 | 406.918 | 0.03 | 5.67 | 0.85 | 0.03 | 4.66 | 5.0 | 11.9 | 5.2 | 24.25 | 36.35 | 4.83 | 36 | 0.25 | 757.50 | 758.53 | 759.76 | 760.35 | 765.04 | 765.33 | 2.4-2.3 |
| 3 | 2 | 177.820 | 0.79 | 6.46 | 0.90 | 0.71 | 5.37 | 5.0 | 13.7 | 4.9 | 26.20 | 39.81 | 3.81 | 36 | 0.30 | 756.38 | 756.92 | 759.42 | 759.62 | 760.88 | 765.04 | 2.3-2.2 |
| 2 | 1 | 192.390 | 0.64 | 7.10 | 0.85 | 0.54 | 5.91 | 5.0 | 14.4 | 4.8 | 28.13 | 30.82 | 4.06 | 36 | 0.18 | 756.03 | 756.38 | 758.93 | 759.18 | 763.26 | 760.88 | 2.2-2.1 |
| 1 | End | 22.480 | 2.82 | 9.92 | 0.89 | 2.51 | 8.42 | 5.0 | 15.2 | 4.6 | 39.07 | 39.84 | 5.32 | 42 | 0.13 | 756.00 | 756.03 | 758.49 | 758.53 | 761.08 | 763.26 | 2.1-2.0 |

Project File: STM - Meijer.stm | Number of lines: 26 | Run Date: 12/8/2014

NOTES:Intensity = 54.67 / (Inlet time + 8.40) ^ 0.78; Return period =Yrs. 10 ; c = cir e = ellip b = box

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




| | | |
|---|---|---|
| Project File: STM - Meijer Roadway.stm | Number of lines: 7 | Date: 12/8/2014 |

Storm Sewers v10.00

# 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 | (ft) | Incr (ac) | Total (ac) | (C) | Incr | Total | Inlet (min) | Syst (min) | (in/hr) | (cfs) | (cfs) | (ft/s) | Size (in) | Slope (%) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | |
| 7 | 6 | 239.545 | 0.54 | 0.54 | 0.54 | 0.29 | 0.29 | 5.0 | 5.0 | 7.2 | 2.10 | 3.27 | 3.48 | 12 | 0.84 | 758.48 | 760.50 | 759.37 | 761.12 | 761.50 | 764.28 | 5.8 to 5.9 |
| 6 | End | 38.804 | 0.23 | 0.77 | 0.48 | 0.11 | 0.40 | 5.0 | 6.5 | 6.6 | 2.67 | 3.57 | 3.80 | 12 | 1.00 | 758.09 | 758.48 | 759.09 | 759.23 | 761.30 | 761.50 | 5.9 to EX2 |
| 5 | End | 164.941 | 0.39 | 0.39 | 0.51 | 0.20 | 0.20 | 5.0 | 5.0 | 7.2 | 1.43 | 4.38 | 2.71 | 12 | 1.52 | 757.00 | 759.50 | 758.25 | 760.01 | 761.20 | 763.81 | 5.7 to EX1 |
| 4 | End | 15.056 | 0.10 | 0.10 | 0.85 | 0.09 | 0.09 | 5.0 | 5.0 | 7.2 | 0.61 | 3.55 | 0.82 | 12 | 1.00 | 759.85 | 760.00 | 760.85 | 760.85 | 761.88 | 764.30 | 5.5 to 1.0 |
| 3 | 2 | 190.961 | 0.69 | 0.69 | 0.54 | 0.37 | 0.37 | 10.0 | 10.0 | 5.6 | 2.10 | 2.11 | 2.96 | 12 | 0.35 | 757.83 | 758.50 | 758.71 | 759.32 | 760.16 | 761.00 | 5.3 to 5.2 |
| 2 | 1 | 181.828 | 0.24 | 0.93 | 0.58 | 0.14 | 0.51 | 5.0 | 11.2 | 5.4 | 2.74 | 3.83 | 2.96 | 15 | 0.35 | 757.19 | 757.83 | 758.22 | 758.62 | 759.94 | 760.16 | 5.2 to 5.1 |
| 1 | End | 54.725 | 0.22 | 1.15 | 0.71 | 0.16 | 0.67 | 5.0 | 12.5 | 5.1 | 3.40 | 3.80 | 3.42 | 15 | 0.35 | 757.00 | 757.19 | 757.95 | 758.13 | 759.33 | 759.94 | 5.1 to 5.0 |

Project File: STM - Meijer Roadway.stm | Number of lines: 7 | Run Date: 12/8/2014

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

12/5/2014
CLH, JRS

**CM 2.1**

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

**Weighted C Value = 0.85**

**CM 2.2**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.10 |
| Pavement | 0.85 | 0.54 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.64 |

**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 | 0.03 |
| Pavement | 0.85 | 0.65 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.68 |

**Weighted C Value = 0.82**

**CM 2.6**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.01 |
| Pavement | 0.85 | 0.71 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.72 |

**Weighted C Value = 0.84**

**CM 2.7**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.01 |
| Pavement | 0.85 | 0.71 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.72 |

**Weighted C Value = 0.84**

**CM 2.8**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.03 |
| Pavement | 0.85 | 0.64 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.67 |

**Weighted C Value = 0.82**

**CM 2.9**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.02 |
| Pavement | 0.85 | 0.73 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.75 |

**Weighted C Value = 0.83**

**CM 2.10**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.04 |
| Pavement | 0.85 | 0.62 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.66 |

**Weighted C Value = 0.81**

**CM 2.11**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.04 |
| Pavement | 0.85 | 0.27 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.31 |

**Weighted C Value = 0.77**

**CM 2.12**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.01 |
| Pavement | 0.85 | 0.28 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.29 |

**Weighted C Value = 0.83**

**CM 2.14**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.00 |
| Pavement | 0.85 | 0.36 |
| Roof | 0.90 | 0.06 |
| | Total Area = | 0.42 |

**Weighted C Value = 0.86**

**CM 2.15**

| 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 2.16**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.00 |
| Pavement | 0.85 | 0.19 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.19 |

**Weighted C Value = 0.85**

**CM 2.17**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.07 |
| Pavement | 0.85 | 0.01 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.08 |

**Weighted C Value = 0.33**

**CM 3.1**

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

**Weighted C Value = 0.85**

# Meijer Franklin

## Weighted C Calculations

12/5/2014
CLH, JRS

**CM 3.2**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.00 |
| Pavement | 0.85 | 0.44 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.44 |

**Weighted C Value = 0.85**

**CM 3.3**

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

**Weighted C Value = 0.85**

**CM 3.4**

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

**Weighted C Value = 0.85**

**CM 3.5**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.06 |
| Pavement | 0.85 | 0.24 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.30 |

**Weighted C Value = 0.73**

**CM 3.6**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.01 |
| Pavement | 0.85 | 0.55 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.56 |

**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 = | 0.72 |

**Weighted C Value = 0.84**

**CM 4.1**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.02 |
| Pavement | 0.85 | 0.24 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.26 |

**Weighted C Value = 0.80**

**CM 4.3**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.02 |
| Pavement | 0.85 | 0.12 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.14 |

**Weighted C Value = 0.76**

**CM 5.1**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.05 |
| Pavement | 0.85 | 0.17 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.22 |

**Weighted C Value = 0.71**

**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 | 0.36 |
| Pavement | 0.85 | 0.33 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.69 |

**Weighted C Value = 0.54**

**CM 5.7**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.22 |
| Pavement | 0.85 | 0.17 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.39 |

**Weighted C Value = 0.51**

**CM 5.8**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.14 |
| Pavement | 0.85 | 0.09 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.23 |

**Weighted C Value = 0.48**

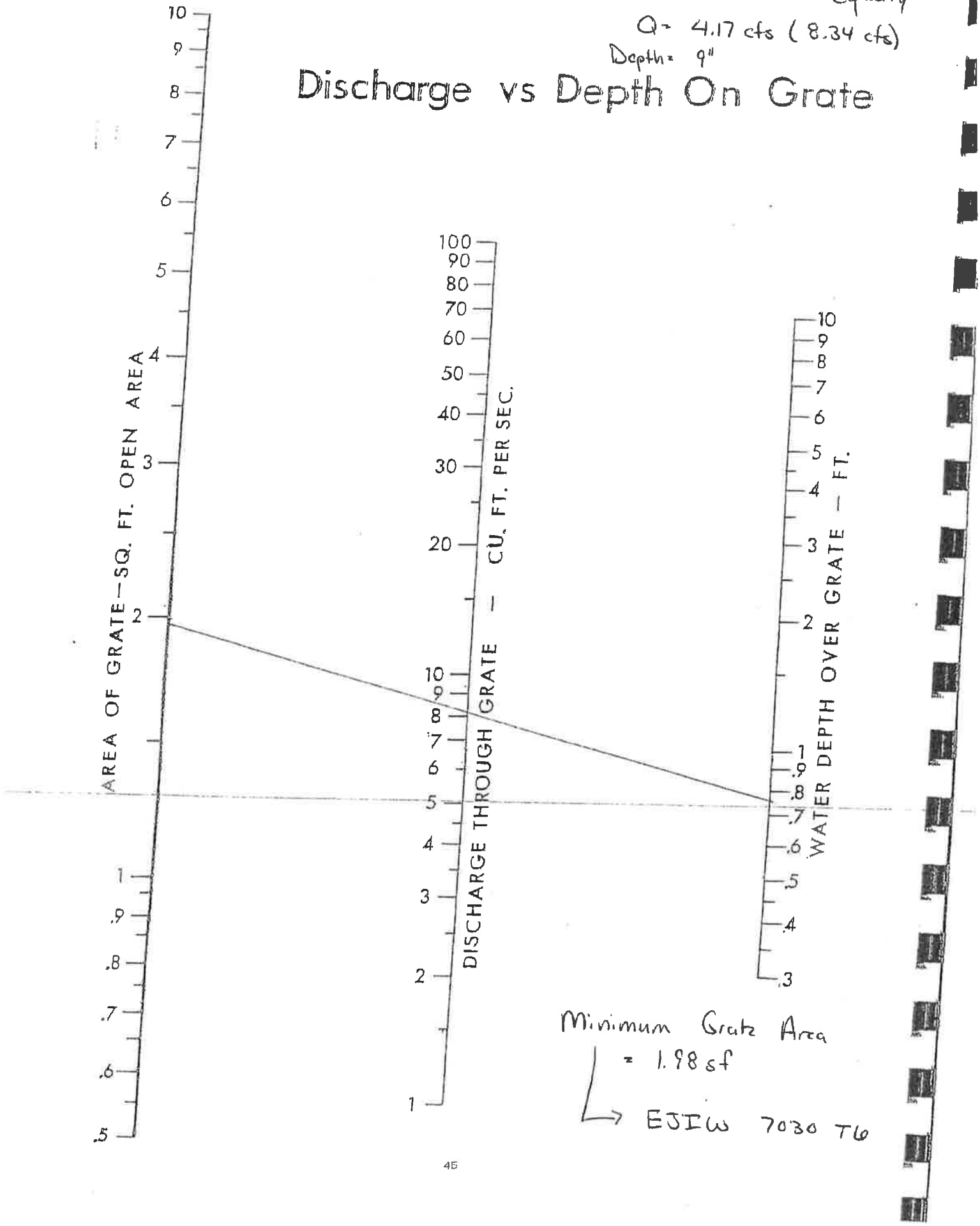
**CM 5.9**

| Cover Type | C Value | Area (ac.) |
|---|---|---|
| Grass | 0.25 | 0.23 |
| Pavement | 0.85 | 0.21 |
| Roof | 0.90 | 0.00 |
| | Total Area = | 0.44 |

**Weighted C Value = 0.54**

Inlet 2.1 10-Year Capacity
Q = 4.17 cfs (8.34 cfs)
Depth = 9"

# Discharge vs Depth On Grate

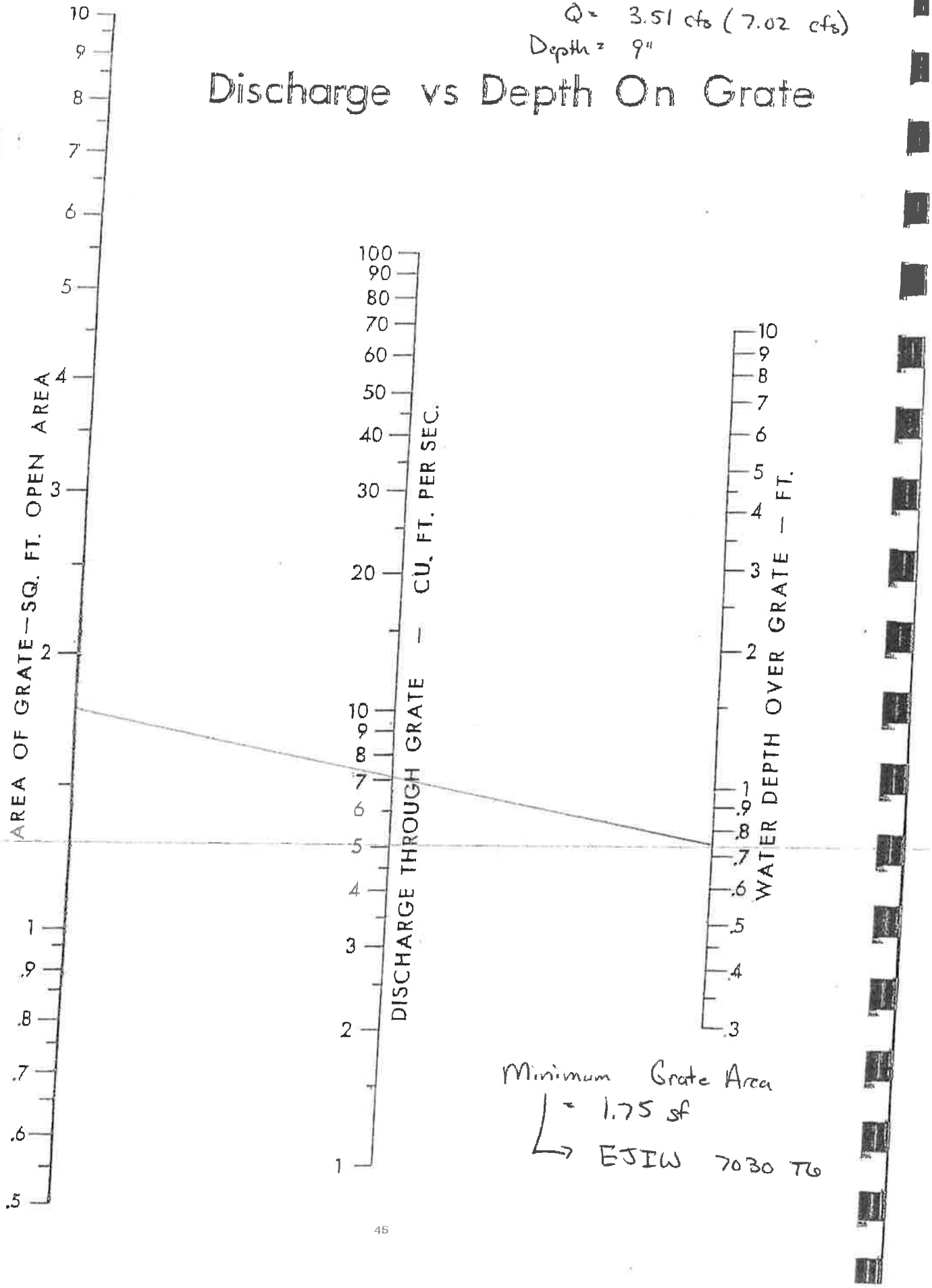



Minimum Grate Area
= 1.98 sf

→ EJIW 7030 T6

Inlet 2.2 10-Year Capacity
Q = 3.51 cfs (7.02 cfs)
Depth = 9"

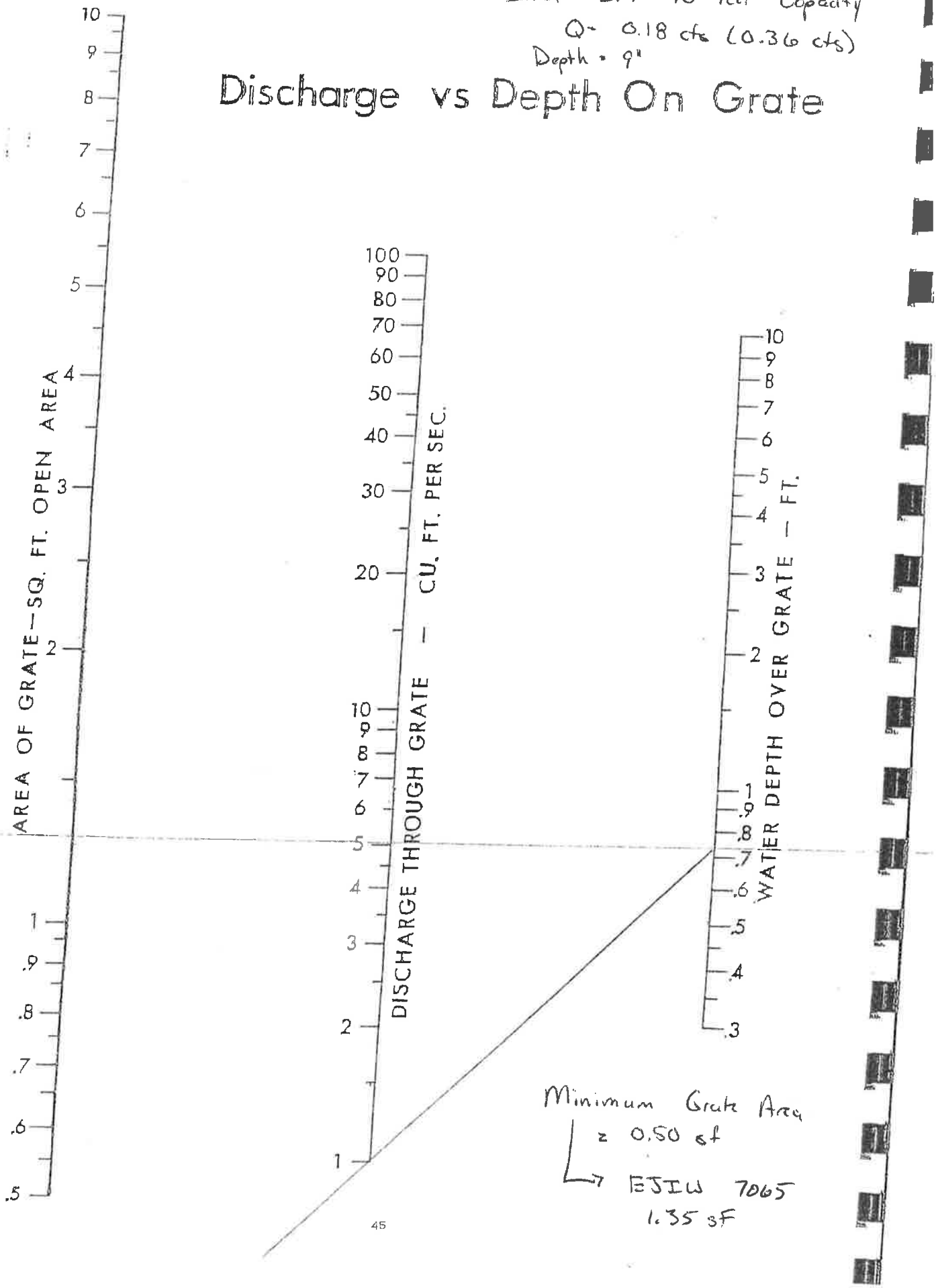
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.75 sf
→ EJIW 7030 T6

Inlet 2.4 10-Year Capacity
Q = 0.18 cfs (0.36 cfs)
Depth = 9"

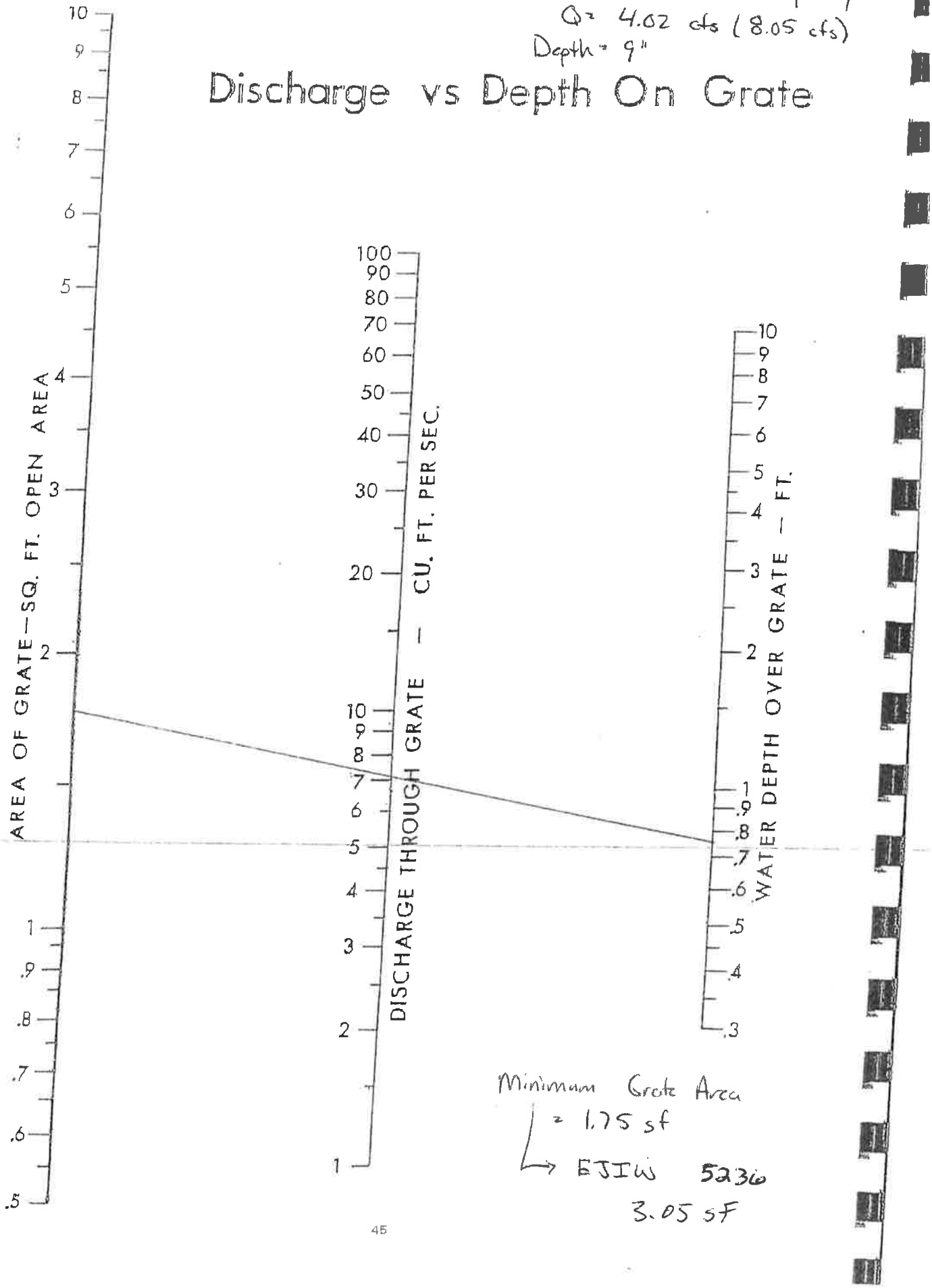
# Discharge vs Depth On Grate




Minimum Grate Area
≈ 0.50 sf
→ EJIW 7065
1.35 sf

Inlet 2.5 10-Year Capacity
Q = 4.02 cfs (8.05 cfs)
Depth = 9"

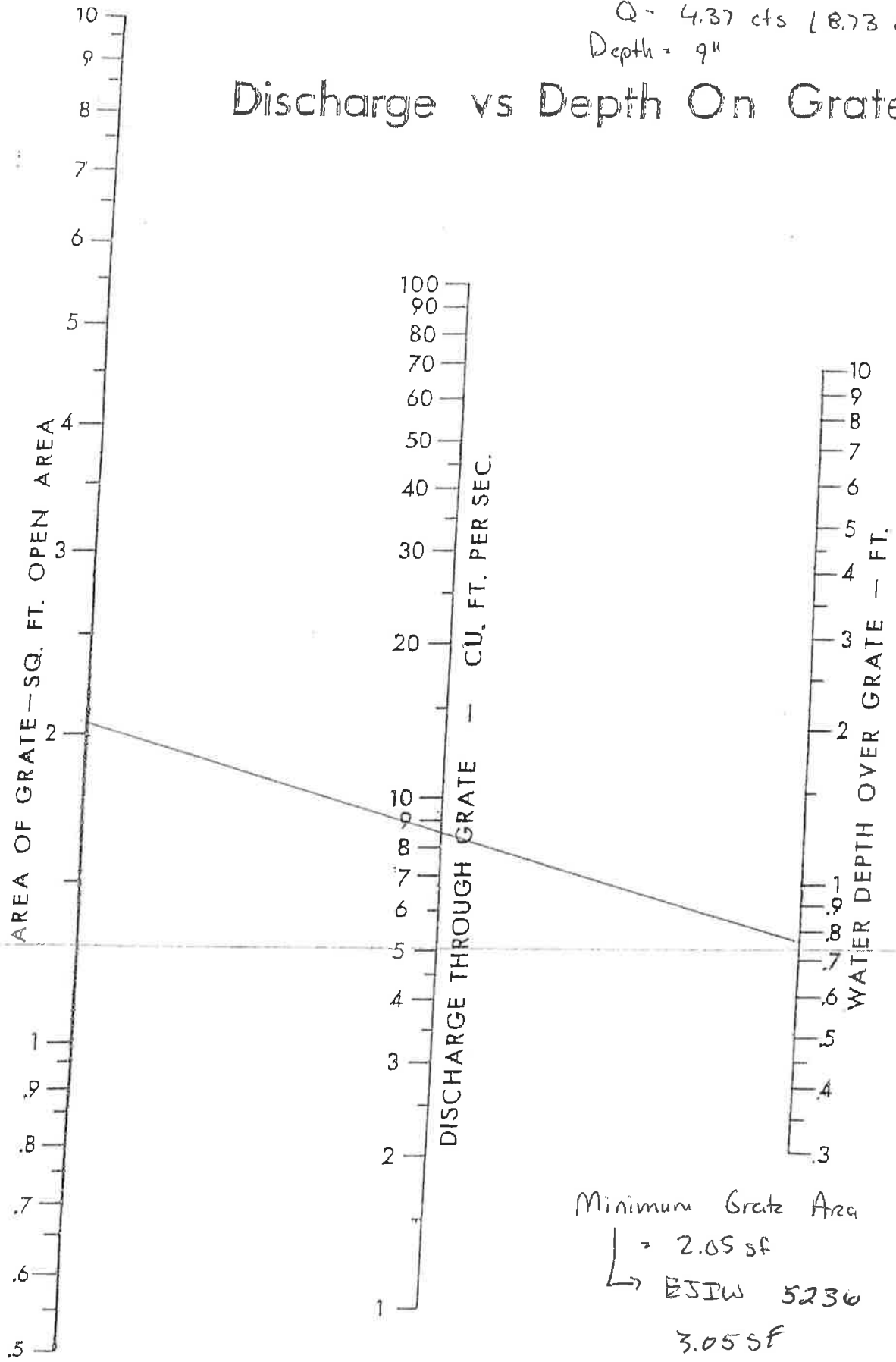
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.75 sf
→ EJIW 5236
3.05 sf

Inlet 2.6 10-Year Capacity
Q = 4.37 cfs (8.73 cfs)
Depth = 9"

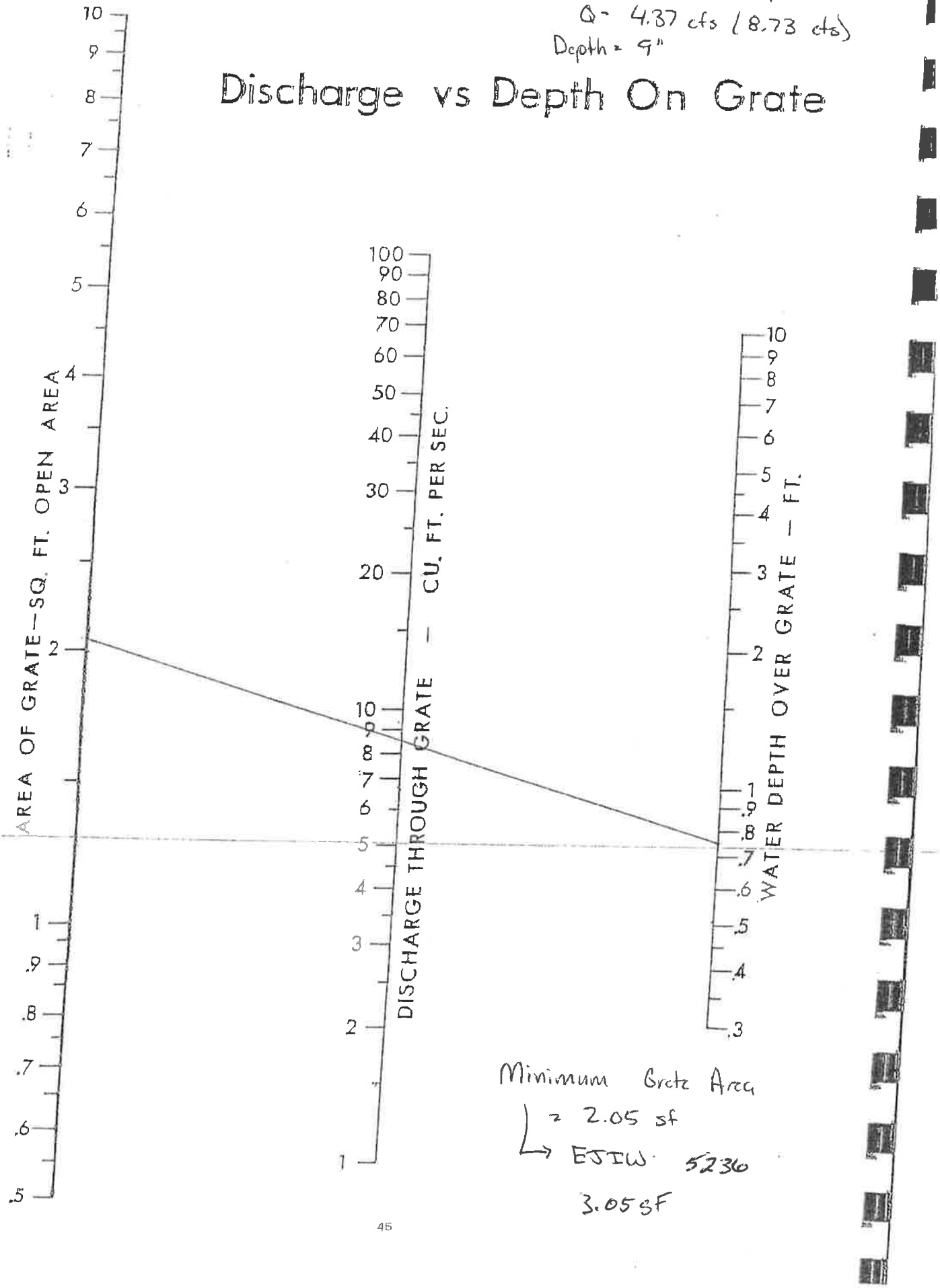
# Discharge vs Depth On Grate




Minimum Grate Area
= 2.05 sf
→ EJIW 5230
3.05 sf

Inlet 2.7 10-Year Capacity
Q = 4.37 cfs (8.73 cfs)
Depth = 9"

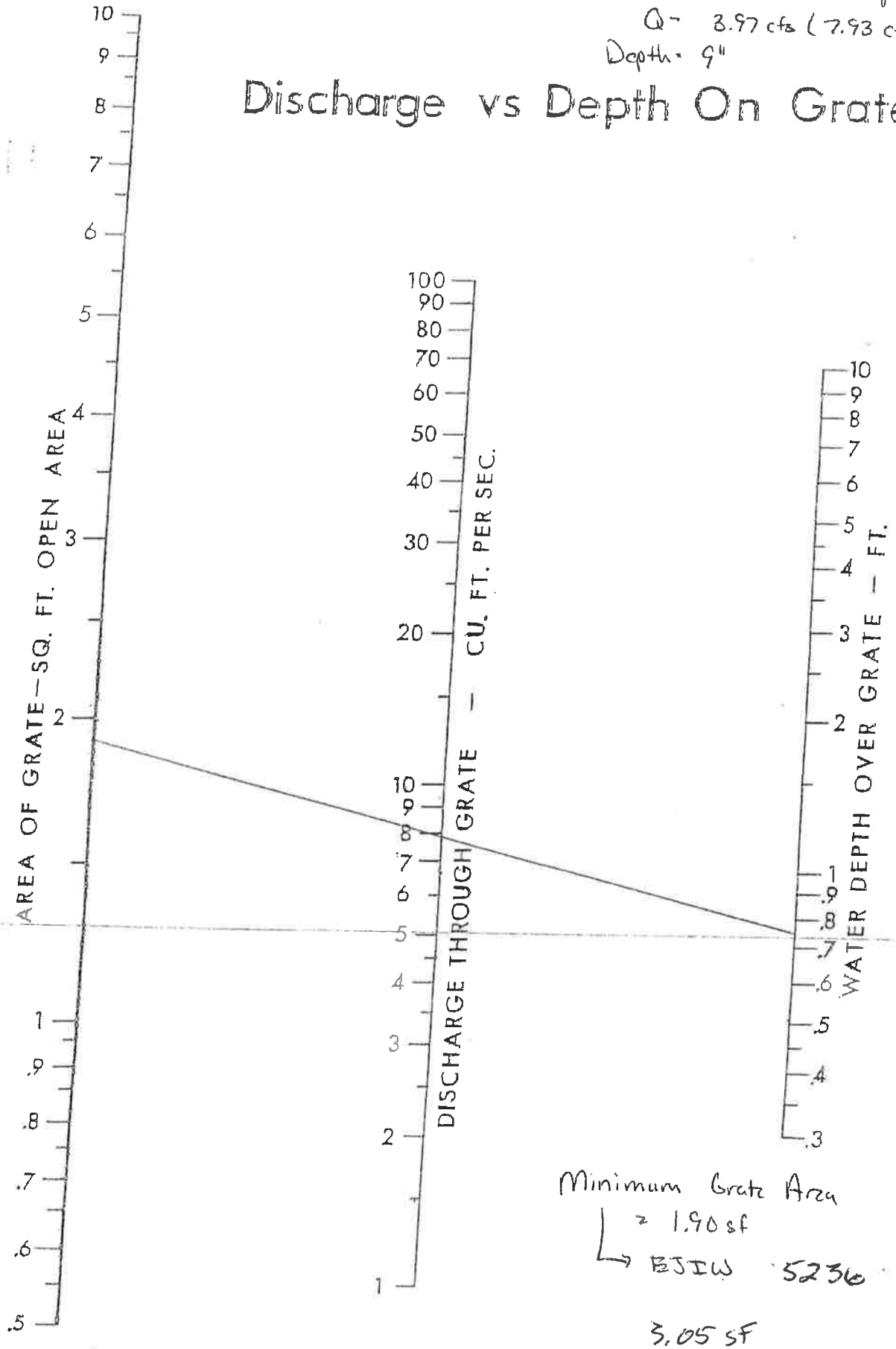
# Discharge vs Depth On Grate




Minimum Grate Area
= 2.05 sf
→ EJIW 5230
3.05 sf

Inlet 2.8 10-Year Capacity
Q- 3.97 cfs (7.93 cfs)
Depth- 9"

# Discharge vs Depth On Grate

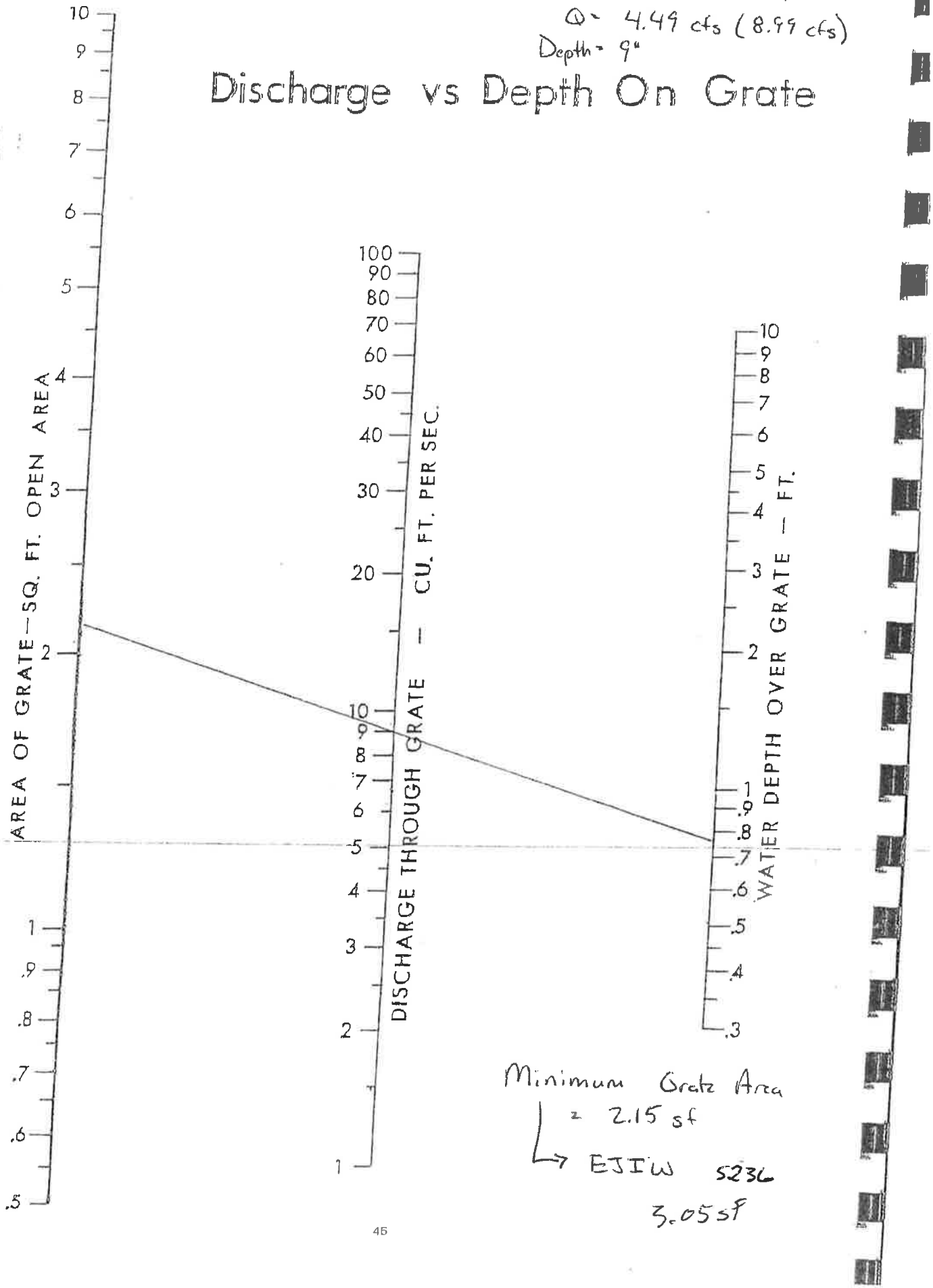



Minimum Grate Area
= 1.90 sf
→ BJIW 5236

3.05 sf

Inlet 2.9 10-Year Capacity
Q = 4.49 cfs (8.99 cfs)
Depth = 9"

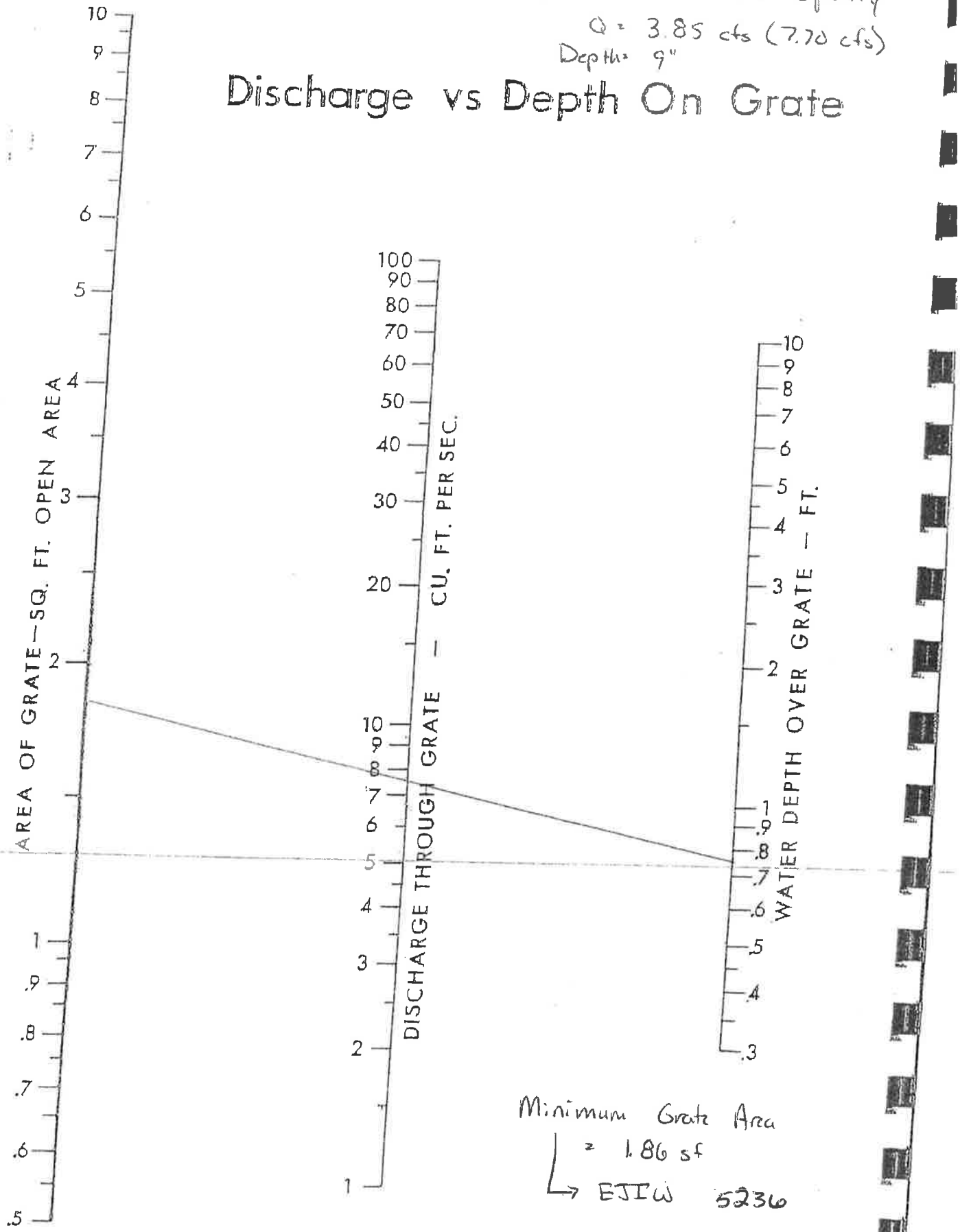
# Discharge vs Depth On Grate




Minimum Grate Area
= 2.15 sf
→ EJIW 5236
3.05 sf

Inlet 2.10 10-Year Capacity
Q = 3.85 cfs (7.70 cfs)
Depth = 9"

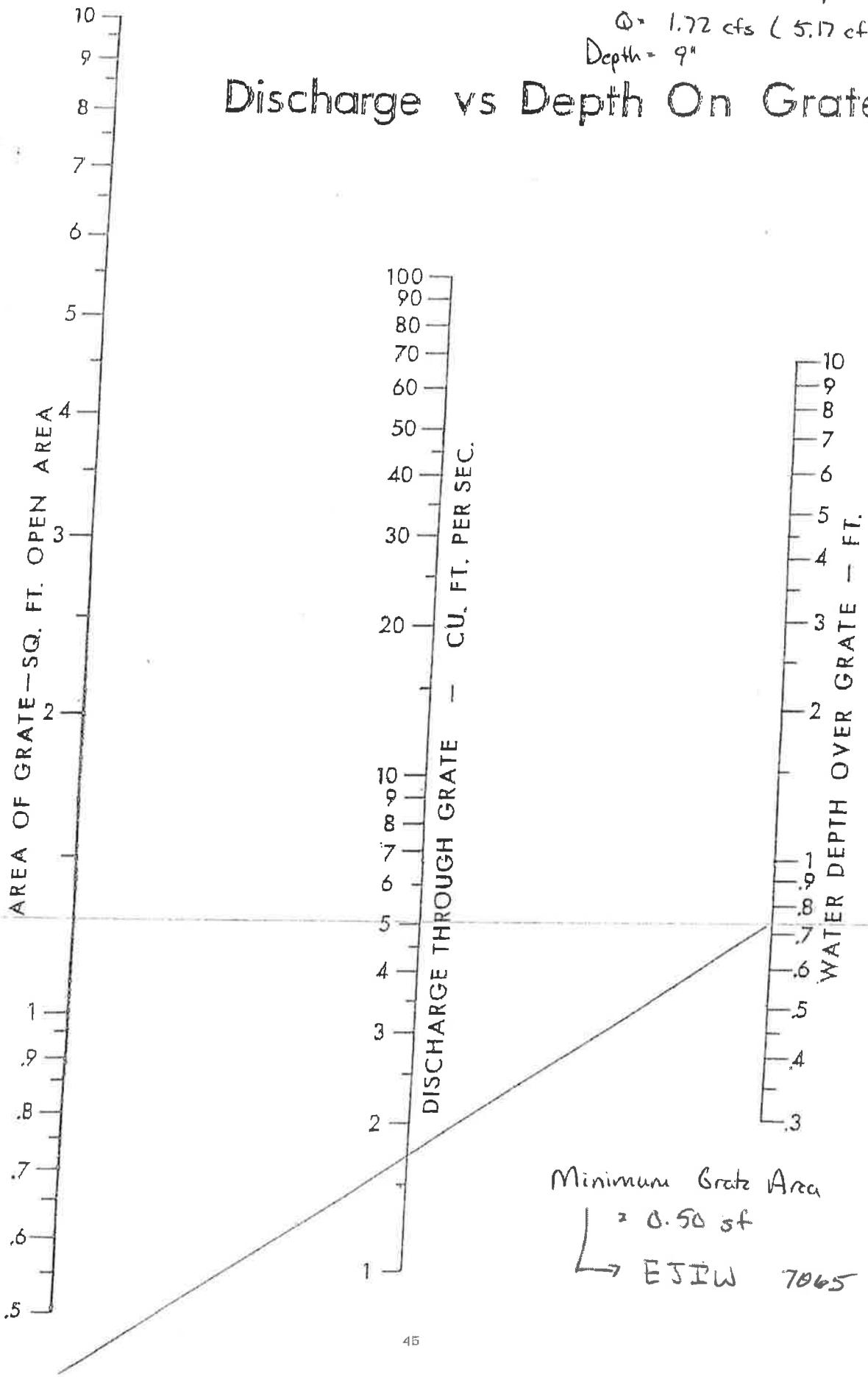
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.86 sf
→ EJIW 5236
3.05 sf

Inlet 2.11 10-Year Capacity
Q = 1.72 cfs ( 5.17 cfs)
Depth = 9"

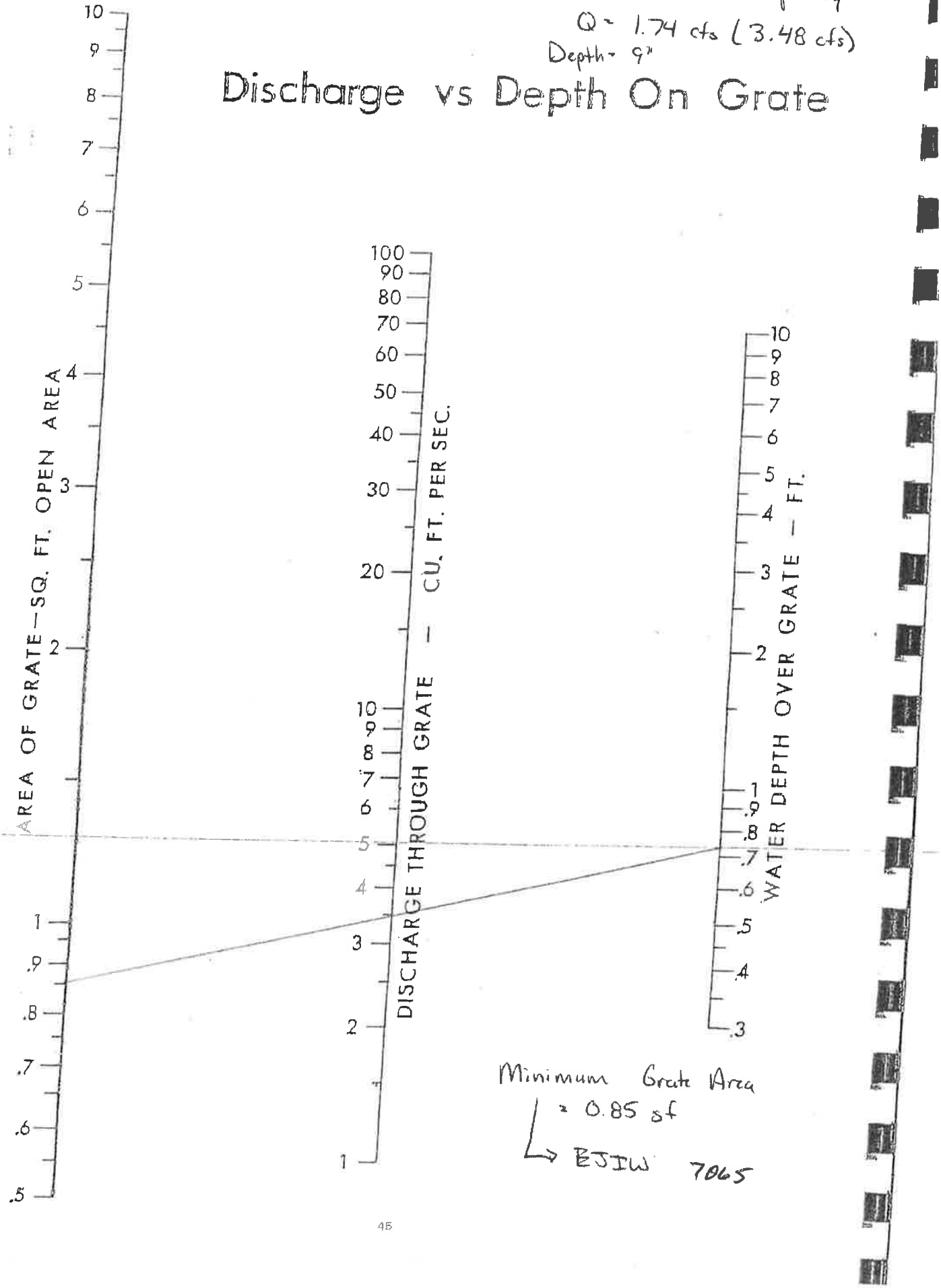
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.50 sf
→ EJIW 7065

Inlet 2.12 10-Year Capacity
Q = 1.74 cfs (3.48 cfs)
Depth = 9"

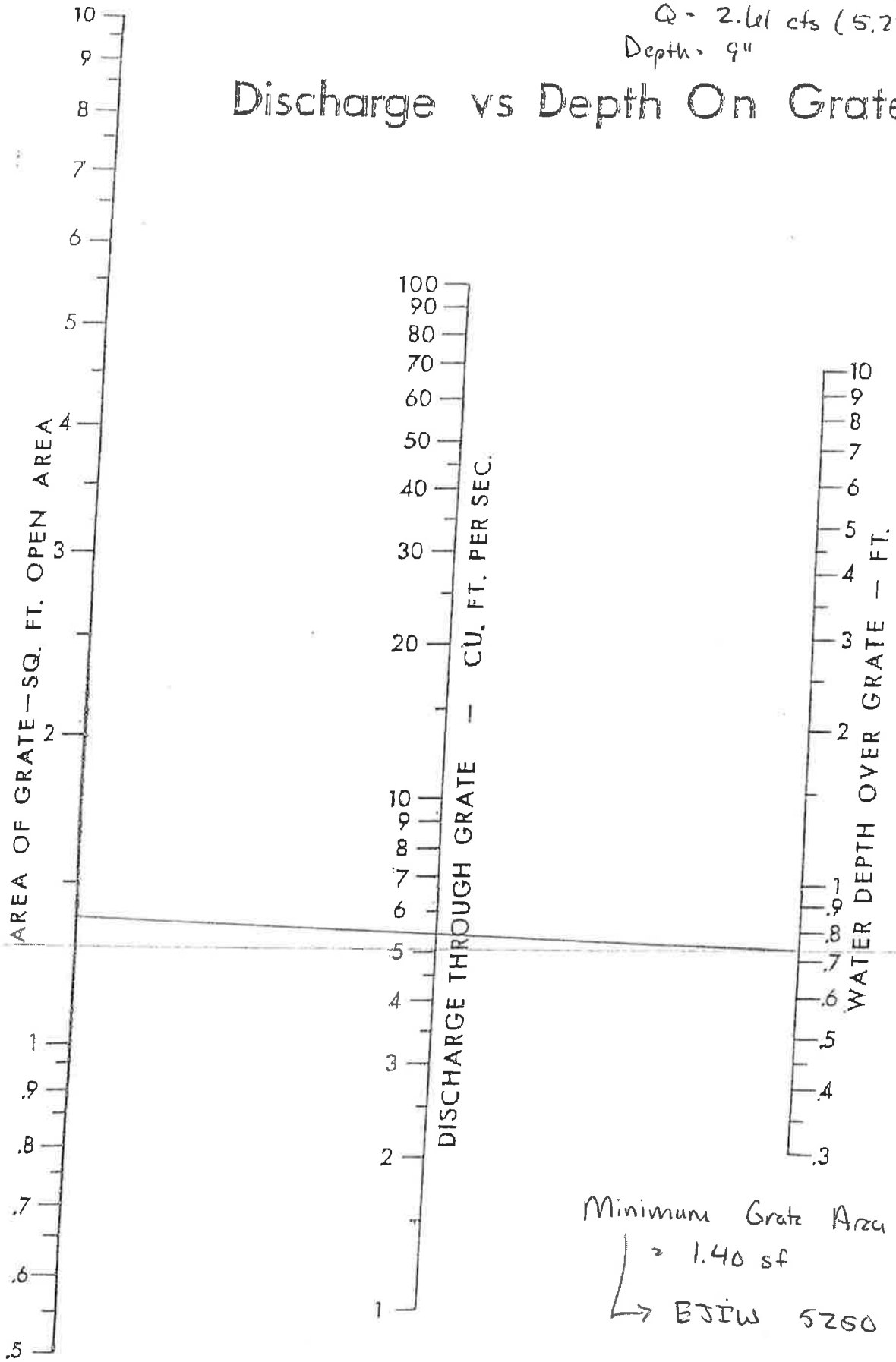
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.85 sf
→ BJIW 7065

Inlet 2.14 10-Year Capacity
Q = 2.61 cfs (5.22 cfs)
Depth = 9"

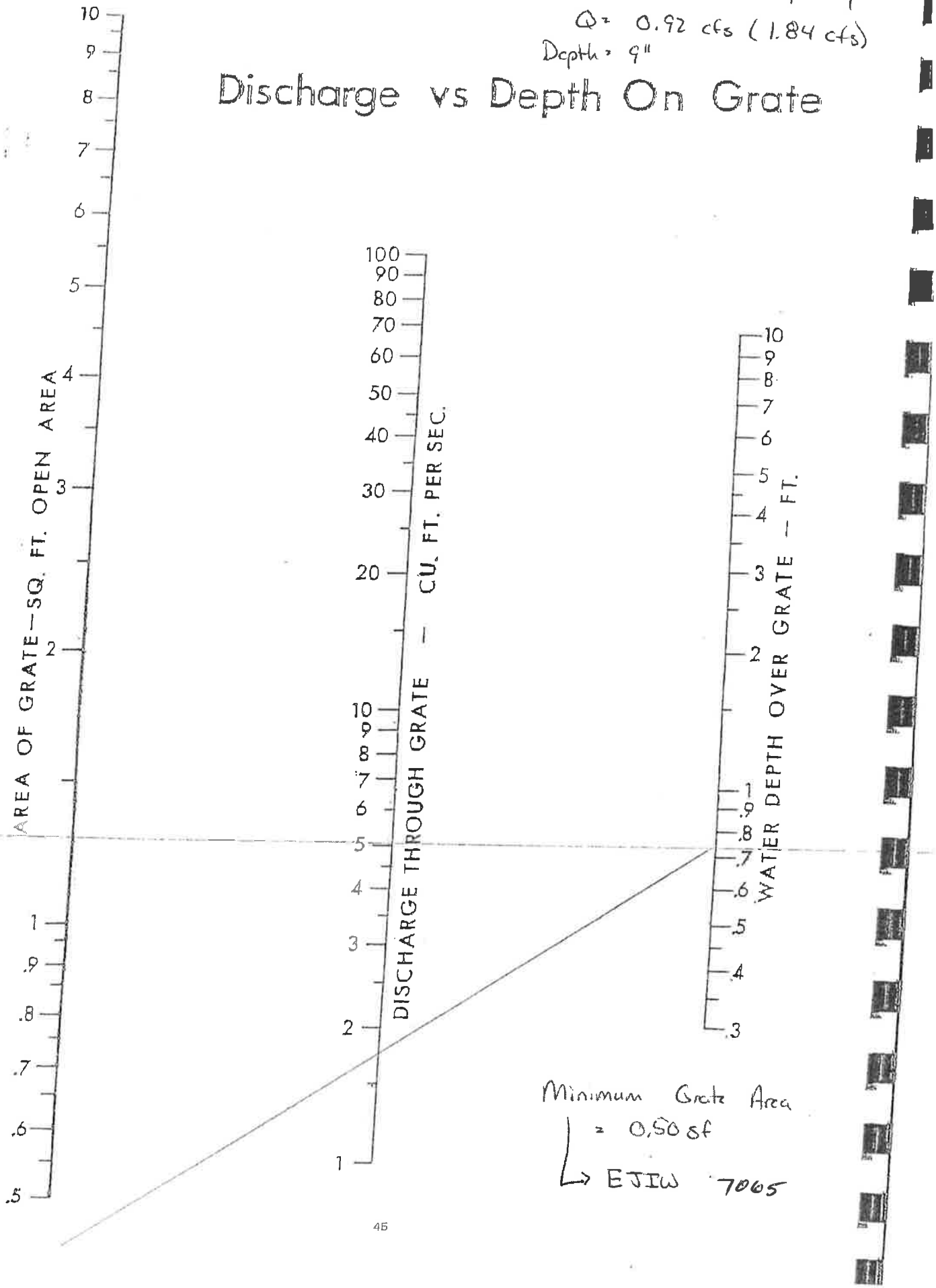
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.40 sf
→ EJIW 5260

Inlet 2.15 10-Year Capacity
Q = 0.92 cfs (1.84 cfs)
Depth = 9"

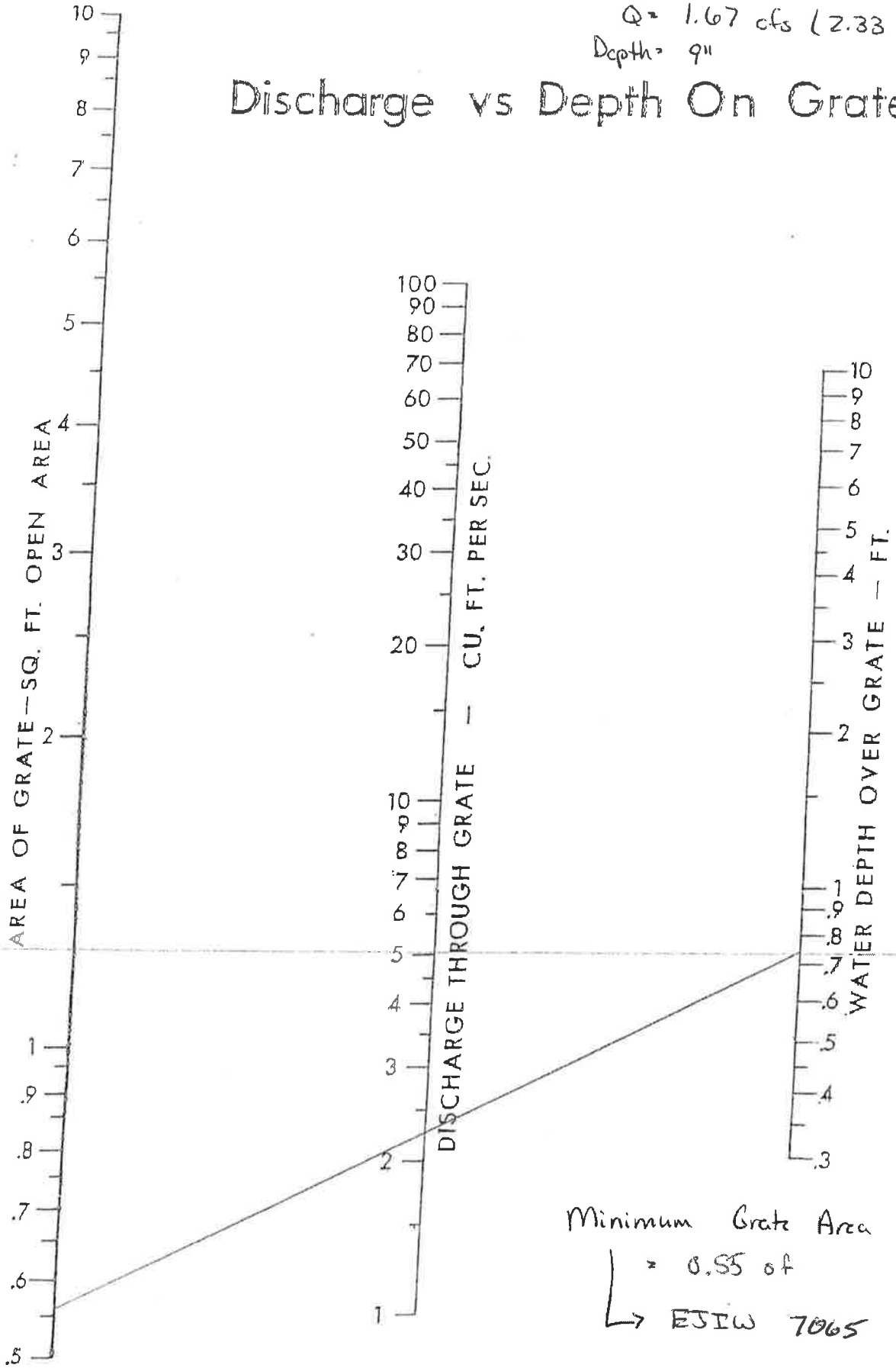
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.50 sf
→ EJIW 7065

Inlet 2.16 10-Year Capacity
Q = 1.67 cfs (2.33 cfs)
Depth = 9"

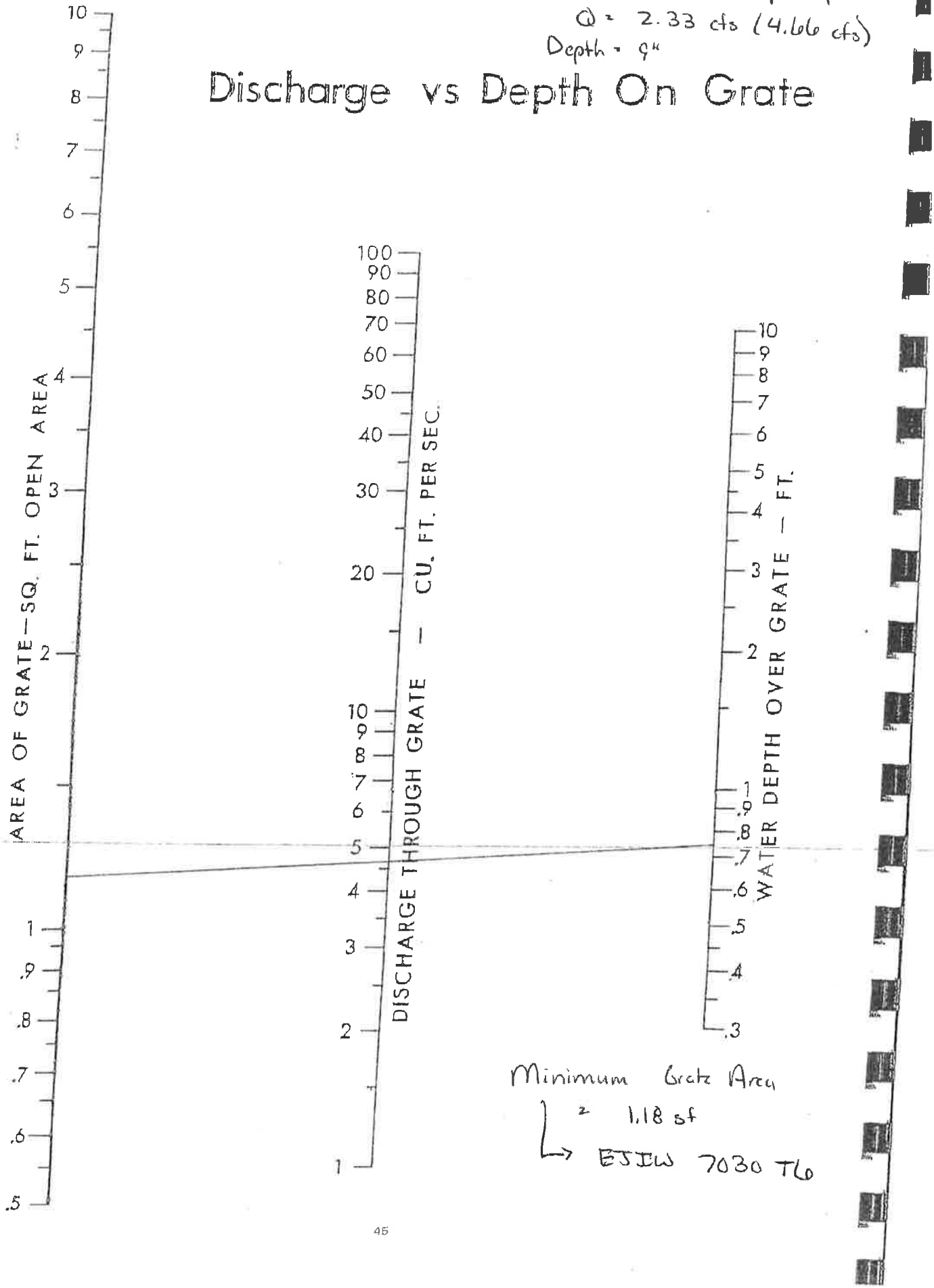
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.55 of
→ EJIW 7065

Inlet 3.1 10-Year Capacity
Q = 2.33 cfs (4.66 cfs)
Depth = 9"

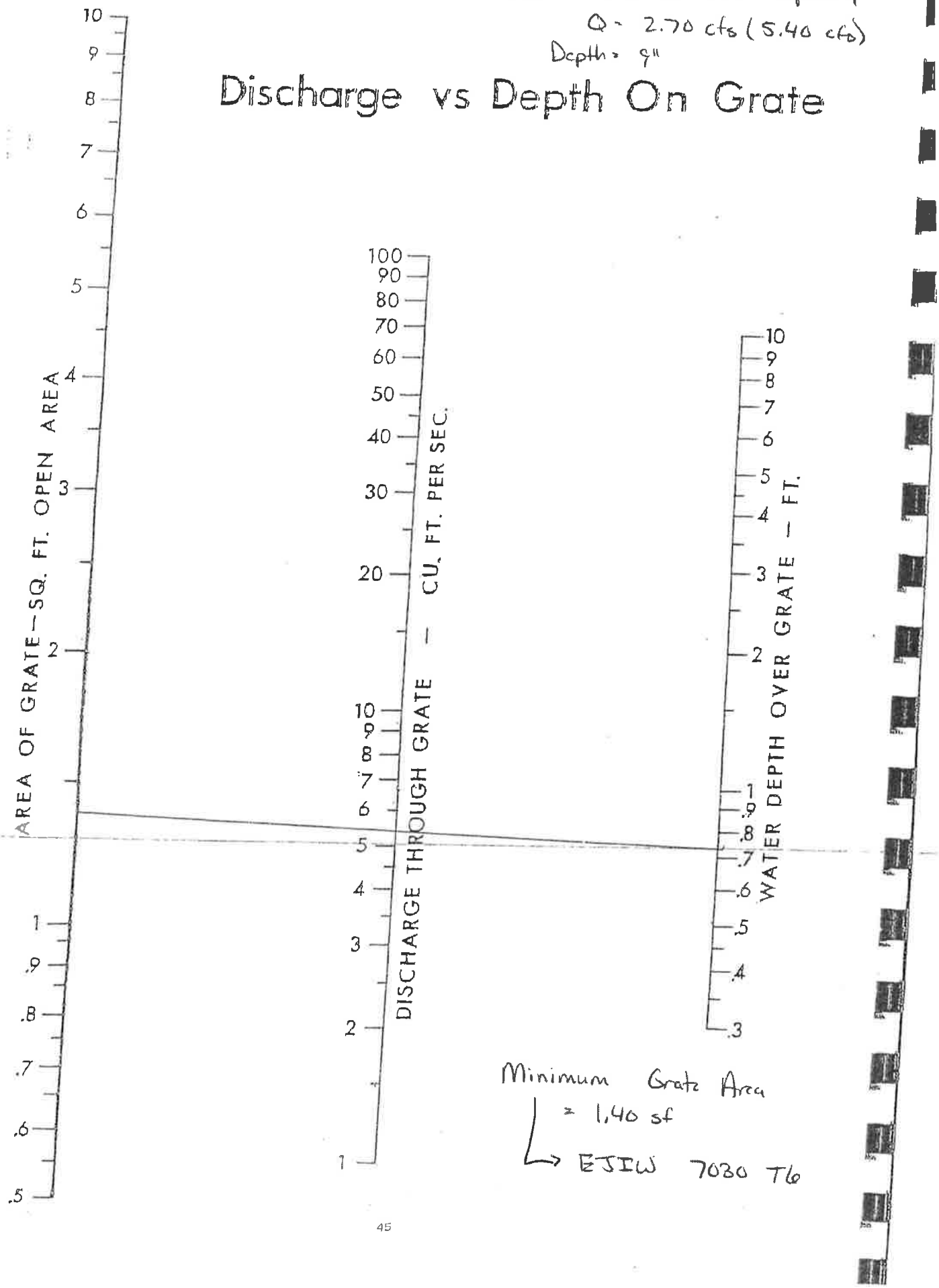
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.18 sf
→ EJIW 7030 T6

Inlet 3.2 10-Year Capacity
Q = 2.70 cfs (5.40 cfs)
Depth = 9"

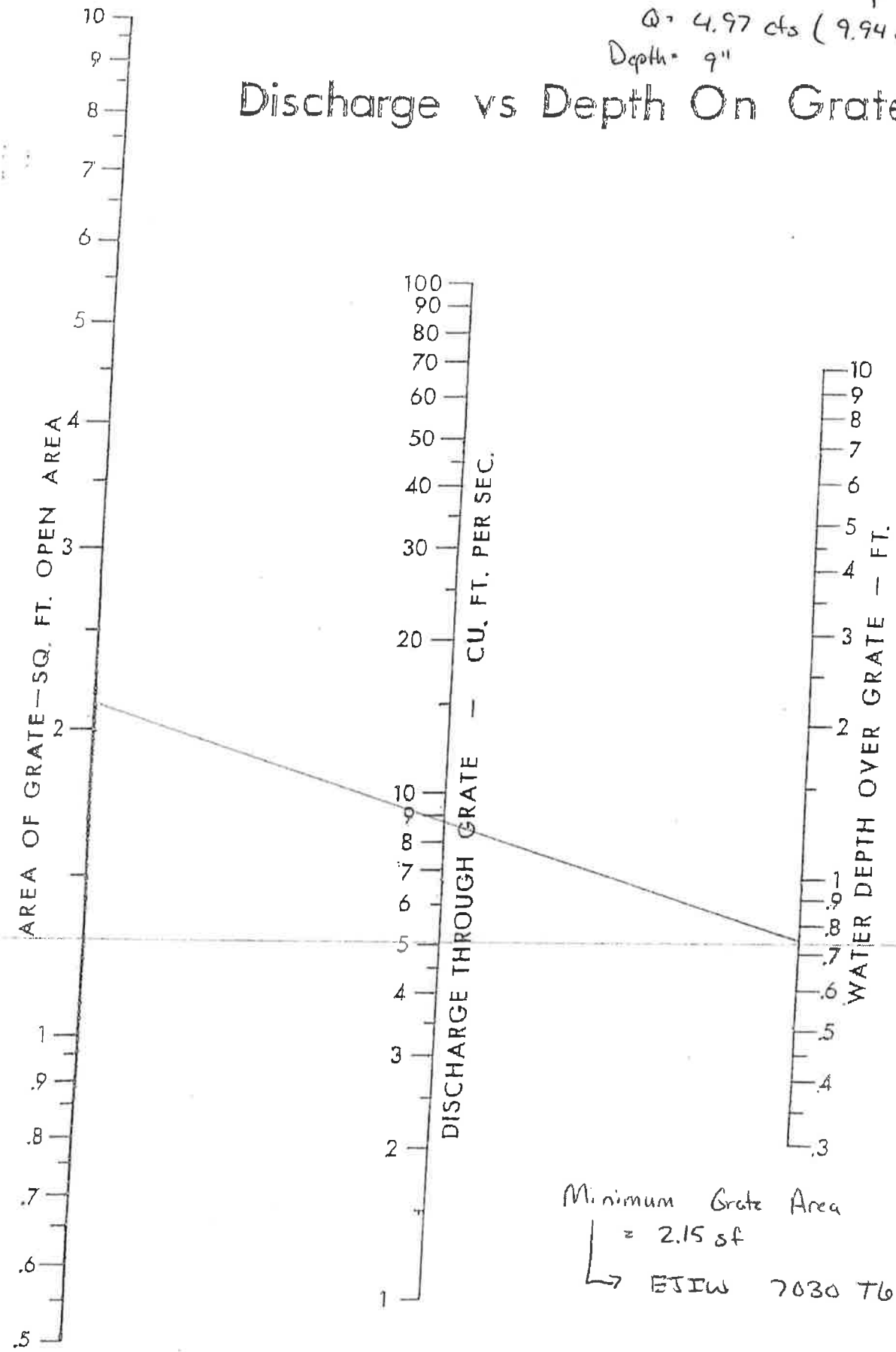
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.40 sf
→ EJIW 7030 T6

Inlet 3.3 10-Year Capacity
Q = 4.97 cfs (9.94 cfs)
Depth = 9"

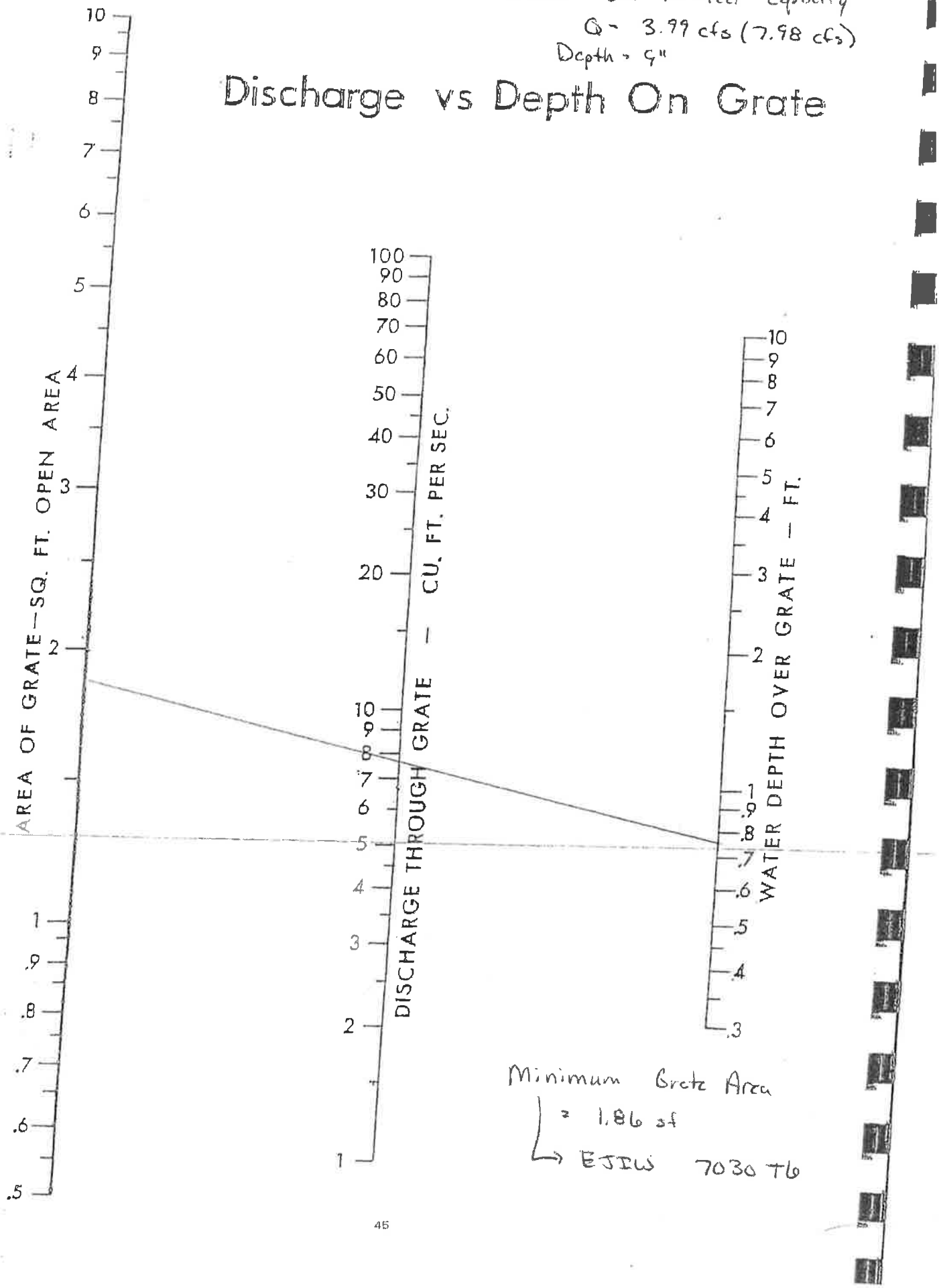
# Discharge vs Depth On Grate




Minimum Grate Area
= 2.15 sf
→ EJIW 7030 T6

Inlet 3.4 10-Year Capacity
Q = 3.99 cfs (7.98 cfs)
Depth = 9"

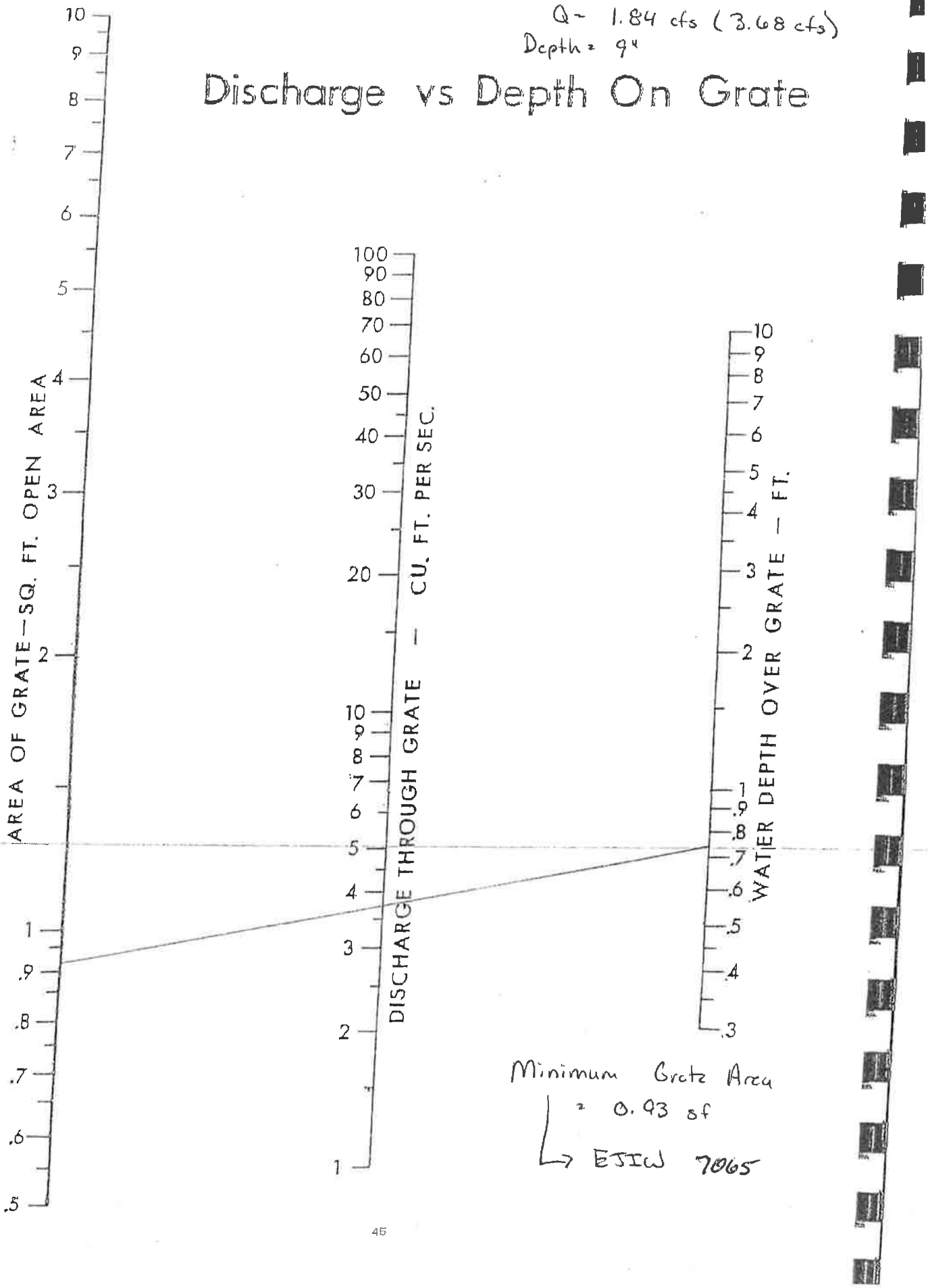
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.86 sf
→ EJIW 7030 T6

Inlet 3.5 10-Year Capacity
Q- 1.84 cfs (3.68 cfs)
Depth = 9"

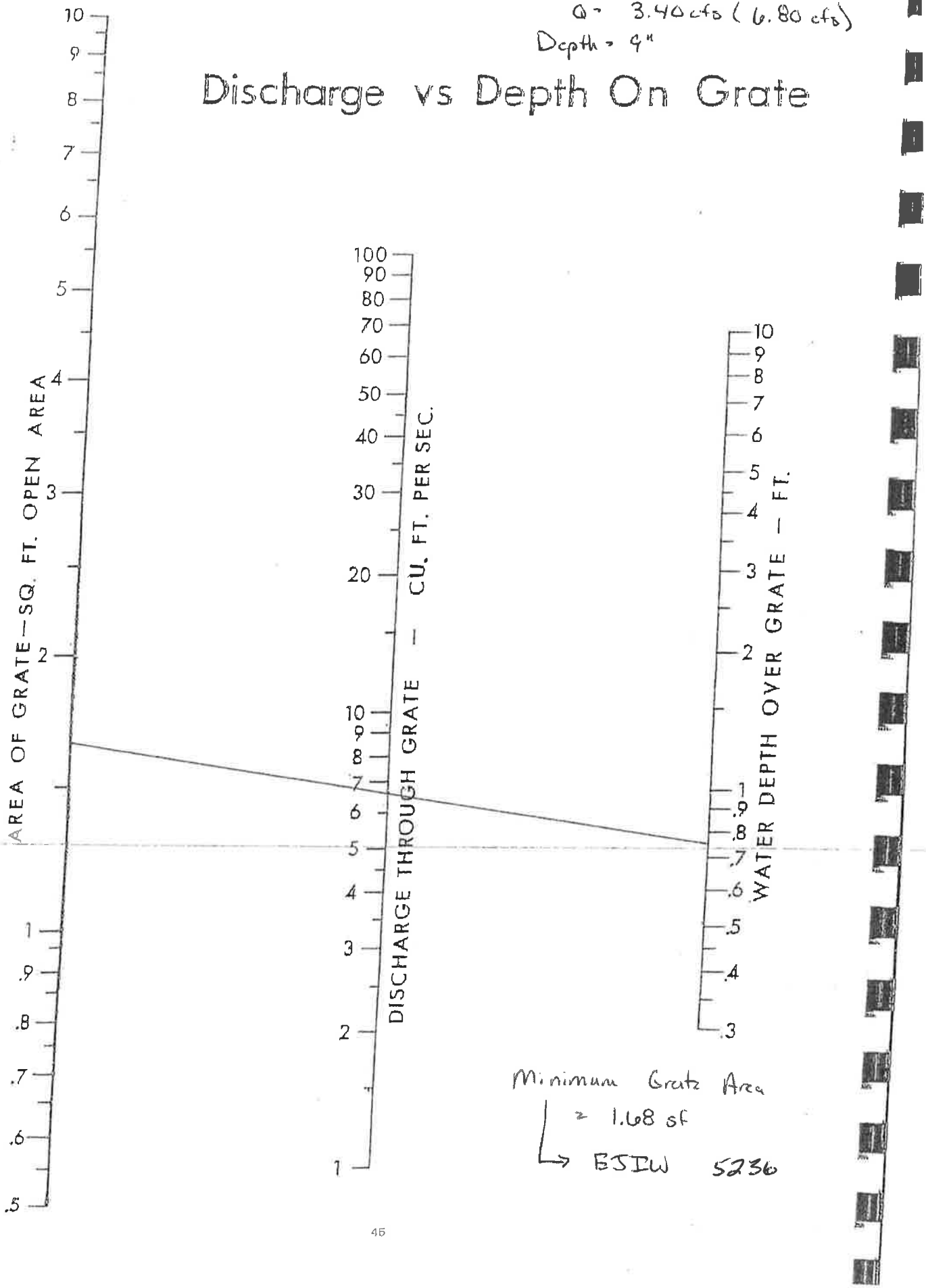
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.93 sf
→ EJIW 7065

Inlet 3.6 10-Year Capacity
Q = 3.40 cfs (6.80 cfs)
Depth = 4"

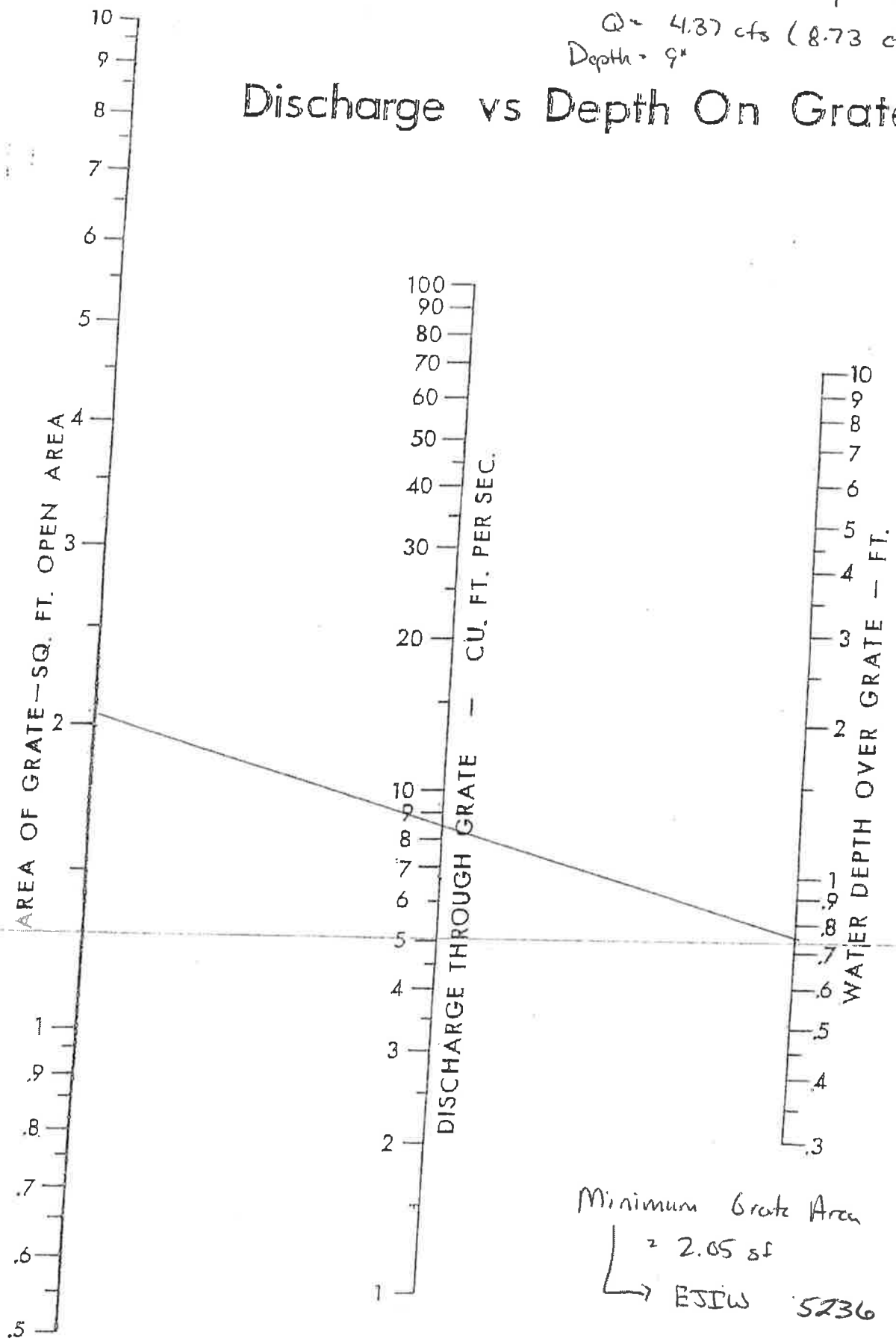
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.68 sf
→ EJIW 5236

Inlet 3.7 10-Year Capacity
Q = 4.37 cfs (8.73 cfs)
Depth = 9"

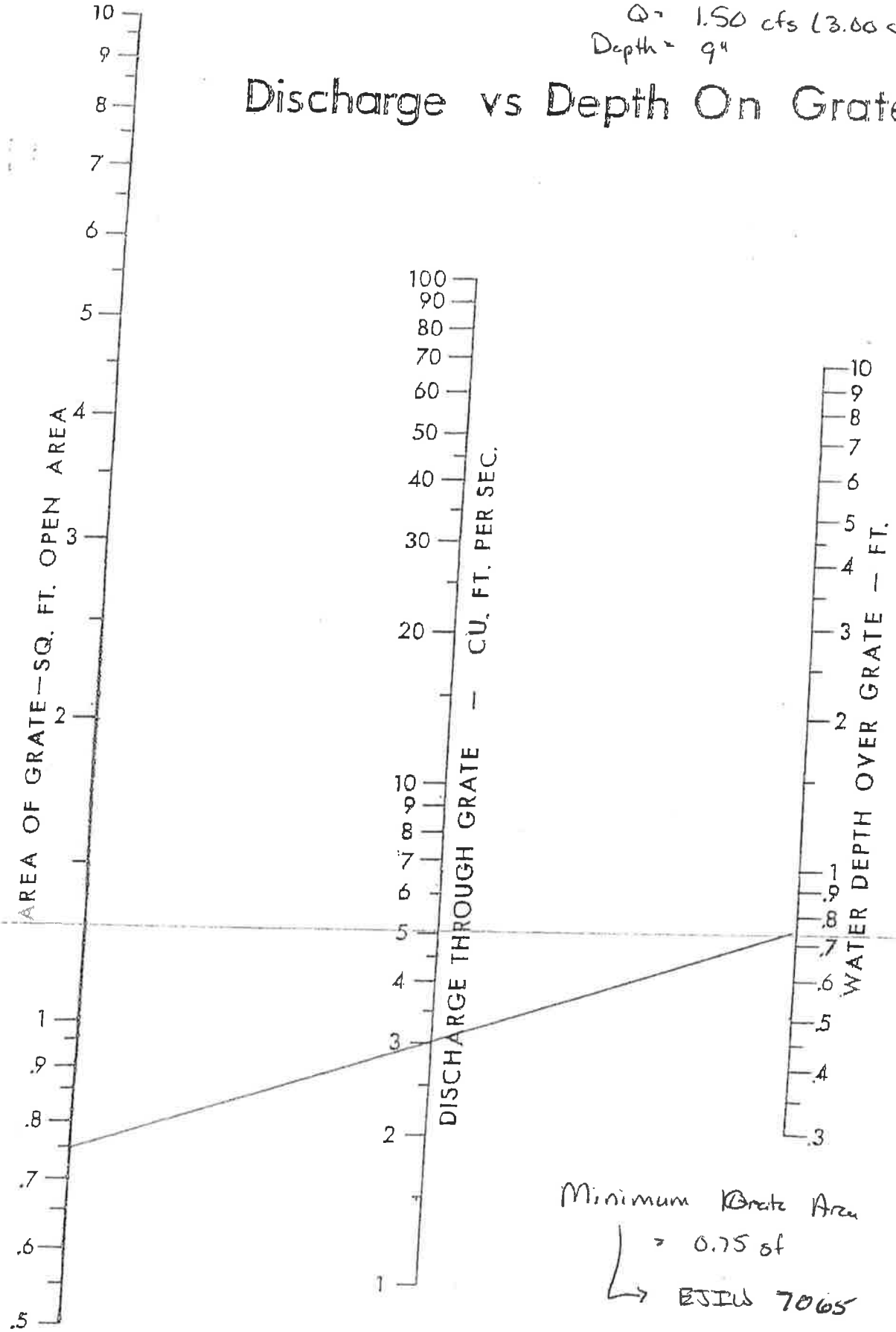
# Discharge vs Depth On Grate




Minimum Grate Area
= 2.05 sf
→ ESIW 5236

Inlet 4.1 10-Year Capacity
Q = 1.50 cfs (3.00 cfs)
Depth = 9"

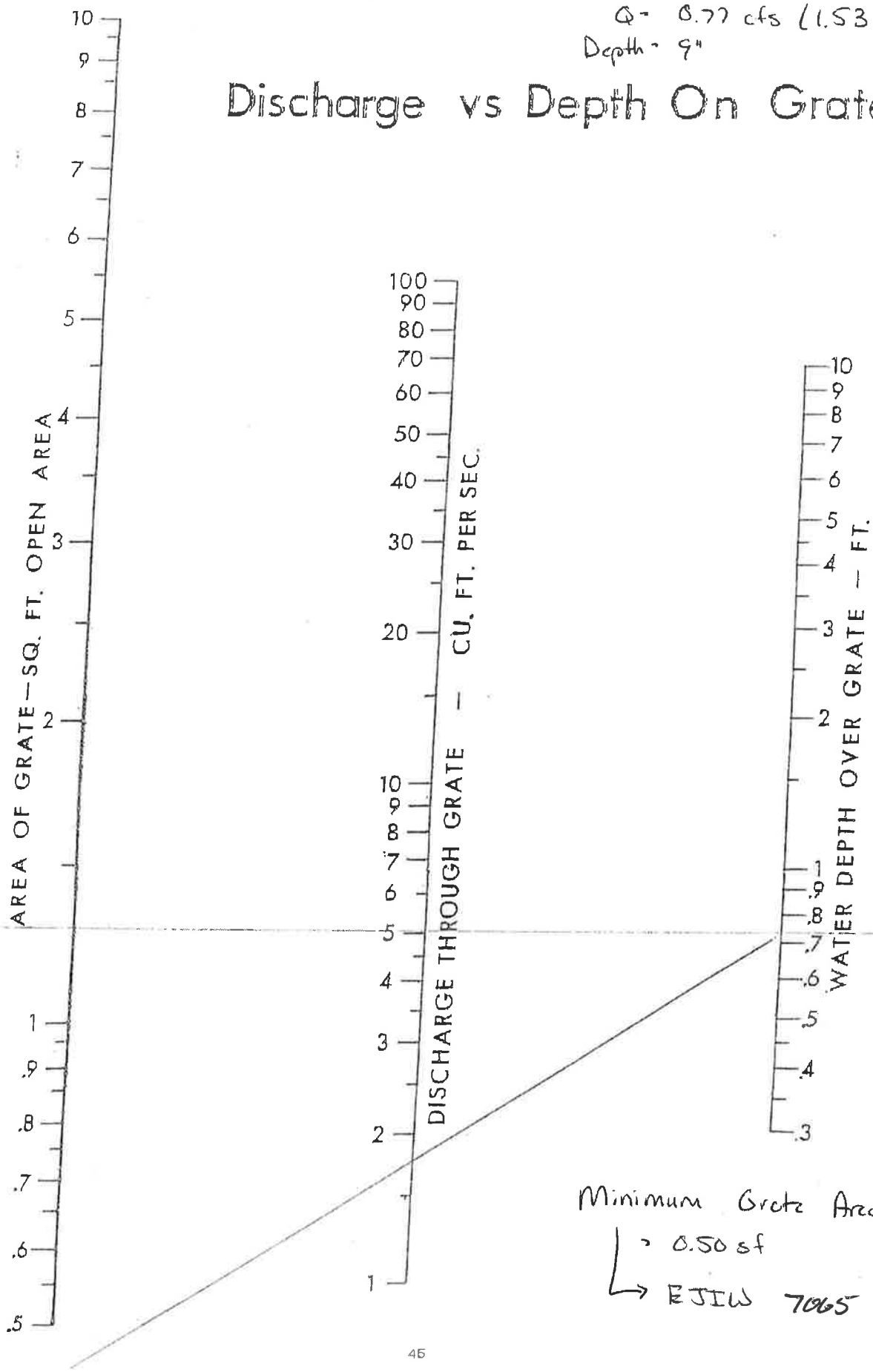
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.75 sf
→ EJIW 7065

Inlet 4.3 10-Year Capacity
Q = 0.77 cfs (1.53 cfs)
Depth = 9"

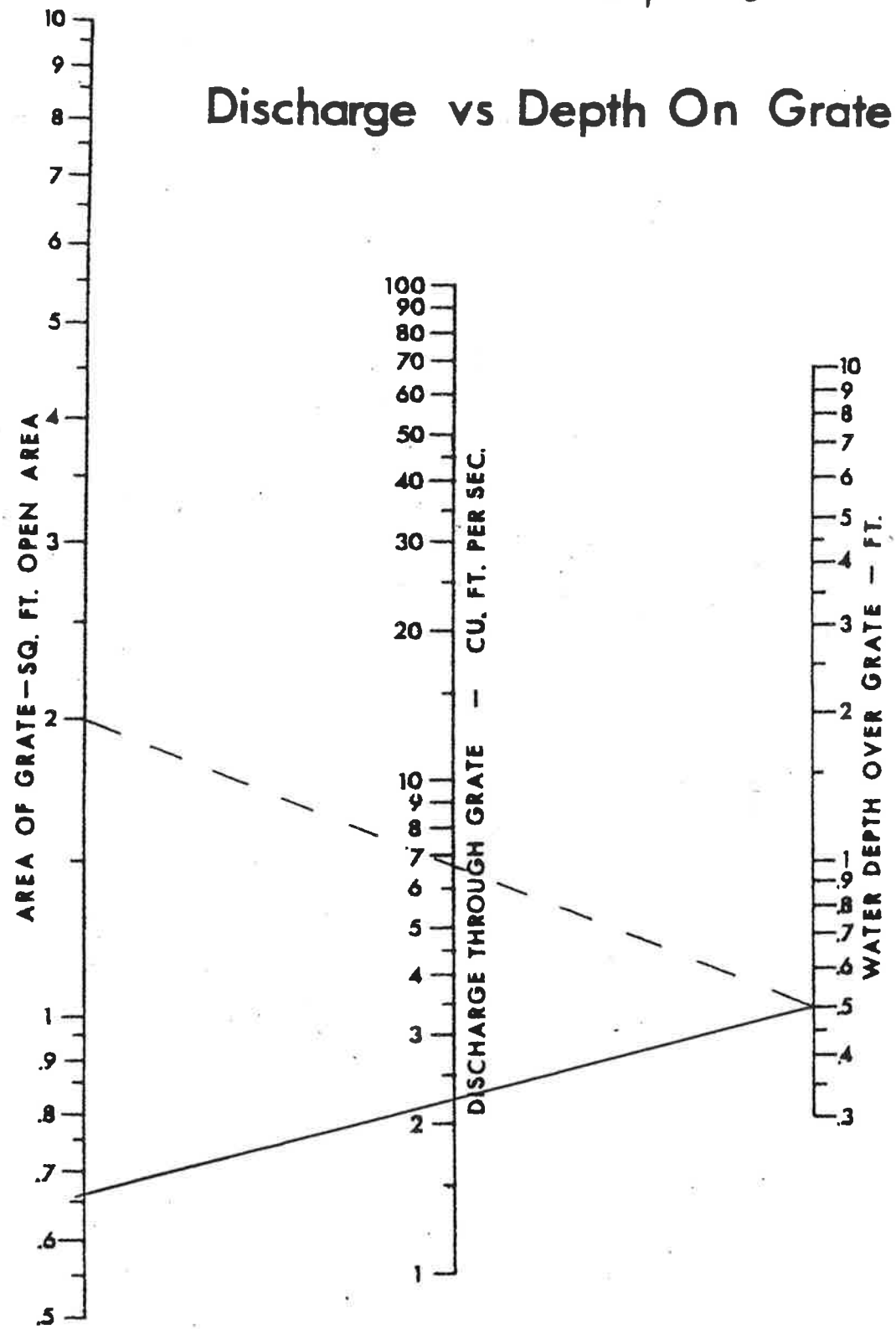
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.50 sf
→ EJIW 7065

Inlet 5.1 10-Year Capacity
Q = 1.13 cfs (2.26 cfs)
Depth = 6"

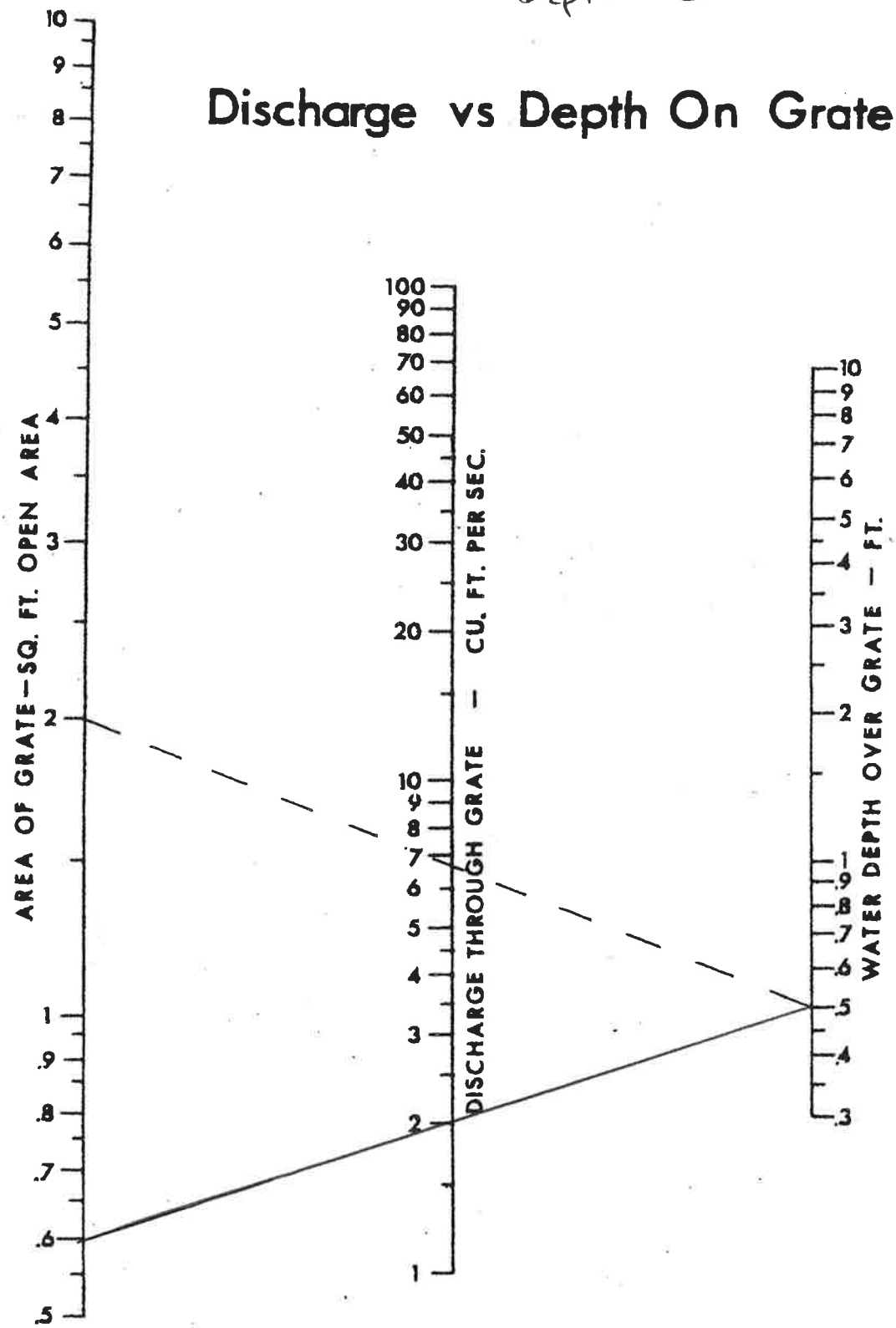
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.66 sf
↳ ESIW 7030

Inlet 52 10-year Capacity
Q= 1.00 cfs (2.00 cfs)
Depth = 6"

# Discharge vs Depth On Grate

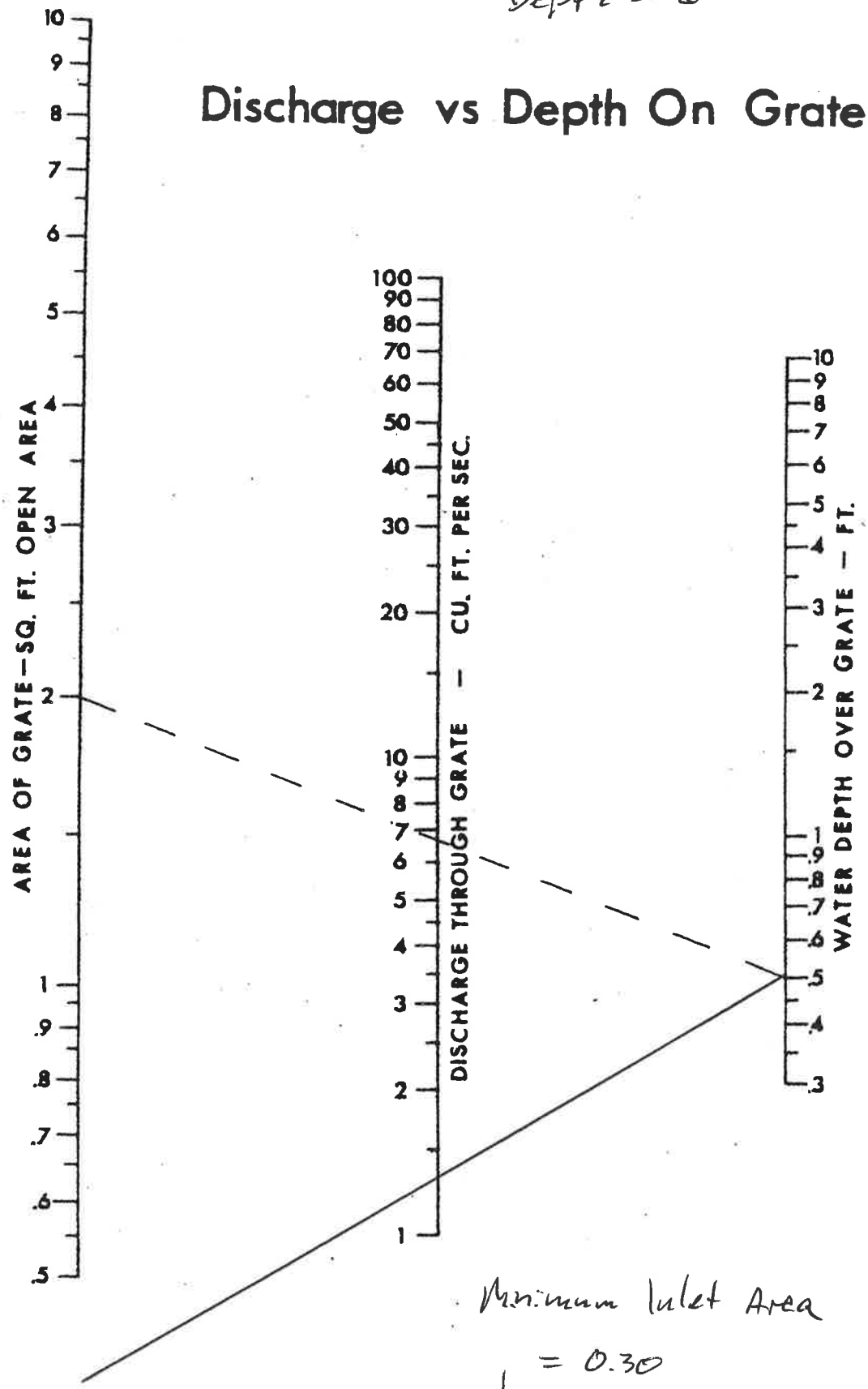



Minimum Grate Area
= 0.60 SF

→ ESIW 7030

Inlet 55 10-Year Capacity
Q = 0.61 cfs (1.22 cfs)
Depth = 6"

# Discharge vs Depth On Grate

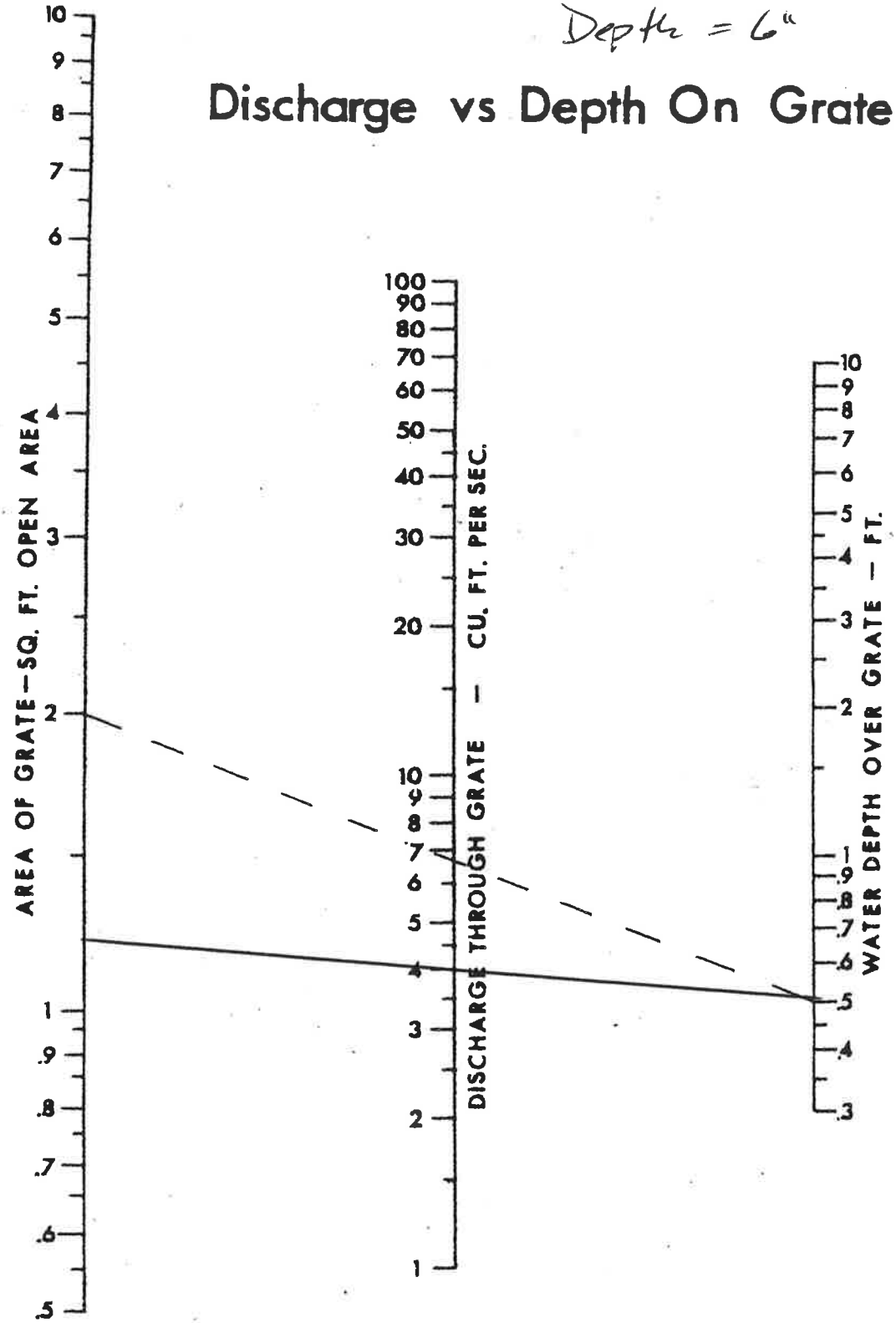



Minimum Inlet Area
= 0.30

→ EJIW 7030

Inlet 5.6 10 Year Capacity
Q = 1.96 cfs (3.92 cfs)
Depth = 6"

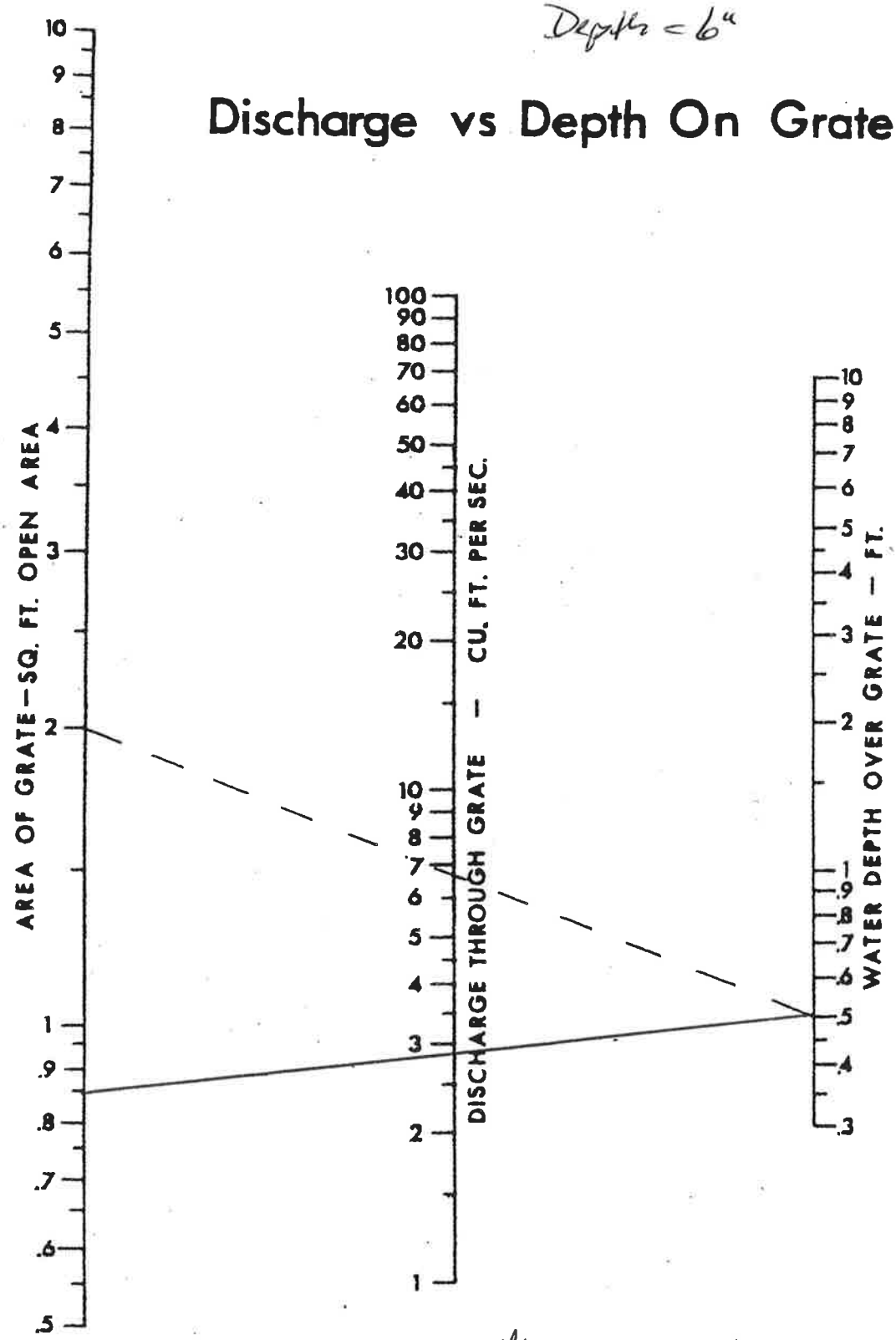
# Discharge vs Depth On Grate




Minimum Grate Area
= 1.25 sf.
↳ EJIW 7030

Inlet 5.7 10-year Capacity
Q = 1.43 cfs (2.86 cfs)
Depth = 6"

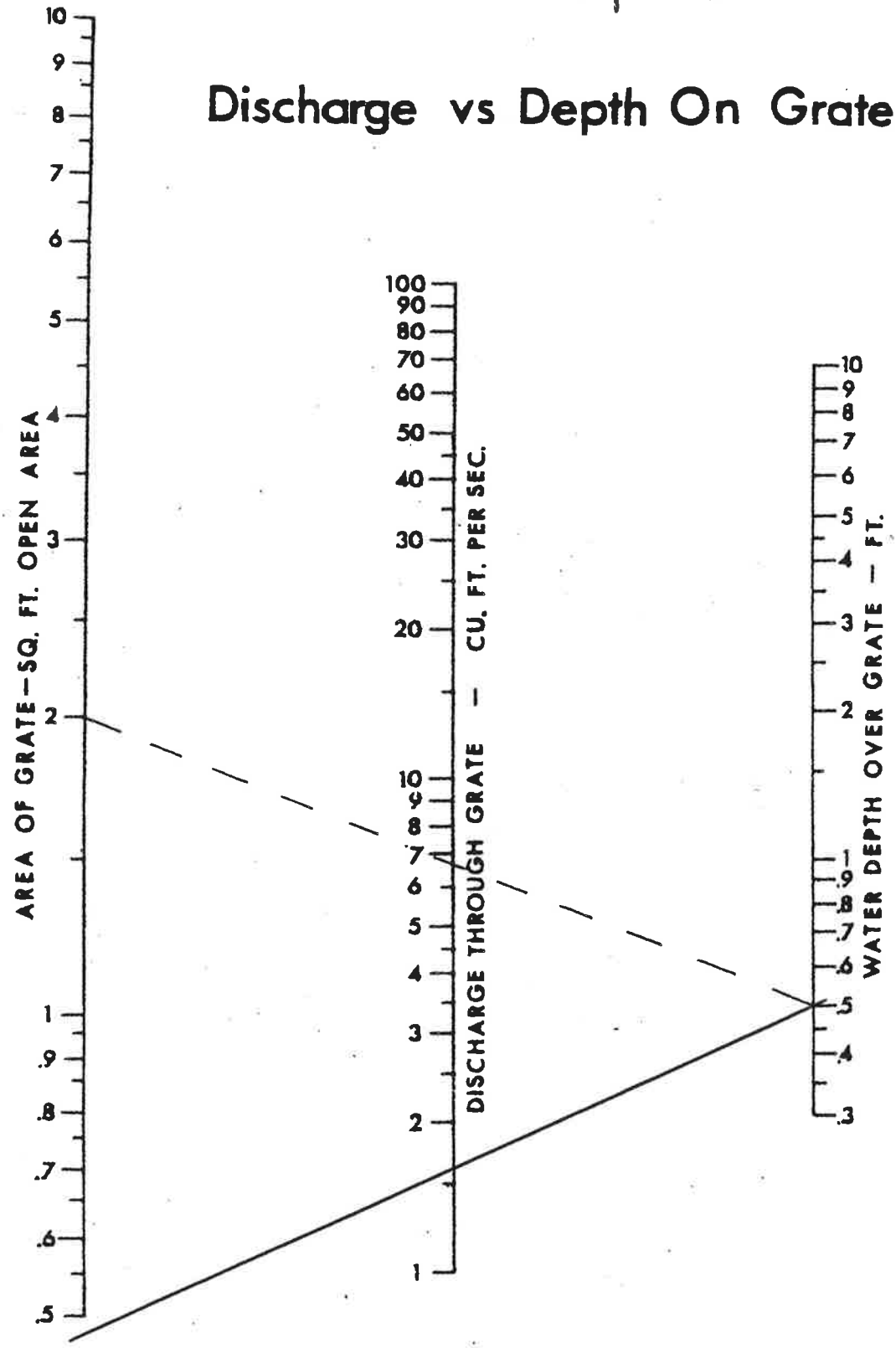
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.85 sF
→ EJIW 7030

Inlet 5.8 10-Year Capacity
Q= 0.80 cfs (1.60 cfs)
Depth = 6"

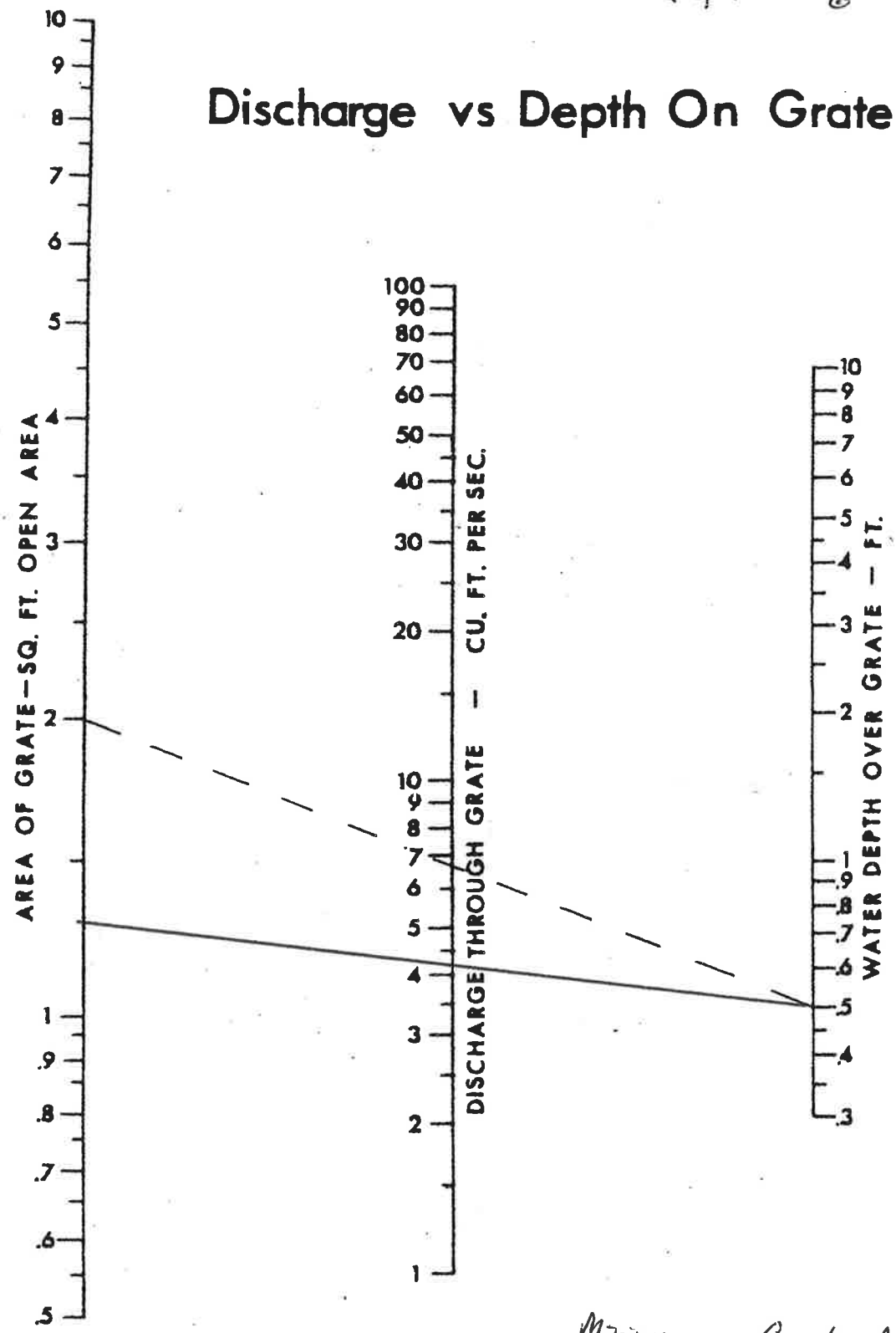
# Discharge vs Depth On Grate




Minimum Grate Area
= 0.55 sF
→ EJIW 7030
1.81 sF

Inlet 5.9 10-Year Capacity
Q = 2.10 cfs (4.20 cfs)
Depth = 6"

# Discharge vs Depth On Grate




Minimum Grate Area
= 1.6 sF
→ EJIW 6610
3.0 sF