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DESIGN REPORT

Wri922420D
Wright County, Iowa
DU Project #IA-340-8

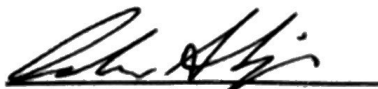
Prepared by:

Ducks Unlimited, Inc.
Great Lakes/Atlantic Region
In Cooperation with:
Iowa Department of Agriculture and Land Stewardship (IDALS)

September 2024



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.


Andrew Schippers, P.E.

9/19/24
Date

My license number is P26317

My license renewal date is December 31, 2025

Pages of sheets covered by this seal: 1-254



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Introduction

This constructed wetland project is located in Wright County, Iowa approximately 2 miles Northeast of Clarion, Iowa just West of Elm Lake. The constructed wetland site is jointly owned by several members of the Peterson family. The constructed wetland site is currently farmed in row crops and does not hold water for any extended period of time. Based on our on-site survey and hydrologic resources, the site exhibits a watershed of approximately 627.2 acres that routes into the proposed wetland area before routing through a road culvert beneath Nelson Avenue. The Peterson's currently rent the land out for farming, and plan to use the constructed wetland area primarily for water quality, recreation, and the intention of promoting wildlife on the site.

This wetland is planned to provide nutrient reduction benefits. Nitrates will be converted to nitrogen gas through natural processes as the water passes through the wetland. Sediment with phosphorus will also be captured but will need to be removed from the sediment basin(s) on a regular basis.

The site was initially assessed by using remote digital desktop information to see if a wetland at this location was feasible. Payment information was presented to the landowner who expressed interest in participating with this project.

The wetland has been designed using the requirements outlined in NRCS Conservation Practice Standard (CPS), Constructed Wetland, Code 656 (December 2023). The project will include a constructed wetland using a sheet pile weir, berm, and includes two submerged berms. Several tile lines will be intercepted to outlet into graded channels to the wetland, or directly discharging into the wetland.

Iowa Engineering Job Approval Authority Form IA-ENG-6 (March 2019) was utilized to determine the project as Job IV Classification. Since the wetland primary design standard is CPS 656, Constructed Wetland, and the wetland falls under "Field Runoff Treatment", with a drainage area over 300 acres and less than 1,000 acres, Job Classification IV applies. The Job Classification IV is still satisfied with the secondary design standard, CPS 410, Grade Stabilization Structure, since the effective height is less than 30 feet.

Iowa Department of Agricultural and Land Stewardship (IDALS) will submit permits for this project, which will include obtaining permits from The State Historic Preservation Office (SHPO), The Army Corps of Engineers, and the Iowa Department of Natural Resources (DNR), and the local Drainage District.

The permanent easement for this project will be on one landowner. We will be updating the abstract and will have a signed easement recorded for the area as shown on the attached site plan drawing. Construction to daylight one tile (18") will extend east of the wetland onto one neighboring property. Another 15" tile will be daylighted from the neighboring property to the South. These neighbors have been contacted, agreed to this work, and a construction easement will be signed once the final plans are approved. All other tile modifications occur on the subject property.

Proposed work includes:

- 1) Grading out within the wetland area, 2) Create berm to impound water within the wetland area, 3) Provide sheet pile primary weir within berm, 4) Daylighting multiple drainage tile into the wetland, 5) Provide submerged berms for water retention, 6) Provide water control structure for water management, and 7) Seeding and restoration of disturbed areas.



Project Location

Site Characteristics

Pre-Development Conditions

Pre-development conditions for the work area include the uses described in the previous section, which is predominately an agricultural landscape. The surrounding areas outside the work area are mostly grain production agricultural, row crops, but also include pastures and some timber. Mild topography is predominant in the area with small waterways, drainage ditches, and culverts. The majority of ground cover is row crops during the growing season with a combination of row crop residue, tillage areas, and cover crop during non-growing season months. Soil types in the area vary with dominant hydrologic soil group D. Hydrologic soil group D is known to have a slow infiltration rate resulting in high runoff potential when wet. NRCS Soil Map for Hydrologic Soil Groups within the Area of Interest is located in the appendix of this report. The Area of Interest (AOI) shown on the NRCS Soil Report and NRCS Hydrologic Soil Report.

There is a homestead located approximately 200 feet Northwest of the proposed wetland project. DU interviewed the homestead owner and surveyed the existing basement top-of-slab elevation, which is 1196.4'. In addition, the grade surrounding the immediate area of the home is approximately at



elevation 1202.0'. DU considered these constraints with the design of the wetland, which is described more in the Embankment Design section, below. Furthermore, the homestead currently exhibits a septic line tied into the existing 14" diameter clay tile main (drainage district tile). This landowner has agreed to update their septic system, which will be included as a bid item for this project and shall be a design-build component coordinated with the County Sanitarian.

Post-Development Conditions

Post-Development conditions will remain the same as pre-development for the basin tributary to the wetland area. This project includes grading within the wetland area itself and creating a berm at the downstream end of the wetland just East of the Nelson Avenue Road culvert. None of the proposed work will change the tributary area or runoff characteristics of the basin.

It should be noted that the primary design standard for this project is the NRCS CPS, Constructed Wetland, Code 656 (December 2023). The definition of this standard is, "An artificial wetland ecosystem with hydrophytic vegetation for biological treatment of water." Since the sheet pile weir will be a full flow open structure, NRCS CPS 410, Grade Stabilization Structure (January 2023), is the standard utilized for designing the primary weir and berm.

Embankment Design

CPS 410, Table 1 – Design Criteria for Establishing Minimum Capacity of Full-flow Open Structures was utilized in the design of the embankment and spillway. The Classification initially considered is a Maximum Drainage Area of 900 acres with a Vertical Drop of 0-10 feet. This classification requires a minimum storm design frequency of 10 years for the principal spillway capacity, and a storm design frequency of 25-years for the Total Capacity (24-hour duration storm).

CPS 656 also requires the impoundment to have sufficient capacity to handle the peak flow and runoff volume from the 25-year frequency, 24-hour duration storm without overtopping the embankment, and provide erosion protection for the perimeter embankment. This criteria is met with the design, which is able to pass a 100-year storm through the sheet pile weir, while still providing 1-foot of freeboard.

The wetland design exhibits a water storage capacity of 55.303 acre-feet associated with the top of dam contour. The top of dam elevation is 1198.7' and the downstream toe of the dam at the lowest elevation of the outside limit of the dam is 1191.4'. Accordingly, the vertical distance between these two points is 7.3', which causes this wetland to be considered a jurisdictional dam by Iowa DNR dam safety criteria.

The design criteria for Iowa DNR dam safety for Low Hazard Dams is providing a principal spillway designed for a Q10 (10% probability occurrence per year) without engaging an auxiliary spillway, and then to be able to withstand a Q100 (1% probability occurrence per year) without overtopping the dam. Due to this wetland site being located adjacent to a homestead, the more conservative design criteria were utilized in the hydrologic modeling. Specifically, the principal spillway (sheet pile weir) was designed to route a 100-year storm event without an auxiliary spillway. This design criteria satisfies both the NRCS guidelines and the Iowa DNR dam safety criteria.

The sheet pile weir spillway exhibits a 60 feet wide crest with sidewalls that slope up 2:1. The 25-year storm bounce in the wetland is 1197.02' and the 100-year storm bounce in the wetland is 1197.58'.



The sheet pile sidewalls are designed at 1197.7', in accordance with CPS 410 design criteria (sidewalls set 0.5' higher than the water surface attained by the principal spillway design discharge and at or above the maximum water surface attained by the total capacity design discharge). The top of embankment was set 1 foot higher than the sheet pile sidewalls (1198.7'). Due to this being a jurisdictional dam, DU verified that the top of dam contour (1198.7') does not extend onto any neighboring properties.

Due to the adjacent homestead basement top-of-slab elevation at 1196.4', DU designed the Normal Water Level of the wetland at 1094.1', which is 2.3 feet below the top of basement slab elevation.

DU excavated test pits within the wetland area and adjacent to the homestead during our tile investigation, and Certified Testing Services, Inc. (CTS) conducted soil borings at the proposed sheet pile location and adjacent to the homestead. Based on the soil information collected, it is unlikely that water infiltration would occur from the wetland site, through the in-situ soils, and into the basement of the homestead at Normal Water Level conditions. As another precautionary design consideration for when storm bounce occurs within the wetland, a 4 feet deep clay core will be provided with the berm. This will minimize water migration underneath the berm and prevent water to migrate toward the homestead. With the NWL set at 1094.1', any storm bounce elevation exceeding 1196.4' in elevation should fall within 24 hours or less and should not be able to affect the homestead.

Two submerged berms have been designed perpendicular to the flow direction in the wetland in order to maximize residence time and increase hydraulic efficiency. These submerged berms are designed with 6-foot-wide tops at elevation 1193.6' (6" below the NWL), provided with 3:1 side slopes.

Subsurface Drainage Tile Modification

DU performed a tile investigation at the subject property in order to measure location and elevation of multiple known tile, as well as to determine if other tile exist on the property. The results of our investigation is shown in the engineering plans. DU located all known tile and other unknown tile. Modifications to these tile were designed in order to outlet drainage tile inverts at least 1 foot above the NWL (1095.1'). Existing pipe flow rate capacities were matches or exceeded with all tile modifications, which is shown in the appendices of this report.

Sedimentation Analysis

DU analyzed the sedimentation accumulation anticipated for this site, which is included in the appendix of this report. Based on our analysis, the wetland would be expected to fill in with sediment after approximately 49 years. Accordingly, two 15'x30' sedimentation basins have been designed for this site at the upstream end of the wetland at the two main waterways (North and South). These sedimentation basins will allow for periodic maintenance and for removing of sediment captured prior to entering the wetland, which will extend the life of the wetland.

Usage of County Roads

There will be no planned usage of county roads except for when the contractor mobilizes to the site. There will be a need to work within the right of way (ROW) at Nelson Avenue and 200th Street in order to accomplish the work. This will need to be coordinated by IDALS with Wright County.

Floodways, Floodplains, and Wetlands

FEMA Map Number 19197C0175C, located in the appendix of this report, shows the existing agricultural area within Zone A. Zone A refers to areas within the Special Flood Hazard Area (SFHA) 1% annual chance flood that do not have listed Base Flood Elevation (BFE). No portion of the project area is located within a Regulatory Floodway.

The U.S. Fish and Wildlife Service National Wetlands Inventory Map located in the appendix of this report shows “Riverine” wetlands routing down the waterways of this site. However, it should be noted that there are no defined ditches or swales routing through this area, and the land is currently being row cropped.

Runoff Analysis

Watershed

Tributary area to the wetland area is determined to be 627.2 acres. This basin was determined with the aid of StreamStats which is a web-based Geographic Information System (GIS) application made available by the United States Geological Survey (USGS). The basin area and other basin characteristics provided by the StreamStats application were reviewed prior to being referenced for this project. A watershed map and StreamStats informational report are included in the appendix of this report.

Time of Concentration

Time of Concentration was calculated using the NRCS Lag Method which is appropriate for this watershed due to its rural character and long hydraulic length. Flow length of the watershed is shown on the watershed map in the appendix of this report, which was derived from StreamStats. NRCS Lag Method considers the flow length, average watershed slope, and maximum potential retention which is a factor of the SCS curve number (CN). Flow length, average watershed slope, and CN used for runoff analysis for this watershed are listed in the HydroCAD Report in the appendix. The average slope of the entire watershed taken from LiDAR data (3.27%) was utilized in this analysis.

Precipitation Model

The rainfall events and intensities were obtained from the HydroCAD lookup table for Wright County, Iowa, MSE, 24-hour, Storm Curve 3 (MSE3). These rainfall events were compared to the MSE 3 rainfall intensities provided by Title 210, National Engineering Handbook, 2nd Ed., Amend. 1, July 2021, Figure IA2-25, Wright County, NOAA 14 Rainfall Type MSE3. The HydroCAD Report in the appendix reflects the precipitation model and rainfall intensities for MSE3.

Runoff Model

SCS TR-20 NRCS Peak Flow method was utilized as a runoff model. SCS methods combine land use and soil type into a single parameter known as the Curve Number (CN). Based on the various land uses and the hydrologic soil groups (predominately HSG D) within the watershed discussed earlier in this report, a weighted CN of 88 was determined to be appropriate assuming straight row crops in good condition.



Runoff Conveyance

Hydraulic Model

HydroCAD 10.20-2g was utilized to model the watershed. Input parameters include watershed size, SCS CN (determined by land use and soil types), time of concentration calculations, precipitation input, stage-storage, discharge, and outlet details. The watershed was modeled with the proposed berm and principal spillway. The HydroCAD Hydrograph Report is included in the appendix.

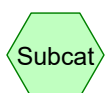
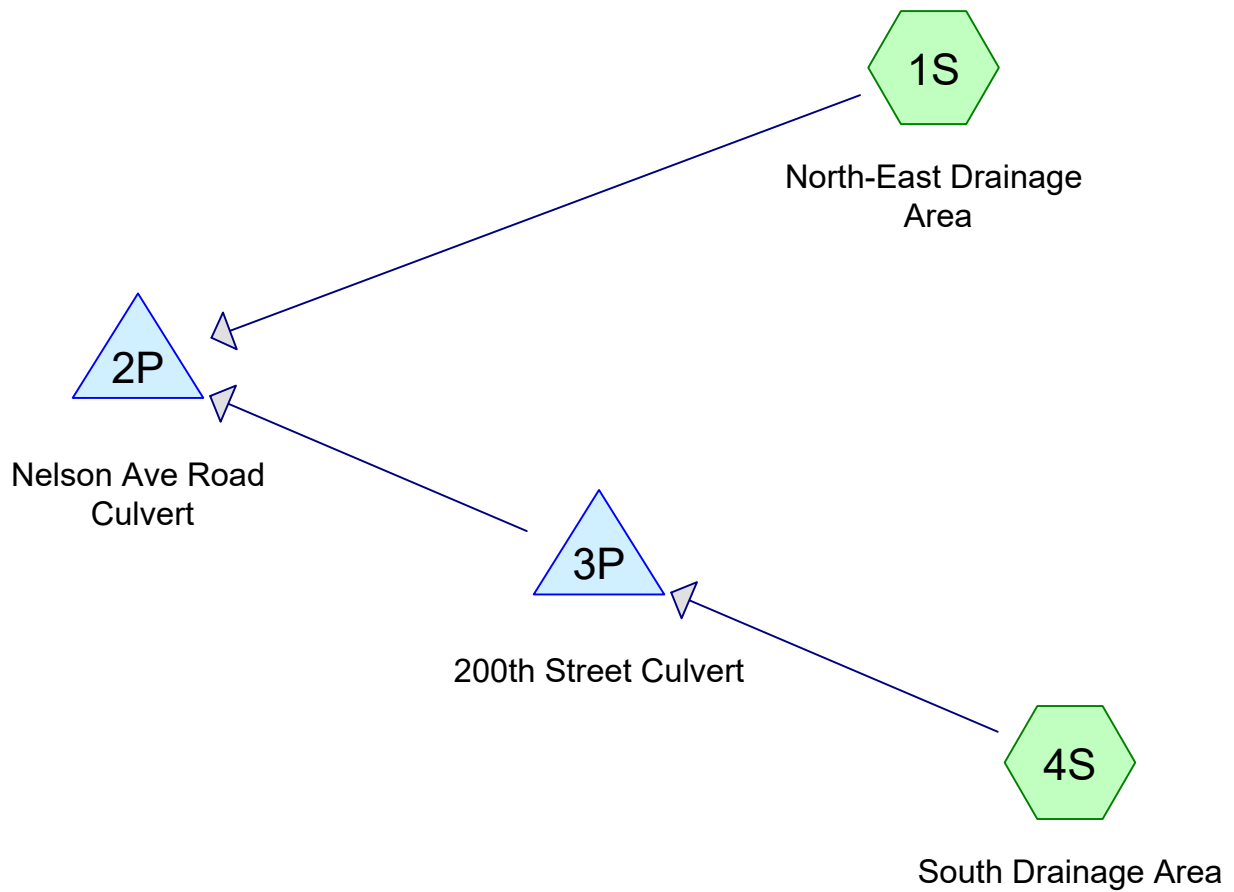
Summary & Conclusions

This project does not change the natural drainage area, drainage courses, runoff coefficients, or any other characteristics of the watershed. The wetland will be graded down, and any spoil material will be re-spread outside of the floodplain area. A berm will be constructed at the downstream end of the wetland, which will be designed to accommodate a 100-year design storm without affecting neighboring properties. Significant benefits to the wetland area and areas upstream of the wetland area include improving water quality, promotion of wildlife habitat, as well as a nutrient and sediment buffer.



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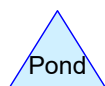
Appendix A-1
HydroCAD Report – Existing Conditions



Subcat



Reach



Pond



Link

Routing Diagram for IA-340-8 - Existing Conditions

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IA-340-8 - Existing Conditions

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Project Notes

Rainfall events imported from "Atlas-14-Rain.txt" for 350 IA Greene

Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene

Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene

Rainfall events imported from "NRCS-Rain.txt" for 1449 IA Jasper

Rainfall events imported from "NRCS-Rain.txt" for 1498 IA Wright

Rainfall events imported from "NRCS-Rain.txt" for 1498 IA Wright

IA-340-8 - Existing Conditions

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	10-Year	MSE 24-hr	3	Default	24.00	1	4.52	2
2	25-Year	MSE 24-hr	3	Default	24.00	1	5.62	2
3	100-Year	MSE 24-hr	3	Default	24.00	1	7.61	2

IA-340-8 - Existing Conditions

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
627.200	88	Weighted Average (1S, 4S)
627.200	88	TOTAL AREA

IA-340-8 - Existing Conditions

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
627.200	Other	1S, 4S
627.200		TOTAL AREA

IA-340-8 - Existing Conditions

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	627.200	627.200	Weighted Average	1S, 4S
0.000	0.000	0.000	0.000	627.200	627.200	TOTAL AREA	

IA-340-8 - Existing Conditions

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	2P	1,190.15	1,189.62	70.0	0.0076	0.025	91.0	52.0	0.0
2	3P	1,198.44	1,198.44	25.0	0.0000	0.012	48.0	24.0	0.0

IA-340-8 - Existing Conditions

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Notes Listing (all nodes)

Line#	Node Number	Notes
1	Project	Rainfall events imported from "Atlas-14-Rain.txt" for 350 IA Greene
2		Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene
3		Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene
4		Rainfall events imported from "NRCS-Rain.txt" for 1449 IA Jasper
5		Rainfall events imported from "NRCS-Rain.txt" for 1498 IA Wright
6		Rainfall events imported from "NRCS-Rain.txt" for 1498 IA Wright

IA-340-8 - Existing Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Time span=0.00-480.00 hrs, dt=0.05 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: North-East Runoff Area=463.047 ac 0.00% Impervious Runoff Depth=3.22"
Flow Length=6,885' Slope=0.0327 '/' Tc=62.5 min CN=88 Runoff=835.83 cfs 124.060 af

Subcatchment 4S: South Drainage Area Runoff Area=164.153 ac 0.00% Impervious Runoff Depth=3.22"
Flow Length=5,631' Slope=0.0327 '/' Tc=53.2 min CN=88 Runoff=329.34 cfs 43.980 af

Pond 2P: Nelson Ave Road Peak Elev=1,198.71' Storage=54.131 af Inflow=908.33 cfs 168.039 af
Primary=276.19 cfs 161.993 af Secondary=93.35 cfs 6.045 af Outflow=369.54 cfs 168.039 af

Pond 3P: 200th Street Culvert Peak Elev=1,203.18' Storage=838,433 cf Inflow=329.34 cfs 43.980 af
Primary=79.59 cfs 43.979 af Secondary=0.00 cfs 0.000 af Outflow=79.59 cfs 43.979 af

Total Runoff Area = 627.200 ac Runoff Volume = 168.040 af Average Runoff Depth = 3.22"
100.00% Pervious = 627.200 ac 0.00% Impervious = 0.000 ac

IA-340-8 - Existing Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Subcatchment 1S: North-East Drainage Area

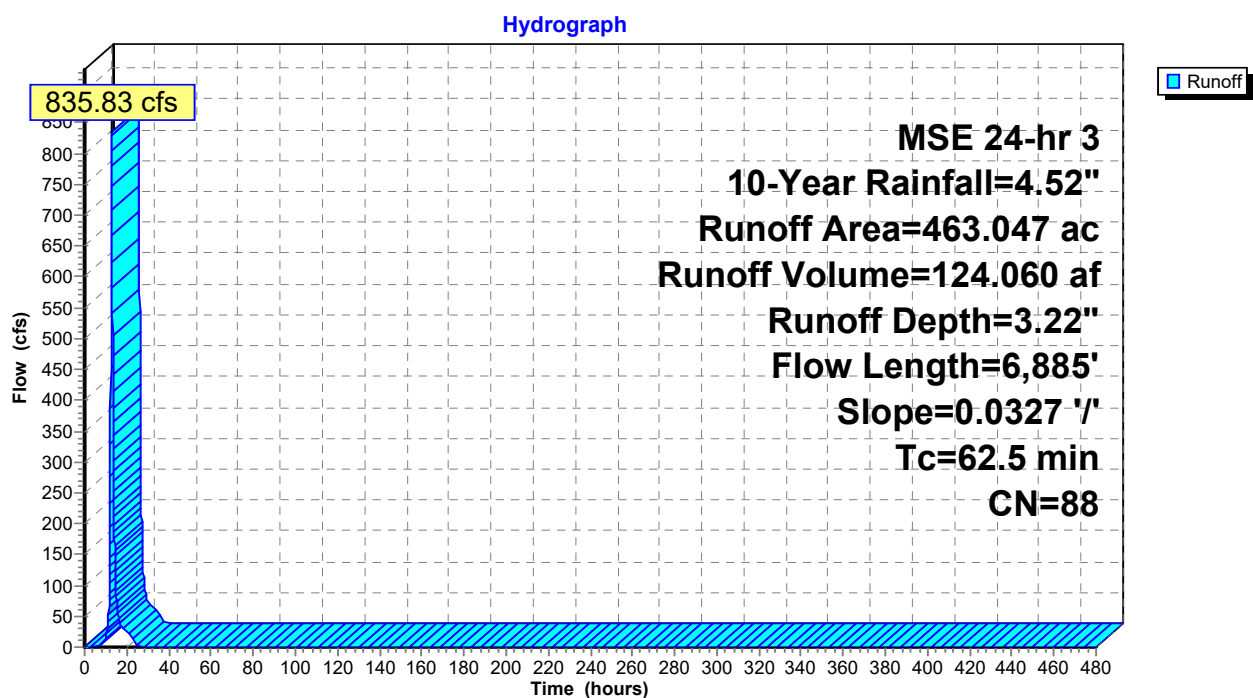
Runoff = 835.83 cfs @ 12.83 hrs, Volume= 124.060 af, Depth= 3.22"
Routed to Pond 2P : Nelson Ave Road Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.52"

Area (ac)	CN	Description
* 463.047	88	Weighted Average
463.047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	6,885	0.0327	1.84		Lag/CN Method,

Subcatchment 1S: North-East Drainage Area



IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Subcatchment 1S: North-East Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	4.52	3.22	0.00
5.00	0.17	0.00	0.00	295.00	4.52	3.22	0.00
10.00	0.62	0.07	15.15	300.00	4.52	3.22	0.00
15.00	4.05	2.78	86.69	305.00	4.52	3.22	0.00
20.00	4.40	3.10	24.45	310.00	4.52	3.22	0.00
25.00	4.52	3.22	2.61	315.00	4.52	3.22	0.00
30.00	4.52	3.22	0.00	320.00	4.52	3.22	0.00
35.00	4.52	3.22	0.00	325.00	4.52	3.22	0.00
40.00	4.52	3.22	0.00	330.00	4.52	3.22	0.00
45.00	4.52	3.22	0.00	335.00	4.52	3.22	0.00
50.00	4.52	3.22	0.00	340.00	4.52	3.22	0.00
55.00	4.52	3.22	0.00	345.00	4.52	3.22	0.00
60.00	4.52	3.22	0.00	350.00	4.52	3.22	0.00
65.00	4.52	3.22	0.00	355.00	4.52	3.22	0.00
70.00	4.52	3.22	0.00	360.00	4.52	3.22	0.00
75.00	4.52	3.22	0.00	365.00	4.52	3.22	0.00
80.00	4.52	3.22	0.00	370.00	4.52	3.22	0.00
85.00	4.52	3.22	0.00	375.00	4.52	3.22	0.00
90.00	4.52	3.22	0.00	380.00	4.52	3.22	0.00
95.00	4.52	3.22	0.00	385.00	4.52	3.22	0.00
100.00	4.52	3.22	0.00	390.00	4.52	3.22	0.00
105.00	4.52	3.22	0.00	395.00	4.52	3.22	0.00
110.00	4.52	3.22	0.00	400.00	4.52	3.22	0.00
115.00	4.52	3.22	0.00	405.00	4.52	3.22	0.00
120.00	4.52	3.22	0.00	410.00	4.52	3.22	0.00
125.00	4.52	3.22	0.00	415.00	4.52	3.22	0.00
130.00	4.52	3.22	0.00	420.00	4.52	3.22	0.00
135.00	4.52	3.22	0.00	425.00	4.52	3.22	0.00
140.00	4.52	3.22	0.00	430.00	4.52	3.22	0.00
145.00	4.52	3.22	0.00	435.00	4.52	3.22	0.00
150.00	4.52	3.22	0.00	440.00	4.52	3.22	0.00
155.00	4.52	3.22	0.00	445.00	4.52	3.22	0.00
160.00	4.52	3.22	0.00	450.00	4.52	3.22	0.00
165.00	4.52	3.22	0.00	455.00	4.52	3.22	0.00
170.00	4.52	3.22	0.00	460.00	4.52	3.22	0.00
175.00	4.52	3.22	0.00	465.00	4.52	3.22	0.00
180.00	4.52	3.22	0.00	470.00	4.52	3.22	0.00
185.00	4.52	3.22	0.00	475.00	4.52	3.22	0.00
190.00	4.52	3.22	0.00	480.00	4.52	3.22	0.00
195.00	4.52	3.22	0.00				
200.00	4.52	3.22	0.00				
205.00	4.52	3.22	0.00				
210.00	4.52	3.22	0.00				
215.00	4.52	3.22	0.00				
220.00	4.52	3.22	0.00				
225.00	4.52	3.22	0.00				
230.00	4.52	3.22	0.00				
235.00	4.52	3.22	0.00				
240.00	4.52	3.22	0.00				
245.00	4.52	3.22	0.00				
250.00	4.52	3.22	0.00				
255.00	4.52	3.22	0.00				
260.00	4.52	3.22	0.00				
265.00	4.52	3.22	0.00				
270.00	4.52	3.22	0.00				
275.00	4.52	3.22	0.00				
280.00	4.52	3.22	0.00				
285.00	4.52	3.22	0.00				

IA-340-8 - Existing Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Subcatchment 4S: South Drainage Area

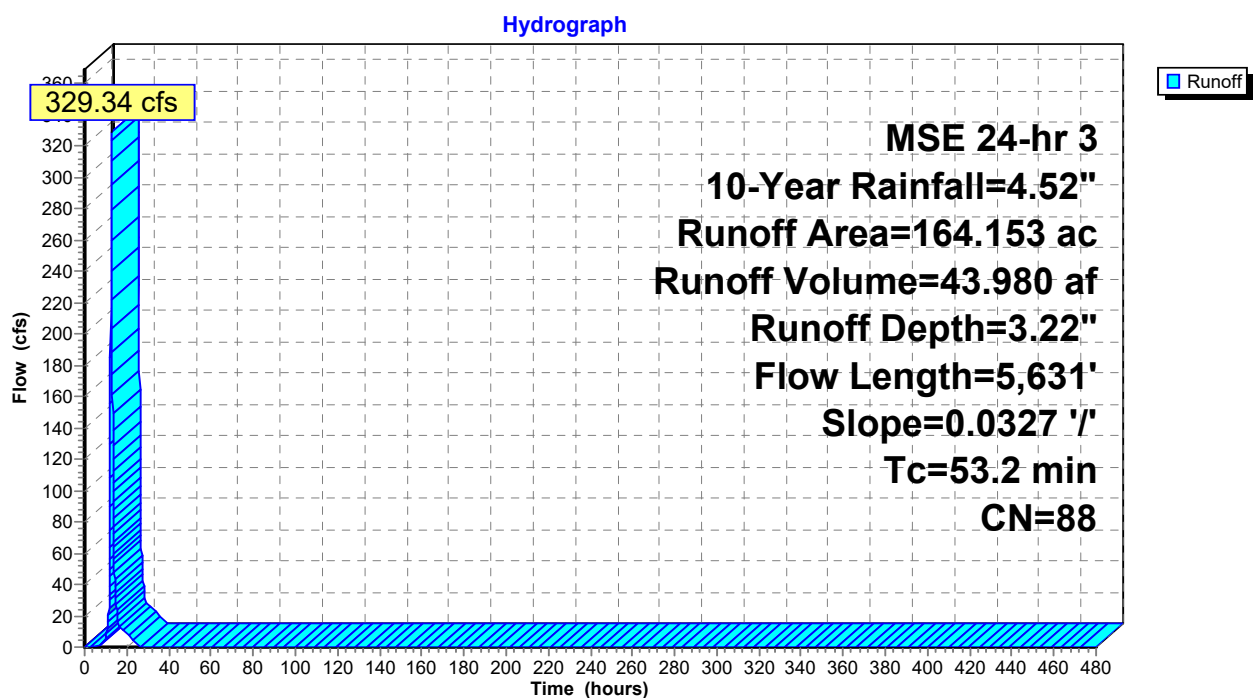
Runoff = 329.34 cfs @ 12.71 hrs, Volume= 43.980 af, Depth= 3.22"
Routed to Pond 3P : 200th Street Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.52"

Area (ac)	CN	Description
* 164.153	88	Weighted Average
164.153		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.2	5,631	0.0327	1.76		Lag/CN Method,

Subcatchment 4S: South Drainage Area



IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Subcatchment 4S: South Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	4.52	3.22	0.00
5.00	0.17	0.00	0.00	295.00	4.52	3.22	0.00
10.00	0.62	0.07	6.08	300.00	4.52	3.22	0.00
15.00	4.05	2.78	26.89	305.00	4.52	3.22	0.00
20.00	4.40	3.10	8.47	310.00	4.52	3.22	0.00
25.00	4.52	3.22	0.58	315.00	4.52	3.22	0.00
30.00	4.52	3.22	0.00	320.00	4.52	3.22	0.00
35.00	4.52	3.22	0.00	325.00	4.52	3.22	0.00
40.00	4.52	3.22	0.00	330.00	4.52	3.22	0.00
45.00	4.52	3.22	0.00	335.00	4.52	3.22	0.00
50.00	4.52	3.22	0.00	340.00	4.52	3.22	0.00
55.00	4.52	3.22	0.00	345.00	4.52	3.22	0.00
60.00	4.52	3.22	0.00	350.00	4.52	3.22	0.00
65.00	4.52	3.22	0.00	355.00	4.52	3.22	0.00
70.00	4.52	3.22	0.00	360.00	4.52	3.22	0.00
75.00	4.52	3.22	0.00	365.00	4.52	3.22	0.00
80.00	4.52	3.22	0.00	370.00	4.52	3.22	0.00
85.00	4.52	3.22	0.00	375.00	4.52	3.22	0.00
90.00	4.52	3.22	0.00	380.00	4.52	3.22	0.00
95.00	4.52	3.22	0.00	385.00	4.52	3.22	0.00
100.00	4.52	3.22	0.00	390.00	4.52	3.22	0.00
105.00	4.52	3.22	0.00	395.00	4.52	3.22	0.00
110.00	4.52	3.22	0.00	400.00	4.52	3.22	0.00
115.00	4.52	3.22	0.00	405.00	4.52	3.22	0.00
120.00	4.52	3.22	0.00	410.00	4.52	3.22	0.00
125.00	4.52	3.22	0.00	415.00	4.52	3.22	0.00
130.00	4.52	3.22	0.00	420.00	4.52	3.22	0.00
135.00	4.52	3.22	0.00	425.00	4.52	3.22	0.00
140.00	4.52	3.22	0.00	430.00	4.52	3.22	0.00
145.00	4.52	3.22	0.00	435.00	4.52	3.22	0.00
150.00	4.52	3.22	0.00	440.00	4.52	3.22	0.00
155.00	4.52	3.22	0.00	445.00	4.52	3.22	0.00
160.00	4.52	3.22	0.00	450.00	4.52	3.22	0.00
165.00	4.52	3.22	0.00	455.00	4.52	3.22	0.00
170.00	4.52	3.22	0.00	460.00	4.52	3.22	0.00
175.00	4.52	3.22	0.00	465.00	4.52	3.22	0.00
180.00	4.52	3.22	0.00	470.00	4.52	3.22	0.00
185.00	4.52	3.22	0.00	475.00	4.52	3.22	0.00
190.00	4.52	3.22	0.00	480.00	4.52	3.22	0.00
195.00	4.52	3.22	0.00				
200.00	4.52	3.22	0.00				
205.00	4.52	3.22	0.00				
210.00	4.52	3.22	0.00				
215.00	4.52	3.22	0.00				
220.00	4.52	3.22	0.00				
225.00	4.52	3.22	0.00				
230.00	4.52	3.22	0.00				
235.00	4.52	3.22	0.00				
240.00	4.52	3.22	0.00				
245.00	4.52	3.22	0.00				
250.00	4.52	3.22	0.00				
255.00	4.52	3.22	0.00				
260.00	4.52	3.22	0.00				
265.00	4.52	3.22	0.00				
270.00	4.52	3.22	0.00				
275.00	4.52	3.22	0.00				
280.00	4.52	3.22	0.00				
285.00	4.52	3.22	0.00				

IA-340-8 - Existing Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Pond 2P: Nelson Ave Road Culvert

[79] Warning: Submerged Pond 3P Primary device # 1 by 0.27'

Inflow Area = 627.200 ac, 0.00% Impervious, Inflow Depth = 3.22" for 10-Year event
 Inflow = 908.33 cfs @ 12.84 hrs, Volume= 168.039 af
 Outflow = 369.54 cfs @ 13.79 hrs, Volume= 168.039 af, Atten= 59%, Lag= 57.0 min
 Primary = 276.19 cfs @ 13.79 hrs, Volume= 161.993 af
 Secondary = 93.35 cfs @ 13.79 hrs, Volume= 6.045 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,198.71' @ 13.79 hrs Surf.Area= 21.142 ac Storage= 54.131 af

Plug-Flow detention time= 79.9 min calculated for 168.021 af (100% of inflow)
 Center-of-Mass det. time= 79.9 min (940.9 - 861.0)

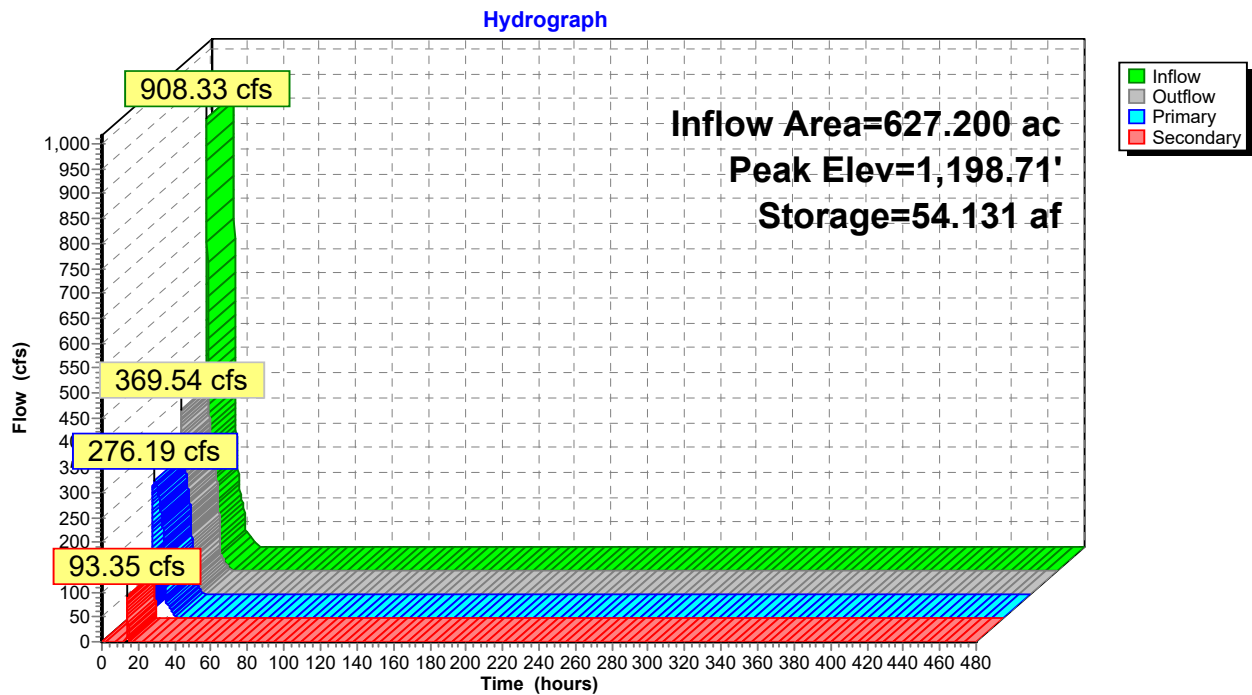
Volume	Invert	Avail.Storage	Storage Description
#1	1,190.00'	85.350 af	Existing Basin Storage (Prismatic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,190.00	0.000	0.000	0.000
1,191.00	0.001	0.001	0.001
1,192.00	0.087	0.044	0.044
1,193.00	0.739	0.413	0.457
1,194.00	3.027	1.883	2.340
1,195.00	5.591	4.309	6.649
1,196.00	8.908	7.249	13.899
1,197.00	12.904	10.906	24.805
1,198.00	17.378	15.141	39.946
1,199.00	22.695	20.036	59.982
1,200.00	28.040	25.367	85.350

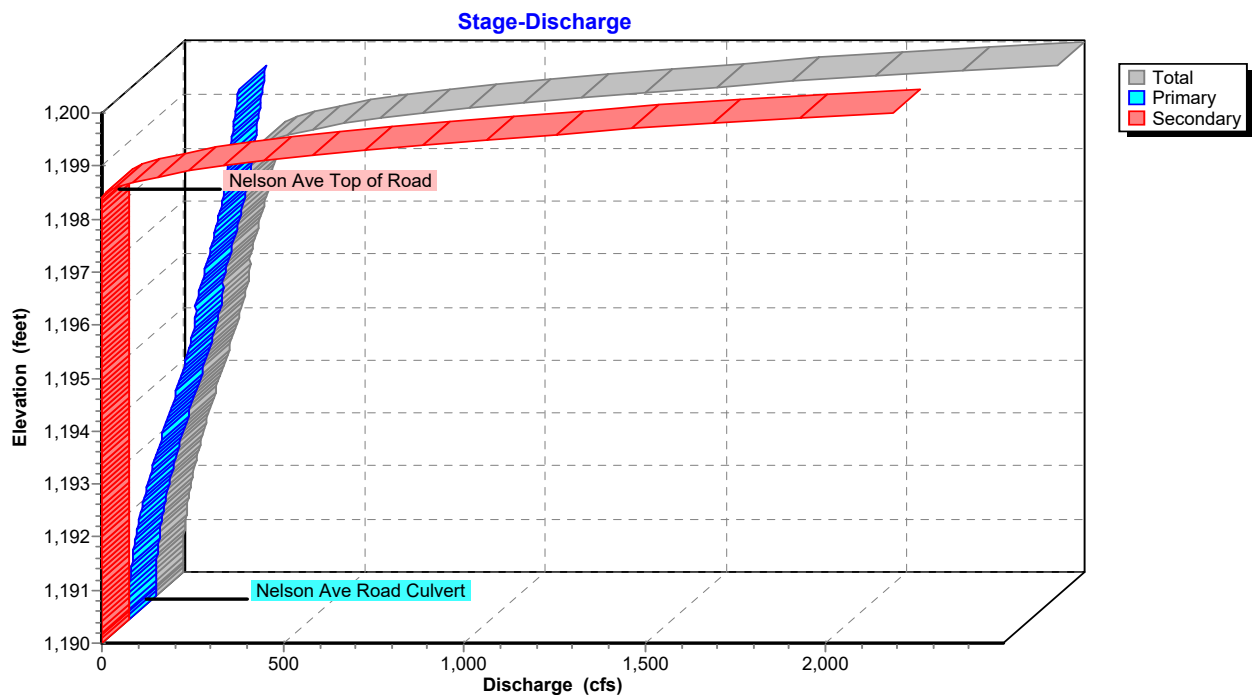
Device	Routing	Invert	Outlet Devices
#1	Primary	1,190.15'	91.0" W x 52.0" H Ellipse Nelson Ave Road Culvert L= 70.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 1,190.15' / 1,189.62' S= 0.0076 ' S= 0.0076 ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 25.81 sf
#2	Secondary	1,198.34'	Nelson Ave Top of Road, C= 3.27 Offset (feet) -257.75 -118.35 118.35 291.14 Elev. (feet) 1,200.00 1,198.34 1,198.64 1,200.00

Primary OutFlow Max=276.18 cfs @ 13.79 hrs HW=1,198.71' (Free Discharge)↑**1=Nelson Ave Road Culvert** (Inlet Controls 276.18 cfs @ 10.70 fps)**Secondary OutFlow** Max=92.53 cfs @ 13.79 hrs HW=1,198.71' (Free Discharge)↑**2=Nelson Ave Top of Road** (Weir Controls 92.53 cfs @ 0.94 fps)

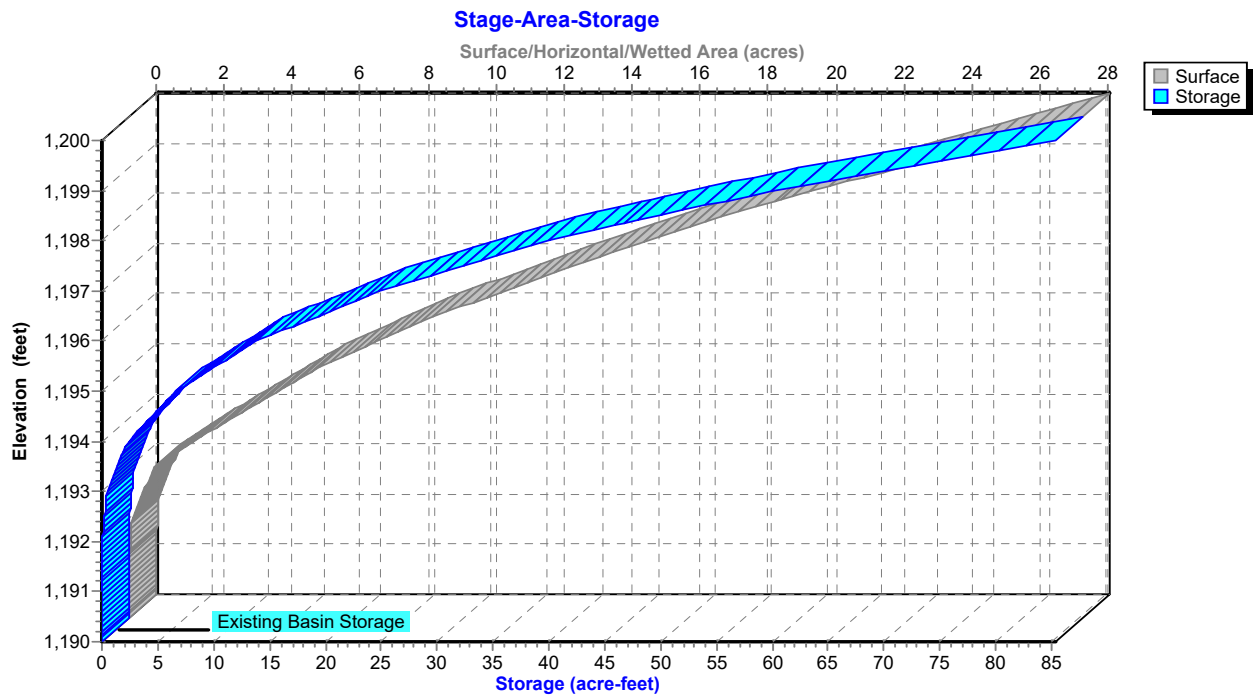
Pond 2P: Nelson Ave Road Culvert



Pond 2P: Nelson Ave Road Culvert



Pond 2P: Nelson Ave Road Culvert



IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Pond 2P: Nelson Ave Road Culvert

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	1,190.00	0.00	0.00	0.00
10.00	21.17	0.028	1,191.63	20.80	20.80	0.00
20.00	32.94	0.519	1,193.03	72.22	72.22	0.00
30.00	0.00	0.000	1,190.15	0.00	0.00	0.00
40.00	0.00	0.000	1,190.15	0.00	0.00	0.00
50.00	0.00	0.000	1,190.15	0.00	0.00	0.00
60.00	0.00	0.000	1,190.15	0.00	0.00	0.00
70.00	0.00	0.000	1,190.15	0.00	0.00	0.00
80.00	0.00	0.000	1,190.15	0.00	0.00	0.00
90.00	0.00	0.000	1,190.15	0.00	0.00	0.00
100.00	0.00	0.000	1,190.15	0.00	0.00	0.00
110.00	0.00	0.000	1,190.15	0.00	0.00	0.00
120.00	0.00	0.000	1,190.15	0.00	0.00	0.00
130.00	0.00	0.000	1,190.15	0.00	0.00	0.00
140.00	0.00	0.000	1,190.15	0.00	0.00	0.00
150.00	0.00	0.000	1,190.15	0.00	0.00	0.00
160.00	0.00	0.000	1,190.15	0.00	0.00	0.00
170.00	0.00	0.000	1,190.15	0.00	0.00	0.00
180.00	0.00	0.000	1,190.15	0.00	0.00	0.00
190.00	0.00	0.000	1,190.15	0.00	0.00	0.00
200.00	0.00	0.000	1,190.15	0.00	0.00	0.00
210.00	0.00	0.000	1,190.15	0.00	0.00	0.00
220.00	0.00	0.000	1,190.15	0.00	0.00	0.00
230.00	0.00	0.000	1,190.15	0.00	0.00	0.00
240.00	0.00	0.000	1,190.15	0.00	0.00	0.00
250.00	0.00	0.000	1,190.15	0.00	0.00	0.00
260.00	0.00	0.000	1,190.15	0.00	0.00	0.00
270.00	0.00	0.000	1,190.15	0.00	0.00	0.00
280.00	0.00	0.000	1,190.15	0.00	0.00	0.00
290.00	0.00	0.000	1,190.15	0.00	0.00	0.00
300.00	0.00	0.000	1,190.15	0.00	0.00	0.00
310.00	0.00	0.000	1,190.15	0.00	0.00	0.00
320.00	0.00	0.000	1,190.15	0.00	0.00	0.00
330.00	0.00	0.000	1,190.15	0.00	0.00	0.00
340.00	0.00	0.000	1,190.15	0.00	0.00	0.00
350.00	0.00	0.000	1,190.15	0.00	0.00	0.00
360.00	0.00	0.000	1,190.15	0.00	0.00	0.00
370.00	0.00	0.000	1,190.15	0.00	0.00	0.00
380.00	0.00	0.000	1,190.15	0.00	0.00	0.00
390.00	0.00	0.000	1,190.15	0.00	0.00	0.00
400.00	0.00	0.000	1,190.15	0.00	0.00	0.00
410.00	0.00	0.000	1,190.15	0.00	0.00	0.00
420.00	0.00	0.000	1,190.15	0.00	0.00	0.00
430.00	0.00	0.000	1,190.15	0.00	0.00	0.00
440.00	0.00	0.000	1,190.15	0.00	0.00	0.00
450.00	0.00	0.000	1,190.15	0.00	0.00	0.00
460.00	0.00	0.000	1,190.15	0.00	0.00	0.00
470.00	0.00	0.000	1,190.15	0.00	0.00	0.00
480.00	0.00	0.000	1,190.15	0.00	0.00	0.00

IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Discharge for Pond 2P: Nelson Ave Road Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,190.00	0.00	0.00	0.00	1,195.80	184.60	184.60	0.00
1,190.10	0.00	0.00	0.00	1,195.90	184.01	184.01	0.00
1,190.20	0.01	0.01	0.00	1,196.00	185.35	185.35	0.00
1,190.30	0.16	0.16	0.00	1,196.10	189.83	189.83	0.00
1,190.40	0.48	0.48	0.00	1,196.20	194.20	194.20	0.00
1,190.50	1.00	1.00	0.00	1,196.30	198.47	198.47	0.00
1,190.60	1.73	1.73	0.00	1,196.40	202.66	202.66	0.00
1,190.70	2.66	2.66	0.00	1,196.50	206.76	206.76	0.00
1,190.80	3.79	3.79	0.00	1,196.60	210.78	210.78	0.00
1,190.90	5.14	5.14	0.00	1,196.70	214.72	214.72	0.00
1,191.00	6.68	6.68	0.00	1,196.80	218.60	218.60	0.00
1,191.10	8.43	8.43	0.00	1,196.90	222.41	222.41	0.00
1,191.20	10.36	10.36	0.00	1,197.00	226.15	226.15	0.00
1,191.30	12.48	12.48	0.00	1,197.10	229.83	229.83	0.00
1,191.40	14.78	14.78	0.00	1,197.20	233.45	233.45	0.00
1,191.50	17.25	17.25	0.00	1,197.30	237.02	237.02	0.00
1,191.60	19.89	19.89	0.00	1,197.40	240.54	240.54	0.00
1,191.70	22.69	22.69	0.00	1,197.50	244.00	244.00	0.00
1,191.80	25.64	25.64	0.00	1,197.60	247.42	247.42	0.00
1,191.90	28.75	28.75	0.00	1,197.70	250.79	250.79	0.00
1,192.00	31.99	31.99	0.00	1,197.80	254.11	254.11	0.00
1,192.10	35.37	35.37	0.00	1,197.90	257.39	257.39	0.00
1,192.20	38.87	38.87	0.00	1,198.00	260.19	260.19	0.00
1,192.30	42.50	42.50	0.00	1,198.10	262.51	262.51	0.00
1,192.40	46.24	46.24	0.00	1,198.20	264.81	264.81	0.00
1,192.50	50.10	50.10	0.00	1,198.30	267.09	267.09	0.00
1,192.60	54.06	54.06	0.00	1,198.40	270.36	269.35	1.01
1,192.70	58.11	58.11	0.00	1,198.50	283.28	271.59	11.69
1,192.80	62.26	62.26	0.00	1,198.60	313.17	273.81	39.36
1,192.90	66.49	66.49	0.00	1,198.70	364.04	276.02	88.03
1,193.00	70.80	70.80	0.00	1,198.80	433.21	278.20	155.01
1,193.10	75.18	75.18	0.00	1,198.90	518.49	280.37	238.12
1,193.20	79.62	79.62	0.00	1,199.00	619.28	282.52	336.76
1,193.30	84.13	84.13	0.00	1,199.10	735.37	284.66	450.71
1,193.40	88.69	88.69	0.00	1,199.20	866.75	286.77	579.98
1,193.50	93.30	93.30	0.00	1,199.30	1,013.54	288.88	724.67
1,193.60	97.94	97.94	0.00	1,199.40	1,175.90	290.96	884.93
1,193.70	102.62	102.62	0.00	1,199.50	1,354.02	293.03	1,060.98
1,193.80	107.32	107.32	0.00	1,199.60	1,548.13	295.09	1,253.04
1,193.90	112.03	112.03	0.00	1,199.70	1,758.49	297.13	1,461.35
1,194.00	116.74	116.74	0.00	1,199.80	1,985.33	299.16	1,686.17
1,194.10	121.45	121.45	0.00	1,199.90	2,228.93	301.17	1,927.76
1,194.20	126.15	126.15	0.00	1,200.00	2,489.56	303.17	2,186.39
1,194.30	130.82	130.82	0.00				
1,194.40	135.46	135.46	0.00				
1,194.50	140.04	140.04	0.00				
1,194.60	144.56	144.56	0.00				
1,194.70	149.00	149.00	0.00				
1,194.80	153.35	153.35	0.00				
1,194.90	157.58	157.58	0.00				
1,195.00	161.68	161.68	0.00				
1,195.10	165.62	165.62	0.00				
1,195.20	169.37	169.37	0.00				
1,195.30	172.89	172.89	0.00				
1,195.40	176.14	176.14	0.00				
1,195.50	179.05	179.05	0.00				
1,195.60	181.55	181.55	0.00				
1,195.70	183.49	183.49	0.00				

IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Area-Storage for Pond 2P: Nelson Ave Road Culvert

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,190.00	0.000	0.000	1,195.80	8.245	12.449
1,190.10	0.000	0.000	1,195.90	8.576	13.174
1,190.20	0.000	0.000	1,196.00	8.908	13.899
1,190.30	0.000	0.000	1,196.10	9.308	14.990
1,190.40	0.000	0.000	1,196.20	9.707	16.080
1,190.50	0.001	0.000	1,196.30	10.107	17.171
1,190.60	0.001	0.000	1,196.40	10.506	18.261
1,190.70	0.001	0.000	1,196.50	10.906	19.352
1,190.80	0.001	0.000	1,196.60	11.306	20.443
1,190.90	0.001	0.000	1,196.70	11.705	21.533
1,191.00	0.001	0.001	1,196.80	12.105	22.624
1,191.10	0.010	0.005	1,196.90	12.504	23.714
1,191.20	0.018	0.009	1,197.00	12.904	24.805
1,191.30	0.027	0.014	1,197.10	13.351	26.319
1,191.40	0.035	0.018	1,197.20	13.799	27.833
1,191.50	0.044	0.022	1,197.30	14.246	29.347
1,191.60	0.053	0.027	1,197.40	14.694	30.861
1,191.70	0.061	0.031	1,197.50	15.141	32.375
1,191.80	0.070	0.036	1,197.60	15.588	33.890
1,191.90	0.078	0.040	1,197.70	16.036	35.404
1,192.00	0.087	0.044	1,197.80	16.483	36.918
1,192.10	0.152	0.086	1,197.90	16.931	38.432
1,192.20	0.217	0.127	1,198.00	17.378	39.946
1,192.30	0.283	0.168	1,198.10	17.910	41.950
1,192.40	0.348	0.210	1,198.20	18.441	43.953
1,192.50	0.413	0.251	1,198.30	18.973	45.957
1,192.60	0.478	0.292	1,198.40	19.505	47.961
1,192.70	0.543	0.334	1,198.50	20.036	49.964
1,192.80	0.609	0.375	1,198.60	20.568	51.968
1,192.90	0.674	0.416	1,198.70	21.100	53.972
1,193.00	0.739	0.457	1,198.80	21.632	55.975
1,193.10	0.968	0.646	1,198.90	22.163	57.979
1,193.20	1.197	0.834	1,199.00	22.695	59.982
1,193.30	1.425	1.022	1,199.10	23.229	62.519
1,193.40	1.654	1.211	1,199.20	23.764	65.056
1,193.50	1.883	1.399	1,199.30	24.298	67.593
1,193.60	2.112	1.587	1,199.40	24.833	70.130
1,193.70	2.341	1.776	1,199.50	25.367	72.666
1,193.80	2.569	1.964	1,199.60	25.902	75.203
1,193.90	2.798	2.152	1,199.70	26.437	77.740
1,194.00	3.027	2.340	1,199.80	26.971	80.276
1,194.10	3.283	2.771	1,199.90	27.506	82.813
1,194.20	3.540	3.202	1,200.00	28.040	85.350
1,194.30	3.796	3.633			
1,194.40	4.053	4.064			
1,194.50	4.309	4.495			
1,194.60	4.565	4.926			
1,194.70	4.822	5.357			
1,194.80	5.078	5.788			
1,194.90	5.335	6.219			
1,195.00	5.591	6.649			
1,195.10	5.923	7.374			
1,195.20	6.254	8.099			
1,195.30	6.586	8.824			
1,195.40	6.918	9.549			
1,195.50	7.249	10.274			
1,195.60	7.581	10.999			
1,195.70	7.913	11.724			

IA-340-8 - Existing Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Pond 3P: 200th Street Culvert

Inflow Area = 164.153 ac, 0.00% Impervious, Inflow Depth = 3.22" for 10-Year event
 Inflow = 329.34 cfs @ 12.71 hrs, Volume= 43.980 af
 Outflow = 79.59 cfs @ 13.82 hrs, Volume= 43.979 af, Atten= 76%, Lag= 66.7 min
 Primary = 79.59 cfs @ 13.82 hrs, Volume= 43.979 af
 Routed to Pond 2P : Nelson Ave Road Culvert
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,203.18' @ 13.82 hrs Surf.Area= 592,639 sf Storage= 838,433 cf

Plug-Flow detention time= 97.9 min calculated for 43.974 af (100% of inflow)
 Center-of-Mass det. time= 97.9 min (927.0 - 829.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,198.00'	5,262,028 cf	Storage South of 200th Street Culvert (Prismatic) listed below (Recalculated)

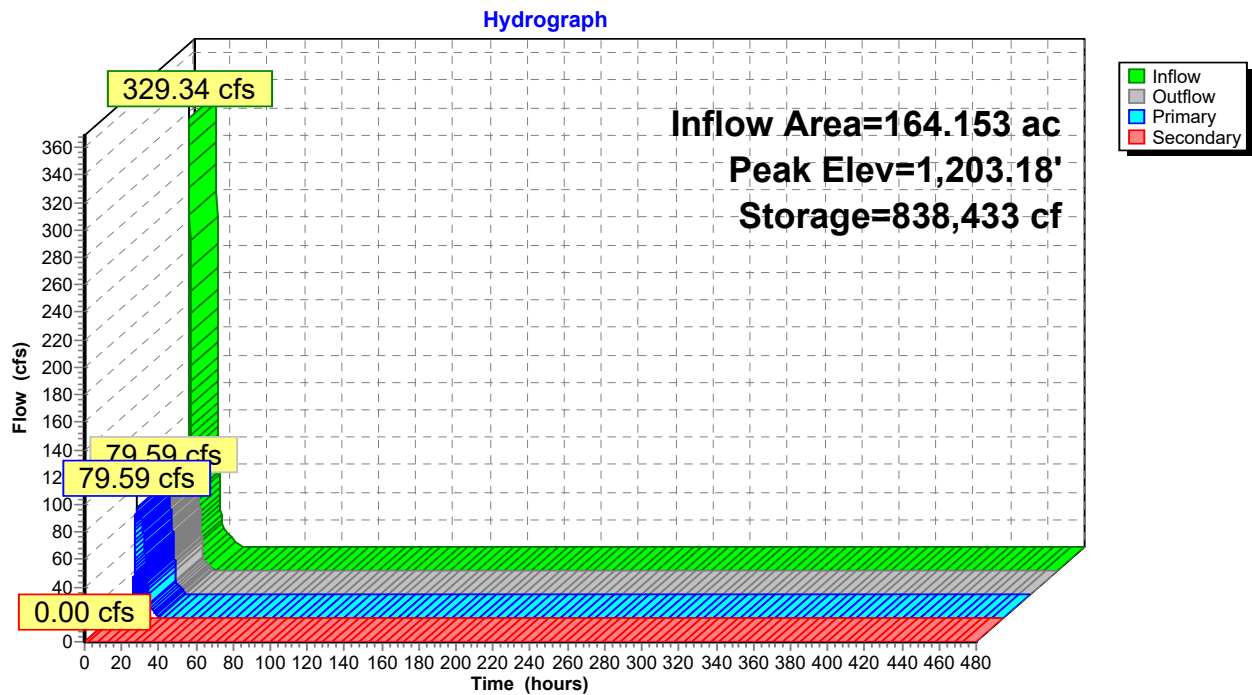
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,198.00	0	0	0
1,199.00	436	218	218
1,200.00	871	654	872
1,201.00	132,684	66,778	67,649
1,202.00	318,032	225,358	293,007
1,203.00	562,882	440,457	733,464
1,204.00	726,668	644,775	1,378,239
1,205.00	850,640	788,654	2,166,893
1,206.00	971,780	911,210	3,078,103
1,207.00	1,093,879	1,032,830	4,110,933
1,208.00	1,208,311	1,151,095	5,262,028

Device	Routing	Invert	Outlet Devices
#1	Primary	1,198.44'	48.0" W x 24.0" H Box 2'x4' Road Culvert L= 25.0' Box, 30-75° wingwalls, square crown, Ke= 0.400 Inlet / Outlet Invert= 1,198.44' / 1,198.44' S= 0.0000 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 8.00 sf
#2	Secondary	1,204.07'	200th St Top of Road, C= 3.27 Offset (feet) -234.90 169.69 318.45 441.99 Height (feet) 1.13 0.20 0.34 1.13

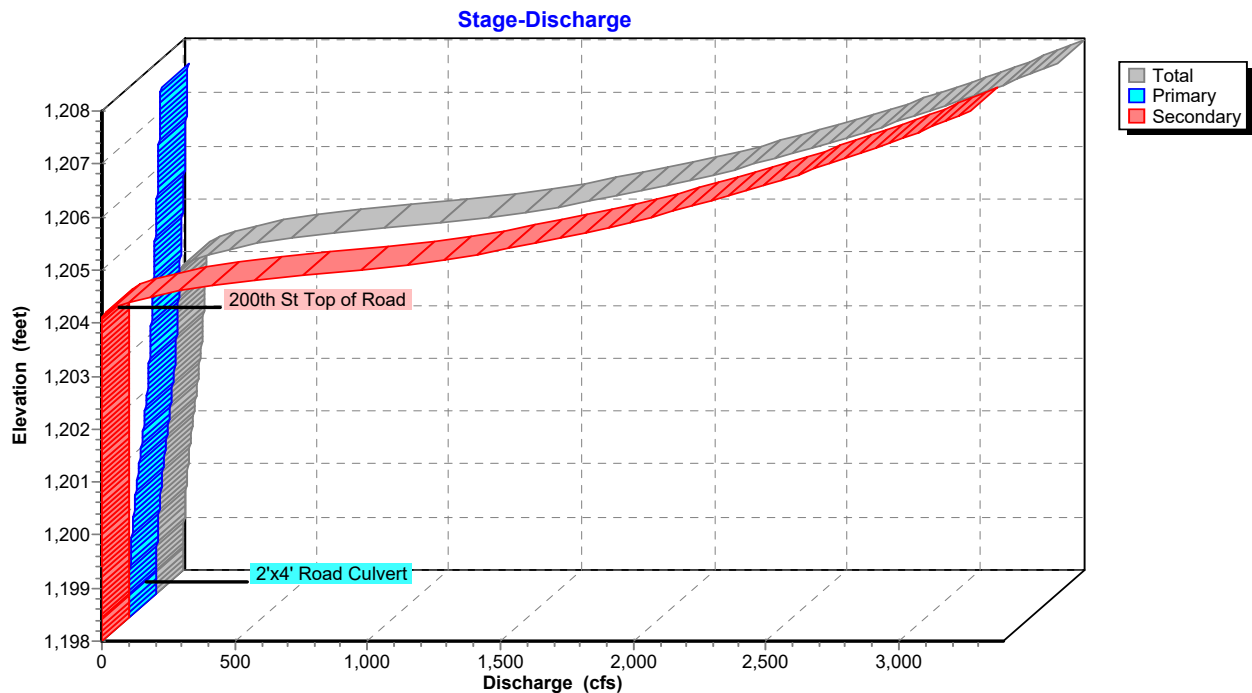
Primary OutFlow Max=79.59 cfs @ 13.82 hrs HW=1,203.18' (Free Discharge)
1=2'x4' Road Culvert (Inlet Controls 79.59 cfs @ 9.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,198.00' (Free Discharge)
2=200th St Top of Road (Controls 0.00 cfs)

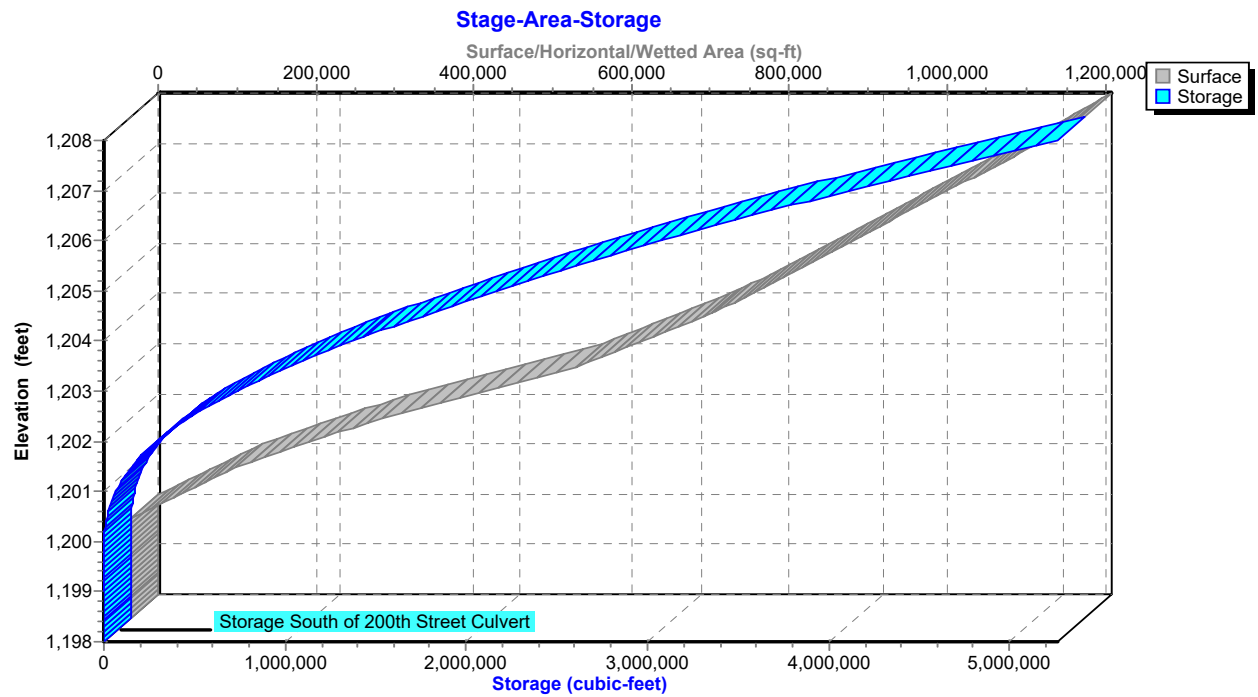
Pond 3P: 200th Street Culvert



Pond 3P: 200th Street Culvert



Pond 3P: 200th Street Culvert



IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Pond 3P: 200th Street Culvert

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	1,198.00	0.00	0.00	0.00
10.00	6.08	311	1,199.19	6.02	6.02	0.00
20.00	8.47	413	1,199.38	8.49	8.49	0.00
30.00	0.00	42	1,198.44	0.00	0.00	0.00
40.00	0.00	42	1,198.44	0.00	0.00	0.00
50.00	0.00	42	1,198.44	0.00	0.00	0.00
60.00	0.00	42	1,198.44	0.00	0.00	0.00
70.00	0.00	42	1,198.44	0.00	0.00	0.00
80.00	0.00	42	1,198.44	0.00	0.00	0.00
90.00	0.00	42	1,198.44	0.00	0.00	0.00
100.00	0.00	42	1,198.44	0.00	0.00	0.00
110.00	0.00	42	1,198.44	0.00	0.00	0.00
120.00	0.00	42	1,198.44	0.00	0.00	0.00
130.00	0.00	42	1,198.44	0.00	0.00	0.00
140.00	0.00	42	1,198.44	0.00	0.00	0.00
150.00	0.00	42	1,198.44	0.00	0.00	0.00
160.00	0.00	42	1,198.44	0.00	0.00	0.00
170.00	0.00	42	1,198.44	0.00	0.00	0.00
180.00	0.00	42	1,198.44	0.00	0.00	0.00
190.00	0.00	42	1,198.44	0.00	0.00	0.00
200.00	0.00	42	1,198.44	0.00	0.00	0.00
210.00	0.00	42	1,198.44	0.00	0.00	0.00
220.00	0.00	42	1,198.44	0.00	0.00	0.00
230.00	0.00	42	1,198.44	0.00	0.00	0.00
240.00	0.00	42	1,198.44	0.00	0.00	0.00
250.00	0.00	42	1,198.44	0.00	0.00	0.00
260.00	0.00	42	1,198.44	0.00	0.00	0.00
270.00	0.00	42	1,198.44	0.00	0.00	0.00
280.00	0.00	42	1,198.44	0.00	0.00	0.00
290.00	0.00	42	1,198.44	0.00	0.00	0.00
300.00	0.00	42	1,198.44	0.00	0.00	0.00
310.00	0.00	42	1,198.44	0.00	0.00	0.00
320.00	0.00	42	1,198.44	0.00	0.00	0.00
330.00	0.00	42	1,198.44	0.00	0.00	0.00
340.00	0.00	42	1,198.44	0.00	0.00	0.00
350.00	0.00	42	1,198.44	0.00	0.00	0.00
360.00	0.00	42	1,198.44	0.00	0.00	0.00
370.00	0.00	42	1,198.44	0.00	0.00	0.00
380.00	0.00	42	1,198.44	0.00	0.00	0.00
390.00	0.00	42	1,198.44	0.00	0.00	0.00
400.00	0.00	42	1,198.44	0.00	0.00	0.00
410.00	0.00	42	1,198.44	0.00	0.00	0.00
420.00	0.00	42	1,198.44	0.00	0.00	0.00
430.00	0.00	42	1,198.44	0.00	0.00	0.00
440.00	0.00	42	1,198.44	0.00	0.00	0.00
450.00	0.00	42	1,198.44	0.00	0.00	0.00
460.00	0.00	42	1,198.44	0.00	0.00	0.00
470.00	0.00	42	1,198.44	0.00	0.00	0.00
480.00	0.00	42	1,198.44	0.00	0.00	0.00

IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Discharge for Pond 3P: 200th Street Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,198.00	0.00	0.00	0.00	1,203.80	85.99	85.99	0.00
1,198.10	0.00	0.00	0.00	1,203.90	86.98	86.98	0.00
1,198.20	0.00	0.00	0.00	1,204.00	87.95	87.95	0.00
1,198.30	0.00	0.00	0.00	1,204.10	89.23	88.92	0.31
1,198.40	0.00	0.00	0.00	1,204.20	101.81	89.88	11.94
1,198.50	0.06	0.06	0.00	1,204.30	137.64	90.82	46.82
1,198.60	0.42	0.42	0.00	1,204.40	195.65	91.76	103.89
1,198.70	1.02	1.02	0.00	1,204.50	276.51	92.69	183.83
1,198.80	1.79	1.79	0.00	1,204.60	381.60	93.60	288.00
1,198.90	2.70	2.70	0.00	1,204.70	512.40	94.51	417.89
1,199.00	3.73	3.73	0.00	1,204.80	670.38	95.41	574.97
1,199.10	4.86	4.86	0.00	1,204.90	856.97	96.30	760.67
1,199.20	6.10	6.10	0.00	1,205.00	1,073.55	97.18	976.36
1,199.30	7.42	7.42	0.00	1,205.10	1,249.00	98.06	1,150.94
1,199.40	8.83	8.83	0.00	1,205.20	1,390.14	98.93	1,291.21
1,199.50	10.31	10.31	0.00	1,205.30	1,514.47	99.79	1,414.68
1,199.60	11.87	11.87	0.00	1,205.40	1,627.47	100.64	1,526.84
1,199.70	13.50	13.50	0.00	1,205.50	1,732.02	101.48	1,630.54
1,199.80	15.20	15.20	0.00	1,205.60	1,829.89	102.32	1,727.57
1,199.90	16.96	16.96	0.00	1,205.70	1,922.28	103.15	1,819.13
1,200.00	18.79	18.79	0.00	1,205.80	2,010.06	103.97	1,906.08
1,200.10	20.68	20.68	0.00	1,205.90	2,093.88	104.79	1,989.09
1,200.20	22.63	22.63	0.00	1,206.00	2,174.26	105.60	2,068.66
1,200.30	24.63	24.63	0.00	1,206.10	2,251.61	106.41	2,145.20
1,200.40	26.69	26.69	0.00	1,206.20	2,326.24	107.21	2,219.03
1,200.50	28.81	28.81	0.00	1,206.30	2,398.43	108.00	2,290.43
1,200.60	30.97	30.97	0.00	1,206.40	2,468.42	108.79	2,359.64
1,200.70	33.19	33.19	0.00	1,206.50	2,536.40	109.57	2,426.83
1,200.80	35.46	35.46	0.00	1,206.60	2,602.53	110.34	2,492.19
1,200.90	37.78	37.78	0.00	1,206.70	2,666.97	111.11	2,555.85
1,201.00	40.15	40.15	0.00	1,206.80	2,729.83	111.88	2,617.95
1,201.10	42.56	42.56	0.00	1,206.90	2,791.23	112.64	2,678.59
1,201.20	44.51	44.51	0.00	1,207.00	2,851.27	113.39	2,737.87
1,201.30	47.35	47.35	0.00	1,207.10	2,910.03	114.14	2,795.89
1,201.40	50.03	50.03	0.00	1,207.20	2,967.60	114.89	2,852.72
1,201.50	52.57	52.57	0.00	1,207.30	3,024.05	115.63	2,908.42
1,201.60	54.99	54.99	0.00	1,207.40	3,079.44	116.36	2,963.07
1,201.70	57.31	57.31	0.00	1,207.50	3,133.82	117.09	3,016.73
1,201.80	59.55	59.55	0.00	1,207.60	3,187.26	117.82	3,069.44
1,201.90	61.70	61.70	0.00	1,207.70	3,239.80	118.54	3,121.26
1,202.00	63.77	63.77	0.00	1,207.80	3,291.48	119.26	3,172.22
1,202.10	65.79	65.79	0.00	1,207.90	3,342.35	119.97	3,222.37
1,202.20	67.74	67.74	0.00	1,208.00	3,392.44	120.68	3,271.76
1,202.30	69.43	69.43	0.00				
1,202.40	70.66	70.66	0.00				
1,202.50	71.87	71.87	0.00				
1,202.60	73.05	73.05	0.00				
1,202.70	74.22	74.22	0.00				
1,202.80	75.37	75.37	0.00				
1,202.90	76.50	76.50	0.00				
1,203.00	77.61	77.61	0.00				
1,203.10	78.71	78.71	0.00				
1,203.20	79.79	79.79	0.00				
1,203.30	80.86	80.86	0.00				
1,203.40	81.91	81.91	0.00				
1,203.50	82.95	82.95	0.00				
1,203.60	83.97	83.97	0.00				
1,203.70	84.99	84.99	0.00				

IA-340-8 - Existing Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Area-Storage for Pond 3P: 200th Street Culvert

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,198.00	0	0	1,203.80	693,911	1,236,181
1,198.10	44	2	1,203.90	710,289	1,306,391
1,198.20	87	9	1,204.00	726,668	1,378,239
1,198.30	131	20	1,204.10	739,065	1,451,526
1,198.40	174	35	1,204.20	751,462	1,526,052
1,198.50	218	55	1,204.30	763,860	1,601,818
1,198.60	262	78	1,204.40	776,257	1,678,824
1,198.70	305	107	1,204.50	788,654	1,757,070
1,198.80	349	140	1,204.60	801,051	1,836,555
1,198.90	392	177	1,204.70	813,448	1,917,280
1,199.00	436	218	1,204.80	825,846	1,999,244
1,199.10	479	264	1,204.90	838,243	2,082,449
1,199.20	523	314	1,205.00	850,640	2,166,893
1,199.30	566	368	1,205.10	862,754	2,252,563
1,199.40	610	427	1,205.20	874,868	2,339,444
1,199.50	654	490	1,205.30	886,982	2,427,536
1,199.60	697	558	1,205.40	899,096	2,516,840
1,199.70	741	630	1,205.50	911,210	2,607,356
1,199.80	784	706	1,205.60	923,324	2,699,082
1,199.90	828	787	1,205.70	935,438	2,792,020
1,200.00	871	872	1,205.80	947,552	2,886,170
1,200.10	14,052	1,618	1,205.90	959,666	2,981,531
1,200.20	27,234	3,682	1,206.00	971,780	3,078,103
1,200.30	40,415	7,064	1,206.10	983,990	3,175,891
1,200.40	53,596	11,765	1,206.20	996,200	3,274,901
1,200.50	66,778	17,784	1,206.30	1,008,410	3,375,131
1,200.60	79,959	25,120	1,206.40	1,020,620	3,476,583
1,200.70	93,140	33,775	1,206.50	1,032,830	3,579,255
1,200.80	106,321	43,748	1,206.60	1,045,039	3,683,149
1,200.90	119,503	55,040	1,206.70	1,057,249	3,788,263
1,201.00	132,684	67,649	1,206.80	1,069,459	3,894,599
1,201.10	151,219	81,844	1,206.90	1,081,669	4,002,155
1,201.20	169,754	97,893	1,207.00	1,093,879	4,110,933
1,201.30	188,288	115,795	1,207.10	1,105,322	4,220,893
1,201.40	206,823	135,550	1,207.20	1,116,765	4,331,997
1,201.50	225,358	157,160	1,207.30	1,128,209	4,444,246
1,201.60	243,893	180,622	1,207.40	1,139,652	4,557,639
1,201.70	262,428	205,938	1,207.50	1,151,095	4,672,176
1,201.80	280,962	233,108	1,207.60	1,162,538	4,787,858
1,201.90	299,497	262,131	1,207.70	1,173,981	4,904,684
1,202.00	318,032	293,007	1,207.80	1,185,425	5,022,654
1,202.10	342,517	326,034	1,207.90	1,196,868	5,141,769
1,202.20	367,002	361,510	1,208.00	1,208,311	5,262,028
1,202.30	391,487	399,435			
1,202.40	415,972	439,808			
1,202.50	440,457	482,629			
1,202.60	464,942	527,899			
1,202.70	489,427	575,618			
1,202.80	513,912	625,785			
1,202.90	538,397	678,400			
1,203.00	562,882	733,464			
1,203.10	579,261	790,571			
1,203.20	595,639	849,316			
1,203.30	612,018	909,699			
1,203.40	628,396	971,720			
1,203.50	644,775	1,035,378			
1,203.60	661,154	1,100,675			
1,203.70	677,532	1,167,609			

IA-340-8 - Existing Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Time span=0.00-480.00 hrs, dt=0.05 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: North-East Runoff Area=463.047 ac 0.00% Impervious Runoff Depth=4.26"
Flow Length=6,885' Slope=0.0327 '/' Tc=62.5 min CN=88 Runoff=1,099.06 cfs 164.410 af

Subcatchment 4S: South Drainage Area Runoff Area=164.153 ac 0.00% Impervious Runoff Depth=4.26"
Flow Length=5,631' Slope=0.0327 '/' Tc=53.2 min CN=88 Runoff=432.86 cfs 58.284 af

Pond 2P: Nelson Ave Road Peak Elev=1,199.08' Storage=61.919 af Inflow=1,176.39 cfs 222.693 af
Primary=284.15 cfs 190.223 af Secondary=423.75 cfs 32.469 af Outflow=707.90 cfs 222.693 af

Pond 3P: 200th Street Culvert Peak Elev=1,203.78' Storage=1,222,512 cf Inflow=432.86 cfs 58.284 af
Primary=85.79 cfs 58.283 af Secondary=0.00 cfs 0.000 af Outflow=85.79 cfs 58.283 af

Total Runoff Area = 627.200 ac Runoff Volume = 222.694 af Average Runoff Depth = 4.26"
100.00% Pervious = 627.200 ac 0.00% Impervious = 0.000 ac

IA-340-8 - Existing Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Subcatchment 1S: North-East Drainage Area

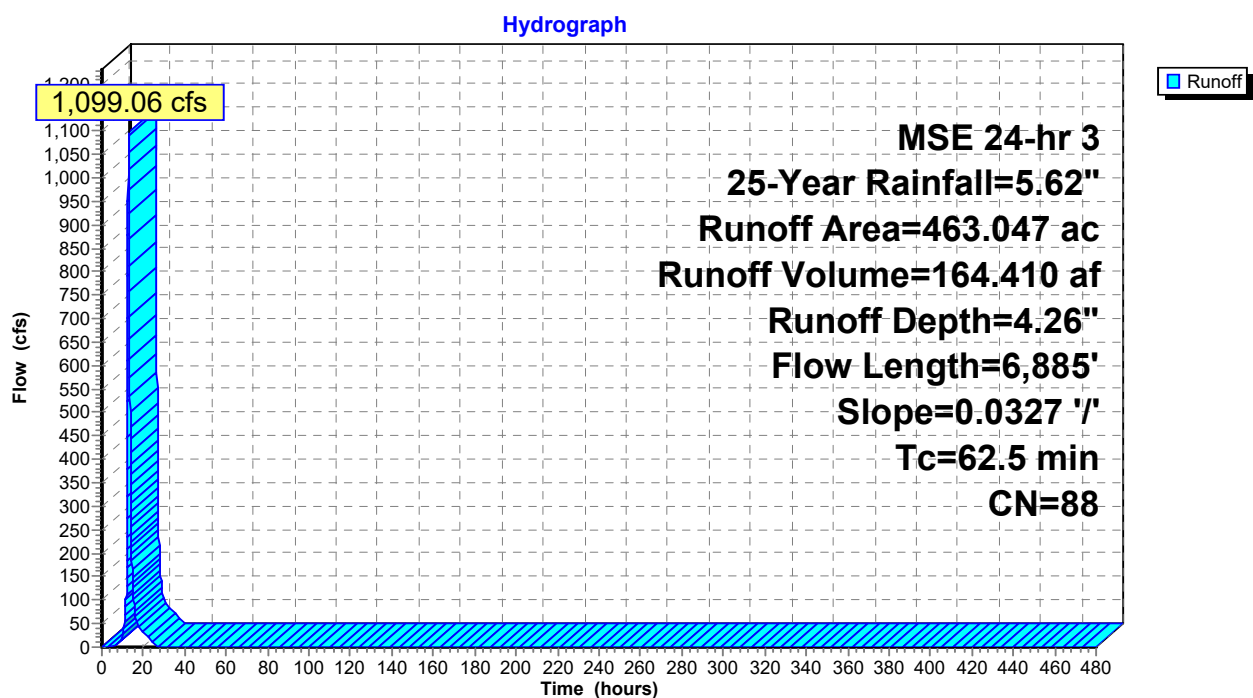
Runoff = 1,099.06 cfs @ 12.83 hrs, Volume= 164.410 af, Depth= 4.26"
Routed to Pond 2P : Nelson Ave Road Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 25-Year Rainfall=5.62"

Area (ac)	CN	Description
* 463.047	88	Weighted Average
463.047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	6,885	0.0327	1.84		Lag/CN Method,

Subcatchment 1S: North-East Drainage Area



IA-340-8 - Existing Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Subcatchment 1S: North-East Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	5.62	4.26	0.00
5.00	0.21	0.00	0.00	295.00	5.62	4.26	0.00
10.00	0.77	0.13	26.24	300.00	5.62	4.26	0.00
15.00	5.04	3.71	110.62	305.00	5.62	4.26	0.00
20.00	5.47	4.12	31.01	310.00	5.62	4.26	0.00
25.00	5.62	4.26	3.31	315.00	5.62	4.26	0.00
30.00	5.62	4.26	0.00	320.00	5.62	4.26	0.00
35.00	5.62	4.26	0.00	325.00	5.62	4.26	0.00
40.00	5.62	4.26	0.00	330.00	5.62	4.26	0.00
45.00	5.62	4.26	0.00	335.00	5.62	4.26	0.00
50.00	5.62	4.26	0.00	340.00	5.62	4.26	0.00
55.00	5.62	4.26	0.00	345.00	5.62	4.26	0.00
60.00	5.62	4.26	0.00	350.00	5.62	4.26	0.00
65.00	5.62	4.26	0.00	355.00	5.62	4.26	0.00
70.00	5.62	4.26	0.00	360.00	5.62	4.26	0.00
75.00	5.62	4.26	0.00	365.00	5.62	4.26	0.00
80.00	5.62	4.26	0.00	370.00	5.62	4.26	0.00
85.00	5.62	4.26	0.00	375.00	5.62	4.26	0.00
90.00	5.62	4.26	0.00	380.00	5.62	4.26	0.00
95.00	5.62	4.26	0.00	385.00	5.62	4.26	0.00
100.00	5.62	4.26	0.00	390.00	5.62	4.26	0.00
105.00	5.62	4.26	0.00	395.00	5.62	4.26	0.00
110.00	5.62	4.26	0.00	400.00	5.62	4.26	0.00
115.00	5.62	4.26	0.00	405.00	5.62	4.26	0.00
120.00	5.62	4.26	0.00	410.00	5.62	4.26	0.00
125.00	5.62	4.26	0.00	415.00	5.62	4.26	0.00
130.00	5.62	4.26	0.00	420.00	5.62	4.26	0.00
135.00	5.62	4.26	0.00	425.00	5.62	4.26	0.00
140.00	5.62	4.26	0.00	430.00	5.62	4.26	0.00
145.00	5.62	4.26	0.00	435.00	5.62	4.26	0.00
150.00	5.62	4.26	0.00	440.00	5.62	4.26	0.00
155.00	5.62	4.26	0.00	445.00	5.62	4.26	0.00
160.00	5.62	4.26	0.00	450.00	5.62	4.26	0.00
165.00	5.62	4.26	0.00	455.00	5.62	4.26	0.00
170.00	5.62	4.26	0.00	460.00	5.62	4.26	0.00
175.00	5.62	4.26	0.00	465.00	5.62	4.26	0.00
180.00	5.62	4.26	0.00	470.00	5.62	4.26	0.00
185.00	5.62	4.26	0.00	475.00	5.62	4.26	0.00
190.00	5.62	4.26	0.00	480.00	5.62	4.26	0.00
195.00	5.62	4.26	0.00				
200.00	5.62	4.26	0.00				
205.00	5.62	4.26	0.00				
210.00	5.62	4.26	0.00				
215.00	5.62	4.26	0.00				
220.00	5.62	4.26	0.00				
225.00	5.62	4.26	0.00				
230.00	5.62	4.26	0.00				
235.00	5.62	4.26	0.00				
240.00	5.62	4.26	0.00				
245.00	5.62	4.26	0.00				
250.00	5.62	4.26	0.00				
255.00	5.62	4.26	0.00				
260.00	5.62	4.26	0.00				
265.00	5.62	4.26	0.00				
270.00	5.62	4.26	0.00				
275.00	5.62	4.26	0.00				
280.00	5.62	4.26	0.00				
285.00	5.62	4.26	0.00				

IA-340-8 - Existing Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Subcatchment 4S: South Drainage Area

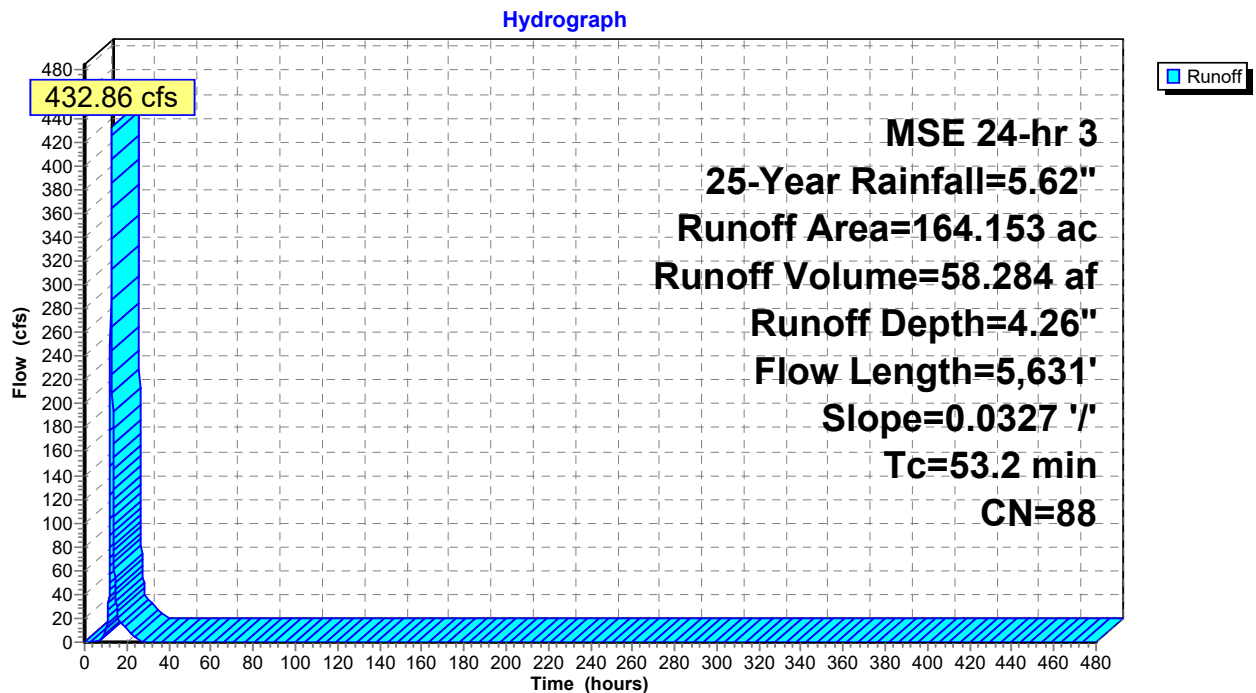
Runoff = 432.86 cfs @ 12.71 hrs, Volume= 58.284 af, Depth= 4.26"
Routed to Pond 3P : 200th Street Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 25-Year Rainfall=5.62"

Area (ac)	CN	Description
* 164.153	88	Weighted Average
164.153		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.2	5,631	0.0327	1.76		Lag/CN Method,

Subcatchment 4S: South Drainage Area



IA-340-8 - Existing Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Subcatchment 4S: South Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	5.62	4.26	0.00
5.00	0.21	0.00	0.00	295.00	5.62	4.26	0.00
10.00	0.77	0.13	10.38	300.00	5.62	4.26	0.00
15.00	5.04	3.71	34.23	305.00	5.62	4.26	0.00
20.00	5.47	4.12	10.75	310.00	5.62	4.26	0.00
25.00	5.62	4.26	0.74	315.00	5.62	4.26	0.00
30.00	5.62	4.26	0.00	320.00	5.62	4.26	0.00
35.00	5.62	4.26	0.00	325.00	5.62	4.26	0.00
40.00	5.62	4.26	0.00	330.00	5.62	4.26	0.00
45.00	5.62	4.26	0.00	335.00	5.62	4.26	0.00
50.00	5.62	4.26	0.00	340.00	5.62	4.26	0.00
55.00	5.62	4.26	0.00	345.00	5.62	4.26	0.00
60.00	5.62	4.26	0.00	350.00	5.62	4.26	0.00
65.00	5.62	4.26	0.00	355.00	5.62	4.26	0.00
70.00	5.62	4.26	0.00	360.00	5.62	4.26	0.00
75.00	5.62	4.26	0.00	365.00	5.62	4.26	0.00
80.00	5.62	4.26	0.00	370.00	5.62	4.26	0.00
85.00	5.62	4.26	0.00	375.00	5.62	4.26	0.00
90.00	5.62	4.26	0.00	380.00	5.62	4.26	0.00
95.00	5.62	4.26	0.00	385.00	5.62	4.26	0.00
100.00	5.62	4.26	0.00	390.00	5.62	4.26	0.00
105.00	5.62	4.26	0.00	395.00	5.62	4.26	0.00
110.00	5.62	4.26	0.00	400.00	5.62	4.26	0.00
115.00	5.62	4.26	0.00	405.00	5.62	4.26	0.00
120.00	5.62	4.26	0.00	410.00	5.62	4.26	0.00
125.00	5.62	4.26	0.00	415.00	5.62	4.26	0.00
130.00	5.62	4.26	0.00	420.00	5.62	4.26	0.00
135.00	5.62	4.26	0.00	425.00	5.62	4.26	0.00
140.00	5.62	4.26	0.00	430.00	5.62	4.26	0.00
145.00	5.62	4.26	0.00	435.00	5.62	4.26	0.00
150.00	5.62	4.26	0.00	440.00	5.62	4.26	0.00
155.00	5.62	4.26	0.00	445.00	5.62	4.26	0.00
160.00	5.62	4.26	0.00	450.00	5.62	4.26	0.00
165.00	5.62	4.26	0.00	455.00	5.62	4.26	0.00
170.00	5.62	4.26	0.00	460.00	5.62	4.26	0.00
175.00	5.62	4.26	0.00	465.00	5.62	4.26	0.00
180.00	5.62	4.26	0.00	470.00	5.62	4.26	0.00
185.00	5.62	4.26	0.00	475.00	5.62	4.26	0.00
190.00	5.62	4.26	0.00	480.00	5.62	4.26	0.00
195.00	5.62	4.26	0.00				
200.00	5.62	4.26	0.00				
205.00	5.62	4.26	0.00				
210.00	5.62	4.26	0.00				
215.00	5.62	4.26	0.00				
220.00	5.62	4.26	0.00				
225.00	5.62	4.26	0.00				
230.00	5.62	4.26	0.00				
235.00	5.62	4.26	0.00				
240.00	5.62	4.26	0.00				
245.00	5.62	4.26	0.00				
250.00	5.62	4.26	0.00				
255.00	5.62	4.26	0.00				
260.00	5.62	4.26	0.00				
265.00	5.62	4.26	0.00				
270.00	5.62	4.26	0.00				
275.00	5.62	4.26	0.00				
280.00	5.62	4.26	0.00				
285.00	5.62	4.26	0.00				

IA-340-8 - Existing Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Pond 2P: Nelson Ave Road Culvert

[79] Warning: Submerged Pond 3P Primary device # 1 by 0.64'

Inflow Area = 627.200 ac, 0.00% Impervious, Inflow Depth = 4.26" for 25-Year event
 Inflow = 1,176.39 cfs @ 12.83 hrs, Volume= 222.693 af
 Outflow = 707.90 cfs @ 13.39 hrs, Volume= 222.693 af, Atten= 40%, Lag= 33.5 min
 Primary = 284.15 cfs @ 13.39 hrs, Volume= 190.223 af
 Secondary = 423.75 cfs @ 13.39 hrs, Volume= 32.469 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,199.08' @ 13.39 hrs Surf.Area= 23.103 ac Storage= 61.919 af

Plug-Flow detention time= 74.2 min calculated for 222.693 af (100% of inflow)
 Center-of-Mass det. time= 74.2 min (939.2 - 865.0)

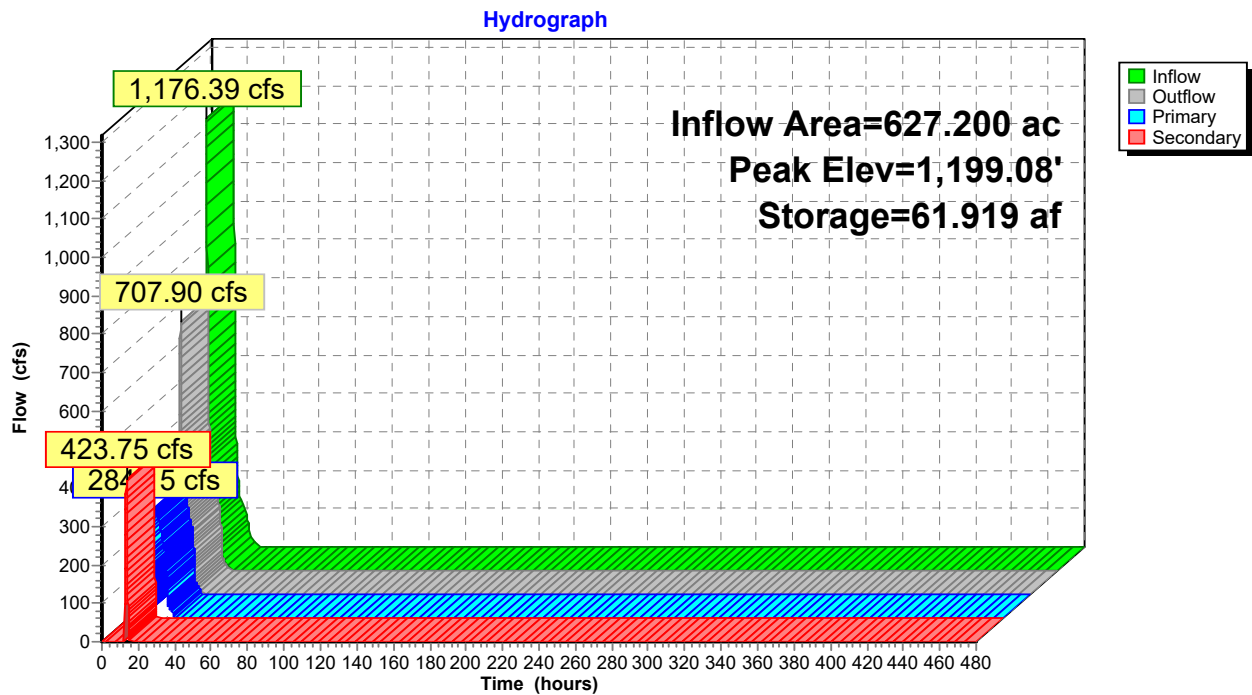
Volume	Invert	Avail.Storage	Storage Description
#1	1,190.00'	85.350 af	Existing Basin Storage (Prismatic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,190.00	0.000	0.000	0.000
1,191.00	0.001	0.001	0.001
1,192.00	0.087	0.044	0.044
1,193.00	0.739	0.413	0.457
1,194.00	3.027	1.883	2.340
1,195.00	5.591	4.309	6.649
1,196.00	8.908	7.249	13.899
1,197.00	12.904	10.906	24.805
1,198.00	17.378	15.141	39.946
1,199.00	22.695	20.036	59.982
1,200.00	28.040	25.367	85.350

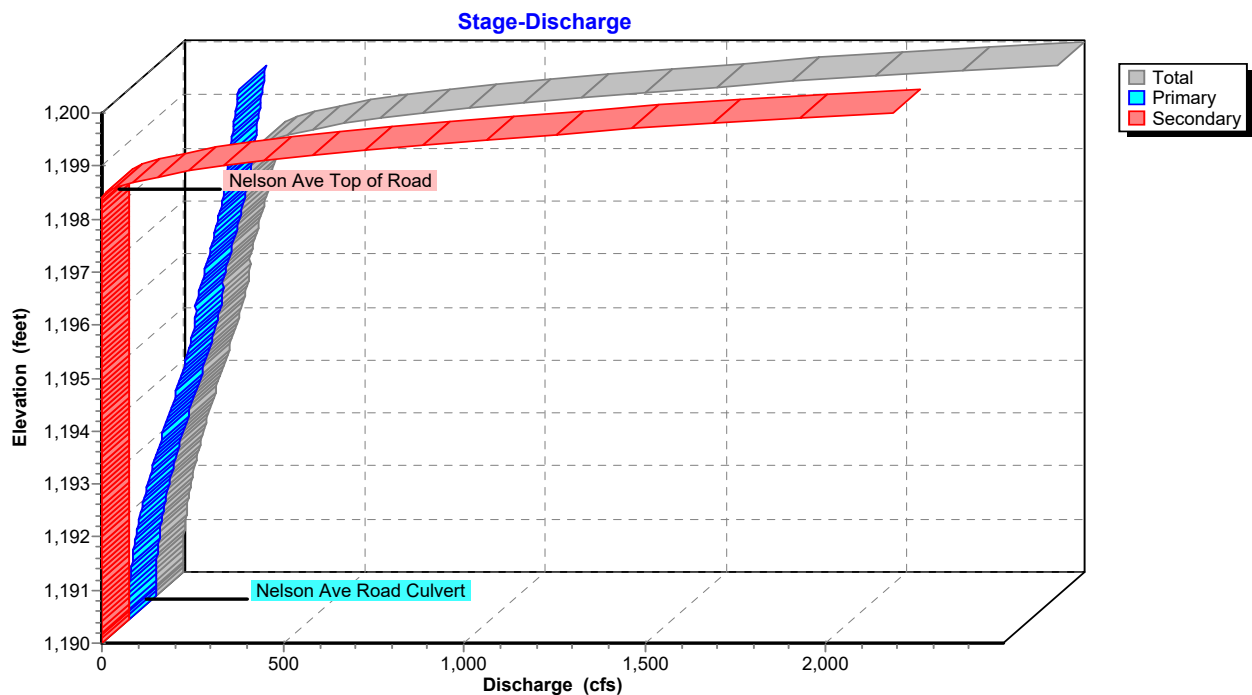
Device	Routing	Invert	Outlet Devices
#1	Primary	1,190.15'	91.0" W x 52.0" H Ellipse Nelson Ave Road Culvert L= 70.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 1,190.15' / 1,189.62' S= 0.0076 ' S= 0.0076 ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 25.81 sf
#2	Secondary	1,198.34'	Nelson Ave Top of Road, C= 3.27 Offset (feet) -257.75 -118.35 118.35 291.14 Elev. (feet) 1,200.00 1,198.34 1,198.64 1,200.00

Primary OutFlow Max=284.14 cfs @ 13.39 hrs HW=1,199.08' (Free Discharge)↑**1=Nelson Ave Road Culvert** (Inlet Controls 284.14 cfs @ 11.01 fps)**Secondary OutFlow** Max=421.79 cfs @ 13.39 hrs HW=1,199.08' (Free Discharge)↑**2=Nelson Ave Top of Road** (Weir Controls 421.79 cfs @ 1.73 fps)

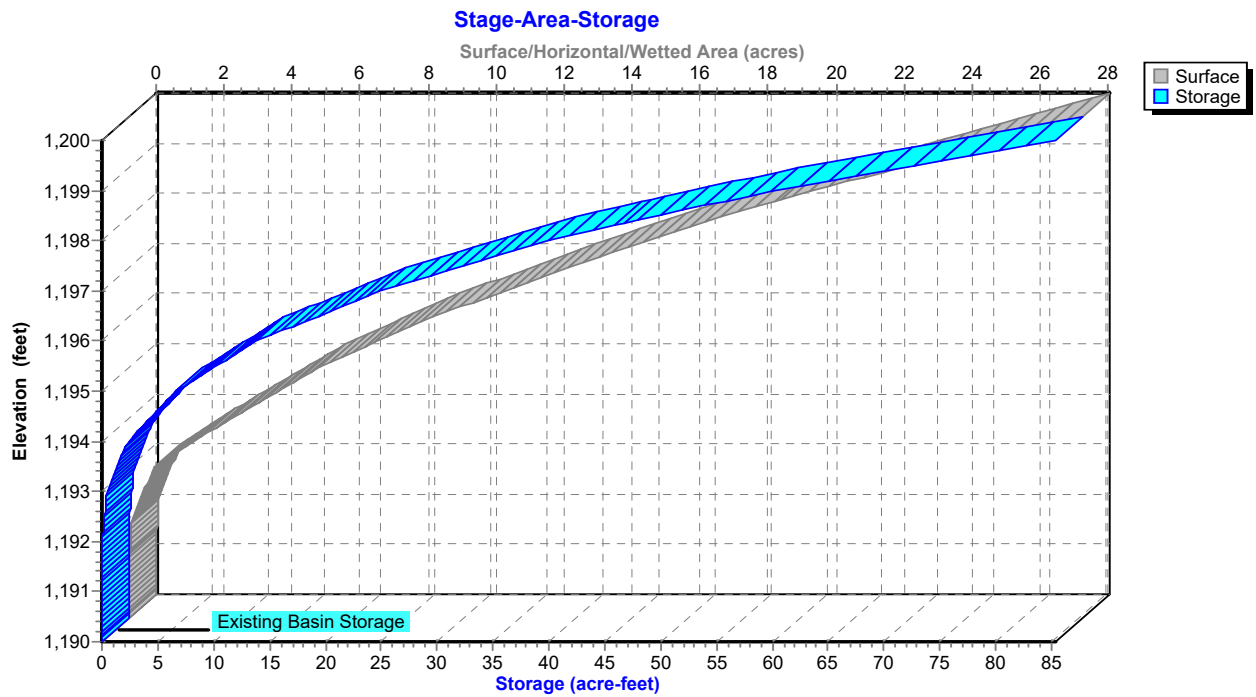
Pond 2P: Nelson Ave Road Culvert



Pond 2P: Nelson Ave Road Culvert



Pond 2P: Nelson Ave Road Culvert



IA-340-8 - Existing Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Pond 2P: Nelson Ave Road Culvert

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	1,190.00	0.00	0.00	0.00
10.00	36.53	0.065	1,192.05	33.70	33.70	0.00
20.00	78.29	6.805	1,195.02	162.52	162.52	0.00
30.00	0.00	0.000	1,190.15	0.00	0.00	0.00
40.00	0.00	0.000	1,190.15	0.00	0.00	0.00
50.00	0.00	0.000	1,190.15	0.00	0.00	0.00
60.00	0.00	0.000	1,190.15	0.00	0.00	0.00
70.00	0.00	0.000	1,190.15	0.00	0.00	0.00
80.00	0.00	0.000	1,190.15	0.00	0.00	0.00
90.00	0.00	0.000	1,190.15	0.00	0.00	0.00
100.00	0.00	0.000	1,190.15	0.00	0.00	0.00
110.00	0.00	0.000	1,190.15	0.00	0.00	0.00
120.00	0.00	0.000	1,190.15	0.00	0.00	0.00
130.00	0.00	0.000	1,190.15	0.00	0.00	0.00
140.00	0.00	0.000	1,190.15	0.00	0.00	0.00
150.00	0.00	0.000	1,190.15	0.00	0.00	0.00
160.00	0.00	0.000	1,190.15	0.00	0.00	0.00
170.00	0.00	0.000	1,190.15	0.00	0.00	0.00
180.00	0.00	0.000	1,190.15	0.00	0.00	0.00
190.00	0.00	0.000	1,190.15	0.00	0.00	0.00
200.00	0.00	0.000	1,190.15	0.00	0.00	0.00
210.00	0.00	0.000	1,190.15	0.00	0.00	0.00
220.00	0.00	0.000	1,190.15	0.00	0.00	0.00
230.00	0.00	0.000	1,190.15	0.00	0.00	0.00
240.00	0.00	0.000	1,190.15	0.00	0.00	0.00
250.00	0.00	0.000	1,190.15	0.00	0.00	0.00
260.00	0.00	0.000	1,190.15	0.00	0.00	0.00
270.00	0.00	0.000	1,190.15	0.00	0.00	0.00
280.00	0.00	0.000	1,190.15	0.00	0.00	0.00
290.00	0.00	0.000	1,190.15	0.00	0.00	0.00
300.00	0.00	0.000	1,190.15	0.00	0.00	0.00
310.00	0.00	0.000	1,190.15	0.00	0.00	0.00
320.00	0.00	0.000	1,190.15	0.00	0.00	0.00
330.00	0.00	0.000	1,190.15	0.00	0.00	0.00
340.00	0.00	0.000	1,190.15	0.00	0.00	0.00
350.00	0.00	0.000	1,190.15	0.00	0.00	0.00
360.00	0.00	0.000	1,190.15	0.00	0.00	0.00
370.00	0.00	0.000	1,190.15	0.00	0.00	0.00
380.00	0.00	0.000	1,190.15	0.00	0.00	0.00
390.00	0.00	0.000	1,190.15	0.00	0.00	0.00
400.00	0.00	0.000	1,190.15	0.00	0.00	0.00
410.00	0.00	0.000	1,190.15	0.00	0.00	0.00
420.00	0.00	0.000	1,190.15	0.00	0.00	0.00
430.00	0.00	0.000	1,190.15	0.00	0.00	0.00
440.00	0.00	0.000	1,190.15	0.00	0.00	0.00
450.00	0.00	0.000	1,190.15	0.00	0.00	0.00
460.00	0.00	0.000	1,190.15	0.00	0.00	0.00
470.00	0.00	0.000	1,190.15	0.00	0.00	0.00
480.00	0.00	0.000	1,190.15	0.00	0.00	0.00

IA-340-8 - Existing Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Stage-Discharge for Pond 2P: Nelson Ave Road Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,190.00	0.00	0.00	0.00	1,195.80	184.60	184.60	0.00
1,190.10	0.00	0.00	0.00	1,195.90	184.01	184.01	0.00
1,190.20	0.01	0.01	0.00	1,196.00	185.35	185.35	0.00
1,190.30	0.16	0.16	0.00	1,196.10	189.83	189.83	0.00
1,190.40	0.48	0.48	0.00	1,196.20	194.20	194.20	0.00
1,190.50	1.00	1.00	0.00	1,196.30	198.47	198.47	0.00
1,190.60	1.73	1.73	0.00	1,196.40	202.66	202.66	0.00
1,190.70	2.66	2.66	0.00	1,196.50	206.76	206.76	0.00
1,190.80	3.79	3.79	0.00	1,196.60	210.78	210.78	0.00
1,190.90	5.14	5.14	0.00	1,196.70	214.72	214.72	0.00
1,191.00	6.68	6.68	0.00	1,196.80	218.60	218.60	0.00
1,191.10	8.43	8.43	0.00	1,196.90	222.41	222.41	0.00
1,191.20	10.36	10.36	0.00	1,197.00	226.15	226.15	0.00
1,191.30	12.48	12.48	0.00	1,197.10	229.83	229.83	0.00
1,191.40	14.78	14.78	0.00	1,197.20	233.45	233.45	0.00
1,191.50	17.25	17.25	0.00	1,197.30	237.02	237.02	0.00
1,191.60	19.89	19.89	0.00	1,197.40	240.54	240.54	0.00
1,191.70	22.69	22.69	0.00	1,197.50	244.00	244.00	0.00
1,191.80	25.64	25.64	0.00	1,197.60	247.42	247.42	0.00
1,191.90	28.75	28.75	0.00	1,197.70	250.79	250.79	0.00
1,192.00	31.99	31.99	0.00	1,197.80	254.11	254.11	0.00
1,192.10	35.37	35.37	0.00	1,197.90	257.39	257.39	0.00
1,192.20	38.87	38.87	0.00	1,198.00	260.19	260.19	0.00
1,192.30	42.50	42.50	0.00	1,198.10	262.51	262.51	0.00
1,192.40	46.24	46.24	0.00	1,198.20	264.81	264.81	0.00
1,192.50	50.10	50.10	0.00	1,198.30	267.09	267.09	0.00
1,192.60	54.06	54.06	0.00	1,198.40	270.36	269.35	1.01
1,192.70	58.11	58.11	0.00	1,198.50	283.28	271.59	11.69
1,192.80	62.26	62.26	0.00	1,198.60	313.17	273.81	39.36
1,192.90	66.49	66.49	0.00	1,198.70	364.04	276.02	88.03
1,193.00	70.80	70.80	0.00	1,198.80	433.21	278.20	155.01
1,193.10	75.18	75.18	0.00	1,198.90	518.49	280.37	238.12
1,193.20	79.62	79.62	0.00	1,199.00	619.28	282.52	336.76
1,193.30	84.13	84.13	0.00	1,199.10	735.37	284.66	450.71
1,193.40	88.69	88.69	0.00	1,199.20	866.75	286.77	579.98
1,193.50	93.30	93.30	0.00	1,199.30	1,013.54	288.88	724.67
1,193.60	97.94	97.94	0.00	1,199.40	1,175.90	290.96	884.93
1,193.70	102.62	102.62	0.00	1,199.50	1,354.02	293.03	1,060.98
1,193.80	107.32	107.32	0.00	1,199.60	1,548.13	295.09	1,253.04
1,193.90	112.03	112.03	0.00	1,199.70	1,758.49	297.13	1,461.35
1,194.00	116.74	116.74	0.00	1,199.80	1,985.33	299.16	1,686.17
1,194.10	121.45	121.45	0.00	1,199.90	2,228.93	301.17	1,927.76
1,194.20	126.15	126.15	0.00	1,200.00	2,489.56	303.17	2,186.39
1,194.30	130.82	130.82	0.00				
1,194.40	135.46	135.46	0.00				
1,194.50	140.04	140.04	0.00				
1,194.60	144.56	144.56	0.00				
1,194.70	149.00	149.00	0.00				
1,194.80	153.35	153.35	0.00				
1,194.90	157.58	157.58	0.00				
1,195.00	161.68	161.68	0.00				
1,195.10	165.62	165.62	0.00				
1,195.20	169.37	169.37	0.00				
1,195.30	172.89	172.89	0.00				
1,195.40	176.14	176.14	0.00				
1,195.50	179.05	179.05	0.00				
1,195.60	181.55	181.55	0.00				
1,195.70	183.49	183.49	0.00				

IA-340-8 - Existing Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Stage-Area-Storage for Pond 2P: Nelson Ave Road Culvert

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,190.00	0.000	0.000	1,195.80	8.245	12.449
1,190.10	0.000	0.000	1,195.90	8.576	13.174
1,190.20	0.000	0.000	1,196.00	8.908	13.899
1,190.30	0.000	0.000	1,196.10	9.308	14.990
1,190.40	0.000	0.000	1,196.20	9.707	16.080
1,190.50	0.001	0.000	1,196.30	10.107	17.171
1,190.60	0.001	0.000	1,196.40	10.506	18.261
1,190.70	0.001	0.000	1,196.50	10.906	19.352
1,190.80	0.001	0.000	1,196.60	11.306	20.443
1,190.90	0.001	0.000	1,196.70	11.705	21.533
1,191.00	0.001	0.001	1,196.80	12.105	22.624
1,191.10	0.010	0.005	1,196.90	12.504	23.714
1,191.20	0.018	0.009	1,197.00	12.904	24.805
1,191.30	0.027	0.014	1,197.10	13.351	26.319
1,191.40	0.035	0.018	1,197.20	13.799	27.833
1,191.50	0.044	0.022	1,197.30	14.246	29.347
1,191.60	0.053	0.027	1,197.40	14.694	30.861
1,191.70	0.061	0.031	1,197.50	15.141	32.375
1,191.80	0.070	0.036	1,197.60	15.588	33.890
1,191.90	0.078	0.040	1,197.70	16.036	35.404
1,192.00	0.087	0.044	1,197.80	16.483	36.918
1,192.10	0.152	0.086	1,197.90	16.931	38.432
1,192.20	0.217	0.127	1,198.00	17.378	39.946
1,192.30	0.283	0.168	1,198.10	17.910	41.950
1,192.40	0.348	0.210	1,198.20	18.441	43.953
1,192.50	0.413	0.251	1,198.30	18.973	45.957
1,192.60	0.478	0.292	1,198.40	19.505	47.961
1,192.70	0.543	0.334	1,198.50	20.036	49.964
1,192.80	0.609	0.375	1,198.60	20.568	51.968
1,192.90	0.674	0.416	1,198.70	21.100	53.972
1,193.00	0.739	0.457	1,198.80	21.632	55.975
1,193.10	0.968	0.646	1,198.90	22.163	57.979
1,193.20	1.197	0.834	1,199.00	22.695	59.982
1,193.30	1.425	1.022	1,199.10	23.229	62.519
1,193.40	1.654	1.211	1,199.20	23.764	65.056
1,193.50	1.883	1.399	1,199.30	24.298	67.593
1,193.60	2.112	1.587	1,199.40	24.833	70.130
1,193.70	2.341	1.776	1,199.50	25.367	72.666
1,193.80	2.569	1.964	1,199.60	25.902	75.203
1,193.90	2.798	2.152	1,199.70	26.437	77.740
1,194.00	3.027	2.340	1,199.80	26.971	80.276
1,194.10	3.283	2.771	1,199.90	27.506	82.813
1,194.20	3.540	3.202	1,200.00	28.040	85.350
1,194.30	3.796	3.633			
1,194.40	4.053	4.064			
1,194.50	4.309	4.495			
1,194.60	4.565	4.926			
1,194.70	4.822	5.357			
1,194.80	5.078	5.788			
1,194.90	5.335	6.219			
1,195.00	5.591	6.649			
1,195.10	5.923	7.374			
1,195.20	6.254	8.099			
1,195.30	6.586	8.824			
1,195.40	6.918	9.549			
1,195.50	7.249	10.274			
1,195.60	7.581	10.999			
1,195.70	7.913	11.724			

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MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Pond 3P: 200th Street Culvert

Inflow Area = 164.153 ac, 0.00% Impervious, Inflow Depth = 4.26" for 25-Year event
 Inflow = 432.86 cfs @ 12.71 hrs, Volume= 58.284 af
 Outflow = 85.79 cfs @ 13.96 hrs, Volume= 58.283 af, Atten= 80%, Lag= 75.2 min
 Primary = 85.79 cfs @ 13.96 hrs, Volume= 58.283 af
 Routed to Pond 2P : Nelson Ave Road Culvert
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,203.78' @ 13.96 hrs Surf.Area= 690,677 sf Storage= 1,222,512 cf

Plug-Flow detention time= 134.4 min calculated for 58.283 af (100% of inflow)
 Center-of-Mass det. time= 134.4 min (957.9 - 823.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,198.00'	5,262,028 cf	Storage South of 200th Street Culvert (Prismatic) listed below (Recalculated)

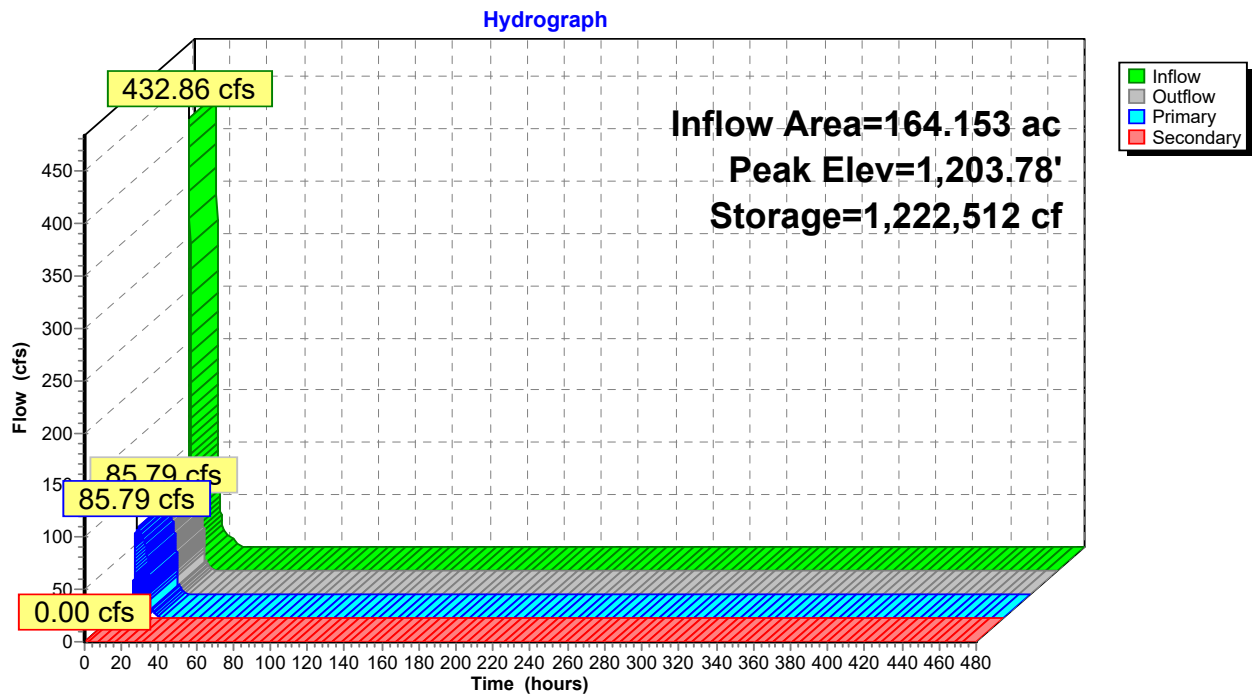
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,198.00	0	0	0
1,199.00	436	218	218
1,200.00	871	654	872
1,201.00	132,684	66,778	67,649
1,202.00	318,032	225,358	293,007
1,203.00	562,882	440,457	733,464
1,204.00	726,668	644,775	1,378,239
1,205.00	850,640	788,654	2,166,893
1,206.00	971,780	911,210	3,078,103
1,207.00	1,093,879	1,032,830	4,110,933
1,208.00	1,208,311	1,151,095	5,262,028

Device	Routing	Invert	Outlet Devices
#1	Primary	1,198.44'	48.0" W x 24.0" H Box 2'x4' Road Culvert L= 25.0' Box, 30-75° wingwalls, square crown, Ke= 0.400 Inlet / Outlet Invert= 1,198.44' / 1,198.44' S= 0.0000 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 8.00 sf
#2	Secondary	1,204.07'	200th St Top of Road, C= 3.27 Offset (feet) -234.90 169.69 318.45 441.99 Height (feet) 1.13 0.20 0.34 1.13

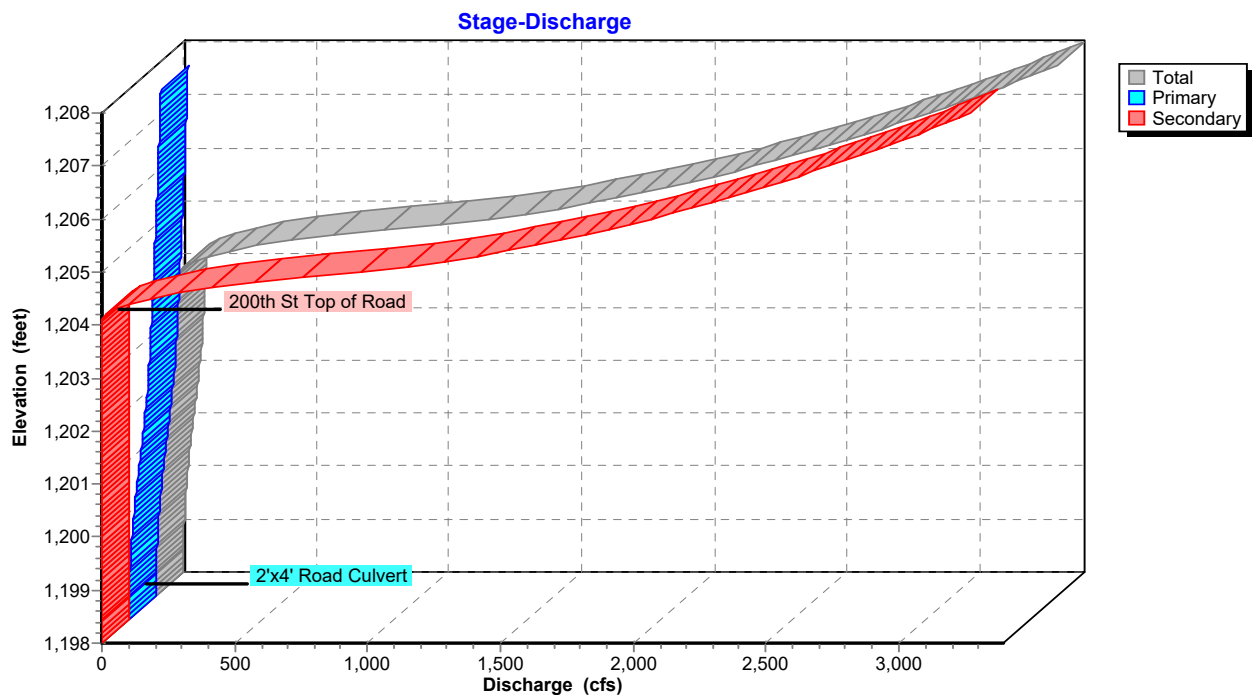
Primary OutFlow Max=85.79 cfs @ 13.96 hrs HW=1,203.78' (Free Discharge)
1=2'x4' Road Culvert (Inlet Controls 85.79 cfs @ 10.72 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,198.00' (Free Discharge)
2=200th St Top of Road (Controls 0.00 cfs)

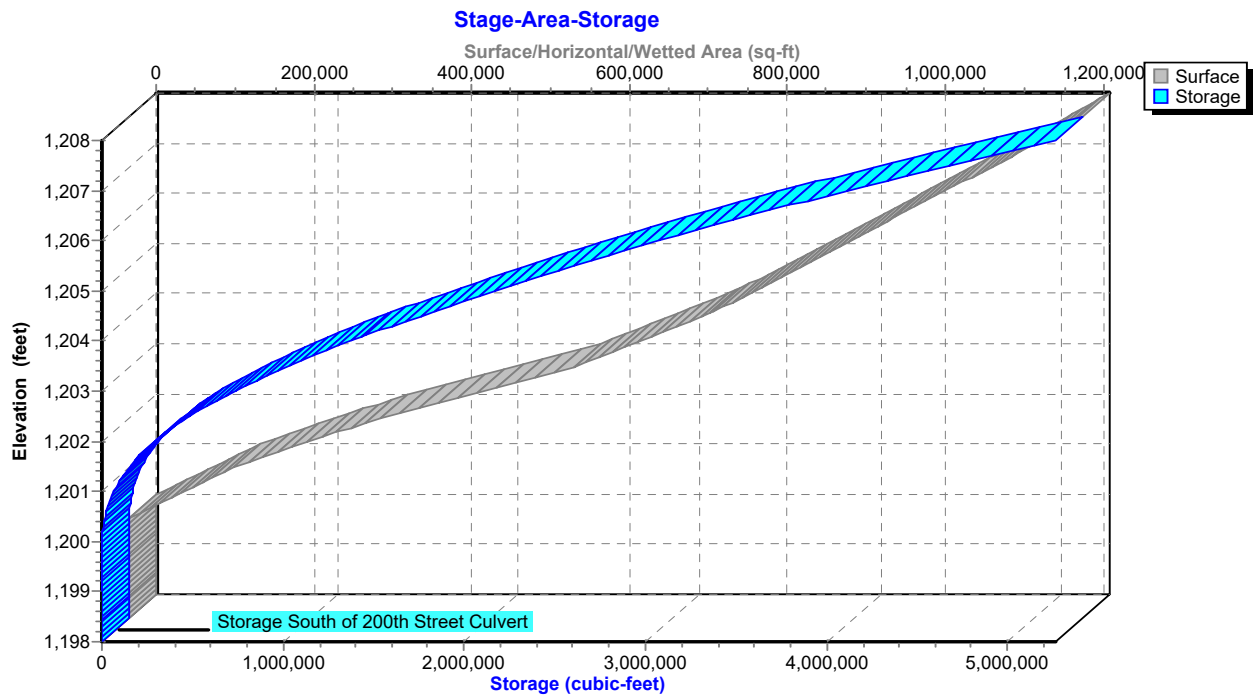
Pond 3P: 200th Street Culvert



Pond 3P: 200th Street Culvert



Pond 3P: 200th Street Culvert



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Hydrograph for Pond 3P: 200th Street Culvert

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	1,198.00	0.00	0.00	0.00
10.00	10.38	490	1,199.50	10.29	10.29	0.00
20.00	10.75	115,350	1,201.30	47.28	47.28	0.00
30.00	0.00	42	1,198.44	0.00	0.00	0.00
40.00	0.00	42	1,198.44	0.00	0.00	0.00
50.00	0.00	42	1,198.44	0.00	0.00	0.00
60.00	0.00	42	1,198.44	0.00	0.00	0.00
70.00	0.00	42	1,198.44	0.00	0.00	0.00
80.00	0.00	42	1,198.44	0.00	0.00	0.00
90.00	0.00	42	1,198.44	0.00	0.00	0.00
100.00	0.00	42	1,198.44	0.00	0.00	0.00
110.00	0.00	42	1,198.44	0.00	0.00	0.00
120.00	0.00	42	1,198.44	0.00	0.00	0.00
130.00	0.00	42	1,198.44	0.00	0.00	0.00
140.00	0.00	42	1,198.44	0.00	0.00	0.00
150.00	0.00	42	1,198.44	0.00	0.00	0.00
160.00	0.00	42	1,198.44	0.00	0.00	0.00
170.00	0.00	42	1,198.44	0.00	0.00	0.00
180.00	0.00	42	1,198.44	0.00	0.00	0.00
190.00	0.00	42	1,198.44	0.00	0.00	0.00
200.00	0.00	42	1,198.44	0.00	0.00	0.00
210.00	0.00	42	1,198.44	0.00	0.00	0.00
220.00	0.00	42	1,198.44	0.00	0.00	0.00
230.00	0.00	42	1,198.44	0.00	0.00	0.00
240.00	0.00	42	1,198.44	0.00	0.00	0.00
250.00	0.00	42	1,198.44	0.00	0.00	0.00
260.00	0.00	42	1,198.44	0.00	0.00	0.00
270.00	0.00	42	1,198.44	0.00	0.00	0.00
280.00	0.00	42	1,198.44	0.00	0.00	0.00
290.00	0.00	42	1,198.44	0.00	0.00	0.00
300.00	0.00	42	1,198.44	0.00	0.00	0.00
310.00	0.00	42	1,198.44	0.00	0.00	0.00
320.00	0.00	42	1,198.44	0.00	0.00	0.00
330.00	0.00	42	1,198.44	0.00	0.00	0.00
340.00	0.00	42	1,198.44	0.00	0.00	0.00
350.00	0.00	42	1,198.44	0.00	0.00	0.00
360.00	0.00	42	1,198.44	0.00	0.00	0.00
370.00	0.00	42	1,198.44	0.00	0.00	0.00
380.00	0.00	42	1,198.44	0.00	0.00	0.00
390.00	0.00	42	1,198.44	0.00	0.00	0.00
400.00	0.00	42	1,198.44	0.00	0.00	0.00
410.00	0.00	42	1,198.44	0.00	0.00	0.00
420.00	0.00	42	1,198.44	0.00	0.00	0.00
430.00	0.00	42	1,198.44	0.00	0.00	0.00
440.00	0.00	42	1,198.44	0.00	0.00	0.00
450.00	0.00	42	1,198.44	0.00	0.00	0.00
460.00	0.00	42	1,198.44	0.00	0.00	0.00
470.00	0.00	42	1,198.44	0.00	0.00	0.00
480.00	0.00	42	1,198.44	0.00	0.00	0.00

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Stage-Discharge for Pond 3P: 200th Street Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,198.00	0.00	0.00	0.00	1,203.80	85.99	85.99	0.00
1,198.10	0.00	0.00	0.00	1,203.90	86.98	86.98	0.00
1,198.20	0.00	0.00	0.00	1,204.00	87.95	87.95	0.00
1,198.30	0.00	0.00	0.00	1,204.10	89.23	88.92	0.31
1,198.40	0.00	0.00	0.00	1,204.20	101.81	89.88	11.94
1,198.50	0.06	0.06	0.00	1,204.30	137.64	90.82	46.82
1,198.60	0.42	0.42	0.00	1,204.40	195.65	91.76	103.89
1,198.70	1.02	1.02	0.00	1,204.50	276.51	92.69	183.83
1,198.80	1.79	1.79	0.00	1,204.60	381.60	93.60	288.00
1,198.90	2.70	2.70	0.00	1,204.70	512.40	94.51	417.89
1,199.00	3.73	3.73	0.00	1,204.80	670.38	95.41	574.97
1,199.10	4.86	4.86	0.00	1,204.90	856.97	96.30	760.67
1,199.20	6.10	6.10	0.00	1,205.00	1,073.55	97.18	976.36
1,199.30	7.42	7.42	0.00	1,205.10	1,249.00	98.06	1,150.94
1,199.40	8.83	8.83	0.00	1,205.20	1,390.14	98.93	1,291.21
1,199.50	10.31	10.31	0.00	1,205.30	1,514.47	99.79	1,414.68
1,199.60	11.87	11.87	0.00	1,205.40	1,627.47	100.64	1,526.84
1,199.70	13.50	13.50	0.00	1,205.50	1,732.02	101.48	1,630.54
1,199.80	15.20	15.20	0.00	1,205.60	1,829.89	102.32	1,727.57
1,199.90	16.96	16.96	0.00	1,205.70	1,922.28	103.15	1,819.13
1,200.00	18.79	18.79	0.00	1,205.80	2,010.06	103.97	1,906.08
1,200.10	20.68	20.68	0.00	1,205.90	2,093.88	104.79	1,989.09
1,200.20	22.63	22.63	0.00	1,206.00	2,174.26	105.60	2,068.66
1,200.30	24.63	24.63	0.00	1,206.10	2,251.61	106.41	2,145.20
1,200.40	26.69	26.69	0.00	1,206.20	2,326.24	107.21	2,219.03
1,200.50	28.81	28.81	0.00	1,206.30	2,398.43	108.00	2,290.43
1,200.60	30.97	30.97	0.00	1,206.40	2,468.42	108.79	2,359.64
1,200.70	33.19	33.19	0.00	1,206.50	2,536.40	109.57	2,426.83
1,200.80	35.46	35.46	0.00	1,206.60	2,602.53	110.34	2,492.19
1,200.90	37.78	37.78	0.00	1,206.70	2,666.97	111.11	2,555.85
1,201.00	40.15	40.15	0.00	1,206.80	2,729.83	111.88	2,617.95
1,201.10	42.56	42.56	0.00	1,206.90	2,791.23	112.64	2,678.59
1,201.20	44.51	44.51	0.00	1,207.00	2,851.27	113.39	2,737.87
1,201.30	47.35	47.35	0.00	1,207.10	2,910.03	114.14	2,795.89
1,201.40	50.03	50.03	0.00	1,207.20	2,967.60	114.89	2,852.72
1,201.50	52.57	52.57	0.00	1,207.30	3,024.05	115.63	2,908.42
1,201.60	54.99	54.99	0.00	1,207.40	3,079.44	116.36	2,963.07
1,201.70	57.31	57.31	0.00	1,207.50	3,133.82	117.09	3,016.73
1,201.80	59.55	59.55	0.00	1,207.60	3,187.26	117.82	3,069.44
1,201.90	61.70	61.70	0.00	1,207.70	3,239.80	118.54	3,121.26
1,202.00	63.77	63.77	0.00	1,207.80	3,291.48	119.26	3,172.22
1,202.10	65.79	65.79	0.00	1,207.90	3,342.35	119.97	3,222.37
1,202.20	67.74	67.74	0.00	1,208.00	3,392.44	120.68	3,271.76
1,202.30	69.43	69.43	0.00				
1,202.40	70.66	70.66	0.00				
1,202.50	71.87	71.87	0.00				
1,202.60	73.05	73.05	0.00				
1,202.70	74.22	74.22	0.00				
1,202.80	75.37	75.37	0.00				
1,202.90	76.50	76.50	0.00				
1,203.00	77.61	77.61	0.00				
1,203.10	78.71	78.71	0.00				
1,203.20	79.79	79.79	0.00				
1,203.30	80.86	80.86	0.00				
1,203.40	81.91	81.91	0.00				
1,203.50	82.95	82.95	0.00				
1,203.60	83.97	83.97	0.00				
1,203.70	84.99	84.99	0.00				

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Stage-Area-Storage for Pond 3P: 200th Street Culvert

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,198.00	0	0	1,203.80	693,911	1,236,181
1,198.10	44	2	1,203.90	710,289	1,306,391
1,198.20	87	9	1,204.00	726,668	1,378,239
1,198.30	131	20	1,204.10	739,065	1,451,526
1,198.40	174	35	1,204.20	751,462	1,526,052
1,198.50	218	55	1,204.30	763,860	1,601,818
1,198.60	262	78	1,204.40	776,257	1,678,824
1,198.70	305	107	1,204.50	788,654	1,757,070
1,198.80	349	140	1,204.60	801,051	1,836,555
1,198.90	392	177	1,204.70	813,448	1,917,280
1,199.00	436	218	1,204.80	825,846	1,999,244
1,199.10	479	264	1,204.90	838,243	2,082,449
1,199.20	523	314	1,205.00	850,640	2,166,893
1,199.30	566	368	1,205.10	862,754	2,252,563
1,199.40	610	427	1,205.20	874,868	2,339,444
1,199.50	654	490	1,205.30	886,982	2,427,536
1,199.60	697	558	1,205.40	899,096	2,516,840
1,199.70	741	630	1,205.50	911,210	2,607,356
1,199.80	784	706	1,205.60	923,324	2,699,082
1,199.90	828	787	1,205.70	935,438	2,792,020
1,200.00	871	872	1,205.80	947,552	2,886,170
1,200.10	14,052	1,618	1,205.90	959,666	2,981,531
1,200.20	27,234	3,682	1,206.00	971,780	3,078,103
1,200.30	40,415	7,064	1,206.10	983,990	3,175,891
1,200.40	53,596	11,765	1,206.20	996,200	3,274,901
1,200.50	66,778	17,784	1,206.30	1,008,410	3,375,131
1,200.60	79,959	25,120	1,206.40	1,020,620	3,476,583
1,200.70	93,140	33,775	1,206.50	1,032,830	3,579,255
1,200.80	106,321	43,748	1,206.60	1,045,039	3,683,149
1,200.90	119,503	55,040	1,206.70	1,057,249	3,788,263
1,201.00	132,684	67,649	1,206.80	1,069,459	3,894,599
1,201.10	151,219	81,844	1,206.90	1,081,669	4,002,155
1,201.20	169,754	97,893	1,207.00	1,093,879	4,110,933
1,201.30	188,288	115,795	1,207.10	1,105,322	4,220,893
1,201.40	206,823	135,550	1,207.20	1,116,765	4,331,997
1,201.50	225,358	157,160	1,207.30	1,128,209	4,444,246
1,201.60	243,893	180,622	1,207.40	1,139,652	4,557,639
1,201.70	262,428	205,938	1,207.50	1,151,095	4,672,176
1,201.80	280,962	233,108	1,207.60	1,162,538	4,787,858
1,201.90	299,497	262,131	1,207.70	1,173,981	4,904,684
1,202.00	318,032	293,007	1,207.80	1,185,425	5,022,654
1,202.10	342,517	326,034	1,207.90	1,196,868	5,141,769
1,202.20	367,002	361,510	1,208.00	1,208,311	5,262,028
1,202.30	391,487	399,435			
1,202.40	415,972	439,808			
1,202.50	440,457	482,629			
1,202.60	464,942	527,899			
1,202.70	489,427	575,618			
1,202.80	513,912	625,785			
1,202.90	538,397	678,400			
1,203.00	562,882	733,464			
1,203.10	579,261	790,571			
1,203.20	595,639	849,316			
1,203.30	612,018	909,699			
1,203.40	628,396	971,720			
1,203.50	644,775	1,035,378			
1,203.60	661,154	1,100,675			
1,203.70	677,532	1,167,609			

IA-340-8 - Existing Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Time span=0.00-480.00 hrs, dt=0.05 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: North-East Runoff Area=463.047 ac 0.00% Impervious Runoff Depth=6.19"
Flow Length=6,885' Slope=0.0327 '/' Tc=62.5 min CN=88 Runoff=1,572.93 cfs 238.753 af

Subcatchment 4S: South Drainage Area Runoff Area=164.153 ac 0.00% Impervious Runoff Depth=6.19"
Flow Length=5,631' Slope=0.0327 '/' Tc=53.2 min CN=88 Runoff=619.66 cfs 84.639 af

Pond 2P: Nelson Ave Road Peak Elev=1,199.48' Storage=72.150 af Inflow=1,658.66 cfs 313.629 af
Primary=292.61 cfs 228.067 af Secondary=1,025.16 cfs 85.562 af Outflow=1,317.78 cfs 313.628 af

Pond 3P: 200th Street Culvert Peak Elev=1,204.43' Storage=1,705,661 cf Inflow=619.66 cfs 84.639 af
Primary=92.08 cfs 74.876 af Secondary=131.45 cfs 9.763 af Outflow=223.53 cfs 84.638 af

Total Runoff Area = 627.200 ac Runoff Volume = 323.392 af Average Runoff Depth = 6.19"
100.00% Pervious = 627.200 ac 0.00% Impervious = 0.000 ac

IA-340-8 - Existing Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Subcatchment 1S: North-East Drainage Area

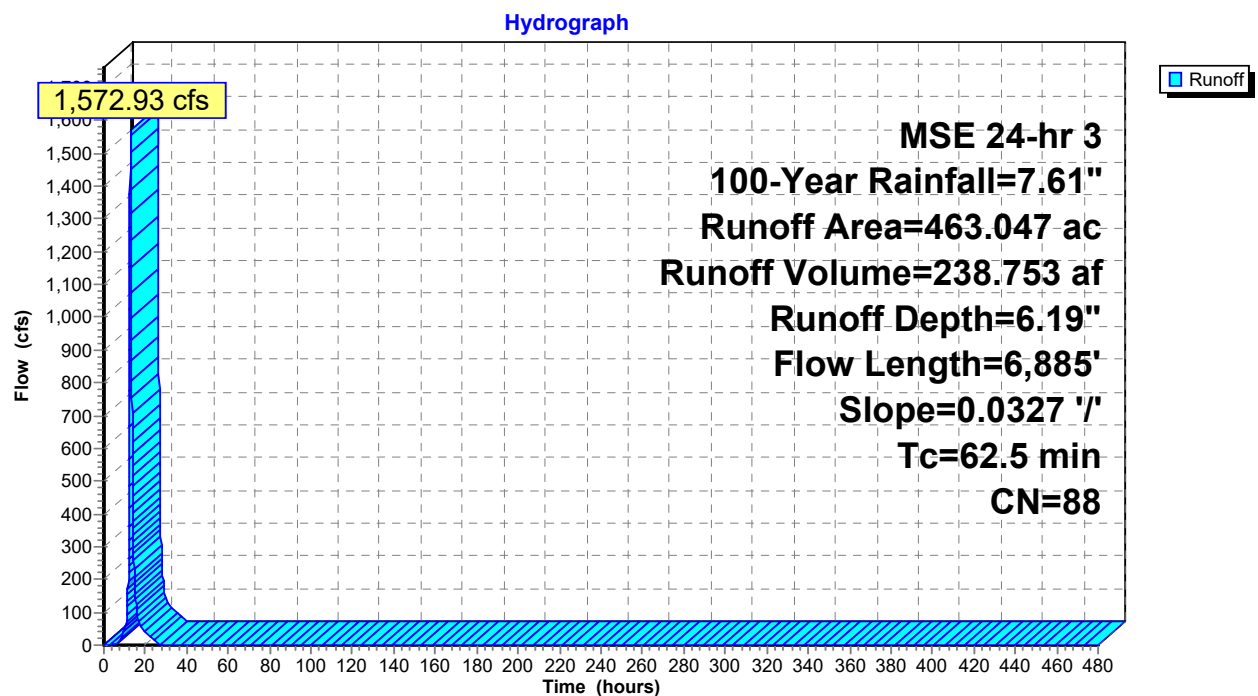
Runoff = 1,572.93 cfs @ 12.82 hrs, Volume= 238.753 af, Depth= 6.19"
Routed to Pond 2P : Nelson Ave Road Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.61"

Area (ac)	CN	Description
* 463.047	88	Weighted Average
463.047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	6,885	0.0327	1.84		Lag/CN Method,

Subcatchment 1S: North-East Drainage Area



IA-340-8 - Existing Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Subcatchment 1S: North-East Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	7.61	6.19	0.00
5.00	0.29	0.00	0.00	295.00	7.61	6.19	0.00
10.00	1.05	0.28	49.13	300.00	7.61	6.19	0.00
15.00	6.83	5.42	153.52	305.00	7.61	6.19	0.00
20.00	7.41	5.99	42.77	310.00	7.61	6.19	0.00
25.00	7.61	6.19	4.56	315.00	7.61	6.19	0.00
30.00	7.61	6.19	0.00	320.00	7.61	6.19	0.00
35.00	7.61	6.19	0.00	325.00	7.61	6.19	0.00
40.00	7.61	6.19	0.00	330.00	7.61	6.19	0.00
45.00	7.61	6.19	0.00	335.00	7.61	6.19	0.00
50.00	7.61	6.19	0.00	340.00	7.61	6.19	0.00
55.00	7.61	6.19	0.00	345.00	7.61	6.19	0.00
60.00	7.61	6.19	0.00	350.00	7.61	6.19	0.00
65.00	7.61	6.19	0.00	355.00	7.61	6.19	0.00
70.00	7.61	6.19	0.00	360.00	7.61	6.19	0.00
75.00	7.61	6.19	0.00	365.00	7.61	6.19	0.00
80.00	7.61	6.19	0.00	370.00	7.61	6.19	0.00
85.00	7.61	6.19	0.00	375.00	7.61	6.19	0.00
90.00	7.61	6.19	0.00	380.00	7.61	6.19	0.00
95.00	7.61	6.19	0.00	385.00	7.61	6.19	0.00
100.00	7.61	6.19	0.00	390.00	7.61	6.19	0.00
105.00	7.61	6.19	0.00	395.00	7.61	6.19	0.00
110.00	7.61	6.19	0.00	400.00	7.61	6.19	0.00
115.00	7.61	6.19	0.00	405.00	7.61	6.19	0.00
120.00	7.61	6.19	0.00	410.00	7.61	6.19	0.00
125.00	7.61	6.19	0.00	415.00	7.61	6.19	0.00
130.00	7.61	6.19	0.00	420.00	7.61	6.19	0.00
135.00	7.61	6.19	0.00	425.00	7.61	6.19	0.00
140.00	7.61	6.19	0.00	430.00	7.61	6.19	0.00
145.00	7.61	6.19	0.00	435.00	7.61	6.19	0.00
150.00	7.61	6.19	0.00	440.00	7.61	6.19	0.00
155.00	7.61	6.19	0.00	445.00	7.61	6.19	0.00
160.00	7.61	6.19	0.00	450.00	7.61	6.19	0.00
165.00	7.61	6.19	0.00	455.00	7.61	6.19	0.00
170.00	7.61	6.19	0.00	460.00	7.61	6.19	0.00
175.00	7.61	6.19	0.00	465.00	7.61	6.19	0.00
180.00	7.61	6.19	0.00	470.00	7.61	6.19	0.00
185.00	7.61	6.19	0.00	475.00	7.61	6.19	0.00
190.00	7.61	6.19	0.00	480.00	7.61	6.19	0.00
195.00	7.61	6.19	0.00				
200.00	7.61	6.19	0.00				
205.00	7.61	6.19	0.00				
210.00	7.61	6.19	0.00				
215.00	7.61	6.19	0.00				
220.00	7.61	6.19	0.00				
225.00	7.61	6.19	0.00				
230.00	7.61	6.19	0.00				
235.00	7.61	6.19	0.00				
240.00	7.61	6.19	0.00				
245.00	7.61	6.19	0.00				
250.00	7.61	6.19	0.00				
255.00	7.61	6.19	0.00				
260.00	7.61	6.19	0.00				
265.00	7.61	6.19	0.00				
270.00	7.61	6.19	0.00				
275.00	7.61	6.19	0.00				
280.00	7.61	6.19	0.00				
285.00	7.61	6.19	0.00				

IA-340-8 - Existing Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Subcatchment 4S: South Drainage Area

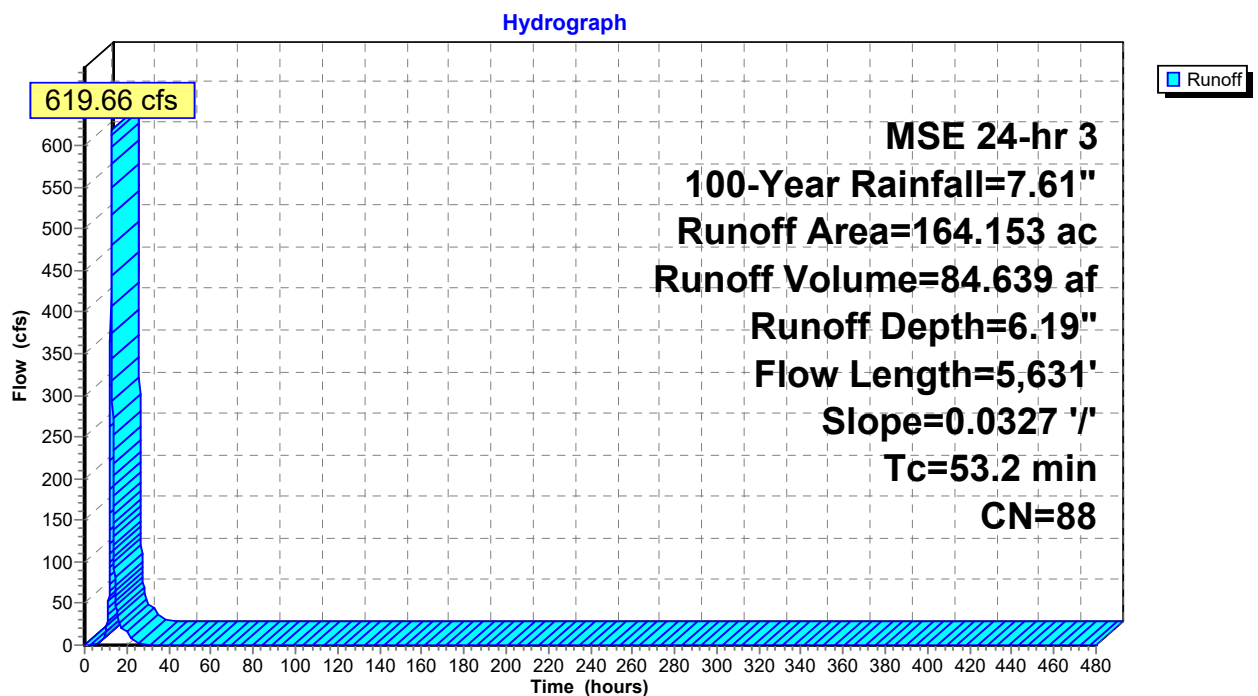
Runoff = 619.66 cfs @ 12.70 hrs, Volume= 84.639 af, Depth= 6.19"
Routed to Pond 3P : 200th Street Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.61"

Area (ac)	CN	Description
* 164.153	88	Weighted Average
164.153		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.2	5,631	0.0327	1.76		Lag/CN Method,

Subcatchment 4S: South Drainage Area



IA-340-8 - Existing Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Subcatchment 4S: South Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	7.61	6.19	0.00
5.00	0.29	0.00	0.00	295.00	7.61	6.19	0.00
10.00	1.05	0.28	19.21	300.00	7.61	6.19	0.00
15.00	6.83	5.42	47.39	305.00	7.61	6.19	0.00
20.00	7.41	5.99	14.82	310.00	7.61	6.19	0.00
25.00	7.61	6.19	1.02	315.00	7.61	6.19	0.00
30.00	7.61	6.19	0.00	320.00	7.61	6.19	0.00
35.00	7.61	6.19	0.00	325.00	7.61	6.19	0.00
40.00	7.61	6.19	0.00	330.00	7.61	6.19	0.00
45.00	7.61	6.19	0.00	335.00	7.61	6.19	0.00
50.00	7.61	6.19	0.00	340.00	7.61	6.19	0.00
55.00	7.61	6.19	0.00	345.00	7.61	6.19	0.00
60.00	7.61	6.19	0.00	350.00	7.61	6.19	0.00
65.00	7.61	6.19	0.00	355.00	7.61	6.19	0.00
70.00	7.61	6.19	0.00	360.00	7.61	6.19	0.00
75.00	7.61	6.19	0.00	365.00	7.61	6.19	0.00
80.00	7.61	6.19	0.00	370.00	7.61	6.19	0.00
85.00	7.61	6.19	0.00	375.00	7.61	6.19	0.00
90.00	7.61	6.19	0.00	380.00	7.61	6.19	0.00
95.00	7.61	6.19	0.00	385.00	7.61	6.19	0.00
100.00	7.61	6.19	0.00	390.00	7.61	6.19	0.00
105.00	7.61	6.19	0.00	395.00	7.61	6.19	0.00
110.00	7.61	6.19	0.00	400.00	7.61	6.19	0.00
115.00	7.61	6.19	0.00	405.00	7.61	6.19	0.00
120.00	7.61	6.19	0.00	410.00	7.61	6.19	0.00
125.00	7.61	6.19	0.00	415.00	7.61	6.19	0.00
130.00	7.61	6.19	0.00	420.00	7.61	6.19	0.00
135.00	7.61	6.19	0.00	425.00	7.61	6.19	0.00
140.00	7.61	6.19	0.00	430.00	7.61	6.19	0.00
145.00	7.61	6.19	0.00	435.00	7.61	6.19	0.00
150.00	7.61	6.19	0.00	440.00	7.61	6.19	0.00
155.00	7.61	6.19	0.00	445.00	7.61	6.19	0.00
160.00	7.61	6.19	0.00	450.00	7.61	6.19	0.00
165.00	7.61	6.19	0.00	455.00	7.61	6.19	0.00
170.00	7.61	6.19	0.00	460.00	7.61	6.19	0.00
175.00	7.61	6.19	0.00	465.00	7.61	6.19	0.00
180.00	7.61	6.19	0.00	470.00	7.61	6.19	0.00
185.00	7.61	6.19	0.00	475.00	7.61	6.19	0.00
190.00	7.61	6.19	0.00	480.00	7.61	6.19	0.00
195.00	7.61	6.19	0.00				
200.00	7.61	6.19	0.00				
205.00	7.61	6.19	0.00				
210.00	7.61	6.19	0.00				
215.00	7.61	6.19	0.00				
220.00	7.61	6.19	0.00				
225.00	7.61	6.19	0.00				
230.00	7.61	6.19	0.00				
235.00	7.61	6.19	0.00				
240.00	7.61	6.19	0.00				
245.00	7.61	6.19	0.00				
250.00	7.61	6.19	0.00				
255.00	7.61	6.19	0.00				
260.00	7.61	6.19	0.00				
265.00	7.61	6.19	0.00				
270.00	7.61	6.19	0.00				
275.00	7.61	6.19	0.00				
280.00	7.61	6.19	0.00				
285.00	7.61	6.19	0.00				

IA-340-8 - Existing Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Pond 2P: Nelson Ave Road Culvert

[79] Warning: Submerged Pond 3P Primary device # 1 by 1.04'

Inflow Area = 627.200 ac, 0.00% Impervious, Inflow Depth = 6.00" for 100-Year event
 Inflow = 1,658.66 cfs @ 12.83 hrs, Volume= 313.629 af
 Outflow = 1,317.78 cfs @ 13.16 hrs, Volume= 313.628 af, Atten= 21%, Lag= 19.9 min
 Primary = 292.61 cfs @ 13.16 hrs, Volume= 228.067 af
 Secondary = 1,025.16 cfs @ 13.16 hrs, Volume= 85.562 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,199.48' @ 13.16 hrs Surf.Area= 25.259 ac Storage= 72.150 af

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

Center-of-Mass det. time= 65.9 min (928.8 - 862.9)

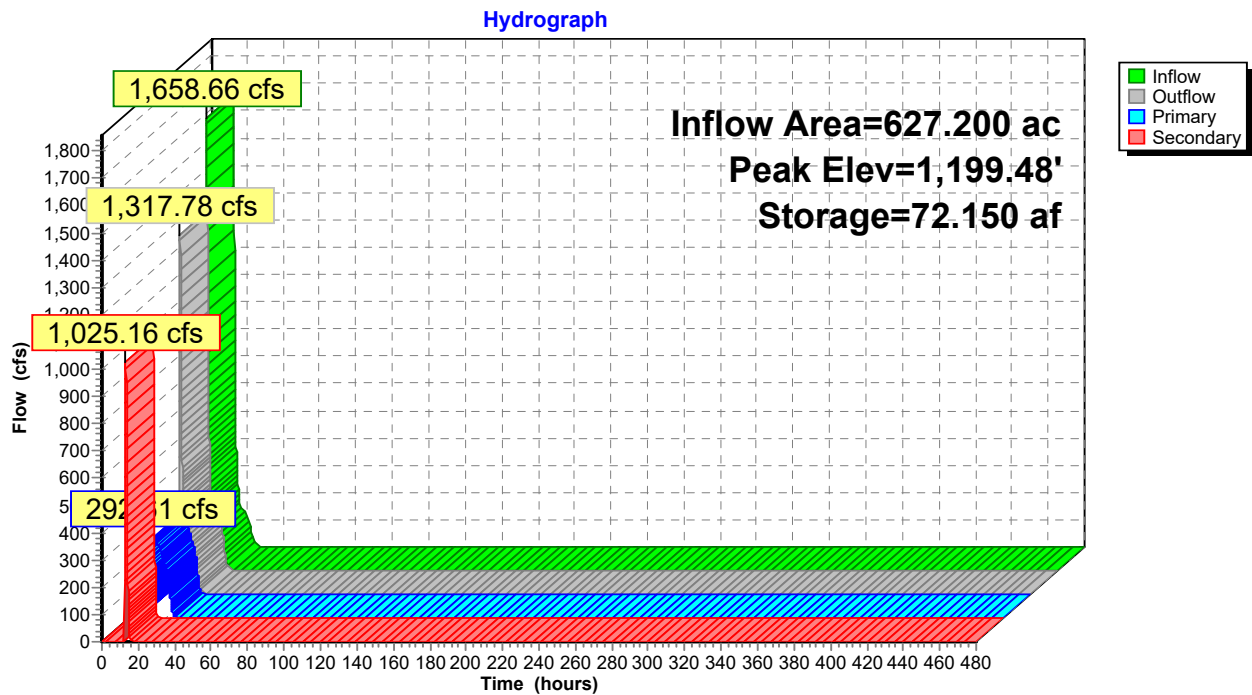
Volume	Invert	Avail.Storage	Storage Description
#1	1,190.00'	85.350 af	Existing Basin Storage (Prismatic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,190.00	0.000	0.000	0.000
1,191.00	0.001	0.001	0.001
1,192.00	0.087	0.044	0.044
1,193.00	0.739	0.413	0.457
1,194.00	3.027	1.883	2.340
1,195.00	5.591	4.309	6.649
1,196.00	8.908	7.249	13.899
1,197.00	12.904	10.906	24.805
1,198.00	17.378	15.141	39.946
1,199.00	22.695	20.036	59.982
1,200.00	28.040	25.367	85.350

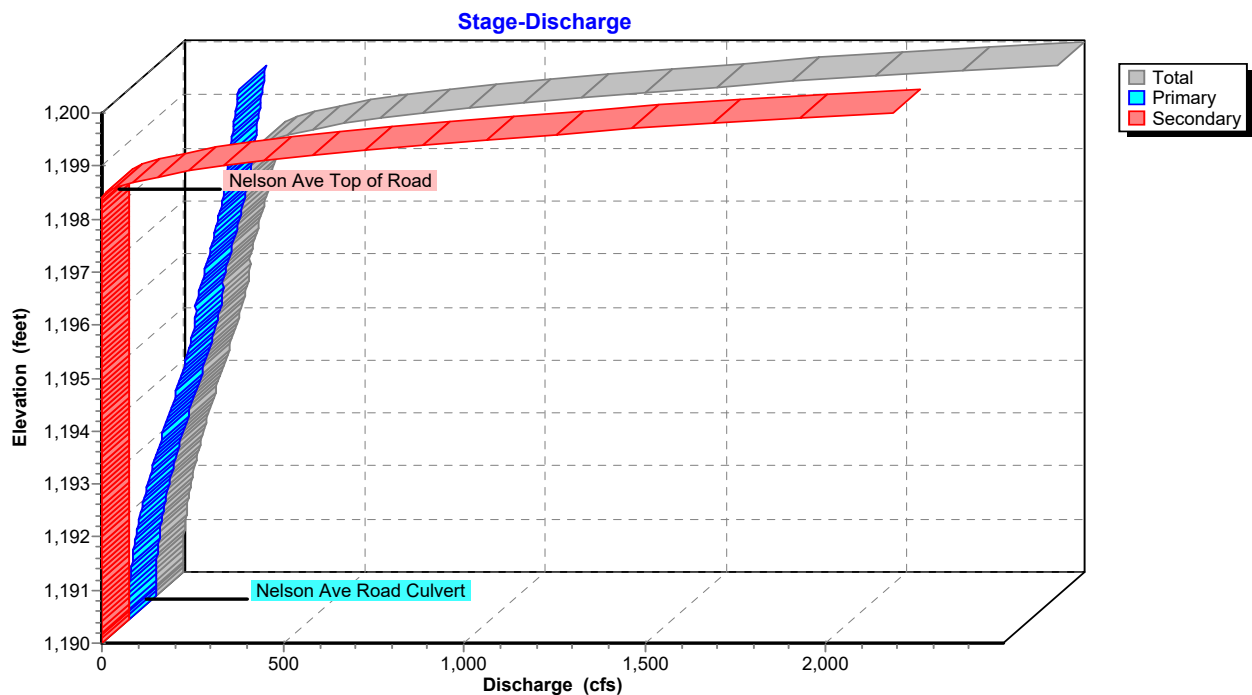
Device	Routing	Invert	Outlet Devices
#1	Primary	1,190.15'	91.0" W x 52.0" H Ellipse Nelson Ave Road Culvert L= 70.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 1,190.15' / 1,189.62' S= 0.0076 ' S= 0.0076 ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 25.81 sf
#2	Secondary	1,198.34'	Nelson Ave Top of Road, C= 3.27 Offset (feet) -257.75 -118.35 118.35 291.14 Elev. (feet) 1,200.00 1,198.34 1,198.64 1,200.00

Primary OutFlow Max=292.59 cfs @ 13.16 hrs HW=1,199.48' (Free Discharge)↑**1=Nelson Ave Road Culvert** (Inlet Controls 292.59 cfs @ 11.34 fps)**Secondary OutFlow** Max=1,022.17 cfs @ 13.16 hrs HW=1,199.48' (Free Discharge)↑**2=Nelson Ave Top of Road** (Weir Controls 1,022.17 cfs @ 2.19 fps)

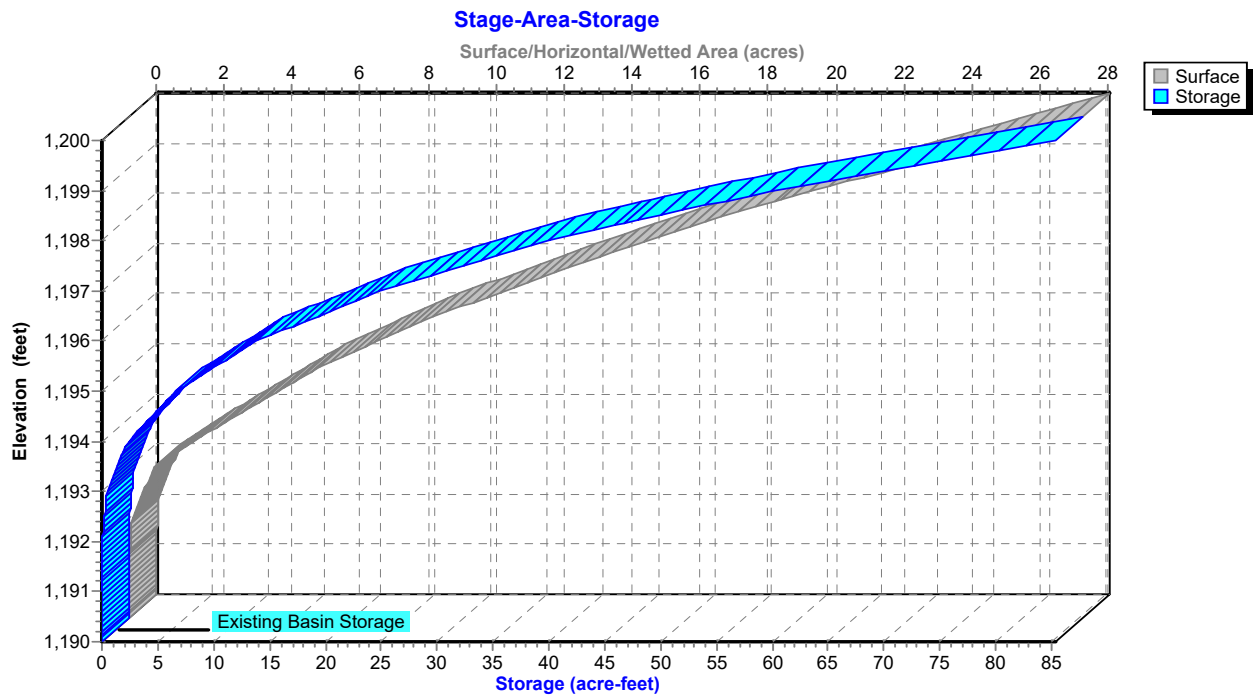
Pond 2P: Nelson Ave Road Culvert



Pond 2P: Nelson Ave Road Culvert



Pond 2P: Nelson Ave Road Culvert



IA-340-8 - Existing Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Pond 2P: Nelson Ave Road Culvert

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	1,190.00	0.00	0.00	0.00
10.00	67.99	0.374	1,192.80	62.16	62.16	0.00
20.00	113.17	14.317	1,196.04	187.07	187.07	0.00
30.00	0.00	0.000	1,190.15	0.00	0.00	0.00
40.00	0.00	0.000	1,190.15	0.00	0.00	0.00
50.00	0.00	0.000	1,190.15	0.00	0.00	0.00
60.00	0.00	0.000	1,190.15	0.00	0.00	0.00
70.00	0.00	0.000	1,190.15	0.00	0.00	0.00
80.00	0.00	0.000	1,190.15	0.00	0.00	0.00
90.00	0.00	0.000	1,190.15	0.00	0.00	0.00
100.00	0.00	0.000	1,190.15	0.00	0.00	0.00
110.00	0.00	0.000	1,190.15	0.00	0.00	0.00
120.00	0.00	0.000	1,190.15	0.00	0.00	0.00
130.00	0.00	0.000	1,190.15	0.00	0.00	0.00
140.00	0.00	0.000	1,190.15	0.00	0.00	0.00
150.00	0.00	0.000	1,190.15	0.00	0.00	0.00
160.00	0.00	0.000	1,190.15	0.00	0.00	0.00
170.00	0.00	0.000	1,190.15	0.00	0.00	0.00
180.00	0.00	0.000	1,190.15	0.00	0.00	0.00
190.00	0.00	0.000	1,190.15	0.00	0.00	0.00
200.00	0.00	0.000	1,190.15	0.00	0.00	0.00
210.00	0.00	0.000	1,190.15	0.00	0.00	0.00
220.00	0.00	0.000	1,190.15	0.00	0.00	0.00
230.00	0.00	0.000	1,190.15	0.00	0.00	0.00
240.00	0.00	0.000	1,190.15	0.00	0.00	0.00
250.00	0.00	0.000	1,190.15	0.00	0.00	0.00
260.00	0.00	0.000	1,190.15	0.00	0.00	0.00
270.00	0.00	0.000	1,190.15	0.00	0.00	0.00
280.00	0.00	0.000	1,190.15	0.00	0.00	0.00
290.00	0.00	0.000	1,190.15	0.00	0.00	0.00
300.00	0.00	0.000	1,190.15	0.00	0.00	0.00
310.00	0.00	0.000	1,190.15	0.00	0.00	0.00
320.00	0.00	0.000	1,190.15	0.00	0.00	0.00
330.00	0.00	0.000	1,190.15	0.00	0.00	0.00
340.00	0.00	0.000	1,190.15	0.00	0.00	0.00
350.00	0.00	0.000	1,190.15	0.00	0.00	0.00
360.00	0.00	0.000	1,190.15	0.00	0.00	0.00
370.00	0.00	0.000	1,190.15	0.00	0.00	0.00
380.00	0.00	0.000	1,190.15	0.00	0.00	0.00
390.00	0.00	0.000	1,190.15	0.00	0.00	0.00
400.00	0.00	0.000	1,190.15	0.00	0.00	0.00
410.00	0.00	0.000	1,190.15	0.00	0.00	0.00
420.00	0.00	0.000	1,190.15	0.00	0.00	0.00
430.00	0.00	0.000	1,190.15	0.00	0.00	0.00
440.00	0.00	0.000	1,190.15	0.00	0.00	0.00
450.00	0.00	0.000	1,190.15	0.00	0.00	0.00
460.00	0.00	0.000	1,190.15	0.00	0.00	0.00
470.00	0.00	0.000	1,190.15	0.00	0.00	0.00
480.00	0.00	0.000	1,190.15	0.00	0.00	0.00

IA-340-8 - Existing Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Stage-Discharge for Pond 2P: Nelson Ave Road Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,190.00	0.00	0.00	0.00	1,195.80	184.60	184.60	0.00
1,190.10	0.00	0.00	0.00	1,195.90	184.01	184.01	0.00
1,190.20	0.01	0.01	0.00	1,196.00	185.35	185.35	0.00
1,190.30	0.16	0.16	0.00	1,196.10	189.83	189.83	0.00
1,190.40	0.48	0.48	0.00	1,196.20	194.20	194.20	0.00
1,190.50	1.00	1.00	0.00	1,196.30	198.47	198.47	0.00
1,190.60	1.73	1.73	0.00	1,196.40	202.66	202.66	0.00
1,190.70	2.66	2.66	0.00	1,196.50	206.76	206.76	0.00
1,190.80	3.79	3.79	0.00	1,196.60	210.78	210.78	0.00
1,190.90	5.14	5.14	0.00	1,196.70	214.72	214.72	0.00
1,191.00	6.68	6.68	0.00	1,196.80	218.60	218.60	0.00
1,191.10	8.43	8.43	0.00	1,196.90	222.41	222.41	0.00
1,191.20	10.36	10.36	0.00	1,197.00	226.15	226.15	0.00
1,191.30	12.48	12.48	0.00	1,197.10	229.83	229.83	0.00
1,191.40	14.78	14.78	0.00	1,197.20	233.45	233.45	0.00
1,191.50	17.25	17.25	0.00	1,197.30	237.02	237.02	0.00
1,191.60	19.89	19.89	0.00	1,197.40	240.54	240.54	0.00
1,191.70	22.69	22.69	0.00	1,197.50	244.00	244.00	0.00
1,191.80	25.64	25.64	0.00	1,197.60	247.42	247.42	0.00
1,191.90	28.75	28.75	0.00	1,197.70	250.79	250.79	0.00
1,192.00	31.99	31.99	0.00	1,197.80	254.11	254.11	0.00
1,192.10	35.37	35.37	0.00	1,197.90	257.39	257.39	0.00
1,192.20	38.87	38.87	0.00	1,198.00	260.19	260.19	0.00
1,192.30	42.50	42.50	0.00	1,198.10	262.51	262.51	0.00
1,192.40	46.24	46.24	0.00	1,198.20	264.81	264.81	0.00
1,192.50	50.10	50.10	0.00	1,198.30	267.09	267.09	0.00
1,192.60	54.06	54.06	0.00	1,198.40	270.36	269.35	1.01
1,192.70	58.11	58.11	0.00	1,198.50	283.28	271.59	11.69
1,192.80	62.26	62.26	0.00	1,198.60	313.17	273.81	39.36
1,192.90	66.49	66.49	0.00	1,198.70	364.04	276.02	88.03
1,193.00	70.80	70.80	0.00	1,198.80	433.21	278.20	155.01
1,193.10	75.18	75.18	0.00	1,198.90	518.49	280.37	238.12
1,193.20	79.62	79.62	0.00	1,199.00	619.28	282.52	336.76
1,193.30	84.13	84.13	0.00	1,199.10	735.37	284.66	450.71
1,193.40	88.69	88.69	0.00	1,199.20	866.75	286.77	579.98
1,193.50	93.30	93.30	0.00	1,199.30	1,013.54	288.88	724.67
1,193.60	97.94	97.94	0.00	1,199.40	1,175.90	290.96	884.93
1,193.70	102.62	102.62	0.00	1,199.50	1,354.02	293.03	1,060.98
1,193.80	107.32	107.32	0.00	1,199.60	1,548.13	295.09	1,253.04
1,193.90	112.03	112.03	0.00	1,199.70	1,758.49	297.13	1,461.35
1,194.00	116.74	116.74	0.00	1,199.80	1,985.33	299.16	1,686.17
1,194.10	121.45	121.45	0.00	1,199.90	2,228.93	301.17	1,927.76
1,194.20	126.15	126.15	0.00	1,200.00	2,489.56	303.17	2,186.39
1,194.30	130.82	130.82	0.00				
1,194.40	135.46	135.46	0.00				
1,194.50	140.04	140.04	0.00				
1,194.60	144.56	144.56	0.00				
1,194.70	149.00	149.00	0.00				
1,194.80	153.35	153.35	0.00				
1,194.90	157.58	157.58	0.00				
1,195.00	161.68	161.68	0.00				
1,195.10	165.62	165.62	0.00				
1,195.20	169.37	169.37	0.00				
1,195.30	172.89	172.89	0.00				
1,195.40	176.14	176.14	0.00				
1,195.50	179.05	179.05	0.00				
1,195.60	181.55	181.55	0.00				
1,195.70	183.49	183.49	0.00				

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Stage-Area-Storage for Pond 2P: Nelson Ave Road Culvert

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,190.00	0.000	0.000	1,195.80	8.245	12.449
1,190.10	0.000	0.000	1,195.90	8.576	13.174
1,190.20	0.000	0.000	1,196.00	8.908	13.899
1,190.30	0.000	0.000	1,196.10	9.308	14.990
1,190.40	0.000	0.000	1,196.20	9.707	16.080
1,190.50	0.001	0.000	1,196.30	10.107	17.171
1,190.60	0.001	0.000	1,196.40	10.506	18.261
1,190.70	0.001	0.000	1,196.50	10.906	19.352
1,190.80	0.001	0.000	1,196.60	11.306	20.443
1,190.90	0.001	0.000	1,196.70	11.705	21.533
1,191.00	0.001	0.001	1,196.80	12.105	22.624
1,191.10	0.010	0.005	1,196.90	12.504	23.714
1,191.20	0.018	0.009	1,197.00	12.904	24.805
1,191.30	0.027	0.014	1,197.10	13.351	26.319
1,191.40	0.035	0.018	1,197.20	13.799	27.833
1,191.50	0.044	0.022	1,197.30	14.246	29.347
1,191.60	0.053	0.027	1,197.40	14.694	30.861
1,191.70	0.061	0.031	1,197.50	15.141	32.375
1,191.80	0.070	0.036	1,197.60	15.588	33.890
1,191.90	0.078	0.040	1,197.70	16.036	35.404
1,192.00	0.087	0.044	1,197.80	16.483	36.918
1,192.10	0.152	0.086	1,197.90	16.931	38.432
1,192.20	0.217	0.127	1,198.00	17.378	39.946
1,192.30	0.283	0.168	1,198.10	17.910	41.950
1,192.40	0.348	0.210	1,198.20	18.441	43.953
1,192.50	0.413	0.251	1,198.30	18.973	45.957
1,192.60	0.478	0.292	1,198.40	19.505	47.961
1,192.70	0.543	0.334	1,198.50	20.036	49.964
1,192.80	0.609	0.375	1,198.60	20.568	51.968
1,192.90	0.674	0.416	1,198.70	21.100	53.972
1,193.00	0.739	0.457	1,198.80	21.632	55.975
1,193.10	0.968	0.646	1,198.90	22.163	57.979
1,193.20	1.197	0.834	1,199.00	22.695	59.982
1,193.30	1.425	1.022	1,199.10	23.229	62.519
1,193.40	1.654	1.211	1,199.20	23.764	65.056
1,193.50	1.883	1.399	1,199.30	24.298	67.593
1,193.60	2.112	1.587	1,199.40	24.833	70.130
1,193.70	2.341	1.776	1,199.50	25.367	72.666
1,193.80	2.569	1.964	1,199.60	25.902	75.203
1,193.90	2.798	2.152	1,199.70	26.437	77.740
1,194.00	3.027	2.340	1,199.80	26.971	80.276
1,194.10	3.283	2.771	1,199.90	27.506	82.813
1,194.20	3.540	3.202	1,200.00	28.040	85.350
1,194.30	3.796	3.633			
1,194.40	4.053	4.064			
1,194.50	4.309	4.495			
1,194.60	4.565	4.926			
1,194.70	4.822	5.357			
1,194.80	5.078	5.788			
1,194.90	5.335	6.219			
1,195.00	5.591	6.649			
1,195.10	5.923	7.374			
1,195.20	6.254	8.099			
1,195.30	6.586	8.824			
1,195.40	6.918	9.549			
1,195.50	7.249	10.274			
1,195.60	7.581	10.999			
1,195.70	7.913	11.724			

IA-340-8 - Existing Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Pond 3P: 200th Street Culvert

Inflow Area = 164.153 ac, 0.00% Impervious, Inflow Depth = 6.19" for 100-Year event
 Inflow = 619.66 cfs @ 12.70 hrs, Volume= 84.639 af
 Outflow = 223.53 cfs @ 13.49 hrs, Volume= 84.638 af, Atten= 64%, Lag= 47.2 min
 Primary = 92.08 cfs @ 13.49 hrs, Volume= 74.876 af
 Routed to Pond 2P : Nelson Ave Road Culvert
 Secondary = 131.45 cfs @ 13.49 hrs, Volume= 9.763 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,204.43' @ 13.49 hrs Surf.Area= 780,531 sf Storage= 1,705,661 cf

Plug-Flow detention time= 149.9 min calculated for 84.630 af (100% of inflow)
 Center-of-Mass det. time= 149.9 min (966.1 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,198.00'	5,262,028 cf	Storage South of 200th Street Culvert (Prismatic) Listed below (Recalculated)

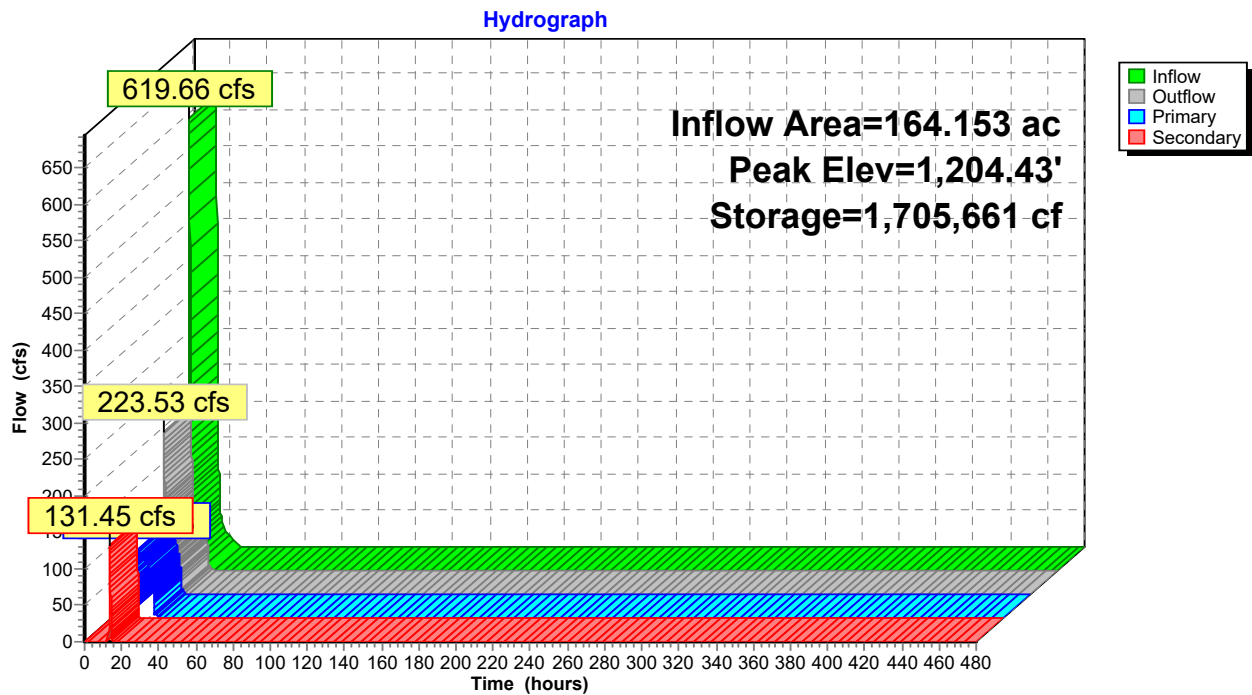
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,198.00	0	0	0
1,199.00	436	218	218
1,200.00	871	654	872
1,201.00	132,684	66,778	67,649
1,202.00	318,032	225,358	293,007
1,203.00	562,882	440,457	733,464
1,204.00	726,668	644,775	1,378,239
1,205.00	850,640	788,654	2,166,893
1,206.00	971,780	911,210	3,078,103
1,207.00	1,093,879	1,032,830	4,110,933
1,208.00	1,208,311	1,151,095	5,262,028

Device	Routing	Invert	Outlet Devices
#1	Primary	1,198.44'	48.0" W x 24.0" H Box 2'x4' Road Culvert L= 25.0' Box, 30-75° wingwalls, square crown, Ke= 0.400 Inlet / Outlet Invert= 1,198.44' / 1,198.44' S= 0.0000 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 8.00 sf
#2	Secondary	1,204.07'	200th St Top of Road, C= 3.27 Offset (feet) -234.90 169.69 318.45 441.99 Height (feet) 1.13 0.20 0.34 1.13

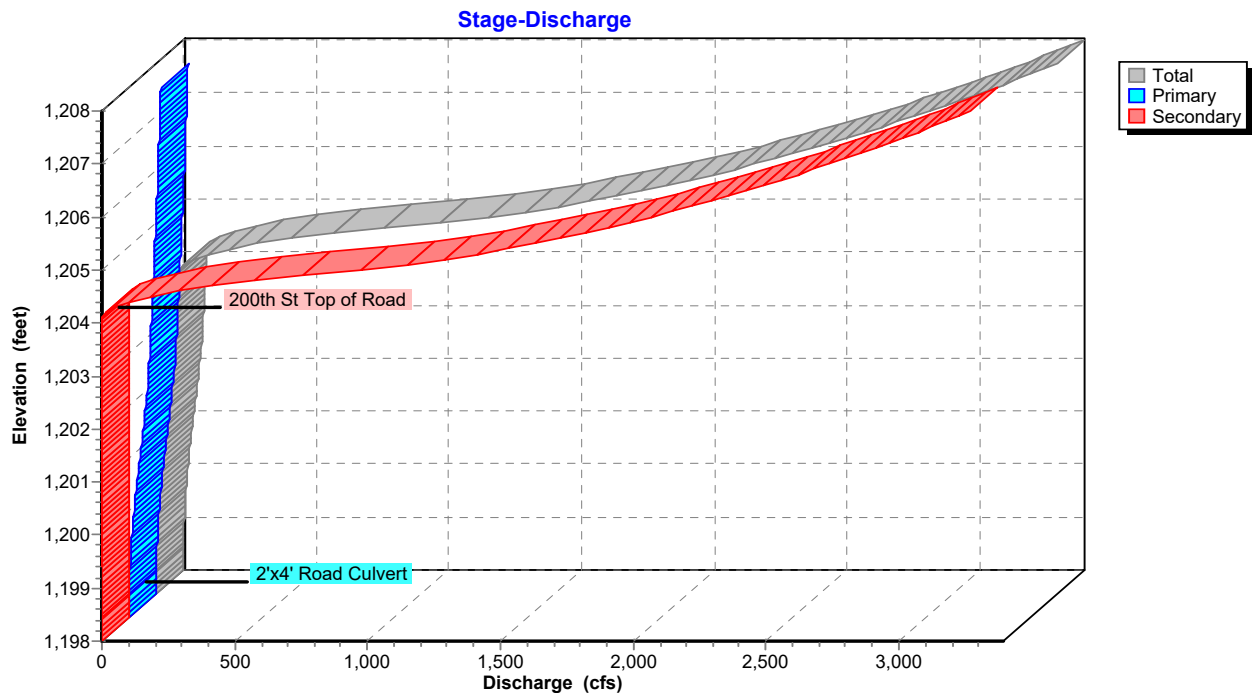
Primary OutFlow Max=92.08 cfs @ 13.49 hrs HW=1,204.43' (Free Discharge)
1=2'x4' Road Culvert (Inlet Controls 92.08 cfs @ 11.51 fps)

Secondary OutFlow Max=128.56 cfs @ 13.49 hrs HW=1,204.43' (Free Discharge)
2=200th St Top of Road (Weir Controls 128.56 cfs @ 1.07 fps)

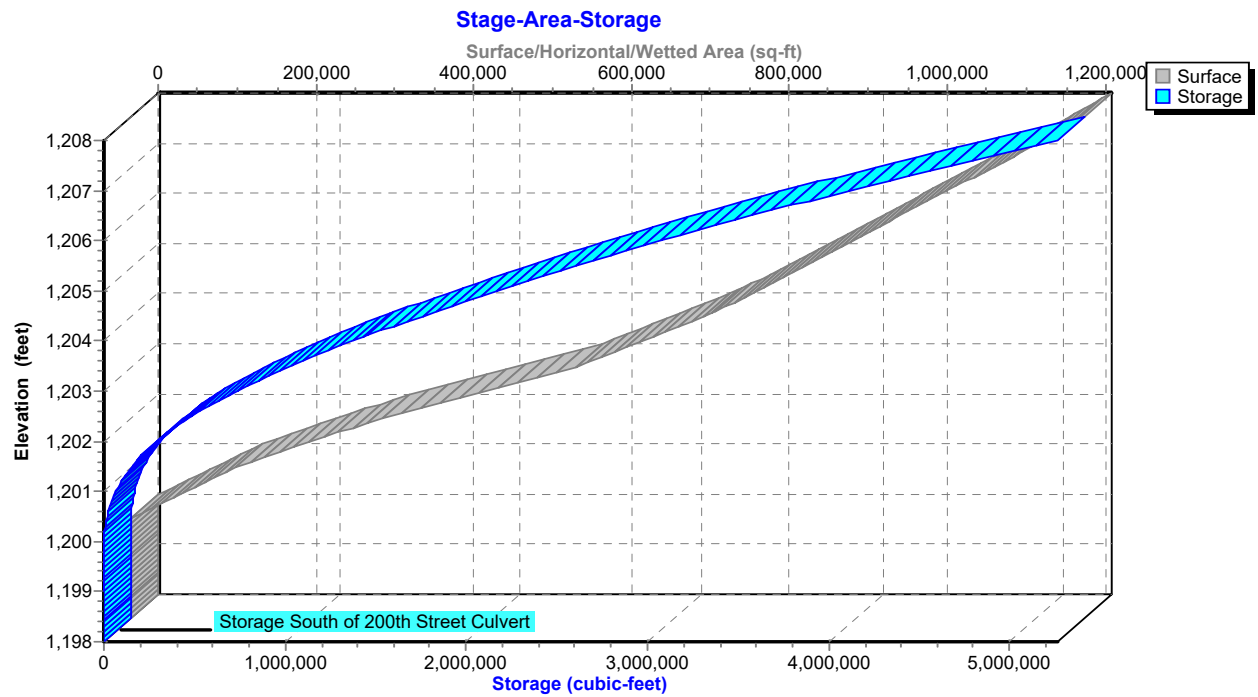
Pond 3P: 200th Street Culvert



Pond 3P: 200th Street Culvert



Pond 3P: 200th Street Culvert



IA-340-8 - Existing Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Pond 3P: 200th Street Culvert

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	1,198.00	0.00	0.00	0.00
10.00	19.21	900	1,200.00	18.86	18.86	0.00
20.00	14.82	431,280	1,202.38	70.40	70.40	0.00
30.00	0.00	42	1,198.44	0.00	0.00	0.00
40.00	0.00	42	1,198.44	0.00	0.00	0.00
50.00	0.00	42	1,198.44	0.00	0.00	0.00
60.00	0.00	42	1,198.44	0.00	0.00	0.00
70.00	0.00	42	1,198.44	0.00	0.00	0.00
80.00	0.00	42	1,198.44	0.00	0.00	0.00
90.00	0.00	42	1,198.44	0.00	0.00	0.00
100.00	0.00	42	1,198.44	0.00	0.00	0.00
110.00	0.00	42	1,198.44	0.00	0.00	0.00
120.00	0.00	42	1,198.44	0.00	0.00	0.00
130.00	0.00	42	1,198.44	0.00	0.00	0.00
140.00	0.00	42	1,198.44	0.00	0.00	0.00
150.00	0.00	42	1,198.44	0.00	0.00	0.00
160.00	0.00	42	1,198.44	0.00	0.00	0.00
170.00	0.00	42	1,198.44	0.00	0.00	0.00
180.00	0.00	42	1,198.44	0.00	0.00	0.00
190.00	0.00	42	1,198.44	0.00	0.00	0.00
200.00	0.00	42	1,198.44	0.00	0.00	0.00
210.00	0.00	42	1,198.44	0.00	0.00	0.00
220.00	0.00	42	1,198.44	0.00	0.00	0.00
230.00	0.00	42	1,198.44	0.00	0.00	0.00
240.00	0.00	42	1,198.44	0.00	0.00	0.00
250.00	0.00	42	1,198.44	0.00	0.00	0.00
260.00	0.00	42	1,198.44	0.00	0.00	0.00
270.00	0.00	42	1,198.44	0.00	0.00	0.00
280.00	0.00	42	1,198.44	0.00	0.00	0.00
290.00	0.00	42	1,198.44	0.00	0.00	0.00
300.00	0.00	42	1,198.44	0.00	0.00	0.00
310.00	0.00	42	1,198.44	0.00	0.00	0.00
320.00	0.00	42	1,198.44	0.00	0.00	0.00
330.00	0.00	42	1,198.44	0.00	0.00	0.00
340.00	0.00	42	1,198.44	0.00	0.00	0.00
350.00	0.00	42	1,198.44	0.00	0.00	0.00
360.00	0.00	42	1,198.44	0.00	0.00	0.00
370.00	0.00	42	1,198.44	0.00	0.00	0.00
380.00	0.00	42	1,198.44	0.00	0.00	0.00
390.00	0.00	42	1,198.44	0.00	0.00	0.00
400.00	0.00	42	1,198.44	0.00	0.00	0.00
410.00	0.00	42	1,198.44	0.00	0.00	0.00
420.00	0.00	42	1,198.44	0.00	0.00	0.00
430.00	0.00	42	1,198.44	0.00	0.00	0.00
440.00	0.00	42	1,198.44	0.00	0.00	0.00
450.00	0.00	42	1,198.44	0.00	0.00	0.00
460.00	0.00	42	1,198.44	0.00	0.00	0.00
470.00	0.00	42	1,198.44	0.00	0.00	0.00
480.00	0.00	42	1,198.44	0.00	0.00	0.00

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Stage-Discharge for Pond 3P: 200th Street Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,198.00	0.00	0.00	0.00	1,203.80	85.99	85.99	0.00
1,198.10	0.00	0.00	0.00	1,203.90	86.98	86.98	0.00
1,198.20	0.00	0.00	0.00	1,204.00	87.95	87.95	0.00
1,198.30	0.00	0.00	0.00	1,204.10	89.23	88.92	0.31
1,198.40	0.00	0.00	0.00	1,204.20	101.81	89.88	11.94
1,198.50	0.06	0.06	0.00	1,204.30	137.64	90.82	46.82
1,198.60	0.42	0.42	0.00	1,204.40	195.65	91.76	103.89
1,198.70	1.02	1.02	0.00	1,204.50	276.51	92.69	183.83
1,198.80	1.79	1.79	0.00	1,204.60	381.60	93.60	288.00
1,198.90	2.70	2.70	0.00	1,204.70	512.40	94.51	417.89
1,199.00	3.73	3.73	0.00	1,204.80	670.38	95.41	574.97
1,199.10	4.86	4.86	0.00	1,204.90	856.97	96.30	760.67
1,199.20	6.10	6.10	0.00	1,205.00	1,073.55	97.18	976.36
1,199.30	7.42	7.42	0.00	1,205.10	1,249.00	98.06	1,150.94
1,199.40	8.83	8.83	0.00	1,205.20	1,390.14	98.93	1,291.21
1,199.50	10.31	10.31	0.00	1,205.30	1,514.47	99.79	1,414.68
1,199.60	11.87	11.87	0.00	1,205.40	1,627.47	100.64	1,526.84
1,199.70	13.50	13.50	0.00	1,205.50	1,732.02	101.48	1,630.54
1,199.80	15.20	15.20	0.00	1,205.60	1,829.89	102.32	1,727.57
1,199.90	16.96	16.96	0.00	1,205.70	1,922.28	103.15	1,819.13
1,200.00	18.79	18.79	0.00	1,205.80	2,010.06	103.97	1,906.08
1,200.10	20.68	20.68	0.00	1,205.90	2,093.88	104.79	1,989.09
1,200.20	22.63	22.63	0.00	1,206.00	2,174.26	105.60	2,068.66
1,200.30	24.63	24.63	0.00	1,206.10	2,251.61	106.41	2,145.20
1,200.40	26.69	26.69	0.00	1,206.20	2,326.24	107.21	2,219.03
1,200.50	28.81	28.81	0.00	1,206.30	2,398.43	108.00	2,290.43
1,200.60	30.97	30.97	0.00	1,206.40	2,468.42	108.79	2,359.64
1,200.70	33.19	33.19	0.00	1,206.50	2,536.40	109.57	2,426.83
1,200.80	35.46	35.46	0.00	1,206.60	2,602.53	110.34	2,492.19
1,200.90	37.78	37.78	0.00	1,206.70	2,666.97	111.11	2,555.85
1,201.00	40.15	40.15	0.00	1,206.80	2,729.83	111.88	2,617.95
1,201.10	42.56	42.56	0.00	1,206.90	2,791.23	112.64	2,678.59
1,201.20	44.51	44.51	0.00	1,207.00	2,851.27	113.39	2,737.87
1,201.30	47.35	47.35	0.00	1,207.10	2,910.03	114.14	2,795.89
1,201.40	50.03	50.03	0.00	1,207.20	2,967.60	114.89	2,852.72
1,201.50	52.57	52.57	0.00	1,207.30	3,024.05	115.63	2,908.42
1,201.60	54.99	54.99	0.00	1,207.40	3,079.44	116.36	2,963.07
1,201.70	57.31	57.31	0.00	1,207.50	3,133.82	117.09	3,016.73
1,201.80	59.55	59.55	0.00	1,207.60	3,187.26	117.82	3,069.44
1,201.90	61.70	61.70	0.00	1,207.70	3,239.80	118.54	3,121.26
1,202.00	63.77	63.77	0.00	1,207.80	3,291.48	119.26	3,172.22
1,202.10	65.79	65.79	0.00	1,207.90	3,342.35	119.97	3,222.37
1,202.20	67.74	67.74	0.00	1,208.00	3,392.44	120.68	3,271.76
1,202.30	69.43	69.43	0.00				
1,202.40	70.66	70.66	0.00				
1,202.50	71.87	71.87	0.00				
1,202.60	73.05	73.05	0.00				
1,202.70	74.22	74.22	0.00				
1,202.80	75.37	75.37	0.00				
1,202.90	76.50	76.50	0.00				
1,203.00	77.61	77.61	0.00				
1,203.10	78.71	78.71	0.00				
1,203.20	79.79	79.79	0.00				
1,203.30	80.86	80.86	0.00				
1,203.40	81.91	81.91	0.00				
1,203.50	82.95	82.95	0.00				
1,203.60	83.97	83.97	0.00				
1,203.70	84.99	84.99	0.00				

IA-340-8 - Existing Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Stage-Area-Storage for Pond 3P: 200th Street Culvert

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,198.00	0	0	1,203.80	693,911	1,236,181
1,198.10	44	2	1,203.90	710,289	1,306,391
1,198.20	87	9	1,204.00	726,668	1,378,239
1,198.30	131	20	1,204.10	739,065	1,451,526
1,198.40	174	35	1,204.20	751,462	1,526,052
1,198.50	218	55	1,204.30	763,860	1,601,818
1,198.60	262	78	1,204.40	776,257	1,678,824
1,198.70	305	107	1,204.50	788,654	1,757,070
1,198.80	349	140	1,204.60	801,051	1,836,555
1,198.90	392	177	1,204.70	813,448	1,917,280
1,199.00	436	218	1,204.80	825,846	1,999,244
1,199.10	479	264	1,204.90	838,243	2,082,449
1,199.20	523	314	1,205.00	850,640	2,166,893
1,199.30	566	368	1,205.10	862,754	2,252,563
1,199.40	610	427	1,205.20	874,868	2,339,444
1,199.50	654	490	1,205.30	886,982	2,427,536
1,199.60	697	558	1,205.40	899,096	2,516,840
1,199.70	741	630	1,205.50	911,210	2,607,356
1,199.80	784	706	1,205.60	923,324	2,699,082
1,199.90	828	787	1,205.70	935,438	2,792,020
1,200.00	871	872	1,205.80	947,552	2,886,170
1,200.10	14,052	1,618	1,205.90	959,666	2,981,531
1,200.20	27,234	3,682	1,206.00	971,780	3,078,103
1,200.30	40,415	7,064	1,206.10	983,990	3,175,891
1,200.40	53,596	11,765	1,206.20	996,200	3,274,901
1,200.50	66,778	17,784	1,206.30	1,008,410	3,375,131
1,200.60	79,959	25,120	1,206.40	1,020,620	3,476,583
1,200.70	93,140	33,775	1,206.50	1,032,830	3,579,255
1,200.80	106,321	43,748	1,206.60	1,045,039	3,683,149
1,200.90	119,503	55,040	1,206.70	1,057,249	3,788,263
1,201.00	132,684	67,649	1,206.80	1,069,459	3,894,599
1,201.10	151,219	81,844	1,206.90	1,081,669	4,002,155
1,201.20	169,754	97,893	1,207.00	1,093,879	4,110,933
1,201.30	188,288	115,795	1,207.10	1,105,322	4,220,893
1,201.40	206,823	135,550	1,207.20	1,116,765	4,331,997
1,201.50	225,358	157,160	1,207.30	1,128,209	4,444,246
1,201.60	243,893	180,622	1,207.40	1,139,652	4,557,639
1,201.70	262,428	205,938	1,207.50	1,151,095	4,672,176
1,201.80	280,962	233,108	1,207.60	1,162,538	4,787,858
1,201.90	299,497	262,131	1,207.70	1,173,981	4,904,684
1,202.00	318,032	293,007	1,207.80	1,185,425	5,022,654
1,202.10	342,517	326,034	1,207.90	1,196,868	5,141,769
1,202.20	367,002	361,510	1,208.00	1,208,311	5,262,028
1,202.30	391,487	399,435			
1,202.40	415,972	439,808			
1,202.50	440,457	482,629			
1,202.60	464,942	527,899			
1,202.70	489,427	575,618			
1,202.80	513,912	625,785			
1,202.90	538,397	678,400			
1,203.00	562,882	733,464			
1,203.10	579,261	790,571			
1,203.20	595,639	849,316			
1,203.30	612,018	909,699			
1,203.40	628,396	971,720			
1,203.50	644,775	1,035,378			
1,203.60	661,154	1,100,675			
1,203.70	677,532	1,167,609			

IA-340-8 - Existing Conditions

Multi-Event Tables

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Events for Subcatchment 1S: North-East Drainage Area

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.52	835.83	124.060	3.22
25-Year	5.62	1,099.06	164.410	4.26
100-Year	7.61	1,572.93	238.753	6.19

IA-340-8 - Existing Conditions

Multi-Event Tables

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Events for Subcatchment 4S: South Drainage Area

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.52	329.34	43.980	3.22
25-Year	5.62	432.86	58.284	4.26
100-Year	7.61	619.66	84.639	6.19

IA-340-8 - Existing Conditions*Multi-Event Tables*

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Events for Pond 2P: Nelson Ave Road Culvert

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	908.33	369.54	276.19	93.35	1,198.71	54.131
25-Year	1,176.39	707.90	284.15	423.75	1,199.08	61.919
100-Year	1,658.66	1,317.78	292.61	1,025.16	1,199.48	72.150

IA-340-8 - Existing Conditions*Multi-Event Tables*

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Events for Pond 3P: 200th Street Culvert

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	329.34	79.59	79.59	0.00	1,203.18	838,433
25-Year	432.86	85.79	85.79	0.00	1,203.78	1,222,512
100-Year	619.66	223.53	92.08	131.45	1,204.43	1,705,661

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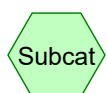
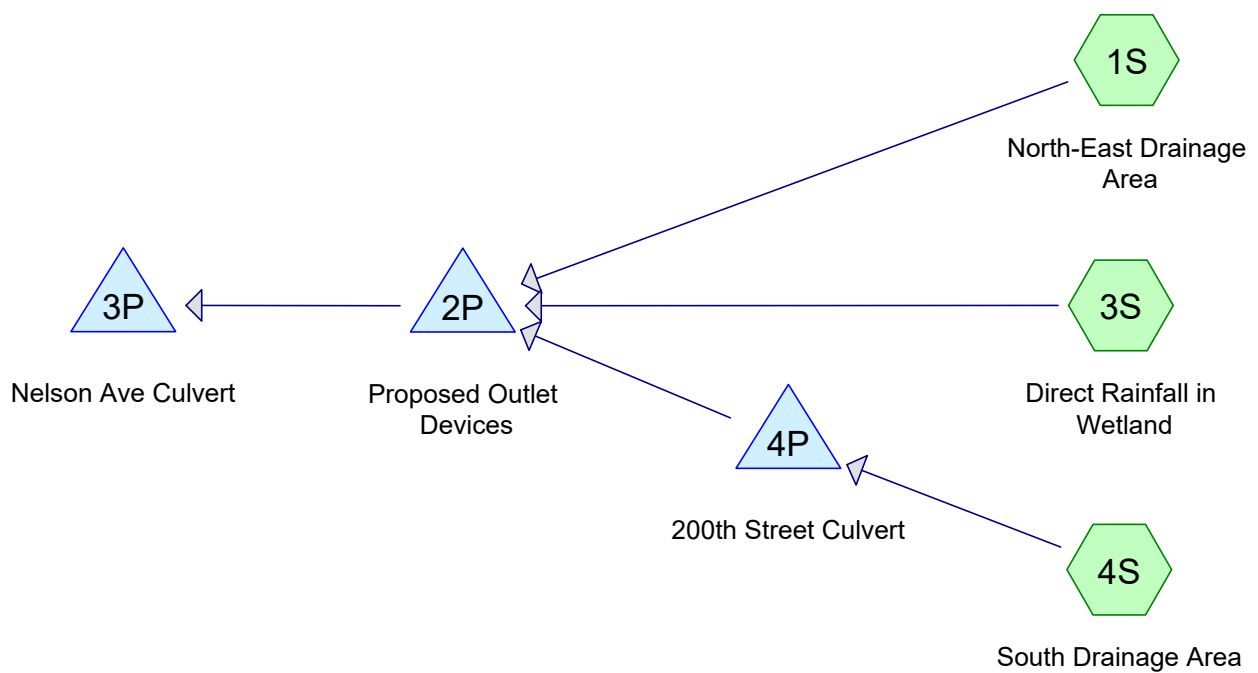
Multi-Event Tables

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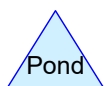
Appendix A-2
HydroCAD Report – Proposed Conditions



Subcat



Reach



Pond



Link

Routing Diagram for IA-340-8 - Proposed Conditions

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IA-340-8 - Proposed Conditions

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Project Notes

Rainfall events imported from "Atlas-14-Rain.txt" for 350 IA Greene

Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene

Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene

Rainfall events imported from "NRCS-Rain.txt" for 1498 IA Wright

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	10-Year	MSE 24-hr	3	Default	24.00	1	4.52	2
2	25-Year	MSE 24-hr	3	Default	24.00	1	5.62	2
3	100-Year	MSE 24-hr	3	Default	24.00	1	7.61	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.720	98	Water Surface, HSG A (3S)
620.860	88	Weighted Average (1S, 4S)
625.580	88	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.720	HSG A	3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
620.860	Other	1S, 4S
625.580		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
4.720	0.000	0.000	0.000	0.000	4.720	Water Surface	3S
0.000	0.000	0.000	0.000	620.860	620.860	Weighted Average	1S, 4S
4.720	0.000	0.000	0.000	620.860	625.580	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	3P	1,189.62	1,189.62	70.0	0.0000	0.025	91.0	52.0	0.0
2	4P	1,198.44	1,198.44	25.0	0.0000	0.012	48.0	24.0	0.0

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Notes Listing (all nodes)

Line#	Node Number	Notes
1	Project	Rainfall events imported from "Atlas-14-Rain.txt" for 350 IA Greene
2		Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene
3		Rainfall events imported from "NRCS-Rain.txt" for 1436 IA Greene
4		Rainfall events imported from "NRCS-Rain.txt" for 1498 IA Wright
5	1S	North-East Watershed Area of 456.82 acres modeled as separate watershed area from South drainage and wetland area itself.
6		Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data for the complete watershed.
7	3S	Direct rainfall into wetland area itself.
8	4S	South Watershed Area of 164.04 acres modeled as sub-watershed since this watershed routes through existing road culvert.
9		Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data from complete watershed.
10	2P	Water in wetland starting at 1094.1' (NWL)

IA-340-8 - Proposed Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Time span=0.00-480.00 hrs, dt=0.05 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: North-East Runoff Area=456.820 ac 0.00% Impervious Runoff Depth=3.22"
Flow Length=6,885' Slope=0.0327 '/' Tc=62.5 min CN=88 Runoff=824.59 cfs 122.391 af

Subcatchment 3S: Direct Rainfall in Runoff Area=4.720 ac 100.00% Impervious Runoff Depth=4.28"
Flow Length=836' Tc=2.2 min CN=98 Runoff=35.67 cfs 1.685 af

Subcatchment 4S: South Drainage Area Runoff Area=164.040 ac 0.00% Impervious Runoff Depth=3.22"
Flow Length=5,631' Slope=0.0327 '/' Tc=53.2 min CN=88 Runoff=329.11 cfs 43.950 af

Pond 2P: Proposed Outlet Devices Peak Elev=1,196.57' Storage=24.060 af Inflow=899.34 cfs 168.025 af
Primary=809.43 cfs 168.025 af Secondary=0.00 cfs 0.000 af Outflow=809.43 cfs 168.025 af

Pond 3P: Nelson Ave Culvert Peak Elev=1,199.15' Storage=7.493 af Inflow=809.43 cfs 168.025 af
Primary=295.30 cfs 126.556 af Secondary=513.17 cfs 41.469 af Outflow=808.47 cfs 168.025 af

Pond 4P: 200th Street Culvert Peak Elev=1,203.18' Storage=837,620 cf Inflow=329.11 cfs 43.950 af
Primary=79.58 cfs 43.949 af Secondary=0.00 cfs 0.000 af Outflow=79.58 cfs 43.949 af

Total Runoff Area = 625.580 ac Runoff Volume = 168.026 af Average Runoff Depth = 3.22"
99.25% Pervious = 620.860 ac 0.75% Impervious = 4.720 ac

IA-340-8 - Proposed Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Subcatchment 1S: North-East Drainage Area

North-East Watershed Area of 456.82 acres modeled as separate watershed area from South drainage and wetland area itself.

Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data for the complete watershed.

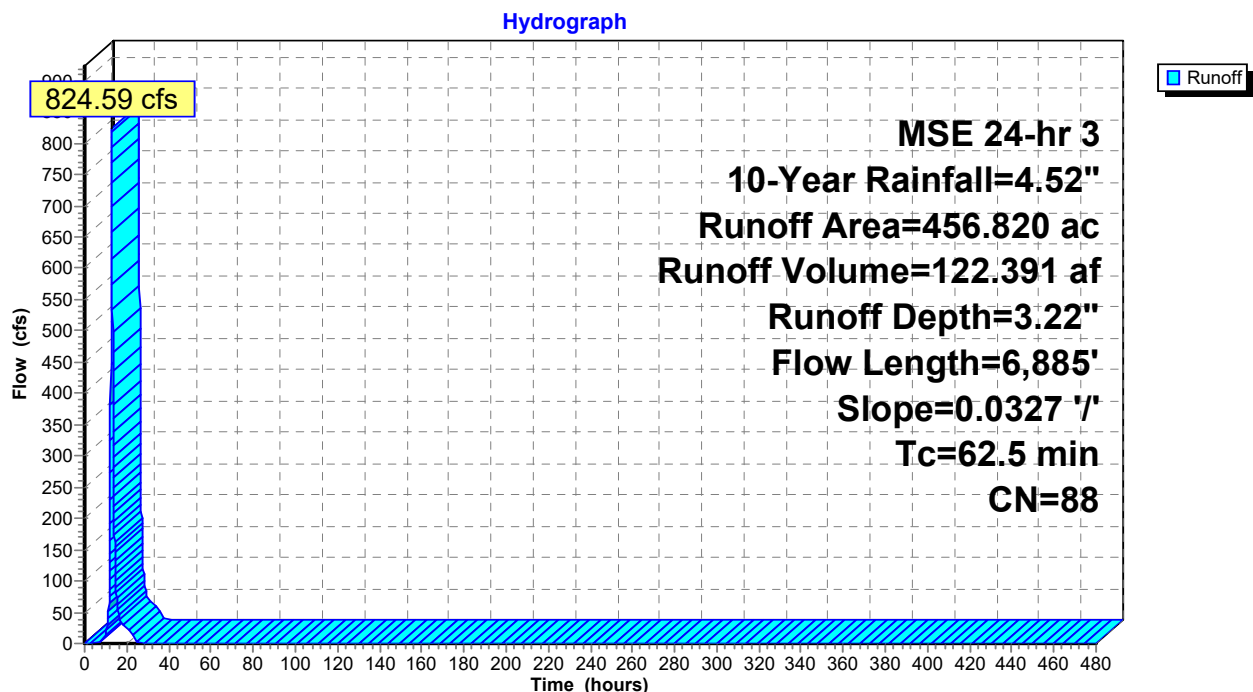
Runoff = 824.59 cfs @ 12.83 hrs, Volume= 122.391 af, Depth= 3.22"
Routed to Pond 2P : Proposed Outlet Devices

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.52"

Area (ac)	CN	Description
* 456.820	88	Weighted Average
456.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	6,885	0.0327	1.84		Lag/CN Method,

Subcatchment 1S: North-East Drainage Area



IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Subcatchment 1S: North-East Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	4.52	3.22	0.00
5.00	0.17	0.00	0.00	295.00	4.52	3.22	0.00
10.00	0.62	0.07	14.95	300.00	4.52	3.22	0.00
15.00	4.05	2.78	85.53	305.00	4.52	3.22	0.00
20.00	4.40	3.10	24.12	310.00	4.52	3.22	0.00
25.00	4.52	3.22	2.58	315.00	4.52	3.22	0.00
30.00	4.52	3.22	0.00	320.00	4.52	3.22	0.00
35.00	4.52	3.22	0.00	325.00	4.52	3.22	0.00
40.00	4.52	3.22	0.00	330.00	4.52	3.22	0.00
45.00	4.52	3.22	0.00	335.00	4.52	3.22	0.00
50.00	4.52	3.22	0.00	340.00	4.52	3.22	0.00
55.00	4.52	3.22	0.00	345.00	4.52	3.22	0.00
60.00	4.52	3.22	0.00	350.00	4.52	3.22	0.00
65.00	4.52	3.22	0.00	355.00	4.52	3.22	0.00
70.00	4.52	3.22	0.00	360.00	4.52	3.22	0.00
75.00	4.52	3.22	0.00	365.00	4.52	3.22	0.00
80.00	4.52	3.22	0.00	370.00	4.52	3.22	0.00
85.00	4.52	3.22	0.00	375.00	4.52	3.22	0.00
90.00	4.52	3.22	0.00	380.00	4.52	3.22	0.00
95.00	4.52	3.22	0.00	385.00	4.52	3.22	0.00
100.00	4.52	3.22	0.00	390.00	4.52	3.22	0.00
105.00	4.52	3.22	0.00	395.00	4.52	3.22	0.00
110.00	4.52	3.22	0.00	400.00	4.52	3.22	0.00
115.00	4.52	3.22	0.00	405.00	4.52	3.22	0.00
120.00	4.52	3.22	0.00	410.00	4.52	3.22	0.00
125.00	4.52	3.22	0.00	415.00	4.52	3.22	0.00
130.00	4.52	3.22	0.00	420.00	4.52	3.22	0.00
135.00	4.52	3.22	0.00	425.00	4.52	3.22	0.00
140.00	4.52	3.22	0.00	430.00	4.52	3.22	0.00
145.00	4.52	3.22	0.00	435.00	4.52	3.22	0.00
150.00	4.52	3.22	0.00	440.00	4.52	3.22	0.00
155.00	4.52	3.22	0.00	445.00	4.52	3.22	0.00
160.00	4.52	3.22	0.00	450.00	4.52	3.22	0.00
165.00	4.52	3.22	0.00	455.00	4.52	3.22	0.00
170.00	4.52	3.22	0.00	460.00	4.52	3.22	0.00
175.00	4.52	3.22	0.00	465.00	4.52	3.22	0.00
180.00	4.52	3.22	0.00	470.00	4.52	3.22	0.00
185.00	4.52	3.22	0.00	475.00	4.52	3.22	0.00
190.00	4.52	3.22	0.00	480.00	4.52	3.22	0.00
195.00	4.52	3.22	0.00				
200.00	4.52	3.22	0.00				
205.00	4.52	3.22	0.00				
210.00	4.52	3.22	0.00				
215.00	4.52	3.22	0.00				
220.00	4.52	3.22	0.00				
225.00	4.52	3.22	0.00				
230.00	4.52	3.22	0.00				
235.00	4.52	3.22	0.00				
240.00	4.52	3.22	0.00				
245.00	4.52	3.22	0.00				
250.00	4.52	3.22	0.00				
255.00	4.52	3.22	0.00				
260.00	4.52	3.22	0.00				
265.00	4.52	3.22	0.00				
270.00	4.52	3.22	0.00				
275.00	4.52	3.22	0.00				
280.00	4.52	3.22	0.00				
285.00	4.52	3.22	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Subcatchment 3S: Direct Rainfall in Wetland

Direct rainfall into wetland area itself.

[49] Hint: $T_c < 2dt$ may require smaller dt

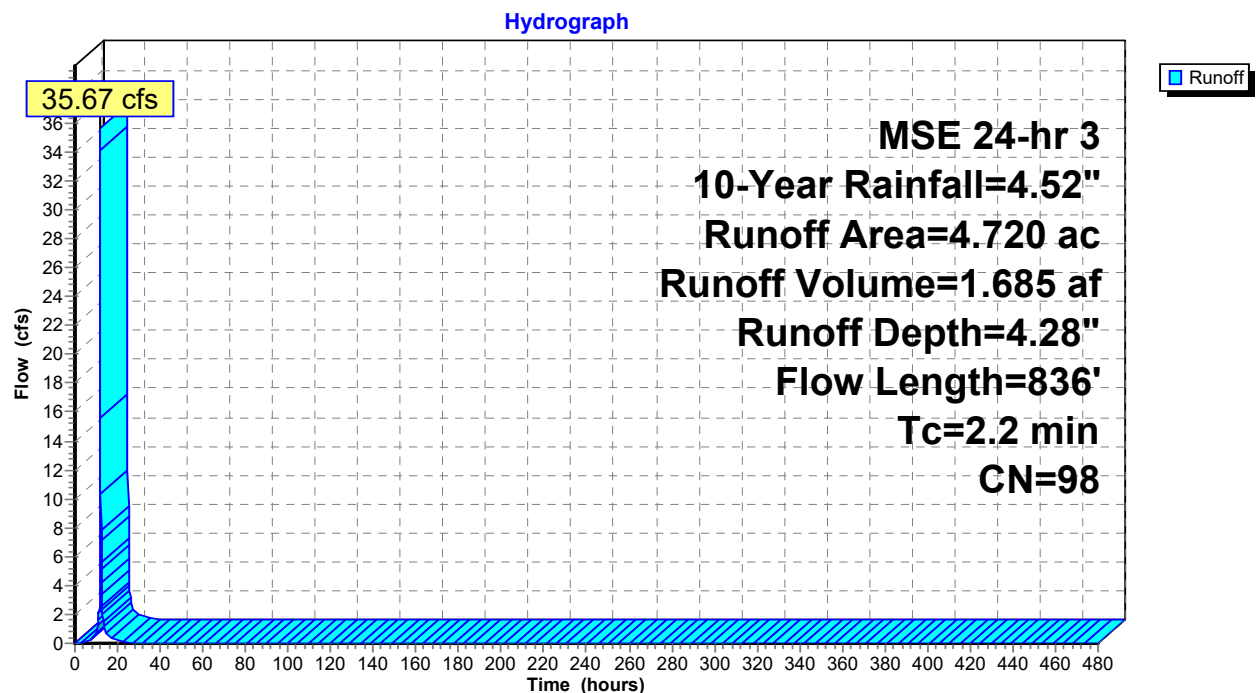
Runoff = 35.67 cfs @ 12.08 hrs, Volume= 1.685 af, Depth= 4.28"
Routed to Pond 2P : Proposed Outlet Devices

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, $dt=0.05$ hrs
MSE 24-hr 3 10-Year Rainfall=4.52"

Area (ac)	CN	Description
4.720	98	Water Surface, HSG A
4.720		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	836		6.22		Lake or Reservoir, Mean Depth= 1.20'

Subcatchment 3S: Direct Rainfall in Wetland



IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Subcatchment 3S: Direct Rainfall in Wetland

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	4.52	4.28	0.00
5.00	0.17	0.05	0.16	295.00	4.52	4.28	0.00
10.00	0.62	0.43	0.73	300.00	4.52	4.28	0.00
15.00	4.05	3.82	0.68	305.00	4.52	4.28	0.00
20.00	4.40	4.17	0.23	310.00	4.52	4.28	0.00
25.00	4.52	4.28	0.00	315.00	4.52	4.28	0.00
30.00	4.52	4.28	0.00	320.00	4.52	4.28	0.00
35.00	4.52	4.28	0.00	325.00	4.52	4.28	0.00
40.00	4.52	4.28	0.00	330.00	4.52	4.28	0.00
45.00	4.52	4.28	0.00	335.00	4.52	4.28	0.00
50.00	4.52	4.28	0.00	340.00	4.52	4.28	0.00
55.00	4.52	4.28	0.00	345.00	4.52	4.28	0.00
60.00	4.52	4.28	0.00	350.00	4.52	4.28	0.00
65.00	4.52	4.28	0.00	355.00	4.52	4.28	0.00
70.00	4.52	4.28	0.00	360.00	4.52	4.28	0.00
75.00	4.52	4.28	0.00	365.00	4.52	4.28	0.00
80.00	4.52	4.28	0.00	370.00	4.52	4.28	0.00
85.00	4.52	4.28	0.00	375.00	4.52	4.28	0.00
90.00	4.52	4.28	0.00	380.00	4.52	4.28	0.00
95.00	4.52	4.28	0.00	385.00	4.52	4.28	0.00
100.00	4.52	4.28	0.00	390.00	4.52	4.28	0.00
105.00	4.52	4.28	0.00	395.00	4.52	4.28	0.00
110.00	4.52	4.28	0.00	400.00	4.52	4.28	0.00
115.00	4.52	4.28	0.00	405.00	4.52	4.28	0.00
120.00	4.52	4.28	0.00	410.00	4.52	4.28	0.00
125.00	4.52	4.28	0.00	415.00	4.52	4.28	0.00
130.00	4.52	4.28	0.00	420.00	4.52	4.28	0.00
135.00	4.52	4.28	0.00	425.00	4.52	4.28	0.00
140.00	4.52	4.28	0.00	430.00	4.52	4.28	0.00
145.00	4.52	4.28	0.00	435.00	4.52	4.28	0.00
150.00	4.52	4.28	0.00	440.00	4.52	4.28	0.00
155.00	4.52	4.28	0.00	445.00	4.52	4.28	0.00
160.00	4.52	4.28	0.00	450.00	4.52	4.28	0.00
165.00	4.52	4.28	0.00	455.00	4.52	4.28	0.00
170.00	4.52	4.28	0.00	460.00	4.52	4.28	0.00
175.00	4.52	4.28	0.00	465.00	4.52	4.28	0.00
180.00	4.52	4.28	0.00	470.00	4.52	4.28	0.00
185.00	4.52	4.28	0.00	475.00	4.52	4.28	0.00
190.00	4.52	4.28	0.00	480.00	4.52	4.28	0.00
195.00	4.52	4.28	0.00				
200.00	4.52	4.28	0.00				
205.00	4.52	4.28	0.00				
210.00	4.52	4.28	0.00				
215.00	4.52	4.28	0.00				
220.00	4.52	4.28	0.00				
225.00	4.52	4.28	0.00				
230.00	4.52	4.28	0.00				
235.00	4.52	4.28	0.00				
240.00	4.52	4.28	0.00				
245.00	4.52	4.28	0.00				
250.00	4.52	4.28	0.00				
255.00	4.52	4.28	0.00				
260.00	4.52	4.28	0.00				
265.00	4.52	4.28	0.00				
270.00	4.52	4.28	0.00				
275.00	4.52	4.28	0.00				
280.00	4.52	4.28	0.00				
285.00	4.52	4.28	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Subcatchment 4S: South Drainage Area

South Watershed Area of 164.04 acres modeled as sub-watershed since this watershed routes through existing road culvert.

Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data from complete watershed.

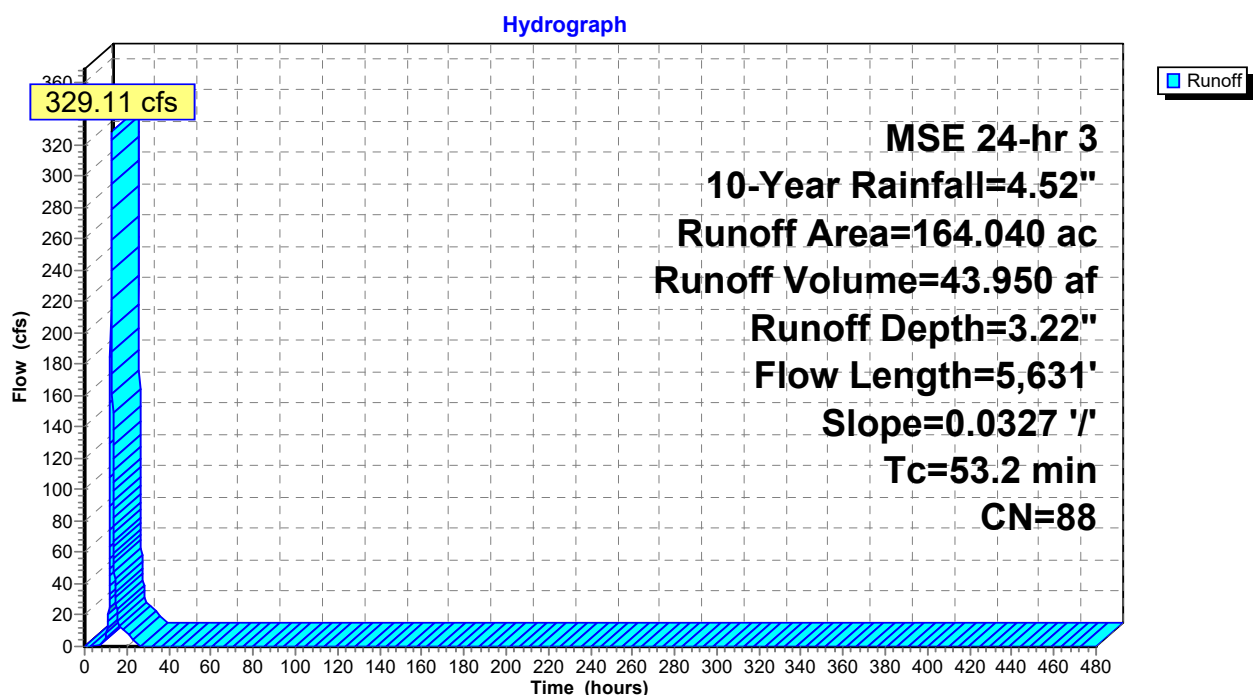
Runoff = 329.11 cfs @ 12.71 hrs, Volume= 43.950 af, Depth= 3.22"
Routed to Pond 4P : 200th Street Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.52"

Area (ac)	CN	Description
* 164.040	88	Weighted Average
164.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.2	5,631	0.0327	1.76		Lag/CN Method,

Subcatchment 4S: South Drainage Area



IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Subcatchment 4S: South Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	4.52	3.22	0.00
5.00	0.17	0.00	0.00	295.00	4.52	3.22	0.00
10.00	0.62	0.07	6.08	300.00	4.52	3.22	0.00
15.00	4.05	2.78	26.87	305.00	4.52	3.22	0.00
20.00	4.40	3.10	8.47	310.00	4.52	3.22	0.00
25.00	4.52	3.22	0.58	315.00	4.52	3.22	0.00
30.00	4.52	3.22	0.00	320.00	4.52	3.22	0.00
35.00	4.52	3.22	0.00	325.00	4.52	3.22	0.00
40.00	4.52	3.22	0.00	330.00	4.52	3.22	0.00
45.00	4.52	3.22	0.00	335.00	4.52	3.22	0.00
50.00	4.52	3.22	0.00	340.00	4.52	3.22	0.00
55.00	4.52	3.22	0.00	345.00	4.52	3.22	0.00
60.00	4.52	3.22	0.00	350.00	4.52	3.22	0.00
65.00	4.52	3.22	0.00	355.00	4.52	3.22	0.00
70.00	4.52	3.22	0.00	360.00	4.52	3.22	0.00
75.00	4.52	3.22	0.00	365.00	4.52	3.22	0.00
80.00	4.52	3.22	0.00	370.00	4.52	3.22	0.00
85.00	4.52	3.22	0.00	375.00	4.52	3.22	0.00
90.00	4.52	3.22	0.00	380.00	4.52	3.22	0.00
95.00	4.52	3.22	0.00	385.00	4.52	3.22	0.00
100.00	4.52	3.22	0.00	390.00	4.52	3.22	0.00
105.00	4.52	3.22	0.00	395.00	4.52	3.22	0.00
110.00	4.52	3.22	0.00	400.00	4.52	3.22	0.00
115.00	4.52	3.22	0.00	405.00	4.52	3.22	0.00
120.00	4.52	3.22	0.00	410.00	4.52	3.22	0.00
125.00	4.52	3.22	0.00	415.00	4.52	3.22	0.00
130.00	4.52	3.22	0.00	420.00	4.52	3.22	0.00
135.00	4.52	3.22	0.00	425.00	4.52	3.22	0.00
140.00	4.52	3.22	0.00	430.00	4.52	3.22	0.00
145.00	4.52	3.22	0.00	435.00	4.52	3.22	0.00
150.00	4.52	3.22	0.00	440.00	4.52	3.22	0.00
155.00	4.52	3.22	0.00	445.00	4.52	3.22	0.00
160.00	4.52	3.22	0.00	450.00	4.52	3.22	0.00
165.00	4.52	3.22	0.00	455.00	4.52	3.22	0.00
170.00	4.52	3.22	0.00	460.00	4.52	3.22	0.00
175.00	4.52	3.22	0.00	465.00	4.52	3.22	0.00
180.00	4.52	3.22	0.00	470.00	4.52	3.22	0.00
185.00	4.52	3.22	0.00	475.00	4.52	3.22	0.00
190.00	4.52	3.22	0.00	480.00	4.52	3.22	0.00
195.00	4.52	3.22	0.00				
200.00	4.52	3.22	0.00				
205.00	4.52	3.22	0.00				
210.00	4.52	3.22	0.00				
215.00	4.52	3.22	0.00				
220.00	4.52	3.22	0.00				
225.00	4.52	3.22	0.00				
230.00	4.52	3.22	0.00				
235.00	4.52	3.22	0.00				
240.00	4.52	3.22	0.00				
245.00	4.52	3.22	0.00				
250.00	4.52	3.22	0.00				
255.00	4.52	3.22	0.00				
260.00	4.52	3.22	0.00				
265.00	4.52	3.22	0.00				
270.00	4.52	3.22	0.00				
275.00	4.52	3.22	0.00				
280.00	4.52	3.22	0.00				
285.00	4.52	3.22	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Pond 2P: Proposed Outlet Devices

Water in wetland starting at 1094.1' (NWL)

Inflow Area = 625.580 ac, 0.75% Impervious, Inflow Depth = 3.22" for 10-Year event
 Inflow = 899.34 cfs @ 12.84 hrs, Volume= 168.025 af
 Outflow = 809.43 cfs @ 13.06 hrs, Volume= 168.025 af, Atten= 10%, Lag= 13.2 min
 Primary = 809.43 cfs @ 13.06 hrs, Volume= 168.025 af
 Routed to Pond 3P : Nelson Ave Culvert
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Starting Elev= 1,194.10' Surf.Area= 4.997 ac Storage= 7.192 af
 Peak Elev= 1,196.57' @ 13.06 hrs Surf.Area= 10.254 ac Storage= 24.060 af (16.868 af above start)

Plug-Flow detention time= 51.0 min calculated for 160.816 af (96% of inflow)
 Center-of-Mass det. time= 20.1 min (880.1 - 860.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,192.00'	85.494 af	Wetland Storage (Prismatic) Listed below

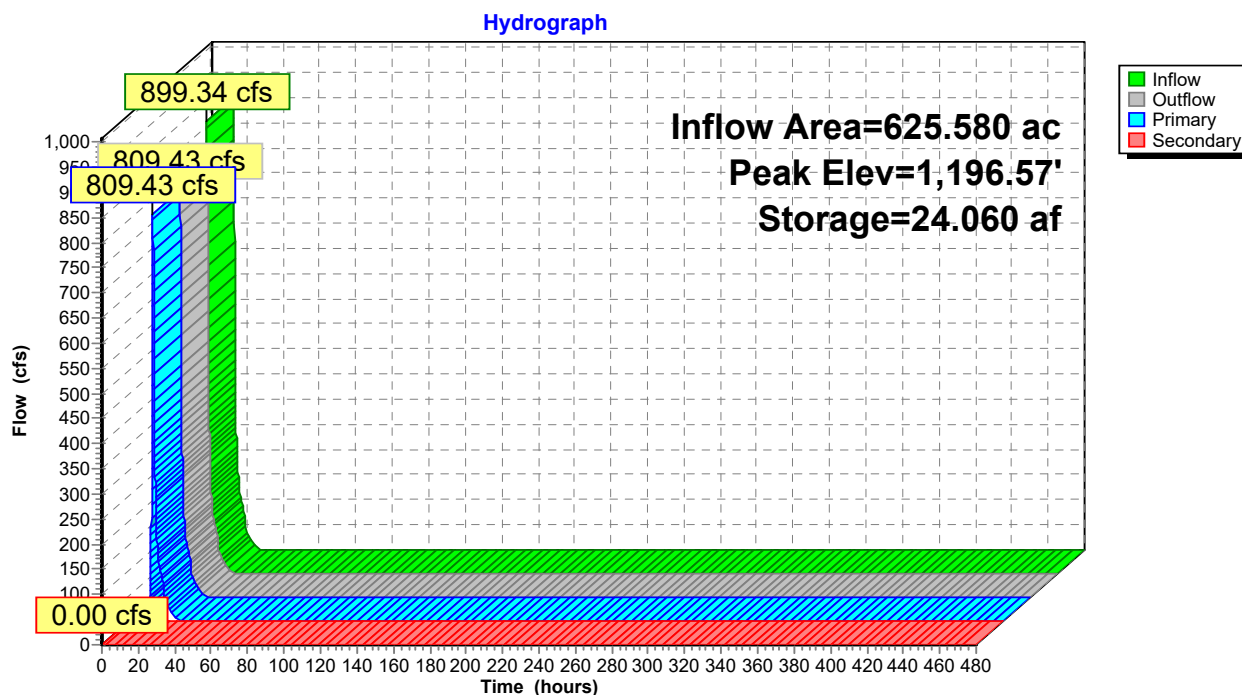
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,192.00	0.000	0.000	0.000
1,193.00	4.363	2.181	2.181
1,194.00	4.690	4.526	6.708
1,194.10	4.997	0.484	7.192
1,195.00	5.272	4.621	11.813
1,196.00	7.894	6.583	18.396
1,197.00	12.049	9.971	28.368
1,198.00	16.333	14.191	42.559
1,198.70	20.079	12.744	55.303
1,199.00	21.492	6.236	61.539
1,200.00	26.419	23.955	85.494

Device	Routing	Invert	Outlet Devices
#1	Primary	1,194.10'	Asymmetrical Sheet Pile Weir, C= 3.27 Offset (feet) -47.00 -45.00 -37.00 -30.00 30.00 37.00 45.00 47.00 Height (feet) 4.60 3.60 3.60 0.00 0.00 3.60 3.60 4.60
#2	Secondary	1,197.10'	Auxillary Spillway in Berm, C= 3.27 Offset (feet) -66.00 -50.00 50.00 66.00 Height (feet) 1.60 0.00 0.00 1.60

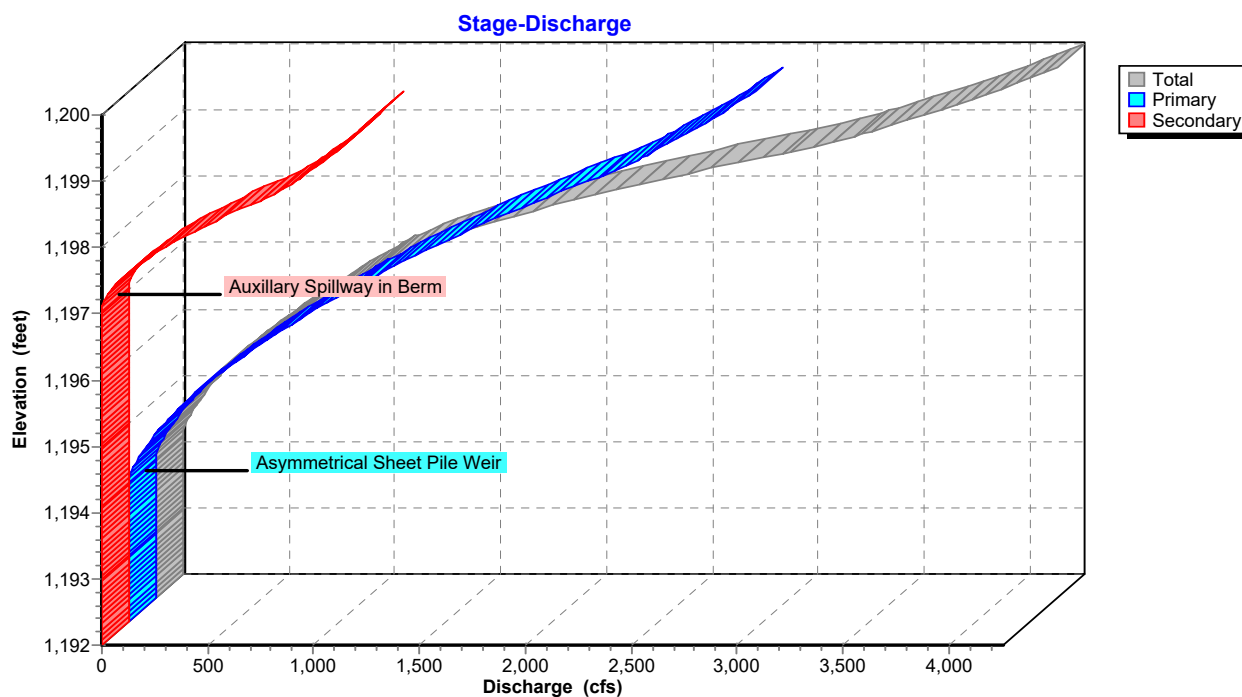
Primary OutFlow Max=808.92 cfs @ 13.06 hrs HW=1,196.57' (Free Discharge)
 ↑1=Asymmetrical Sheet Pile Weir (Weir Controls 808.92 cfs @ 4.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,194.10' (Free Discharge)
 ↑2=Auxillary Spillway in Berm (Controls 0.00 cfs)

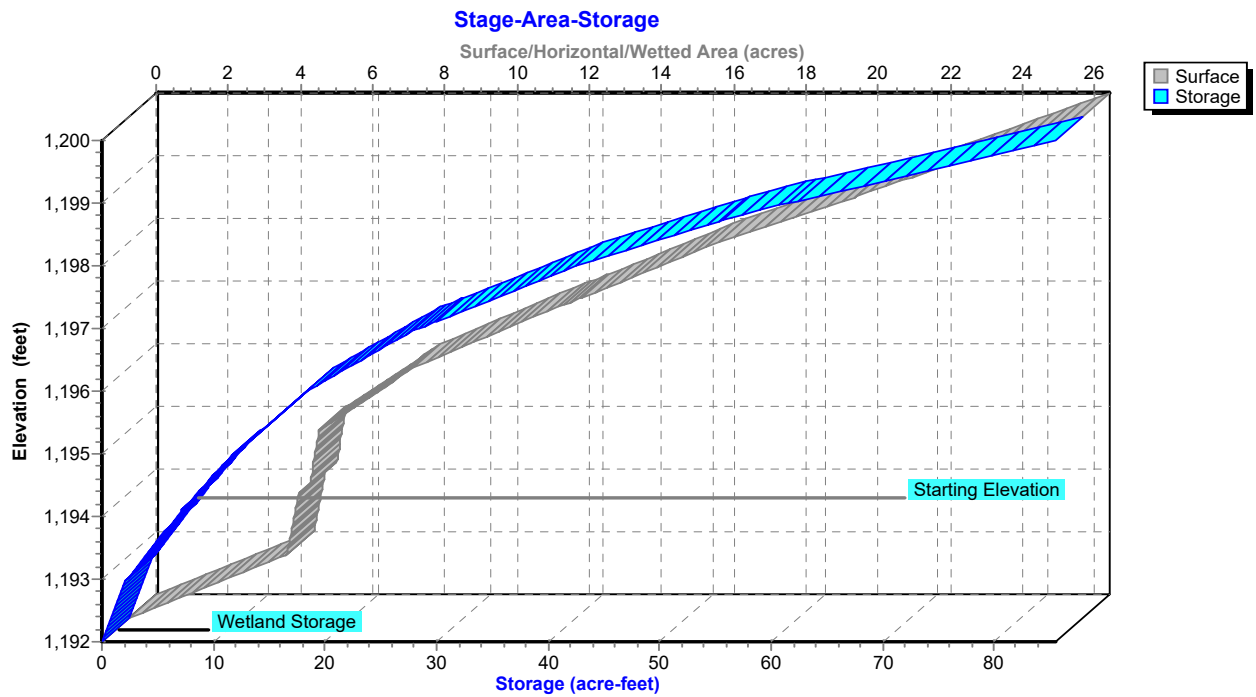
Pond 2P: Proposed Outlet Devices



Pond 2P: Proposed Outlet Devices



Pond 2P: Proposed Outlet Devices



IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Pond 2P: Proposed Outlet Devices

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	7.192	1,194.10	0.00	0.00	0.00
10.00	21.69	8.035	1,194.26	13.35	13.35	0.00
20.00	32.83	8.903	1,194.43	38.27	38.27	0.00
30.00	0.00	7.206	1,194.10	0.13	0.13	0.00
40.00	0.00	7.192	1,194.10	0.00	0.00	0.00
50.00	0.00	7.192	1,194.10	0.00	0.00	0.00
60.00	0.00	7.192	1,194.10	0.00	0.00	0.00
70.00	0.00	7.192	1,194.10	0.00	0.00	0.00
80.00	0.00	7.192	1,194.10	0.00	0.00	0.00
90.00	0.00	7.192	1,194.10	0.00	0.00	0.00
100.00	0.00	7.192	1,194.10	0.00	0.00	0.00
110.00	0.00	7.192	1,194.10	0.00	0.00	0.00
120.00	0.00	7.192	1,194.10	0.00	0.00	0.00
130.00	0.00	7.192	1,194.10	0.00	0.00	0.00
140.00	0.00	7.192	1,194.10	0.00	0.00	0.00
150.00	0.00	7.192	1,194.10	0.00	0.00	0.00
160.00	0.00	7.192	1,194.10	0.00	0.00	0.00
170.00	0.00	7.192	1,194.10	0.00	0.00	0.00
180.00	0.00	7.192	1,194.10	0.00	0.00	0.00
190.00	0.00	7.192	1,194.10	0.00	0.00	0.00
200.00	0.00	7.192	1,194.10	0.00	0.00	0.00
210.00	0.00	7.192	1,194.10	0.00	0.00	0.00
220.00	0.00	7.192	1,194.10	0.00	0.00	0.00
230.00	0.00	7.192	1,194.10	0.00	0.00	0.00
240.00	0.00	7.192	1,194.10	0.00	0.00	0.00
250.00	0.00	7.192	1,194.10	0.00	0.00	0.00
260.00	0.00	7.192	1,194.10	0.00	0.00	0.00
270.00	0.00	7.192	1,194.10	0.00	0.00	0.00
280.00	0.00	7.192	1,194.10	0.00	0.00	0.00
290.00	0.00	7.192	1,194.10	0.00	0.00	0.00
300.00	0.00	7.192	1,194.10	0.00	0.00	0.00
310.00	0.00	7.192	1,194.10	0.00	0.00	0.00
320.00	0.00	7.192	1,194.10	0.00	0.00	0.00
330.00	0.00	7.192	1,194.10	0.00	0.00	0.00
340.00	0.00	7.192	1,194.10	0.00	0.00	0.00
350.00	0.00	7.192	1,194.10	0.00	0.00	0.00
360.00	0.00	7.192	1,194.10	0.00	0.00	0.00
370.00	0.00	7.192	1,194.10	0.00	0.00	0.00
380.00	0.00	7.192	1,194.10	0.00	0.00	0.00
390.00	0.00	7.192	1,194.10	0.00	0.00	0.00
400.00	0.00	7.192	1,194.10	0.00	0.00	0.00
410.00	0.00	7.192	1,194.10	0.00	0.00	0.00
420.00	0.00	7.192	1,194.10	0.00	0.00	0.00
430.00	0.00	7.192	1,194.10	0.00	0.00	0.00
440.00	0.00	7.192	1,194.10	0.00	0.00	0.00
450.00	0.00	7.192	1,194.10	0.00	0.00	0.00
460.00	0.00	7.192	1,194.10	0.00	0.00	0.00
470.00	0.00	7.192	1,194.10	0.00	0.00	0.00
480.00	0.00	7.192	1,194.10	0.00	0.00	0.00

IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Discharge for Pond 2P: Proposed Outlet Devices

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,192.00	0.00	0.00	0.00	1,197.80	1,734.21	1,531.98	202.24
1,192.10	0.00	0.00	0.00	1,197.90	1,850.19	1,601.23	248.96
1,192.20	0.00	0.00	0.00	1,198.00	1,971.80	1,672.50	299.30
1,192.30	0.00	0.00	0.00	1,198.10	2,098.78	1,745.62	353.16
1,192.40	0.00	0.00	0.00	1,198.20	2,230.94	1,820.49	410.46
1,192.50	0.00	0.00	0.00	1,198.30	2,368.14	1,897.03	471.12
1,192.60	0.00	0.00	0.00	1,198.40	2,510.28	1,975.18	535.10
1,192.70	0.00	0.00	0.00	1,198.50	2,657.26	2,054.92	602.34
1,192.80	0.00	0.00	0.00	1,198.60	2,809.03	2,136.20	672.83
1,192.90	0.00	0.00	0.00	1,198.70	2,965.52	2,219.00	746.51
1,193.00	0.00	0.00	0.00	1,198.80	3,103.21	2,293.56	809.65
1,193.10	0.00	0.00	0.00	1,198.90	3,225.81	2,361.48	864.33
1,193.20	0.00	0.00	0.00	1,199.00	3,339.88	2,425.52	914.36
1,193.30	0.00	0.00	0.00	1,199.10	3,447.68	2,486.65	961.03
1,193.40	0.00	0.00	0.00	1,199.20	3,550.49	2,545.42	1,005.07
1,193.50	0.00	0.00	0.00	1,199.30	3,649.13	2,602.20	1,046.94
1,193.60	0.00	0.00	0.00	1,199.40	3,744.20	2,657.23	1,086.97
1,193.70	0.00	0.00	0.00	1,199.50	3,836.14	2,710.73	1,125.41
1,193.80	0.00	0.00	0.00	1,199.60	3,925.31	2,762.86	1,162.45
1,193.90	0.00	0.00	0.00	1,199.70	4,011.98	2,813.73	1,198.25
1,194.00	0.00	0.00	0.00	1,199.80	4,096.39	2,863.45	1,232.94
1,194.10	0.00	0.00	0.00	1,199.90	4,178.74	2,912.13	1,266.61
1,194.20	6.22	6.22	0.00	1,200.00	4,259.18	2,959.82	1,299.36
1,194.30	17.64	17.64	0.00				
1,194.40	32.49	32.49	0.00				
1,194.50	50.15	50.15	0.00				
1,194.60	70.27	70.27	0.00				
1,194.70	92.60	92.60	0.00				
1,194.80	116.99	116.99	0.00				
1,194.90	143.30	143.30	0.00				
1,195.00	171.43	171.43	0.00				
1,195.10	201.29	201.29	0.00				
1,195.20	232.81	232.81	0.00				
1,195.30	265.94	265.94	0.00				
1,195.40	300.61	300.61	0.00				
1,195.50	336.80	336.80	0.00				
1,195.60	374.46	374.46	0.00				
1,195.70	413.55	413.55	0.00				
1,195.80	454.05	454.05	0.00				
1,195.90	495.93	495.93	0.00				
1,196.00	539.15	539.15	0.00				
1,196.10	583.71	583.71	0.00				
1,196.20	629.58	629.58	0.00				
1,196.30	676.74	676.74	0.00				
1,196.40	725.18	725.18	0.00				
1,196.50	774.87	774.87	0.00				
1,196.60	825.82	825.82	0.00				
1,196.70	877.99	877.99	0.00				
1,196.80	931.38	931.38	0.00				
1,196.90	985.99	985.99	0.00				
1,197.00	1,041.79	1,041.79	0.00				
1,197.10	1,098.78	1,098.78	0.00				
1,197.20	1,167.37	1,156.95	10.42				
1,197.30	1,246.01	1,216.29	29.72				
1,197.40	1,331.82	1,276.80	55.02				
1,197.50	1,423.83	1,338.46	85.37				
1,197.60	1,521.51	1,401.27	120.24				
1,197.70	1,624.50	1,465.23	159.27				

IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Area-Storage for Pond 2P: Proposed Outlet Devices

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,192.00	0.000	0.000	1,197.80	15.476	39.721
1,192.10	0.436	0.218	1,197.90	15.905	41.140
1,192.20	0.873	0.436	1,198.00	16.333	42.559
1,192.30	1.309	0.654	1,198.10	16.868	44.379
1,192.40	1.745	0.873	1,198.20	17.403	46.200
1,192.50	2.181	1.091	1,198.30	17.938	48.021
1,192.60	2.618	1.309	1,198.40	18.474	49.841
1,192.70	3.054	1.527	1,198.50	19.009	51.662
1,192.80	3.490	1.745	1,198.60	19.544	53.482
1,192.90	3.927	1.963	1,198.70	20.079	55.303
1,193.00	4.363	2.181	1,198.80	20.550	57.382
1,193.10	4.396	2.634	1,198.90	21.021	59.460
1,193.20	4.428	3.087	1,199.00	21.492	61.539
1,193.30	4.461	3.539	1,199.10	21.985	63.934
1,193.40	4.494	3.992	1,199.20	22.477	66.330
1,193.50	4.526	4.445	1,199.30	22.970	68.725
1,193.60	4.559	4.897	1,199.40	23.463	71.121
1,193.70	4.592	5.350	1,199.50	23.955	73.516
1,193.80	4.625	5.803	1,199.60	24.448	75.912
1,193.90	4.657	6.255	1,199.70	24.941	78.308
1,194.00	4.690	6.708	1,199.80	25.434	80.703
1,194.10	4.997	7.192	1,199.90	25.926	83.099
1,194.20	5.028	7.706	1,200.00	26.419	85.494
1,194.30	5.058	8.219			
1,194.40	5.089	8.733			
1,194.50	5.119	9.246			
1,194.60	5.150	9.760			
1,194.70	5.180	10.273			
1,194.80	5.211	10.786			
1,194.90	5.241	11.300			
1,195.00	5.272	11.813			
1,195.10	5.534	12.472			
1,195.20	5.796	13.130			
1,195.30	6.059	13.788			
1,195.40	6.321	14.447			
1,195.50	6.583	15.105			
1,195.60	6.845	15.763			
1,195.70	7.107	16.422			
1,195.80	7.370	17.080			
1,195.90	7.632	17.738			
1,196.00	7.894	18.396			
1,196.10	8.309	19.394			
1,196.20	8.725	20.391			
1,196.30	9.140	21.388			
1,196.40	9.556	22.385			
1,196.50	9.971	23.382			
1,196.60	10.387	24.379			
1,196.70	10.803	25.376			
1,196.80	11.218	26.374			
1,196.90	11.634	27.371			
1,197.00	12.049	28.368			
1,197.10	12.477	29.787			
1,197.20	12.906	31.206			
1,197.30	13.334	32.625			
1,197.40	13.763	34.044			
1,197.50	14.191	35.463			
1,197.60	14.619	36.882			
1,197.70	15.048	38.302			

IA-340-8 - Proposed Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Pond 3P: Nelson Ave Culvert

[44] Hint: Outlet device #1 is below defined storage

[81] Warning: Exceeded Pond 2P by 3.19' @ 14.30 hrs

Inflow Area = 625.580 ac, 0.75% Impervious, Inflow Depth = 3.22" for 10-Year event
 Inflow = 809.43 cfs @ 13.06 hrs, Volume= 168.025 af
 Outflow = 808.47 cfs @ 13.08 hrs, Volume= 168.025 af, Atten= 0%, Lag= 1.5 min
 Primary = 295.30 cfs @ 13.08 hrs, Volume= 126.556 af
 Secondary = 513.17 cfs @ 13.08 hrs, Volume= 41.469 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs

Peak Elev= 1,199.15' @ 13.08 hrs Surf.Area= 2.625 ac Storage= 7.493 af

Plug-Flow detention time= 7.9 min calculated for 168.025 af (100% of inflow)

Center-of-Mass det. time= 7.9 min (888.0 - 880.1)

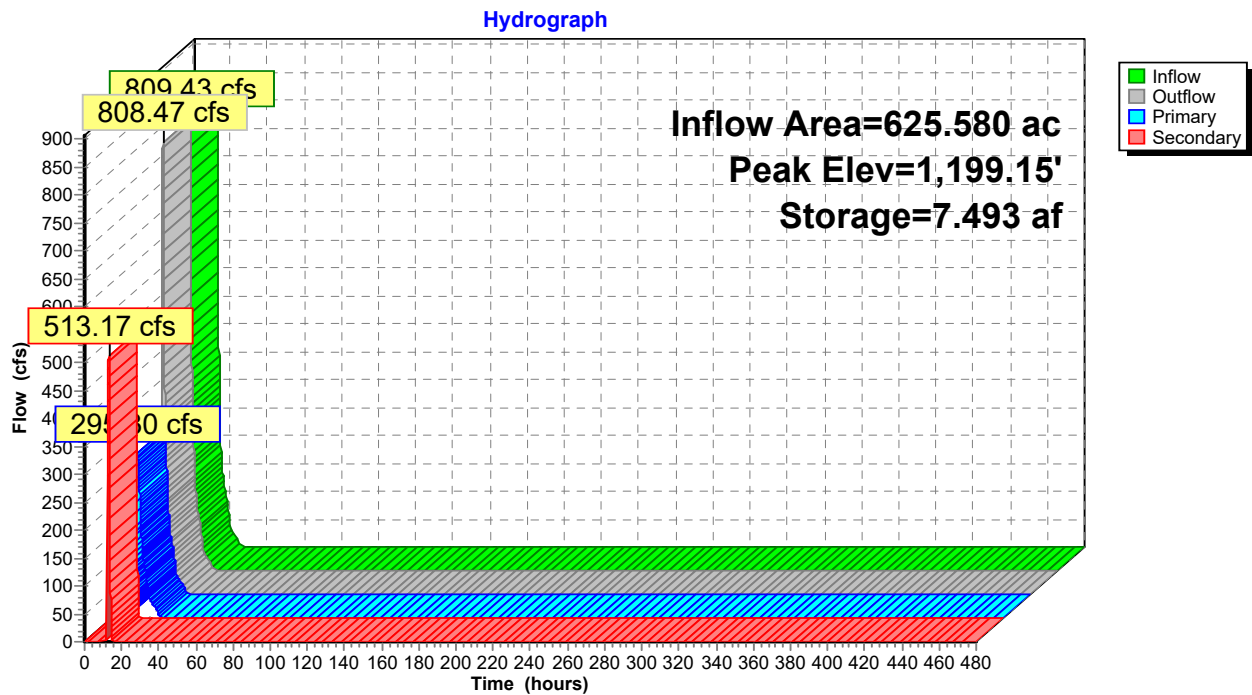
Volume	Invert	Avail.Storage	Storage Description
#1	1,190.00'	9.786 af	Storage Btw Berm and Road (Prismatic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,190.00	0.000	0.000	0.000
1,191.00	0.023	0.011	0.011
1,192.00	0.089	0.056	0.068
1,193.00	0.411	0.250	0.317
1,194.00	0.648	0.529	0.847
1,195.00	0.846	0.747	1.594
1,196.00	1.025	0.936	2.529
1,197.00	1.234	1.130	3.659
1,198.00	1.520	1.377	5.036
1,199.00	2.596	2.058	7.094
1,200.00	2.789	2.692	9.786

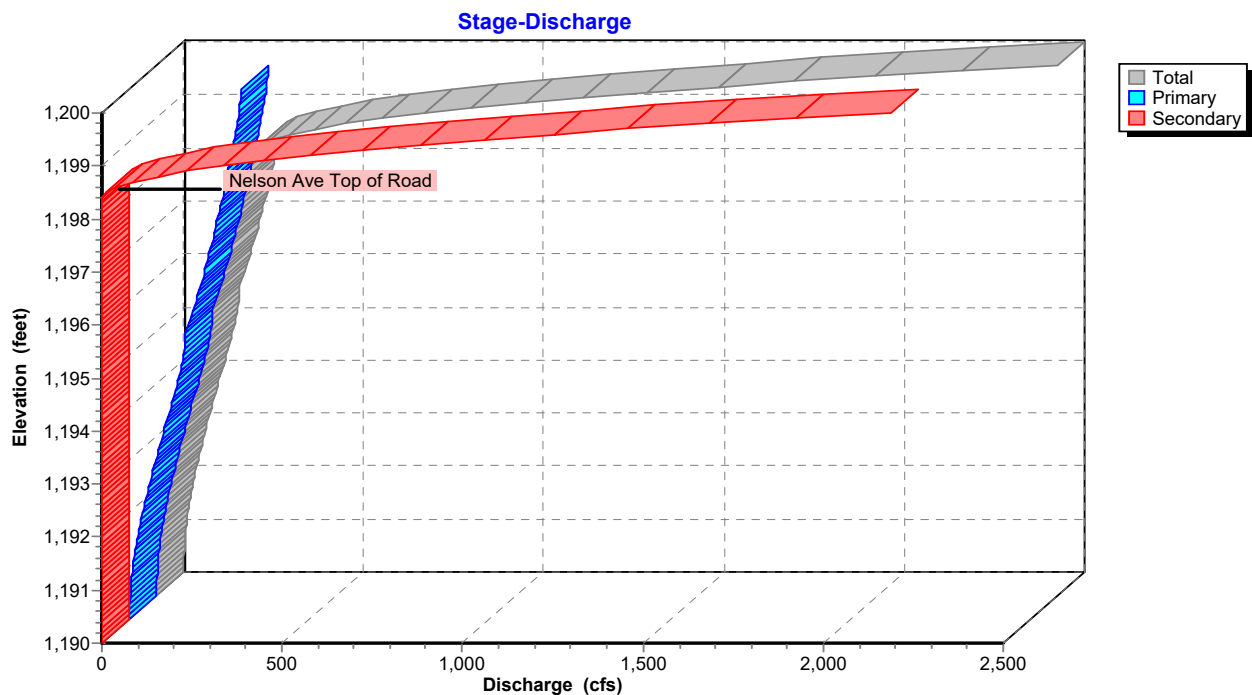
Device	Routing	Invert	Outlet Devices
#1	Primary	1,189.62'	91.0" W x 52.0" H Ellipse Nelson Ave Road Culvert L= 70.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 1,189.62' / 1,189.62' S= 0.0000 ' Cc= 0.900 n= 0.025, Flow Area= 25.81 sf
#2	Secondary	1,198.34'	Nelson Ave Top of Road, C= 3.27 Offset (feet) -257.75 -118.35 118.35 291.17 Elev. (feet) 1,200.00 1,198.34 1,198.64 1,200.00

Primary OutFlow Max=295.29 cfs @ 13.08 hrs HW=1,199.15' (Free Discharge)↑**1=Nelson Ave Road Culvert** (Barrel Controls 295.29 cfs @ 11.44 fps)**Secondary OutFlow** Max=510.46 cfs @ 13.08 hrs HW=1,199.15' (Free Discharge)↑**2=Nelson Ave Top of Road** (Weir Controls 510.46 cfs @ 1.83 fps)

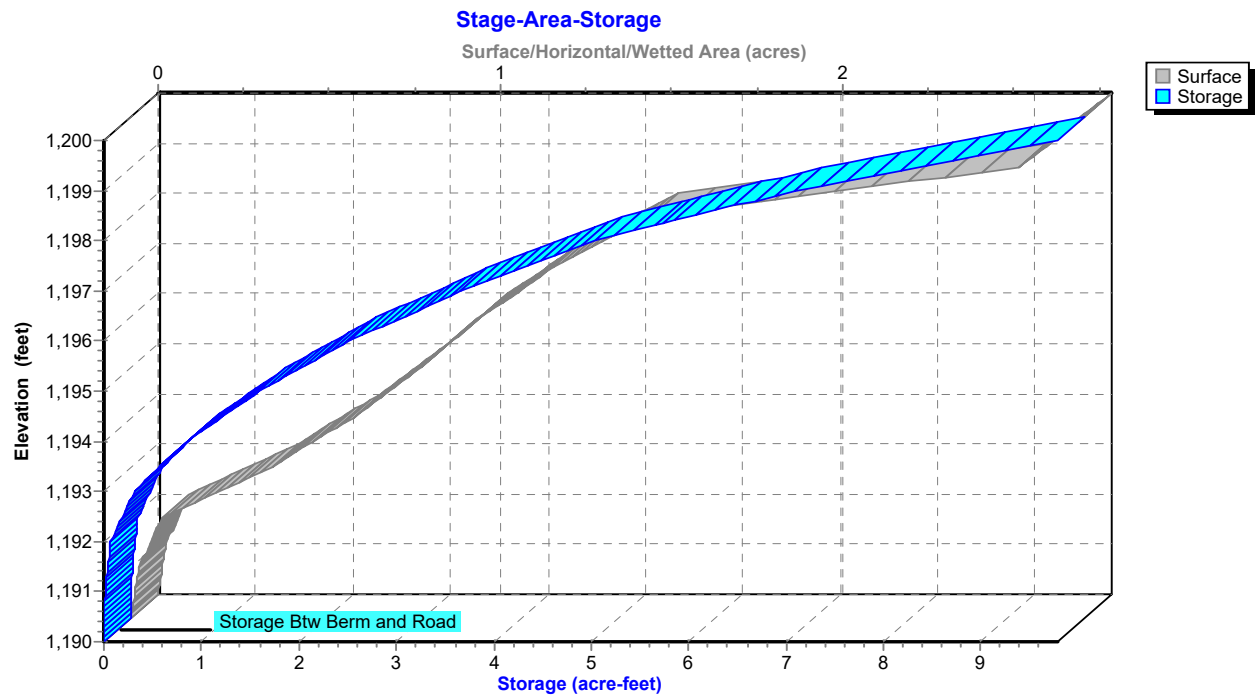
Pond 3P: Nelson Ave Culvert



Pond 3P: Nelson Ave Culvert



Pond 3P: Nelson Ave Culvert



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Hydrograph for Pond 3P: Nelson Ave Culvert

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	1,190.00	0.00	0.00	0.00
10.00	13.35	0.016	1,191.07	12.79	12.79	0.00
20.00	38.27	0.087	1,192.08	39.92	39.92	0.00
30.00	0.13	0.000	1,190.01	0.13	0.13	0.00
40.00	0.00	0.000	1,190.00	0.00	0.00	0.00
50.00	0.00	0.000	1,190.00	0.00	0.00	0.00
60.00	0.00	0.000	1,190.00	0.00	0.00	0.00
70.00	0.00	0.000	1,190.00	0.00	0.00	0.00
80.00	0.00	0.000	1,190.00	0.00	0.00	0.00
90.00	0.00	0.000	1,190.00	0.00	0.00	0.00
100.00	0.00	0.000	1,190.00	0.00	0.00	0.00
110.00	0.00	0.000	1,190.00	0.00	0.00	0.00
120.00	0.00	0.000	1,190.00	0.00	0.00	0.00
130.00	0.00	0.000	1,190.00	0.00	0.00	0.00
140.00	0.00	0.000	1,190.00	0.00	0.00	0.00
150.00	0.00	0.000	1,190.00	0.00	0.00	0.00
160.00	0.00	0.000	1,190.00	0.00	0.00	0.00
170.00	0.00	0.000	1,190.00	0.00	0.00	0.00
180.00	0.00	0.000	1,190.00	0.00	0.00	0.00
190.00	0.00	0.000	1,190.00	0.00	0.00	0.00
200.00	0.00	0.000	1,190.00	0.00	0.00	0.00
210.00	0.00	0.000	1,190.00	0.00	0.00	0.00
220.00	0.00	0.000	1,190.00	0.00	0.00	0.00
230.00	0.00	0.000	1,190.00	0.00	0.00	0.00
240.00	0.00	0.000	1,190.00	0.00	0.00	0.00
250.00	0.00	0.000	1,190.00	0.00	0.00	0.00
260.00	0.00	0.000	1,190.00	0.00	0.00	0.00
270.00	0.00	0.000	1,190.00	0.00	0.00	0.00
280.00	0.00	0.000	1,190.00	0.00	0.00	0.00
290.00	0.00	0.000	1,190.00	0.00	0.00	0.00
300.00	0.00	0.000	1,190.00	0.00	0.00	0.00
310.00	0.00	0.000	1,190.00	0.00	0.00	0.00
320.00	0.00	0.000	1,190.00	0.00	0.00	0.00
330.00	0.00	0.000	1,190.00	0.00	0.00	0.00
340.00	0.00	0.000	1,190.00	0.00	0.00	0.00
350.00	0.00	0.000	1,190.00	0.00	0.00	0.00
360.00	0.00	0.000	1,190.00	0.00	0.00	0.00
370.00	0.00	0.000	1,190.00	0.00	0.00	0.00
380.00	0.00	0.000	1,190.00	0.00	0.00	0.00
390.00	0.00	0.000	1,190.00	0.00	0.00	0.00
400.00	0.00	0.000	1,190.00	0.00	0.00	0.00
410.00	0.00	0.000	1,190.00	0.00	0.00	0.00
420.00	0.00	0.000	1,190.00	0.00	0.00	0.00
430.00	0.00	0.000	1,190.00	0.00	0.00	0.00
440.00	0.00	0.000	1,190.00	0.00	0.00	0.00
450.00	0.00	0.000	1,190.00	0.00	0.00	0.00
460.00	0.00	0.000	1,190.00	0.00	0.00	0.00
470.00	0.00	0.000	1,190.00	0.00	0.00	0.00
480.00	0.00	0.000	1,190.00	0.00	0.00	0.00

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Stage-Discharge for Pond 3P: Nelson Ave Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,190.00	0.00	0.00	0.00	1,195.80	176.07	176.07	0.00
1,190.10	0.85	0.85	0.00	1,195.90	180.77	180.77	0.00
1,190.20	1.38	1.38	0.00	1,196.00	185.35	185.35	0.00
1,190.30	2.06	2.06	0.00	1,196.10	189.83	189.83	0.00
1,190.40	2.89	2.89	0.00	1,196.20	194.20	194.20	0.00
1,190.50	3.89	3.89	0.00	1,196.30	198.47	198.47	0.00
1,190.60	5.05	5.05	0.00	1,196.40	202.66	202.66	0.00
1,190.70	6.38	6.38	0.00	1,196.50	206.76	206.76	0.00
1,190.80	7.86	7.86	0.00	1,196.60	210.78	210.78	0.00
1,190.90	9.51	9.51	0.00	1,196.70	214.72	214.72	0.00
1,191.00	11.32	11.32	0.00	1,196.80	218.60	218.60	0.00
1,191.10	13.28	13.28	0.00	1,196.90	222.41	222.41	0.00
1,191.20	15.40	15.40	0.00	1,197.00	226.15	226.15	0.00
1,191.30	17.66	17.66	0.00	1,197.10	229.83	229.83	0.00
1,191.40	20.07	20.07	0.00	1,197.20	233.45	233.45	0.00
1,191.50	22.62	22.62	0.00	1,197.30	237.02	237.02	0.00
1,191.60	25.30	25.30	0.00	1,197.40	240.54	240.54	0.00
1,191.70	28.11	28.11	0.00	1,197.50	244.00	244.00	0.00
1,191.80	31.05	31.05	0.00	1,197.60	247.42	247.42	0.00
1,191.90	34.11	34.11	0.00	1,197.70	250.79	250.79	0.00
1,192.00	37.29	37.29	0.00	1,197.80	254.11	254.11	0.00
1,192.10	40.58	40.58	0.00	1,197.90	257.39	257.39	0.00
1,192.20	43.97	43.97	0.00	1,198.00	260.63	260.63	0.00
1,192.30	47.46	47.46	0.00	1,198.10	263.83	263.83	0.00
1,192.40	51.05	51.05	0.00	1,198.20	267.00	267.00	0.00
1,192.50	54.72	54.72	0.00	1,198.30	270.12	270.12	0.00
1,192.60	58.48	58.48	0.00	1,198.40	274.22	273.21	1.01
1,192.70	62.32	62.32	0.00	1,198.50	287.96	276.26	11.69
1,192.80	66.22	66.22	0.00	1,198.60	318.65	279.29	39.36
1,192.90	70.20	70.20	0.00	1,198.70	370.30	282.28	88.03
1,193.00	74.23	74.23	0.00	1,198.80	440.24	285.23	155.01
1,193.10	78.31	78.31	0.00	1,198.90	526.28	288.16	238.12
1,193.20	82.44	82.44	0.00	1,199.00	627.82	291.06	336.76
1,193.30	86.61	86.61	0.00	1,199.10	744.64	293.93	450.71
1,193.40	90.80	90.80	0.00	1,199.20	876.76	296.77	579.99
1,193.50	95.02	95.02	0.00	1,199.30	1,024.26	299.59	724.68
1,193.60	99.24	99.24	0.00	1,199.40	1,186.72	301.77	884.95
1,193.70	103.47	103.47	0.00	1,199.50	1,364.77	303.77	1,061.00
1,193.80	107.70	107.70	0.00	1,199.60	1,558.82	305.75	1,253.07
1,193.90	111.90	111.90	0.00	1,199.70	1,769.11	307.72	1,461.39
1,194.00	116.07	116.07	0.00	1,199.80	1,995.89	309.68	1,686.22
1,194.10	120.21	120.21	0.00	1,199.90	2,239.44	311.62	1,927.81
1,194.20	124.28	124.28	0.00	1,200.00	2,500.00	313.55	2,186.45
1,194.30	128.28	128.28	0.00				
1,194.40	132.20	132.20	0.00				
1,194.50	136.00	136.00	0.00				
1,194.60	139.67	139.67	0.00				
1,194.70	143.17	143.17	0.00				
1,194.80	146.48	146.48	0.00				
1,194.90	149.56	149.56	0.00				
1,195.00	152.33	152.33	0.00				
1,195.10	154.71	154.71	0.00				
1,195.20	156.57	156.57	0.00				
1,195.30	157.61	157.61	0.00				
1,195.40	155.83	155.83	0.00				
1,195.50	161.13	161.13	0.00				
1,195.60	166.26	166.26	0.00				
1,195.70	171.23	171.23	0.00				

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Stage-Area-Storage for Pond 3P: Nelson Ave Culvert

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,190.00	0.000	0.000	1,195.80	0.989	2.342
1,190.10	0.002	0.001	1,195.90	1.007	2.436
1,190.20	0.005	0.002	1,196.00	1.025	2.529
1,190.30	0.007	0.003	1,196.10	1.046	2.642
1,190.40	0.009	0.005	1,196.20	1.067	2.755
1,190.50	0.011	0.006	1,196.30	1.088	2.868
1,190.60	0.014	0.007	1,196.40	1.109	2.981
1,190.70	0.016	0.008	1,196.50	1.130	3.094
1,190.80	0.018	0.009	1,196.60	1.150	3.207
1,190.90	0.021	0.010	1,196.70	1.171	3.320
1,191.00	0.023	0.011	1,196.80	1.192	3.433
1,191.10	0.030	0.017	1,196.90	1.213	3.546
1,191.20	0.036	0.023	1,197.00	1.234	3.659
1,191.30	0.043	0.028	1,197.10	1.263	3.797
1,191.40	0.049	0.034	1,197.20	1.291	3.934
1,191.50	0.056	0.040	1,197.30	1.320	4.072
1,191.60	0.063	0.045	1,197.40	1.348	4.210
1,191.70	0.069	0.051	1,197.50	1.377	4.347
1,191.80	0.076	0.056	1,197.60	1.406	4.485
1,191.90	0.082	0.062	1,197.70	1.434	4.623
1,192.00	0.089	0.068	1,197.80	1.463	4.761
1,192.10	0.121	0.092	1,197.90	1.491	4.898
1,192.20	0.153	0.118	1,198.00	1.520	5.036
1,192.30	0.186	0.142	1,198.10	1.628	5.242
1,192.40	0.218	0.168	1,198.20	1.735	5.448
1,192.50	0.250	0.192	1,198.30	1.843	5.653
1,192.60	0.282	0.217	1,198.40	1.950	5.859
1,192.70	0.314	0.243	1,198.50	2.058	6.065
1,192.80	0.347	0.267	1,198.60	2.166	6.271
1,192.90	0.379	0.293	1,198.70	2.273	6.477
1,193.00	0.411	0.317	1,198.80	2.381	6.682
1,193.10	0.435	0.370	1,198.90	2.488	6.888
1,193.20	0.458	0.423	1,199.00	2.596	7.094
1,193.30	0.482	0.476	1,199.10	2.615	7.363
1,193.40	0.506	0.529	1,199.20	2.635	7.633
1,193.50	0.529	0.582	1,199.30	2.654	7.902
1,193.60	0.553	0.635	1,199.40	2.673	8.171
1,193.70	0.577	0.688	1,199.50	2.692	8.440
1,193.80	0.601	0.741	1,199.60	2.712	8.709
1,193.90	0.624	0.794	1,199.70	2.731	8.979
1,194.00	0.648	0.847	1,199.80	2.750	9.248
1,194.10	0.668	0.922	1,199.90	2.770	9.517
1,194.20	0.688	0.996	1,200.00	2.789	9.786
1,194.30	0.707	1.071			
1,194.40	0.727	1.146			
1,194.50	0.747	1.220			
1,194.60	0.767	1.295			
1,194.70	0.787	1.370			
1,194.80	0.806	1.445			
1,194.90	0.826	1.519			
1,195.00	0.846	1.594			
1,195.10	0.864	1.688			
1,195.20	0.882	1.781			
1,195.30	0.900	1.875			
1,195.40	0.918	1.968			
1,195.50	0.936	2.062			
1,195.60	0.953	2.155			
1,195.70	0.971	2.249			

IA-340-8 - Proposed Conditions

MSE 24-hr 3 10-Year Rainfall=4.52"

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Summary for Pond 4P: 200th Street Culvert

Inflow Area = 164.040 ac, 0.00% Impervious, Inflow Depth = 3.22" for 10-Year event
 Inflow = 329.11 cfs @ 12.71 hrs, Volume= 43.950 af
 Outflow = 79.58 cfs @ 13.82 hrs, Volume= 43.949 af, Atten= 76%, Lag= 66.7 min
 Primary = 79.58 cfs @ 13.82 hrs, Volume= 43.949 af
 Routed to Pond 2P : Proposed Outlet Devices
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,203.18' @ 13.82 hrs Surf.Area= 592,414 sf Storage= 837,620 cf

Plug-Flow detention time= 97.9 min calculated for 43.944 af (100% of inflow)
 Center-of-Mass det. time= 97.8 min (926.9 - 829.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,198.00'	5,262,028 cf	Storage South of 200th Street Culvert (Prismatic) listed below (Recalculated)

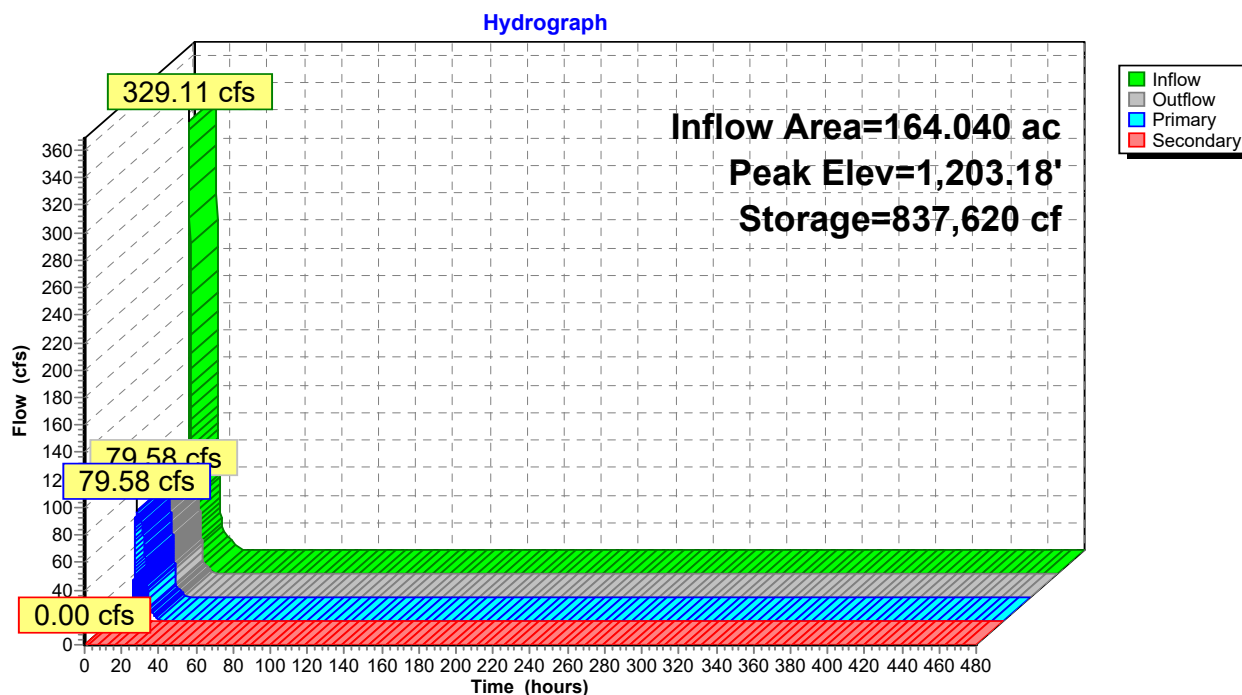
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,198.00	0	0	0
1,199.00	436	218	218
1,200.00	871	654	872
1,201.00	132,684	66,778	67,649
1,202.00	318,032	225,358	293,007
1,203.00	562,882	440,457	733,464
1,204.00	726,668	644,775	1,378,239
1,205.00	850,640	788,654	2,166,893
1,206.00	971,780	911,210	3,078,103
1,207.00	1,093,879	1,032,830	4,110,933
1,208.00	1,208,311	1,151,095	5,262,028

Device	Routing	Invert	Outlet Devices
#1	Primary	1,198.44'	48.0" W x 24.0" H Box 2'x4' Road Culvert L= 25.0' Box, 30-75° wingwalls, square crown, Ke= 0.400 Inlet / Outlet Invert= 1,198.44' / 1,198.44' S= 0.0000 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 8.00 sf
#2	Secondary	1,204.07'	200th St Top of Road, C= 3.27 Offset (feet) -234.90 169.69 318.45 441.99 Height (feet) 1.13 0.20 0.34 1.13

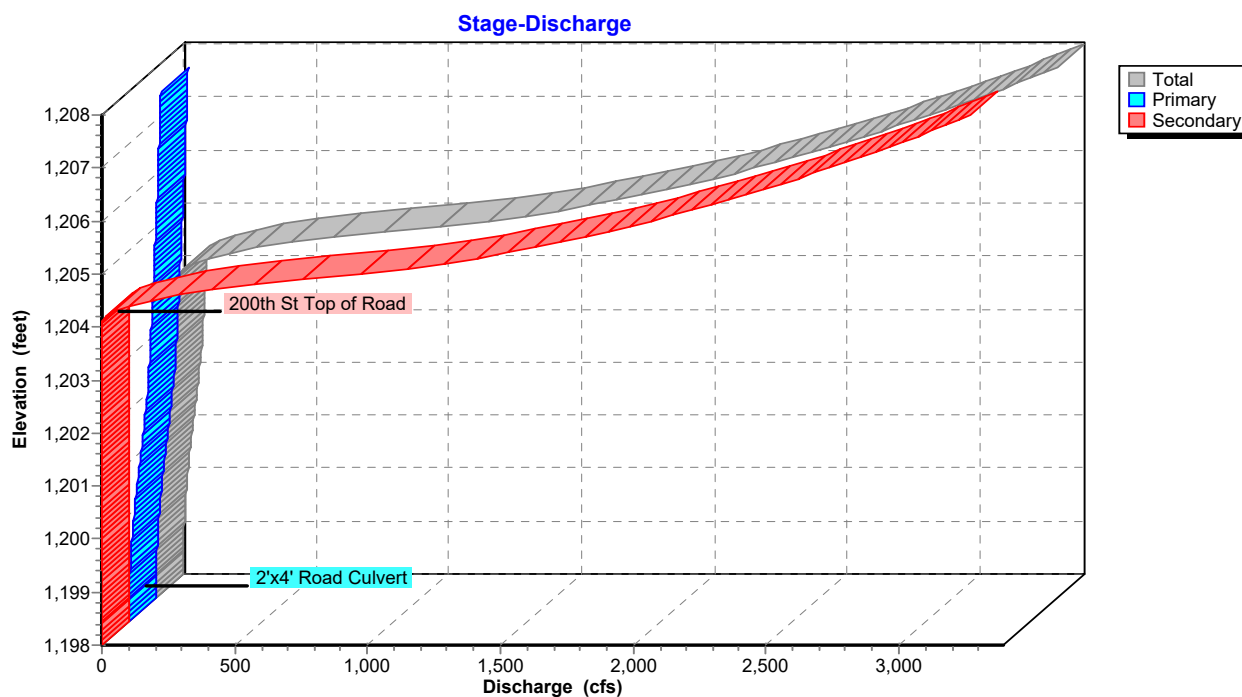
Primary OutFlow Max=79.57 cfs @ 13.82 hrs HW=1,203.18' (Free Discharge)
 ↑ **1=2'x4' Road Culvert** (Inlet Controls 79.57 cfs @ 9.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,198.00' (Free Discharge)
 ↑ **2=200th St Top of Road** (Controls 0.00 cfs)

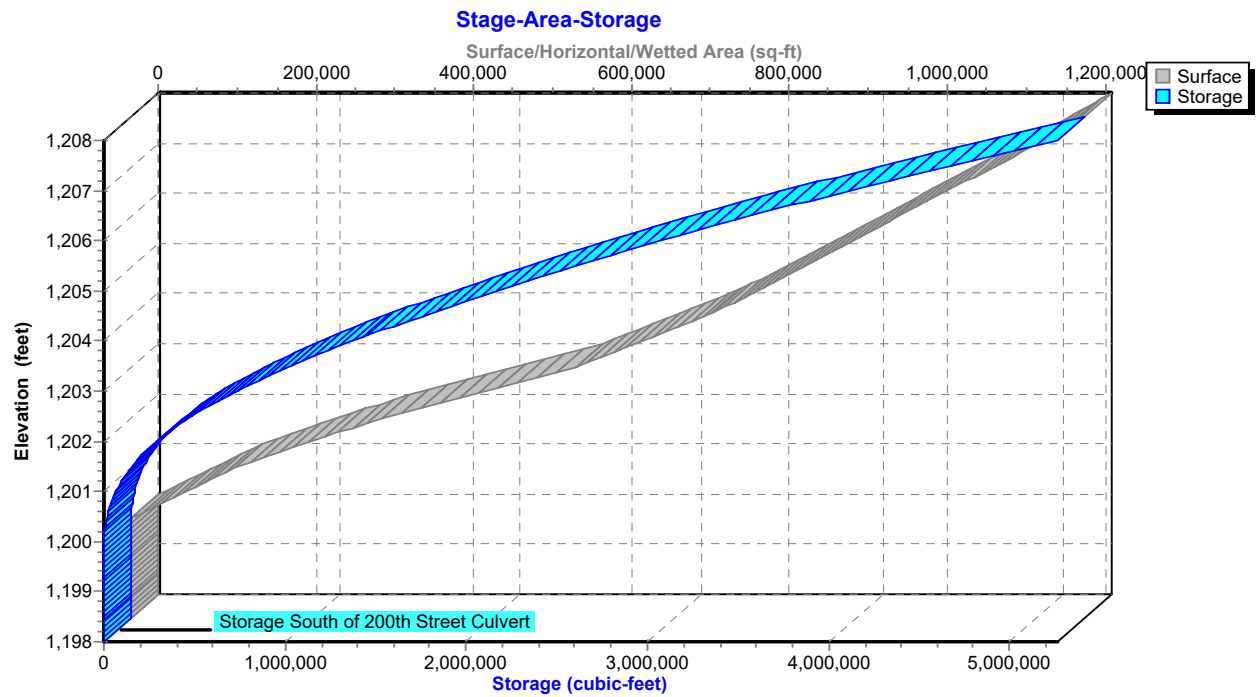
Pond 4P: 200th Street Culvert



Pond 4P: 200th Street Culvert



Pond 4P: 200th Street Culvert



IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Hydrograph for Pond 4P: 200th Street Culvert

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	1,198.00	0.00	0.00	0.00
10.00	6.08	311	1,199.19	6.02	6.02	0.00
20.00	8.47	413	1,199.38	8.48	8.48	0.00
30.00	0.00	42	1,198.44	0.00	0.00	0.00
40.00	0.00	42	1,198.44	0.00	0.00	0.00
50.00	0.00	42	1,198.44	0.00	0.00	0.00
60.00	0.00	42	1,198.44	0.00	0.00	0.00
70.00	0.00	42	1,198.44	0.00	0.00	0.00
80.00	0.00	42	1,198.44	0.00	0.00	0.00
90.00	0.00	42	1,198.44	0.00	0.00	0.00
100.00	0.00	42	1,198.44	0.00	0.00	0.00
110.00	0.00	42	1,198.44	0.00	0.00	0.00
120.00	0.00	42	1,198.44	0.00	0.00	0.00
130.00	0.00	42	1,198.44	0.00	0.00	0.00
140.00	0.00	42	1,198.44	0.00	0.00	0.00
150.00	0.00	42	1,198.44	0.00	0.00	0.00
160.00	0.00	42	1,198.44	0.00	0.00	0.00
170.00	0.00	42	1,198.44	0.00	0.00	0.00
180.00	0.00	42	1,198.44	0.00	0.00	0.00
190.00	0.00	42	1,198.44	0.00	0.00	0.00
200.00	0.00	42	1,198.44	0.00	0.00	0.00
210.00	0.00	42	1,198.44	0.00	0.00	0.00
220.00	0.00	42	1,198.44	0.00	0.00	0.00
230.00	0.00	42	1,198.44	0.00	0.00	0.00
240.00	0.00	42	1,198.44	0.00	0.00	0.00
250.00	0.00	42	1,198.44	0.00	0.00	0.00
260.00	0.00	42	1,198.44	0.00	0.00	0.00
270.00	0.00	42	1,198.44	0.00	0.00	0.00
280.00	0.00	42	1,198.44	0.00	0.00	0.00
290.00	0.00	42	1,198.44	0.00	0.00	0.00
300.00	0.00	42	1,198.44	0.00	0.00	0.00
310.00	0.00	42	1,198.44	0.00	0.00	0.00
320.00	0.00	42	1,198.44	0.00	0.00	0.00
330.00	0.00	42	1,198.44	0.00	0.00	0.00
340.00	0.00	42	1,198.44	0.00	0.00	0.00
350.00	0.00	42	1,198.44	0.00	0.00	0.00
360.00	0.00	42	1,198.44	0.00	0.00	0.00
370.00	0.00	42	1,198.44	0.00	0.00	0.00
380.00	0.00	42	1,198.44	0.00	0.00	0.00
390.00	0.00	42	1,198.44	0.00	0.00	0.00
400.00	0.00	42	1,198.44	0.00	0.00	0.00
410.00	0.00	42	1,198.44	0.00	0.00	0.00
420.00	0.00	42	1,198.44	0.00	0.00	0.00
430.00	0.00	42	1,198.44	0.00	0.00	0.00
440.00	0.00	42	1,198.44	0.00	0.00	0.00
450.00	0.00	42	1,198.44	0.00	0.00	0.00
460.00	0.00	42	1,198.44	0.00	0.00	0.00
470.00	0.00	42	1,198.44	0.00	0.00	0.00
480.00	0.00	42	1,198.44	0.00	0.00	0.00

IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Discharge for Pond 4P: 200th Street Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,198.00	0.00	0.00	0.00	1,203.80	85.99	85.99	0.00
1,198.10	0.00	0.00	0.00	1,203.90	86.98	86.98	0.00
1,198.20	0.00	0.00	0.00	1,204.00	87.95	87.95	0.00
1,198.30	0.00	0.00	0.00	1,204.10	89.23	88.92	0.31
1,198.40	0.00	0.00	0.00	1,204.20	101.81	89.88	11.94
1,198.50	0.06	0.06	0.00	1,204.30	137.64	90.82	46.82
1,198.60	0.42	0.42	0.00	1,204.40	195.65	91.76	103.89
1,198.70	1.02	1.02	0.00	1,204.50	276.51	92.69	183.83
1,198.80	1.79	1.79	0.00	1,204.60	381.60	93.60	288.00
1,198.90	2.70	2.70	0.00	1,204.70	512.40	94.51	417.89
1,199.00	3.73	3.73	0.00	1,204.80	670.38	95.41	574.97
1,199.10	4.86	4.86	0.00	1,204.90	856.97	96.30	760.67
1,199.20	6.10	6.10	0.00	1,205.00	1,073.55	97.18	976.36
1,199.30	7.42	7.42	0.00	1,205.10	1,249.00	98.06	1,150.94
1,199.40	8.83	8.83	0.00	1,205.20	1,390.14	98.93	1,291.21
1,199.50	10.31	10.31	0.00	1,205.30	1,514.47	99.79	1,414.68
1,199.60	11.87	11.87	0.00	1,205.40	1,627.47	100.64	1,526.84
1,199.70	13.50	13.50	0.00	1,205.50	1,732.02	101.48	1,630.54
1,199.80	15.20	15.20	0.00	1,205.60	1,829.89	102.32	1,727.57
1,199.90	16.96	16.96	0.00	1,205.70	1,922.28	103.15	1,819.13
1,200.00	18.79	18.79	0.00	1,205.80	2,010.06	103.97	1,906.08
1,200.10	20.68	20.68	0.00	1,205.90	2,093.88	104.79	1,989.09
1,200.20	22.63	22.63	0.00	1,206.00	2,174.26	105.60	2,068.66
1,200.30	24.63	24.63	0.00	1,206.10	2,251.61	106.41	2,145.20
1,200.40	26.69	26.69	0.00	1,206.20	2,326.24	107.21	2,219.03
1,200.50	28.81	28.81	0.00	1,206.30	2,398.43	108.00	2,290.43
1,200.60	30.97	30.97	0.00	1,206.40	2,468.42	108.79	2,359.64
1,200.70	33.19	33.19	0.00	1,206.50	2,536.40	109.57	2,426.83
1,200.80	35.46	35.46	0.00	1,206.60	2,602.53	110.34	2,492.19
1,200.90	37.78	37.78	0.00	1,206.70	2,666.97	111.11	2,555.85
1,201.00	40.15	40.15	0.00	1,206.80	2,729.83	111.88	2,617.95
1,201.10	42.56	42.56	0.00	1,206.90	2,791.23	112.64	2,678.59
1,201.20	44.51	44.51	0.00	1,207.00	2,851.27	113.39	2,737.87
1,201.30	47.35	47.35	0.00	1,207.10	2,910.03	114.14	2,795.89
1,201.40	50.03	50.03	0.00	1,207.20	2,967.60	114.89	2,852.72
1,201.50	52.57	52.57	0.00	1,207.30	3,024.05	115.63	2,908.42
1,201.60	54.99	54.99	0.00	1,207.40	3,079.44	116.36	2,963.07
1,201.70	57.31	57.31	0.00	1,207.50	3,133.82	117.09	3,016.73
1,201.80	59.55	59.55	0.00	1,207.60	3,187.26	117.82	3,069.44
1,201.90	61.70	61.70	0.00	1,207.70	3,239.80	118.54	3,121.26
1,202.00	63.77	63.77	0.00	1,207.80	3,291.48	119.26	3,172.22
1,202.10	65.79	65.79	0.00	1,207.90	3,342.35	119.97	3,222.37
1,202.20	67.74	67.74	0.00	1,208.00	3,392.44	120.68	3,271.76
1,202.30	69.43	69.43	0.00				
1,202.40	70.66	70.66	0.00				
1,202.50	71.87	71.87	0.00				
1,202.60	73.05	73.05	0.00				
1,202.70	74.22	74.22	0.00				
1,202.80	75.37	75.37	0.00				
1,202.90	76.50	76.50	0.00				
1,203.00	77.61	77.61	0.00				
1,203.10	78.71	78.71	0.00				
1,203.20	79.79	79.79	0.00				
1,203.30	80.86	80.86	0.00				
1,203.40	81.91	81.91	0.00				
1,203.50	82.95	82.95	0.00				
1,203.60	83.97	83.97	0.00				
1,203.70	84.99	84.99	0.00				

IA-340-8 - Proposed Conditions*MSE 24-hr 3 10-Year Rainfall=4.52"*

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Stage-Area-Storage for Pond 4P: 200th Street Culvert

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,198.00	0	0	1,203.80	693,911	1,236,181
1,198.10	44	2	1,203.90	710,289	1,306,391
1,198.20	87	9	1,204.00	726,668	1,378,239
1,198.30	131	20	1,204.10	739,065	1,451,526
1,198.40	174	35	1,204.20	751,462	1,526,052
1,198.50	218	55	1,204.30	763,860	1,601,818
1,198.60	262	78	1,204.40	776,257	1,678,824
1,198.70	305	107	1,204.50	788,654	1,757,070
1,198.80	349	140	1,204.60	801,051	1,836,555
1,198.90	392	177	1,204.70	813,448	1,917,280
1,199.00	436	218	1,204.80	825,846	1,999,244
1,199.10	479	264	1,204.90	838,243	2,082,449
1,199.20	523	314	1,205.00	850,640	2,166,893
1,199.30	566	368	1,205.10	862,754	2,252,563
1,199.40	610	427	1,205.20	874,868	2,339,444
1,199.50	654	490	1,205.30	886,982	2,427,536
1,199.60	697	558	1,205.40	899,096	2,516,840
1,199.70	741	630	1,205.50	911,210	2,607,356
1,199.80	784	706	1,205.60	923,324	2,699,082
1,199.90	828	787	1,205.70	935,438	2,792,020
1,200.00	871	872	1,205.80	947,552	2,886,170
1,200.10	14,052	1,618	1,205.90	959,666	2,981,531
1,200.20	27,234	3,682	1,206.00	971,780	3,078,103
1,200.30	40,415	7,064	1,206.10	983,990	3,175,891
1,200.40	53,596	11,765	1,206.20	996,200	3,274,901
1,200.50	66,778	17,784	1,206.30	1,008,410	3,375,131
1,200.60	79,959	25,120	1,206.40	1,020,620	3,476,583
1,200.70	93,140	33,775	1,206.50	1,032,830	3,579,255
1,200.80	106,321	43,748	1,206.60	1,045,039	3,683,149
1,200.90	119,503	55,040	1,206.70	1,057,249	3,788,263
1,201.00	132,684	67,649	1,206.80	1,069,459	3,894,599
1,201.10	151,219	81,844	1,206.90	1,081,669	4,002,155
1,201.20	169,754	97,893	1,207.00	1,093,879	4,110,933
1,201.30	188,288	115,795	1,207.10	1,105,322	4,220,893
1,201.40	206,823	135,550	1,207.20	1,116,765	4,331,997
1,201.50	225,358	157,160	1,207.30	1,128,209	4,444,246
1,201.60	243,893	180,622	1,207.40	1,139,652	4,557,639
1,201.70	262,428	205,938	1,207.50	1,151,095	4,672,176
1,201.80	280,962	233,108	1,207.60	1,162,538	4,787,858
1,201.90	299,497	262,131	1,207.70	1,173,981	4,904,684
1,202.00	318,032	293,007	1,207.80	1,185,425	5,022,654
1,202.10	342,517	326,034	1,207.90	1,196,868	5,141,769
1,202.20	367,002	361,510	1,208.00	1,208,311	5,262,028
1,202.30	391,487	399,435			
1,202.40	415,972	439,808			
1,202.50	440,457	482,629			
1,202.60	464,942	527,899			
1,202.70	489,427	575,618			
1,202.80	513,912	625,785			
1,202.90	538,397	678,400			
1,203.00	562,882	733,464			
1,203.10	579,261	790,571			
1,203.20	595,639	849,316			
1,203.30	612,018	909,699			
1,203.40	628,396	971,720			
1,203.50	644,775	1,035,378			
1,203.60	661,154	1,100,675			
1,203.70	677,532	1,167,609			

IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Time span=0.00-480.00 hrs, dt=0.05 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: North-East Runoff Area=456.820 ac 0.00% Impervious Runoff Depth=4.26"
Flow Length=6,885' Slope=0.0327 '/' Tc=62.5 min CN=88 Runoff=1,084.28 cfs 162.199 af

Subcatchment 3S: Direct Rainfall in Runoff Area=4.720 ac 100.00% Impervious Runoff Depth=5.38"
Flow Length=836' Tc=2.2 min CN=98 Runoff=44.44 cfs 2.117 af

Subcatchment 4S: South Drainage Area Runoff Area=164.040 ac 0.00% Impervious Runoff Depth=4.26"
Flow Length=5,631' Slope=0.0327 '/' Tc=53.2 min CN=88 Runoff=432.57 cfs 58.244 af

Pond 2P: Proposed Outlet Peak Elev=1,197.02' Storage=28.630 af Inflow=1,164.43 cfs 222.559 af
Primary=1,052.24 cfs 222.559 af Secondary=0.00 cfs 0.000 af Outflow=1,052.24 cfs 222.559 af

Pond 3P: Nelson Ave Culvert Peak Elev=1,199.32' Storage=7.947 af Inflow=1,052.24 cfs 222.559 af
Primary=299.95 cfs 154.398 af Secondary=751.70 cfs 68.160 af Outflow=1,051.65 cfs 222.559 af

Pond 4P: 200th Street Culvert Peak Elev=1,203.78' Storage=1,221,379 cf Inflow=432.57 cfs 58.244 af
Primary=85.77 cfs 58.243 af Secondary=0.00 cfs 0.000 af Outflow=85.77 cfs 58.243 af

Total Runoff Area = 625.580 ac Runoff Volume = 222.560 af Average Runoff Depth = 4.27"
99.25% Pervious = 620.860 ac 0.75% Impervious = 4.720 ac

IA-340-8 - Proposed Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Subcatchment 1S: North-East Drainage Area

North-East Watershed Area of 456.82 acres modeled as separate watershed area from South drainage and wetland area itself.

Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data for the complete watershed.

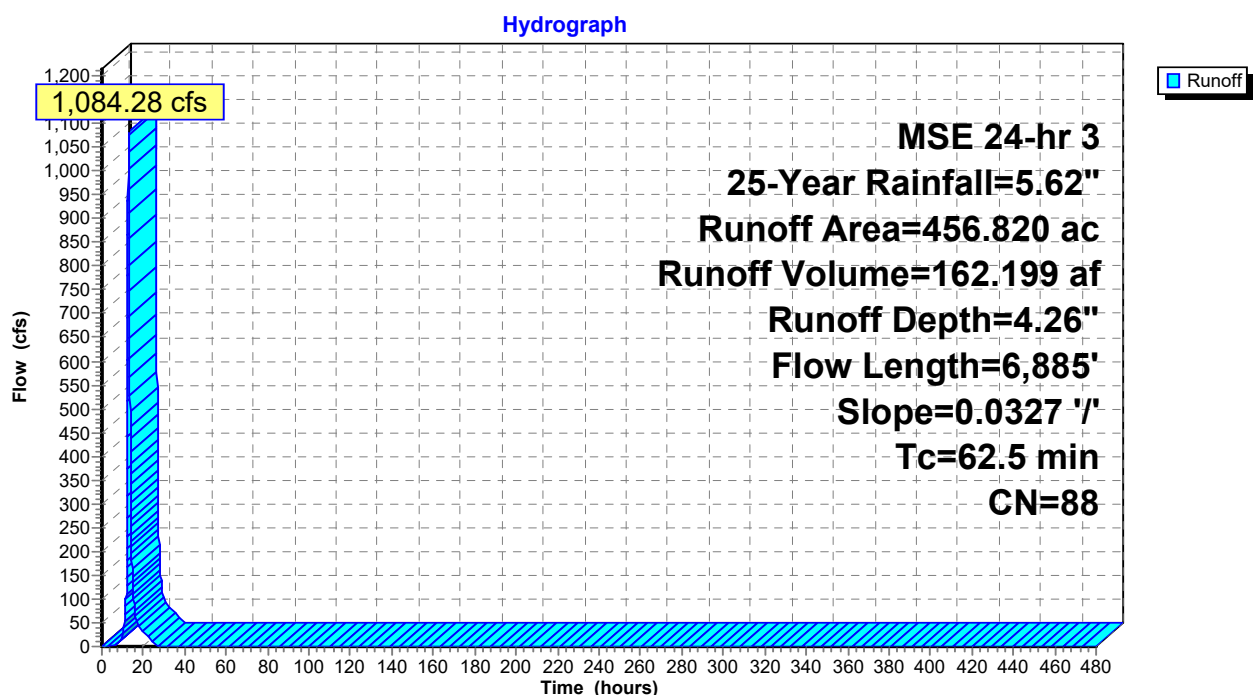
Runoff = 1,084.28 cfs @ 12.83 hrs, Volume= 162.199 af, Depth= 4.26"
Routed to Pond 2P : Proposed Outlet Devices

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 25-Year Rainfall=5.62"

Area (ac)	CN	Description
* 456.820	88	Weighted Average
456.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	6,885	0.0327	1.84		Lag/CN Method,

Subcatchment 1S: North-East Drainage Area



IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Subcatchment 1S: North-East Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	5.62	4.26	0.00
5.00	0.21	0.00	0.00	295.00	5.62	4.26	0.00
10.00	0.77	0.13	25.88	300.00	5.62	4.26	0.00
15.00	5.04	3.71	109.14	305.00	5.62	4.26	0.00
20.00	5.47	4.12	30.59	310.00	5.62	4.26	0.00
25.00	5.62	4.26	3.27	315.00	5.62	4.26	0.00
30.00	5.62	4.26	0.00	320.00	5.62	4.26	0.00
35.00	5.62	4.26	0.00	325.00	5.62	4.26	0.00
40.00	5.62	4.26	0.00	330.00	5.62	4.26	0.00
45.00	5.62	4.26	0.00	335.00	5.62	4.26	0.00
50.00	5.62	4.26	0.00	340.00	5.62	4.26	0.00
55.00	5.62	4.26	0.00	345.00	5.62	4.26	0.00
60.00	5.62	4.26	0.00	350.00	5.62	4.26	0.00
65.00	5.62	4.26	0.00	355.00	5.62	4.26	0.00
70.00	5.62	4.26	0.00	360.00	5.62	4.26	0.00
75.00	5.62	4.26	0.00	365.00	5.62	4.26	0.00
80.00	5.62	4.26	0.00	370.00	5.62	4.26	0.00
85.00	5.62	4.26	0.00	375.00	5.62	4.26	0.00
90.00	5.62	4.26	0.00	380.00	5.62	4.26	0.00
95.00	5.62	4.26	0.00	385.00	5.62	4.26	0.00
100.00	5.62	4.26	0.00	390.00	5.62	4.26	0.00
105.00	5.62	4.26	0.00	395.00	5.62	4.26	0.00
110.00	5.62	4.26	0.00	400.00	5.62	4.26	0.00
115.00	5.62	4.26	0.00	405.00	5.62	4.26	0.00
120.00	5.62	4.26	0.00	410.00	5.62	4.26	0.00
125.00	5.62	4.26	0.00	415.00	5.62	4.26	0.00
130.00	5.62	4.26	0.00	420.00	5.62	4.26	0.00
135.00	5.62	4.26	0.00	425.00	5.62	4.26	0.00
140.00	5.62	4.26	0.00	430.00	5.62	4.26	0.00
145.00	5.62	4.26	0.00	435.00	5.62	4.26	0.00
150.00	5.62	4.26	0.00	440.00	5.62	4.26	0.00
155.00	5.62	4.26	0.00	445.00	5.62	4.26	0.00
160.00	5.62	4.26	0.00	450.00	5.62	4.26	0.00
165.00	5.62	4.26	0.00	455.00	5.62	4.26	0.00
170.00	5.62	4.26	0.00	460.00	5.62	4.26	0.00
175.00	5.62	4.26	0.00	465.00	5.62	4.26	0.00
180.00	5.62	4.26	0.00	470.00	5.62	4.26	0.00
185.00	5.62	4.26	0.00	475.00	5.62	4.26	0.00
190.00	5.62	4.26	0.00	480.00	5.62	4.26	0.00
195.00	5.62	4.26	0.00				
200.00	5.62	4.26	0.00				
205.00	5.62	4.26	0.00				
210.00	5.62	4.26	0.00				
215.00	5.62	4.26	0.00				
220.00	5.62	4.26	0.00				
225.00	5.62	4.26	0.00				
230.00	5.62	4.26	0.00				
235.00	5.62	4.26	0.00				
240.00	5.62	4.26	0.00				
245.00	5.62	4.26	0.00				
250.00	5.62	4.26	0.00				
255.00	5.62	4.26	0.00				
260.00	5.62	4.26	0.00				
265.00	5.62	4.26	0.00				
270.00	5.62	4.26	0.00				
275.00	5.62	4.26	0.00				
280.00	5.62	4.26	0.00				
285.00	5.62	4.26	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Subcatchment 3S: Direct Rainfall in Wetland

Direct rainfall into wetland area itself.

[49] Hint: $T_c < 2dt$ may require smaller dt

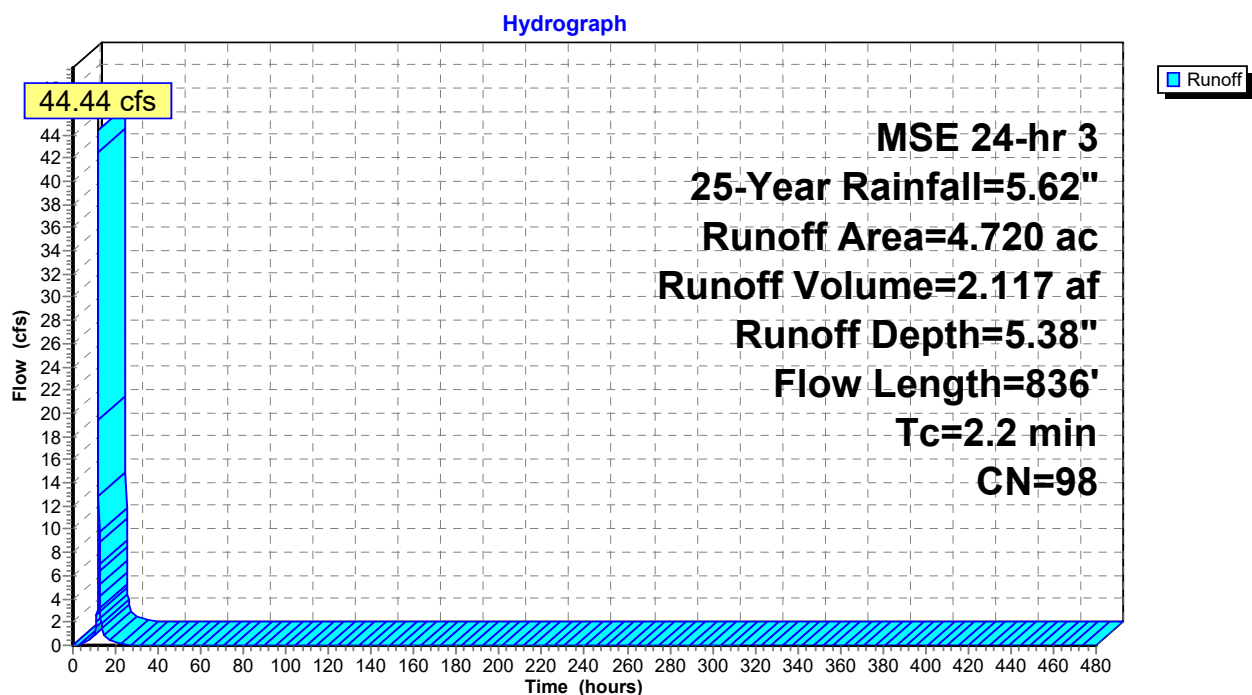
Runoff = 44.44 cfs @ 12.08 hrs, Volume= 2.117 af, Depth= 5.38"
Routed to Pond 2P : Proposed Outlet Devices

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, $dt=0.05$ hrs
MSE 24-hr 3 25-Year Rainfall=5.62"

Area (ac)	CN	Description
4.720	98	Water Surface, HSG A
4.720		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	836		6.22		Lake or Reservoir, Mean Depth= 1.20'

Subcatchment 3S: Direct Rainfall in Wetland



IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Subcatchment 3S: Direct Rainfall in Wetland

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	5.62	5.38	0.00
5.00	0.21	0.08	0.23	295.00	5.62	5.38	0.00
10.00	0.77	0.57	0.93	300.00	5.62	5.38	0.00
15.00	5.04	4.80	0.85	305.00	5.62	5.38	0.00
20.00	5.47	5.24	0.28	310.00	5.62	5.38	0.00
25.00	5.62	5.38	0.00	315.00	5.62	5.38	0.00
30.00	5.62	5.38	0.00	320.00	5.62	5.38	0.00
35.00	5.62	5.38	0.00	325.00	5.62	5.38	0.00
40.00	5.62	5.38	0.00	330.00	5.62	5.38	0.00
45.00	5.62	5.38	0.00	335.00	5.62	5.38	0.00
50.00	5.62	5.38	0.00	340.00	5.62	5.38	0.00
55.00	5.62	5.38	0.00	345.00	5.62	5.38	0.00
60.00	5.62	5.38	0.00	350.00	5.62	5.38	0.00
65.00	5.62	5.38	0.00	355.00	5.62	5.38	0.00
70.00	5.62	5.38	0.00	360.00	5.62	5.38	0.00
75.00	5.62	5.38	0.00	365.00	5.62	5.38	0.00
80.00	5.62	5.38	0.00	370.00	5.62	5.38	0.00
85.00	5.62	5.38	0.00	375.00	5.62	5.38	0.00
90.00	5.62	5.38	0.00	380.00	5.62	5.38	0.00
95.00	5.62	5.38	0.00	385.00	5.62	5.38	0.00
100.00	5.62	5.38	0.00	390.00	5.62	5.38	0.00
105.00	5.62	5.38	0.00	395.00	5.62	5.38	0.00
110.00	5.62	5.38	0.00	400.00	5.62	5.38	0.00
115.00	5.62	5.38	0.00	405.00	5.62	5.38	0.00
120.00	5.62	5.38	0.00	410.00	5.62	5.38	0.00
125.00	5.62	5.38	0.00	415.00	5.62	5.38	0.00
130.00	5.62	5.38	0.00	420.00	5.62	5.38	0.00
135.00	5.62	5.38	0.00	425.00	5.62	5.38	0.00
140.00	5.62	5.38	0.00	430.00	5.62	5.38	0.00
145.00	5.62	5.38	0.00	435.00	5.62	5.38	0.00
150.00	5.62	5.38	0.00	440.00	5.62	5.38	0.00
155.00	5.62	5.38	0.00	445.00	5.62	5.38	0.00
160.00	5.62	5.38	0.00	450.00	5.62	5.38	0.00
165.00	5.62	5.38	0.00	455.00	5.62	5.38	0.00
170.00	5.62	5.38	0.00	460.00	5.62	5.38	0.00
175.00	5.62	5.38	0.00	465.00	5.62	5.38	0.00
180.00	5.62	5.38	0.00	470.00	5.62	5.38	0.00
185.00	5.62	5.38	0.00	475.00	5.62	5.38	0.00
190.00	5.62	5.38	0.00	480.00	5.62	5.38	0.00
195.00	5.62	5.38	0.00				
200.00	5.62	5.38	0.00				
205.00	5.62	5.38	0.00				
210.00	5.62	5.38	0.00				
215.00	5.62	5.38	0.00				
220.00	5.62	5.38	0.00				
225.00	5.62	5.38	0.00				
230.00	5.62	5.38	0.00				
235.00	5.62	5.38	0.00				
240.00	5.62	5.38	0.00				
245.00	5.62	5.38	0.00				
250.00	5.62	5.38	0.00				
255.00	5.62	5.38	0.00				
260.00	5.62	5.38	0.00				
265.00	5.62	5.38	0.00				
270.00	5.62	5.38	0.00				
275.00	5.62	5.38	0.00				
280.00	5.62	5.38	0.00				
285.00	5.62	5.38	0.00				

Summary for Subcatchment 4S: South Drainage Area

South Watershed Area of 164.04 acres modeled as sub-watershed since this watershed routes through existing road culvert.

Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data from complete watershed.

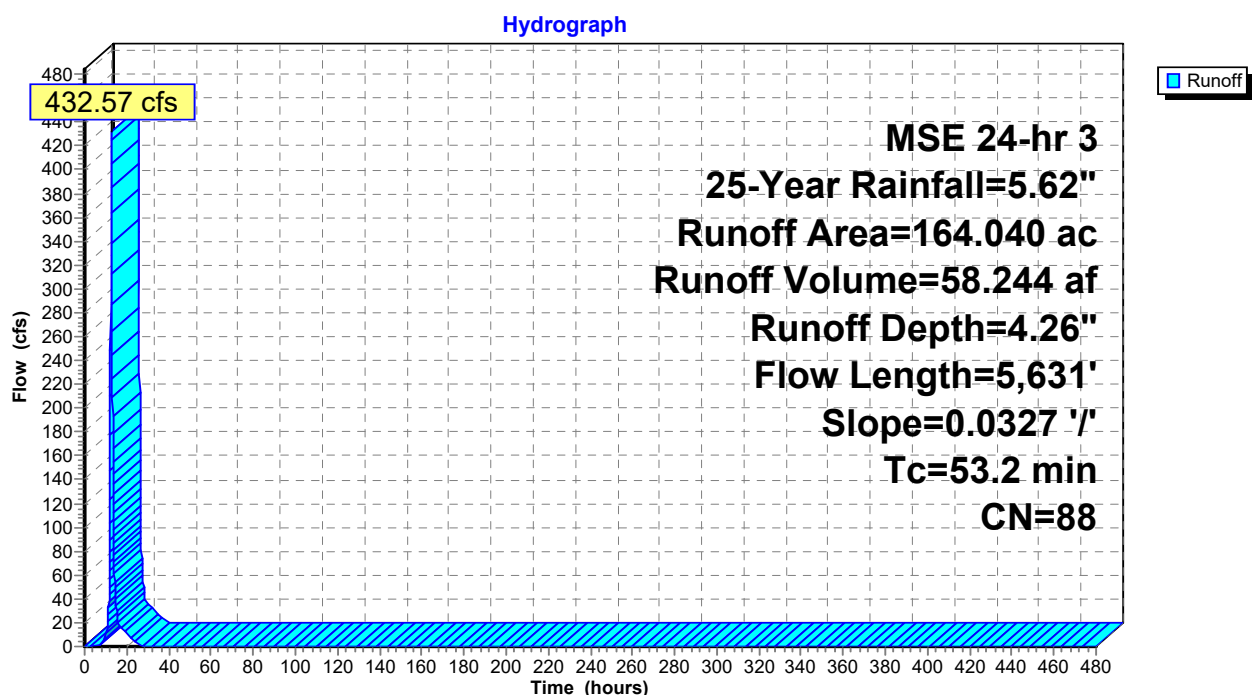
Runoff = 432.57 cfs @ 12.71 hrs, Volume= 58.244 af, Depth= 4.26"
Routed to Pond 4P : 200th Street Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 25-Year Rainfall=5.62"

Area (ac)	CN	Description
* 164.040	88	Weighted Average
164.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.2	5,631	0.0327	1.76		Lag/CN Method,

Subcatchment 4S: South Drainage Area



IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Subcatchment 4S: South Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	5.62	4.26	0.00
5.00	0.21	0.00	0.00	295.00	5.62	4.26	0.00
10.00	0.77	0.13	10.38	300.00	5.62	4.26	0.00
15.00	5.04	3.71	34.21	305.00	5.62	4.26	0.00
20.00	5.47	4.12	10.74	310.00	5.62	4.26	0.00
25.00	5.62	4.26	0.74	315.00	5.62	4.26	0.00
30.00	5.62	4.26	0.00	320.00	5.62	4.26	0.00
35.00	5.62	4.26	0.00	325.00	5.62	4.26	0.00
40.00	5.62	4.26	0.00	330.00	5.62	4.26	0.00
45.00	5.62	4.26	0.00	335.00	5.62	4.26	0.00
50.00	5.62	4.26	0.00	340.00	5.62	4.26	0.00
55.00	5.62	4.26	0.00	345.00	5.62	4.26	0.00
60.00	5.62	4.26	0.00	350.00	5.62	4.26	0.00
65.00	5.62	4.26	0.00	355.00	5.62	4.26	0.00
70.00	5.62	4.26	0.00	360.00	5.62	4.26	0.00
75.00	5.62	4.26	0.00	365.00	5.62	4.26	0.00
80.00	5.62	4.26	0.00	370.00	5.62	4.26	0.00
85.00	5.62	4.26	0.00	375.00	5.62	4.26	0.00
90.00	5.62	4.26	0.00	380.00	5.62	4.26	0.00
95.00	5.62	4.26	0.00	385.00	5.62	4.26	0.00
100.00	5.62	4.26	0.00	390.00	5.62	4.26	0.00
105.00	5.62	4.26	0.00	395.00	5.62	4.26	0.00
110.00	5.62	4.26	0.00	400.00	5.62	4.26	0.00
115.00	5.62	4.26	0.00	405.00	5.62	4.26	0.00
120.00	5.62	4.26	0.00	410.00	5.62	4.26	0.00
125.00	5.62	4.26	0.00	415.00	5.62	4.26	0.00
130.00	5.62	4.26	0.00	420.00	5.62	4.26	0.00
135.00	5.62	4.26	0.00	425.00	5.62	4.26	0.00
140.00	5.62	4.26	0.00	430.00	5.62	4.26	0.00
145.00	5.62	4.26	0.00	435.00	5.62	4.26	0.00
150.00	5.62	4.26	0.00	440.00	5.62	4.26	0.00
155.00	5.62	4.26	0.00	445.00	5.62	4.26	0.00
160.00	5.62	4.26	0.00	450.00	5.62	4.26	0.00
165.00	5.62	4.26	0.00	455.00	5.62	4.26	0.00
170.00	5.62	4.26	0.00	460.00	5.62	4.26	0.00
175.00	5.62	4.26	0.00	465.00	5.62	4.26	0.00
180.00	5.62	4.26	0.00	470.00	5.62	4.26	0.00
185.00	5.62	4.26	0.00	475.00	5.62	4.26	0.00
190.00	5.62	4.26	0.00	480.00	5.62	4.26	0.00
195.00	5.62	4.26	0.00				
200.00	5.62	4.26	0.00				
205.00	5.62	4.26	0.00				
210.00	5.62	4.26	0.00				
215.00	5.62	4.26	0.00				
220.00	5.62	4.26	0.00				
225.00	5.62	4.26	0.00				
230.00	5.62	4.26	0.00				
235.00	5.62	4.26	0.00				
240.00	5.62	4.26	0.00				
245.00	5.62	4.26	0.00				
250.00	5.62	4.26	0.00				
255.00	5.62	4.26	0.00				
260.00	5.62	4.26	0.00				
265.00	5.62	4.26	0.00				
270.00	5.62	4.26	0.00				
275.00	5.62	4.26	0.00				
280.00	5.62	4.26	0.00				
285.00	5.62	4.26	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Pond 2P: Proposed Outlet Devices

Water in wetland starting at 1094.1' (NWL)

Inflow Area = 625.580 ac, 0.75% Impervious, Inflow Depth = 4.27" for 25-Year event
 Inflow = 1,164.43 cfs @ 12.83 hrs, Volume= 222.559 af
 Outflow = 1,052.24 cfs @ 13.04 hrs, Volume= 222.559 af, Atten= 10%, Lag= 12.7 min
 Primary = 1,052.24 cfs @ 13.04 hrs, Volume= 222.559 af
 Routed to Pond 3P : Nelson Ave Culvert
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Starting Elev= 1,194.10' Surf.Area= 4.997 ac Storage= 7.192 af
 Peak Elev= 1,197.02' @ 13.04 hrs Surf.Area= 12.128 ac Storage= 28.630 af (21.437 af above start)

Plug-Flow detention time= 44.6 min calculated for 215.344 af (97% of inflow)
 Center-of-Mass det. time= 19.2 min (883.2 - 864.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,192.00'	85.494 af	Wetland Storage (Prismatic) Listed below

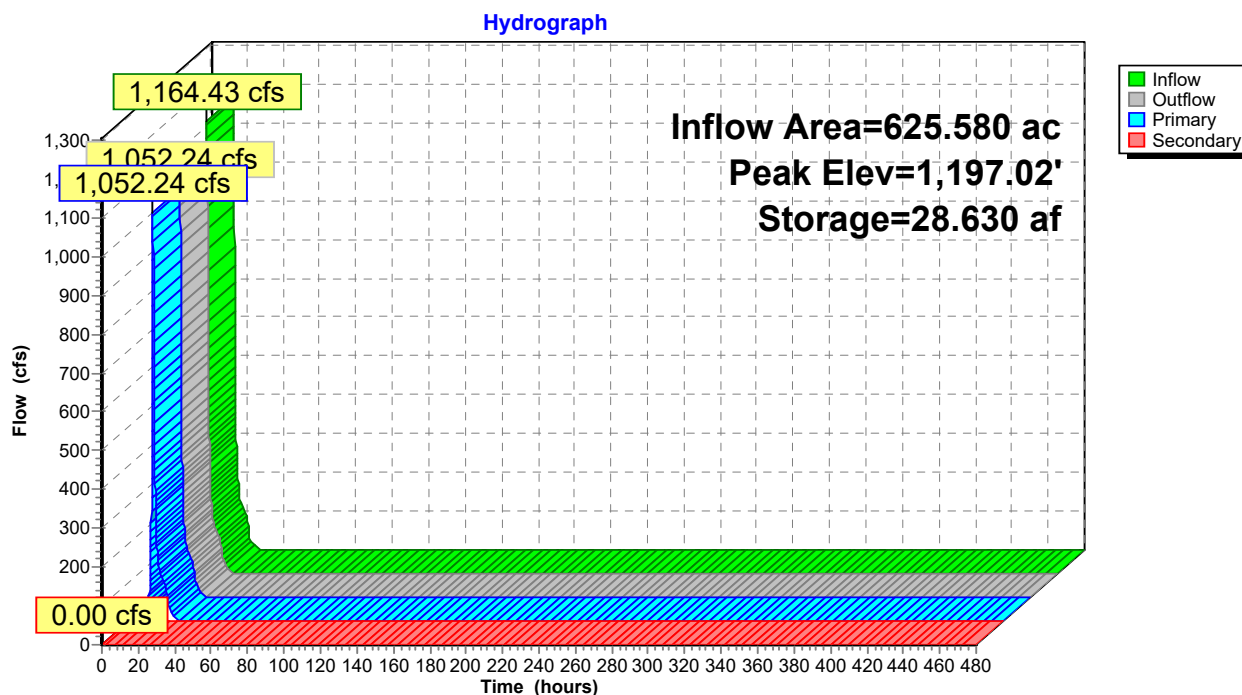
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,192.00	0.000	0.000	0.000
1,193.00	4.363	2.181	2.181
1,194.00	4.690	4.526	6.708
1,194.10	4.997	0.484	7.192
1,195.00	5.272	4.621	11.813
1,196.00	7.894	6.583	18.396
1,197.00	12.049	9.971	28.368
1,198.00	16.333	14.191	42.559
1,198.70	20.079	12.744	55.303
1,199.00	21.492	6.236	61.539
1,200.00	26.419	23.955	85.494

Device	Routing	Invert	Outlet Devices
#1	Primary	1,194.10'	Asymmetrical Sheet Pile Weir, C= 3.27 Offset (feet) -47.00 -45.00 -37.00 -30.00 30.00 37.00 45.00 47.00 Height (feet) 4.60 3.60 3.60 0.00 0.00 3.60 3.60 4.60
#2	Secondary	1,197.10'	Auxillary Spillway in Berm, C= 3.27 Offset (feet) -66.00 -50.00 50.00 66.00 Height (feet) 1.60 0.00 0.00 1.60

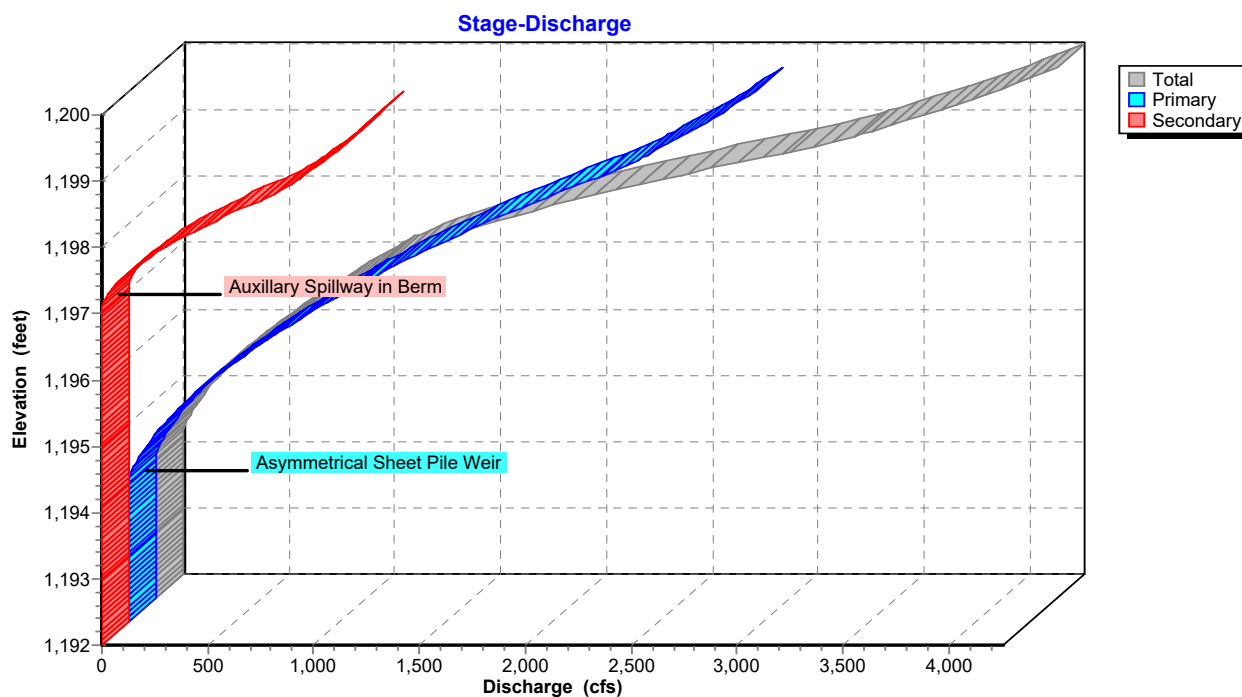
Primary OutFlow Max=1,051.79 cfs @ 13.04 hrs HW=1,197.02' (Free Discharge)
 ↑1=Asymmetrical Sheet Pile Weir (Weir Controls 1,051.79 cfs @ 5.05 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,194.10' (Free Discharge)
 ↑2=Auxillary Spillway in Berm (Controls 0.00 cfs)

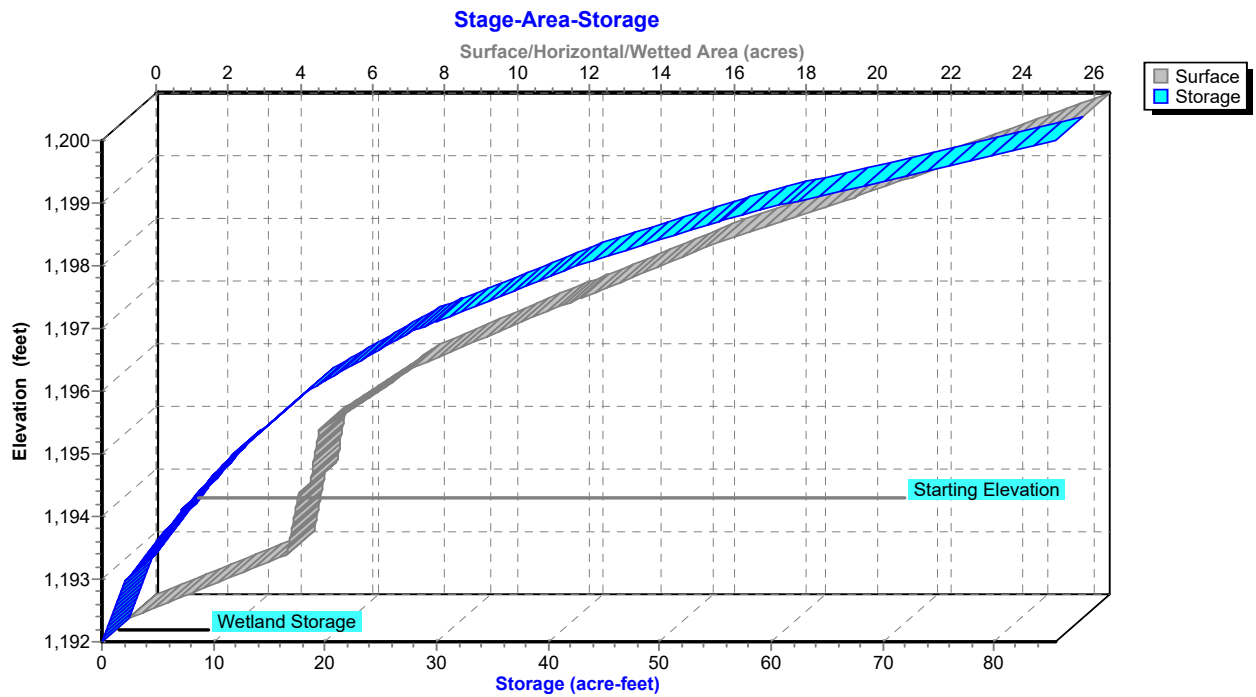
Pond 2P: Proposed Outlet Devices



Pond 2P: Proposed Outlet Devices



Pond 2P: Proposed Outlet Devices



IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Pond 2P: Proposed Outlet Devices

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	7.192	1,194.10	0.00	0.00	0.00
10.00	37.09	8.536	1,194.36	26.69	26.69	0.00
20.00	78.05	10.076	1,194.66	83.92	83.92	0.00
30.00	0.00	7.207	1,194.10	0.14	0.14	0.00
40.00	0.00	7.192	1,194.10	0.00	0.00	0.00
50.00	0.00	7.192	1,194.10	0.00	0.00	0.00
60.00	0.00	7.192	1,194.10	0.00	0.00	0.00
70.00	0.00	7.192	1,194.10	0.00	0.00	0.00
80.00	0.00	7.192	1,194.10	0.00	0.00	0.00
90.00	0.00	7.192	1,194.10	0.00	0.00	0.00
100.00	0.00	7.192	1,194.10	0.00	0.00	0.00
110.00	0.00	7.192	1,194.10	0.00	0.00	0.00
120.00	0.00	7.192	1,194.10	0.00	0.00	0.00
130.00	0.00	7.192	1,194.10	0.00	0.00	0.00
140.00	0.00	7.192	1,194.10	0.00	0.00	0.00
150.00	0.00	7.192	1,194.10	0.00	0.00	0.00
160.00	0.00	7.192	1,194.10	0.00	0.00	0.00
170.00	0.00	7.192	1,194.10	0.00	0.00	0.00
180.00	0.00	7.192	1,194.10	0.00	0.00	0.00
190.00	0.00	7.192	1,194.10	0.00	0.00	0.00
200.00	0.00	7.192	1,194.10	0.00	0.00	0.00
210.00	0.00	7.192	1,194.10	0.00	0.00	0.00
220.00	0.00	7.192	1,194.10	0.00	0.00	0.00
230.00	0.00	7.192	1,194.10	0.00	0.00	0.00
240.00	0.00	7.192	1,194.10	0.00	0.00	0.00
250.00	0.00	7.192	1,194.10	0.00	0.00	0.00
260.00	0.00	7.192	1,194.10	0.00	0.00	0.00
270.00	0.00	7.192	1,194.10	0.00	0.00	0.00
280.00	0.00	7.192	1,194.10	0.00	0.00	0.00
290.00	0.00	7.192	1,194.10	0.00	0.00	0.00
300.00	0.00	7.192	1,194.10	0.00	0.00	0.00
310.00	0.00	7.192	1,194.10	0.00	0.00	0.00
320.00	0.00	7.192	1,194.10	0.00	0.00	0.00
330.00	0.00	7.192	1,194.10	0.00	0.00	0.00
340.00	0.00	7.192	1,194.10	0.00	0.00	0.00
350.00	0.00	7.192	1,194.10	0.00	0.00	0.00
360.00	0.00	7.192	1,194.10	0.00	0.00	0.00
370.00	0.00	7.192	1,194.10	0.00	0.00	0.00
380.00	0.00	7.192	1,194.10	0.00	0.00	0.00
390.00	0.00	7.192	1,194.10	0.00	0.00	0.00
400.00	0.00	7.192	1,194.10	0.00	0.00	0.00
410.00	0.00	7.192	1,194.10	0.00	0.00	0.00
420.00	0.00	7.192	1,194.10	0.00	0.00	0.00
430.00	0.00	7.192	1,194.10	0.00	0.00	0.00
440.00	0.00	7.192	1,194.10	0.00	0.00	0.00
450.00	0.00	7.192	1,194.10	0.00	0.00	0.00
460.00	0.00	7.192	1,194.10	0.00	0.00	0.00
470.00	0.00	7.192	1,194.10	0.00	0.00	0.00
480.00	0.00	7.192	1,194.10	0.00	0.00	0.00

IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Stage-Discharge for Pond 2P: Proposed Outlet Devices

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,192.00	0.00	0.00	0.00	1,197.80	1,734.21	1,531.98	202.24
1,192.10	0.00	0.00	0.00	1,197.90	1,850.19	1,601.23	248.96
1,192.20	0.00	0.00	0.00	1,198.00	1,971.80	1,672.50	299.30
1,192.30	0.00	0.00	0.00	1,198.10	2,098.78	1,745.62	353.16
1,192.40	0.00	0.00	0.00	1,198.20	2,230.94	1,820.49	410.46
1,192.50	0.00	0.00	0.00	1,198.30	2,368.14	1,897.03	471.12
1,192.60	0.00	0.00	0.00	1,198.40	2,510.28	1,975.18	535.10
1,192.70	0.00	0.00	0.00	1,198.50	2,657.26	2,054.92	602.34
1,192.80	0.00	0.00	0.00	1,198.60	2,809.03	2,136.20	672.83
1,192.90	0.00	0.00	0.00	1,198.70	2,965.52	2,219.00	746.51
1,193.00	0.00	0.00	0.00	1,198.80	3,103.21	2,293.56	809.65
1,193.10	0.00	0.00	0.00	1,198.90	3,225.81	2,361.48	864.33
1,193.20	0.00	0.00	0.00	1,199.00	3,339.88	2,425.52	914.36
1,193.30	0.00	0.00	0.00	1,199.10	3,447.68	2,486.65	961.03
1,193.40	0.00	0.00	0.00	1,199.20	3,550.49	2,545.42	1,005.07
1,193.50	0.00	0.00	0.00	1,199.30	3,649.13	2,602.20	1,046.94
1,193.60	0.00	0.00	0.00	1,199.40	3,744.20	2,657.23	1,086.97
1,193.70	0.00	0.00	0.00	1,199.50	3,836.14	2,710.73	1,125.41
1,193.80	0.00	0.00	0.00	1,199.60	3,925.31	2,762.86	1,162.45
1,193.90	0.00	0.00	0.00	1,199.70	4,011.98	2,813.73	1,198.25
1,194.00	0.00	0.00	0.00	1,199.80	4,096.39	2,863.45	1,232.94
1,194.10	0.00	0.00	0.00	1,199.90	4,178.74	2,912.13	1,266.61
1,194.20	6.22	6.22	0.00	1,200.00	4,259.18	2,959.82	1,299.36
1,194.30	17.64	17.64	0.00				
1,194.40	32.49	32.49	0.00				
1,194.50	50.15	50.15	0.00				
1,194.60	70.27	70.27	0.00				
1,194.70	92.60	92.60	0.00				
1,194.80	116.99	116.99	0.00				
1,194.90	143.30	143.30	0.00				
1,195.00	171.43	171.43	0.00				
1,195.10	201.29	201.29	0.00				
1,195.20	232.81	232.81	0.00				
1,195.30	265.94	265.94	0.00				
1,195.40	300.61	300.61	0.00				
1,195.50	336.80	336.80	0.00				
1,195.60	374.46	374.46	0.00				
1,195.70	413.55	413.55	0.00				
1,195.80	454.05	454.05	0.00				
1,195.90	495.93	495.93	0.00				
1,196.00	539.15	539.15	0.00				
1,196.10	583.71	583.71	0.00				
1,196.20	629.58	629.58	0.00				
1,196.30	676.74	676.74	0.00				
1,196.40	725.18	725.18	0.00				
1,196.50	774.87	774.87	0.00				
1,196.60	825.82	825.82	0.00				
1,196.70	877.99	877.99	0.00				
1,196.80	931.38	931.38	0.00				
1,196.90	985.99	985.99	0.00				
1,197.00	1,041.79	1,041.79	0.00				
1,197.10	1,098.78	1,098.78	0.00				
1,197.20	1,167.37	1,156.95	10.42				
1,197.30	1,246.01	1,216.29	29.72				
1,197.40	1,331.82	1,276.80	55.02				
1,197.50	1,423.83	1,338.46	85.37				
1,197.60	1,521.51	1,401.27	120.24				
1,197.70	1,624.50	1,465.23	159.27				

IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Stage-Area-Storage for Pond 2P: Proposed Outlet Devices

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,192.00	0.000	0.000	1,197.80	15.476	39.721
1,192.10	0.436	0.218	1,197.90	15.905	41.140
1,192.20	0.873	0.436	1,198.00	16.333	42.559
1,192.30	1.309	0.654	1,198.10	16.868	44.379
1,192.40	1.745	0.873	1,198.20	17.403	46.200
1,192.50	2.181	1.091	1,198.30	17.938	48.021
1,192.60	2.618	1.309	1,198.40	18.474	49.841
1,192.70	3.054	1.527	1,198.50	19.009	51.662
1,192.80	3.490	1.745	1,198.60	19.544	53.482
1,192.90	3.927	1.963	1,198.70	20.079	55.303
1,193.00	4.363	2.181	1,198.80	20.550	57.382
1,193.10	4.396	2.634	1,198.90	21.021	59.460
1,193.20	4.428	3.087	1,199.00	21.492	61.539
1,193.30	4.461	3.539	1,199.10	21.985	63.934
1,193.40	4.494	3.992	1,199.20	22.477	66.330
1,193.50	4.526	4.445	1,199.30	22.970	68.725
1,193.60	4.559	4.897	1,199.40	23.463	71.121
1,193.70	4.592	5.350	1,199.50	23.955	73.516
1,193.80	4.625	5.803	1,199.60	24.448	75.912
1,193.90	4.657	6.255	1,199.70	24.941	78.308
1,194.00	4.690	6.708	1,199.80	25.434	80.703
1,194.10	4.997	7.192	1,199.90	25.926	83.099
1,194.20	5.028	7.706	1,200.00	26.419	85.494
1,194.30	5.058	8.219			
1,194.40	5.089	8.733			
1,194.50	5.119	9.246			
1,194.60	5.150	9.760			
1,194.70	5.180	10.273			
1,194.80	5.211	10.786			
1,194.90	5.241	11.300			
1,195.00	5.272	11.813			
1,195.10	5.534	12.472			
1,195.20	5.796	13.130			
1,195.30	6.059	13.788			
1,195.40	6.321	14.447			
1,195.50	6.583	15.105			
1,195.60	6.845	15.763			
1,195.70	7.107	16.422			
1,195.80	7.370	17.080			
1,195.90	7.632	17.738			
1,196.00	7.894	18.396			
1,196.10	8.309	19.394			
1,196.20	8.725	20.391			
1,196.30	9.140	21.388			
1,196.40	9.556	22.385			
1,196.50	9.971	23.382			
1,196.60	10.387	24.379			
1,196.70	10.803	25.376			
1,196.80	11.218	26.374			
1,196.90	11.634	27.371			
1,197.00	12.049	28.368			
1,197.10	12.477	29.787			
1,197.20	12.906	31.206			
1,197.30	13.334	32.625			
1,197.40	13.763	34.044			
1,197.50	14.191	35.463			
1,197.60	14.619	36.882			
1,197.70	15.048	38.302			

IA-340-8 - Proposed Conditions

MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Pond 3P: Nelson Ave Culvert

[44] Hint: Outlet device #1 is below defined storage

[81] Warning: Exceeded Pond 2P by 3.19' @ 14.55 hrs

Inflow Area = 625.580 ac, 0.75% Impervious, Inflow Depth = 4.27" for 25-Year event
 Inflow = 1,052.24 cfs @ 13.04 hrs, Volume= 222.559 af
 Outflow = 1,051.65 cfs @ 13.06 hrs, Volume= 222.559 af, Atten= 0%, Lag= 1.2 min
 Primary = 299.95 cfs @ 13.06 hrs, Volume= 154.398 af
 Secondary = 751.70 cfs @ 13.06 hrs, Volume= 68.160 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs

Peak Elev= 1,199.32' @ 13.06 hrs Surf.Area= 2.657 ac Storage= 7.947 af

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

Center-of-Mass det. time= 7.5 min (890.7 - 883.2)

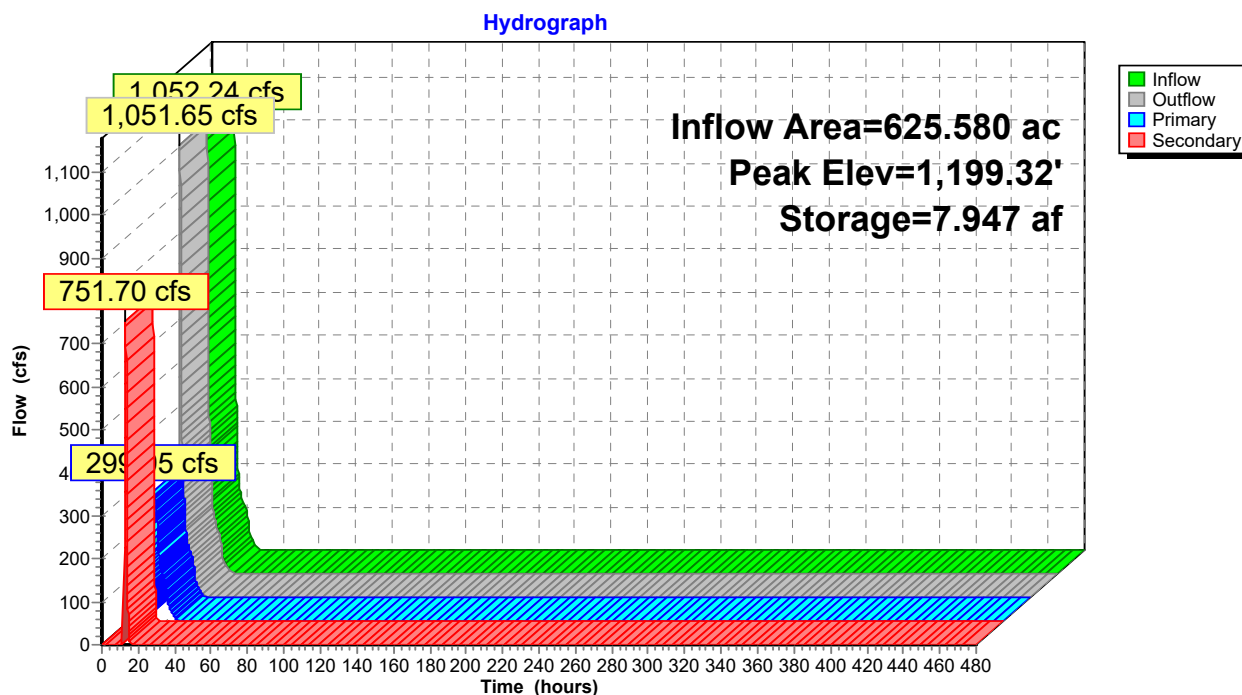
Volume	Invert	Avail.Storage	Storage Description
#1	1,190.00'	9.786 af	Storage Btw Berm and Road (Prismatic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,190.00	0.000	0.000	0.000
1,191.00	0.023	0.011	0.011
1,192.00	0.089	0.056	0.068
1,193.00	0.411	0.250	0.317
1,194.00	0.648	0.529	0.847
1,195.00	0.846	0.747	1.594
1,196.00	1.025	0.936	2.529
1,197.00	1.234	1.130	3.659
1,198.00	1.520	1.377	5.036
1,199.00	2.596	2.058	7.094
1,200.00	2.789	2.692	9.786

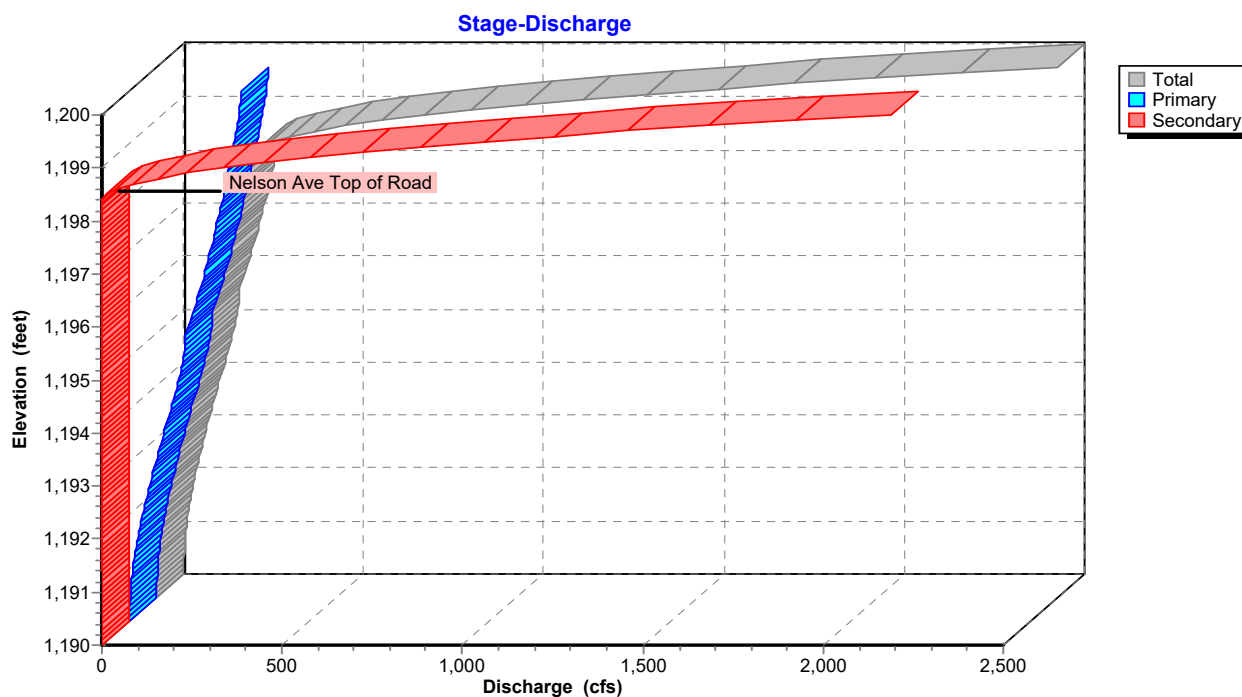
Device	Routing	Invert	Outlet Devices
#1	Primary	1,189.62'	91.0" W x 52.0" H Ellipse Nelson Ave Road Culvert L= 70.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 1,189.62' / 1,189.62' S= 0.0000 ' Cc= 0.900 n= 0.025, Flow Area= 25.81 sf
#2	Secondary	1,198.34'	Nelson Ave Top of Road, C= 3.27 Offset (feet) -257.75 -118.35 118.35 291.17 Elev. (feet) 1,200.00 1,198.34 1,198.64 1,200.00

Primary OutFlow Max=300.04 cfs @ 13.06 hrs HW=1,199.32' (Free Discharge)↑**1=Nelson Ave Road Culvert** (Barrel Controls 300.04 cfs @ 11.63 fps)**Secondary OutFlow** Max=749.91 cfs @ 13.06 hrs HW=1,199.32' (Free Discharge)↑**2=Nelson Ave Top of Road** (Weir Controls 749.91 cfs @ 2.03 fps)

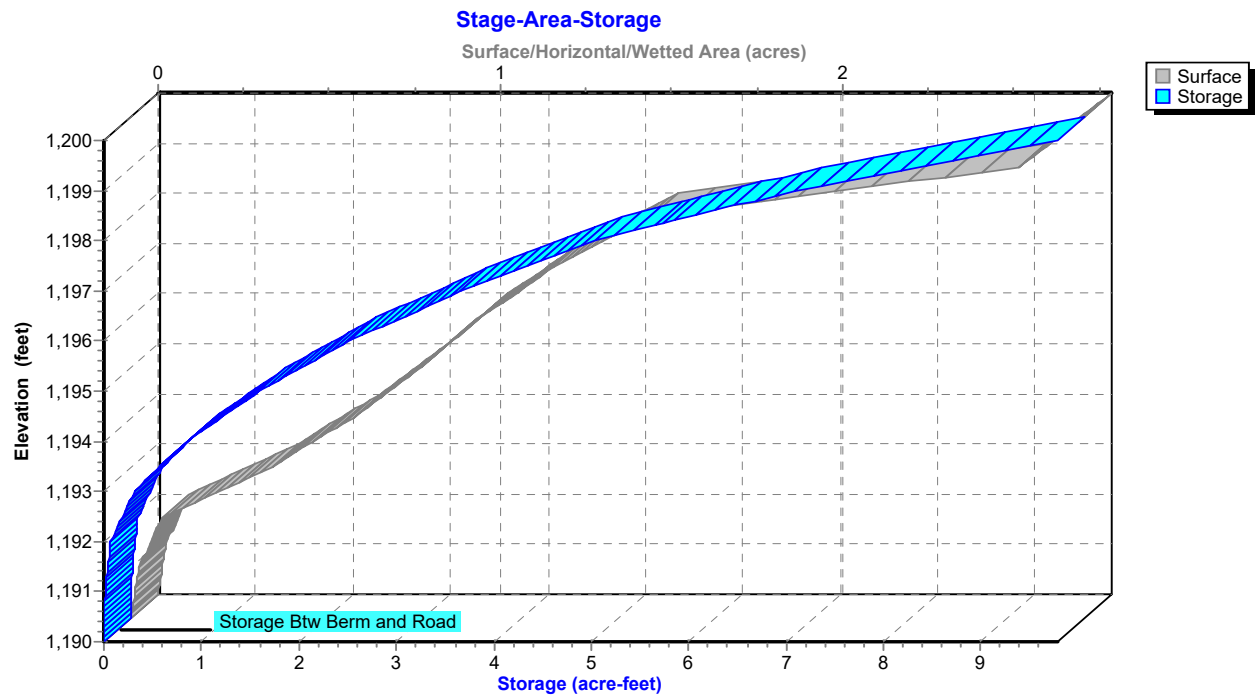
Pond 3P: Nelson Ave Culvert



Pond 3P: Nelson Ave Culvert



Pond 3P: Nelson Ave Culvert



IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Hydrograph for Pond 3P: Nelson Ave Culvert

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	1,190.00	0.00	0.00	0.00
10.00	26.69	0.047	1,191.63	26.08	26.08	0.00
20.00	83.92	0.482	1,193.31	87.05	87.05	0.00
30.00	0.14	0.000	1,190.02	0.14	0.14	0.00
40.00	0.00	0.000	1,190.00	0.00	0.00	0.00
50.00	0.00	0.000	1,190.00	0.00	0.00	0.00
60.00	0.00	0.000	1,190.00	0.00	0.00	0.00
70.00	0.00	0.000	1,190.00	0.00	0.00	0.00
80.00	0.00	0.000	1,190.00	0.00	0.00	0.00
90.00	0.00	0.000	1,190.00	0.00	0.00	0.00
100.00	0.00	0.000	1,190.00	0.00	0.00	0.00
110.00	0.00	0.000	1,190.00	0.00	0.00	0.00
120.00	0.00	0.000	1,190.00	0.00	0.00	0.00
130.00	0.00	0.000	1,190.00	0.00	0.00	0.00
140.00	0.00	0.000	1,190.00	0.00	0.00	0.00
150.00	0.00	0.000	1,190.00	0.00	0.00	0.00
160.00	0.00	0.000	1,190.00	0.00	0.00	0.00
170.00	0.00	0.000	1,190.00	0.00	0.00	0.00
180.00	0.00	0.000	1,190.00	0.00	0.00	0.00
190.00	0.00	0.000	1,190.00	0.00	0.00	0.00
200.00	0.00	0.000	1,190.00	0.00	0.00	0.00
210.00	0.00	0.000	1,190.00	0.00	0.00	0.00
220.00	0.00	0.000	1,190.00	0.00	0.00	0.00
230.00	0.00	0.000	1,190.00	0.00	0.00	0.00
240.00	0.00	0.000	1,190.00	0.00	0.00	0.00
250.00	0.00	0.000	1,190.00	0.00	0.00	0.00
260.00	0.00	0.000	1,190.00	0.00	0.00	0.00
270.00	0.00	0.000	1,190.00	0.00	0.00	0.00
280.00	0.00	0.000	1,190.00	0.00	0.00	0.00
290.00	0.00	0.000	1,190.00	0.00	0.00	0.00
300.00	0.00	0.000	1,190.00	0.00	0.00	0.00
310.00	0.00	0.000	1,190.00	0.00	0.00	0.00
320.00	0.00	0.000	1,190.00	0.00	0.00	0.00
330.00	0.00	0.000	1,190.00	0.00	0.00	0.00
340.00	0.00	0.000	1,190.00	0.00	0.00	0.00
350.00	0.00	0.000	1,190.00	0.00	0.00	0.00
360.00	0.00	0.000	1,190.00	0.00	0.00	0.00
370.00	0.00	0.000	1,190.00	0.00	0.00	0.00
380.00	0.00	0.000	1,190.00	0.00	0.00	0.00
390.00	0.00	0.000	1,190.00	0.00	0.00	0.00
400.00	0.00	0.000	1,190.00	0.00	0.00	0.00
410.00	0.00	0.000	1,190.00	0.00	0.00	0.00
420.00	0.00	0.000	1,190.00	0.00	0.00	0.00
430.00	0.00	0.000	1,190.00	0.00	0.00	0.00
440.00	0.00	0.000	1,190.00	0.00	0.00	0.00
450.00	0.00	0.000	1,190.00	0.00	0.00	0.00
460.00	0.00	0.000	1,190.00	0.00	0.00	0.00
470.00	0.00	0.000	1,190.00	0.00	0.00	0.00
480.00	0.00	0.000	1,190.00	0.00	0.00	0.00

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Stage-Discharge for Pond 3P: Nelson Ave Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,190.00	0.00	0.00	0.00	1,195.80	176.07	176.07	0.00
1,190.10	0.85	0.85	0.00	1,195.90	180.77	180.77	0.00
1,190.20	1.38	1.38	0.00	1,196.00	185.35	185.35	0.00
1,190.30	2.06	2.06	0.00	1,196.10	189.83	189.83	0.00
1,190.40	2.89	2.89	0.00	1,196.20	194.20	194.20	0.00
1,190.50	3.89	3.89	0.00	1,196.30	198.47	198.47	0.00
1,190.60	5.05	5.05	0.00	1,196.40	202.66	202.66	0.00
1,190.70	6.38	6.38	0.00	1,196.50	206.76	206.76	0.00
1,190.80	7.86	7.86	0.00	1,196.60	210.78	210.78	0.00
1,190.90	9.51	9.51	0.00	1,196.70	214.72	214.72	0.00
1,191.00	11.32	11.32	0.00	1,196.80	218.60	218.60	0.00
1,191.10	13.28	13.28	0.00	1,196.90	222.41	222.41	0.00
1,191.20	15.40	15.40	0.00	1,197.00	226.15	226.15	0.00
1,191.30	17.66	17.66	0.00	1,197.10	229.83	229.83	0.00
1,191.40	20.07	20.07	0.00	1,197.20	233.45	233.45	0.00
1,191.50	22.62	22.62	0.00	1,197.30	237.02	237.02	0.00
1,191.60	25.30	25.30	0.00	1,197.40	240.54	240.54	0.00
1,191.70	28.11	28.11	0.00	1,197.50	244.00	244.00	0.00
1,191.80	31.05	31.05	0.00	1,197.60	247.42	247.42	0.00
1,191.90	34.11	34.11	0.00	1,197.70	250.79	250.79	0.00
1,192.00	37.29	37.29	0.00	1,197.80	254.11	254.11	0.00
1,192.10	40.58	40.58	0.00	1,197.90	257.39	257.39	0.00
1,192.20	43.97	43.97	0.00	1,198.00	260.63	260.63	0.00
1,192.30	47.46	47.46	0.00	1,198.10	263.83	263.83	0.00
1,192.40	51.05	51.05	0.00	1,198.20	267.00	267.00	0.00
1,192.50	54.72	54.72	0.00	1,198.30	270.12	270.12	0.00
1,192.60	58.48	58.48	0.00	1,198.40	274.22	273.21	1.01
1,192.70	62.32	62.32	0.00	1,198.50	287.96	276.26	11.69
1,192.80	66.22	66.22	0.00	1,198.60	318.65	279.29	39.36
1,192.90	70.20	70.20	0.00	1,198.70	370.30	282.28	88.03
1,193.00	74.23	74.23	0.00	1,198.80	440.24	285.23	155.01
1,193.10	78.31	78.31	0.00	1,198.90	526.28	288.16	238.12
1,193.20	82.44	82.44	0.00	1,199.00	627.82	291.06	336.76
1,193.30	86.61	86.61	0.00	1,199.10	744.64	293.93	450.71
1,193.40	90.80	90.80	0.00	1,199.20	876.76	296.77	579.99
1,193.50	95.02	95.02	0.00	1,199.30	1,024.26	299.59	724.68
1,193.60	99.24	99.24	0.00	1,199.40	1,186.72	301.77	884.95
1,193.70	103.47	103.47	0.00	1,199.50	1,364.77	303.77	1,061.00
1,193.80	107.70	107.70	0.00	1,199.60	1,558.82	305.75	1,253.07
1,193.90	111.90	111.90	0.00	1,199.70	1,769.11	307.72	1,461.39
1,194.00	116.07	116.07	0.00	1,199.80	1,995.89	309.68	1,686.22
1,194.10	120.21	120.21	0.00	1,199.90	2,239.44	311.62	1,927.81
1,194.20	124.28	124.28	0.00	1,200.00	2,500.00	313.55	2,186.45
1,194.30	128.28	128.28	0.00				
1,194.40	132.20	132.20	0.00				
1,194.50	136.00	136.00	0.00				
1,194.60	139.67	139.67	0.00				
1,194.70	143.17	143.17	0.00				
1,194.80	146.48	146.48	0.00				
1,194.90	149.56	149.56	0.00				
1,195.00	152.33	152.33	0.00				
1,195.10	154.71	154.71	0.00				
1,195.20	156.57	156.57	0.00				
1,195.30	157.61	157.61	0.00				
1,195.40	155.83	155.83	0.00				
1,195.50	161.13	161.13	0.00				
1,195.60	166.26	166.26	0.00				
1,195.70	171.23	171.23	0.00				

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Stage-Area-Storage for Pond 3P: Nelson Ave Culvert

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,190.00	0.000	0.000	1,195.80	0.989	2.342
1,190.10	0.002	0.001	1,195.90	1.007	2.436
1,190.20	0.005	0.002	1,196.00	1.025	2.529
1,190.30	0.007	0.003	1,196.10	1.046	2.642
1,190.40	0.009	0.005	1,196.20	1.067	2.755
1,190.50	0.011	0.006	1,196.30	1.088	2.868
1,190.60	0.014	0.007	1,196.40	1.109	2.981
1,190.70	0.016	0.008	1,196.50	1.130	3.094
1,190.80	0.018	0.009	1,196.60	1.150	3.207
1,190.90	0.021	0.010	1,196.70	1.171	3.320
1,191.00	0.023	0.011	1,196.80	1.192	3.433
1,191.10	0.030	0.017	1,196.90	1.213	3.546
1,191.20	0.036	0.023	1,197.00	1.234	3.659
1,191.30	0.043	0.028	1,197.10	1.263	3.797
1,191.40	0.049	0.034	1,197.20	1.291	3.934
1,191.50	0.056	0.040	1,197.30	1.320	4.072
1,191.60	0.063	0.045	1,197.40	1.348	4.210
1,191.70	0.069	0.051	1,197.50	1.377	4.347
1,191.80	0.076	0.056	1,197.60	1.406	4.485
1,191.90	0.082	0.062	1,197.70	1.434	4.623
1,192.00	0.089	0.068	1,197.80	1.463	4.761
1,192.10	0.121	0.092	1,197.90	1.491	4.898
1,192.20	0.153	0.118	1,198.00	1.520	5.036
1,192.30	0.186	0.142	1,198.10	1.628	5.242
1,192.40	0.218	0.168	1,198.20	1.735	5.448
1,192.50	0.250	0.192	1,198.30	1.843	5.653
1,192.60	0.282	0.217	1,198.40	1.950	5.859
1,192.70	0.314	0.243	1,198.50	2.058	6.065
1,192.80	0.347	0.267	1,198.60	2.166	6.271
1,192.90	0.379	0.293	1,198.70	2.273	6.477
1,193.00	0.411	0.317	1,198.80	2.381	6.682
1,193.10	0.435	0.370	1,198.90	2.488	6.888
1,193.20	0.458	0.423	1,199.00	2.596	7.094
1,193.30	0.482	0.476	1,199.10	2.615	7.363
1,193.40	0.506	0.529	1,199.20	2.635	7.633
1,193.50	0.529	0.582	1,199.30	2.654	7.902
1,193.60	0.553	0.635	1,199.40	2.673	8.171
1,193.70	0.577	0.688	1,199.50	2.692	8.440
1,193.80	0.601	0.741	1,199.60	2.712	8.709
1,193.90	0.624	0.794	1,199.70	2.731	8.979
1,194.00	0.648	0.847	1,199.80	2.750	9.248
1,194.10	0.668	0.922	1,199.90	2.770	9.517
1,194.20	0.688	0.996	1,200.00	2.789	9.786
1,194.30	0.707	1.071			
1,194.40	0.727	1.146			
1,194.50	0.747	1.220			
1,194.60	0.767	1.295			
1,194.70	0.787	1.370			
1,194.80	0.806	1.445			
1,194.90	0.826	1.519			
1,195.00	0.846	1.594			
1,195.10	0.864	1.688			
1,195.20	0.882	1.781			
1,195.30	0.900	1.875			
1,195.40	0.918	1.968			
1,195.50	0.936	2.062			
1,195.60	0.953	2.155			
1,195.70	0.971	2.249			

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MSE 24-hr 3 25-Year Rainfall=5.62"

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Summary for Pond 4P: 200th Street Culvert

Inflow Area = 164.040 ac, 0.00% Impervious, Inflow Depth = 4.26" for 25-Year event
 Inflow = 432.57 cfs @ 12.71 hrs, Volume= 58.244 af
 Outflow = 85.77 cfs @ 13.96 hrs, Volume= 58.243 af, Atten= 80%, Lag= 75.2 min
 Primary = 85.77 cfs @ 13.96 hrs, Volume= 58.243 af
 Routed to Pond 2P : Proposed Outlet Devices
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,203.78' @ 13.96 hrs Surf.Area= 690,408 sf Storage= 1,221,379 cf

Plug-Flow detention time= 134.3 min calculated for 58.243 af (100% of inflow)
 Center-of-Mass det. time= 134.3 min (957.8 - 823.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,198.00'	5,262,028 cf	Storage South of 200th Street Culvert (Prismatic) listed below (Recalculated)

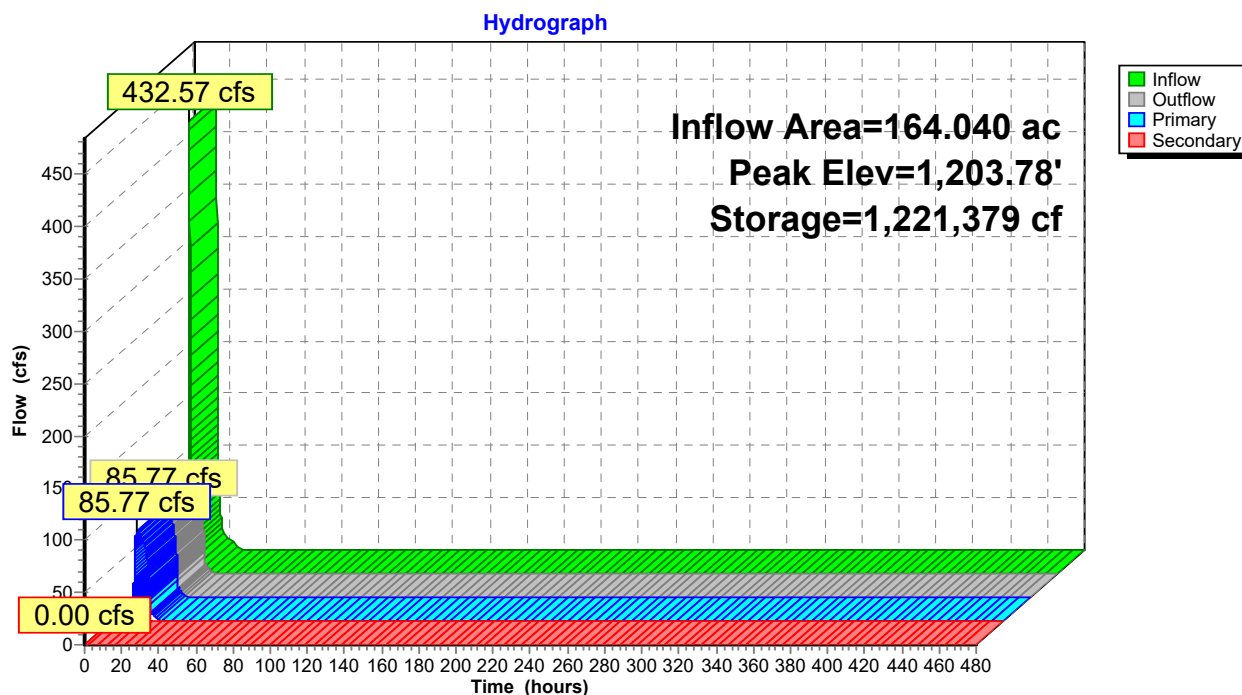
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,198.00	0	0	0
1,199.00	436	218	218
1,200.00	871	654	872
1,201.00	132,684	66,778	67,649
1,202.00	318,032	225,358	293,007
1,203.00	562,882	440,457	733,464
1,204.00	726,668	644,775	1,378,239
1,205.00	850,640	788,654	2,166,893
1,206.00	971,780	911,210	3,078,103
1,207.00	1,093,879	1,032,830	4,110,933
1,208.00	1,208,311	1,151,095	5,262,028

Device	Routing	Invert	Outlet Devices
#1	Primary	1,198.44'	48.0" W x 24.0" H Box 2'x4' Road Culvert L= 25.0' Box, 30-75° wingwalls, square crown, Ke= 0.400 Inlet / Outlet Invert= 1,198.44' / 1,198.44' S= 0.0000 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 8.00 sf
#2	Secondary	1,204.07'	200th St Top of Road, C= 3.27 Offset (feet) -234.90 169.69 318.45 441.99 Height (feet) 1.13 0.20 0.34 1.13

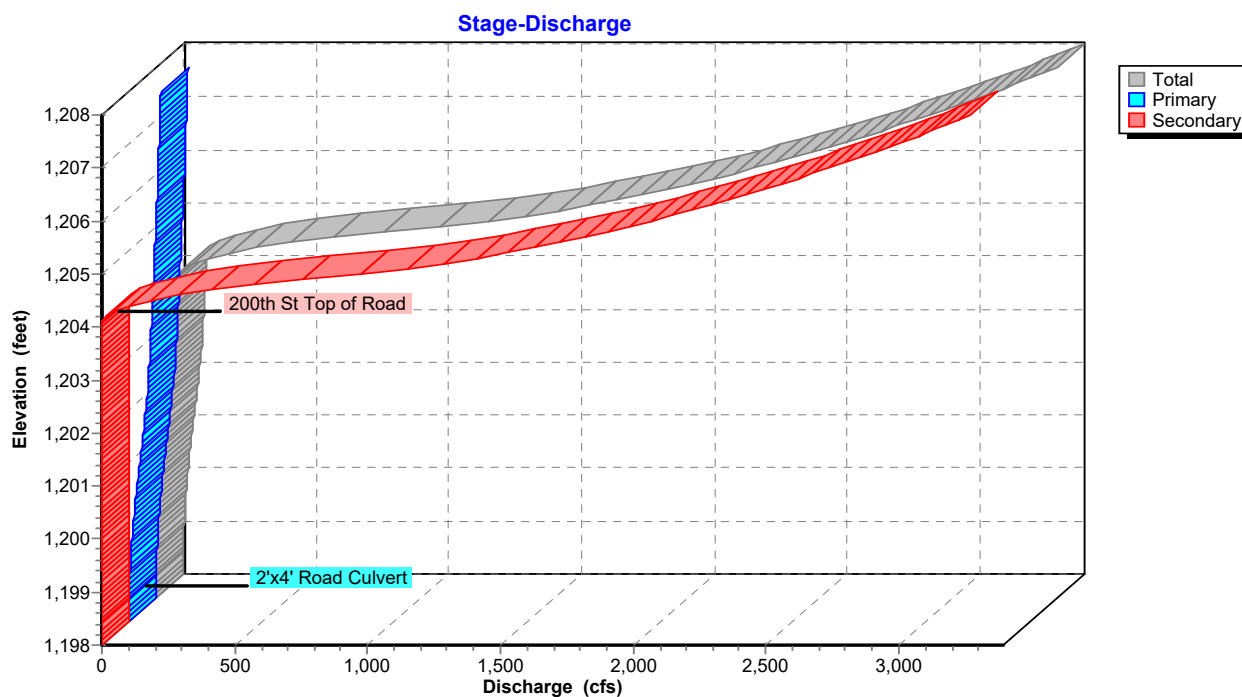
Primary OutFlow Max=85.77 cfs @ 13.96 hrs HW=1,203.78' (Free Discharge)
1=2'x4' Road Culvert (Inlet Controls 85.77 cfs @ 10.72 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,198.00' (Free Discharge)
2=200th St Top of Road (Controls 0.00 cfs)

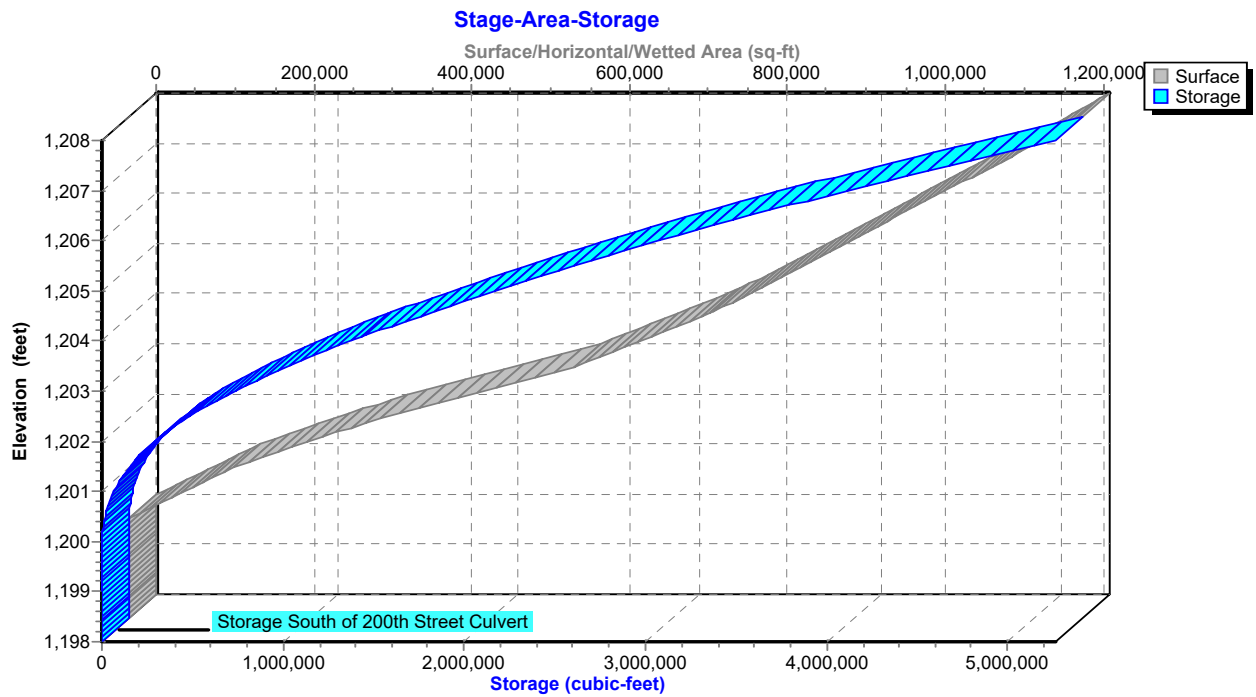
Pond 4P: 200th Street Culvert



Pond 4P: 200th Street Culvert



Pond 4P: 200th Street Culvert



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Hydrograph for Pond 4P: 200th Street Culvert

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	1,198.00	0.00	0.00	0.00
10.00	10.38	489	1,199.50	10.28	10.28	0.00
20.00	10.74	114,658	1,201.29	47.17	47.17	0.00
30.00	0.00	42	1,198.44	0.00	0.00	0.00
40.00	0.00	42	1,198.44	0.00	0.00	0.00
50.00	0.00	42	1,198.44	0.00	0.00	0.00
60.00	0.00	42	1,198.44	0.00	0.00	0.00
70.00	0.00	42	1,198.44	0.00	0.00	0.00
80.00	0.00	42	1,198.44	0.00	0.00	0.00
90.00	0.00	42	1,198.44	0.00	0.00	0.00
100.00	0.00	42	1,198.44	0.00	0.00	0.00
110.00	0.00	42	1,198.44	0.00	0.00	0.00
120.00	0.00	42	1,198.44	0.00	0.00	0.00
130.00	0.00	42	1,198.44	0.00	0.00	0.00
140.00	0.00	42	1,198.44	0.00	0.00	0.00
150.00	0.00	42	1,198.44	0.00	0.00	0.00
160.00	0.00	42	1,198.44	0.00	0.00	0.00
170.00	0.00	42	1,198.44	0.00	0.00	0.00
180.00	0.00	42	1,198.44	0.00	0.00	0.00
190.00	0.00	42	1,198.44	0.00	0.00	0.00
200.00	0.00	42	1,198.44	0.00	0.00	0.00
210.00	0.00	42	1,198.44	0.00	0.00	0.00
220.00	0.00	42	1,198.44	0.00	0.00	0.00
230.00	0.00	42	1,198.44	0.00	0.00	0.00
240.00	0.00	42	1,198.44	0.00	0.00	0.00
250.00	0.00	42	1,198.44	0.00	0.00	0.00
260.00	0.00	42	1,198.44	0.00	0.00	0.00
270.00	0.00	42	1,198.44	0.00	0.00	0.00
280.00	0.00	42	1,198.44	0.00	0.00	0.00
290.00	0.00	42	1,198.44	0.00	0.00	0.00
300.00	0.00	42	1,198.44	0.00	0.00	0.00
310.00	0.00	42	1,198.44	0.00	0.00	0.00
320.00	0.00	42	1,198.44	0.00	0.00	0.00
330.00	0.00	42	1,198.44	0.00	0.00	0.00
340.00	0.00	42	1,198.44	0.00	0.00	0.00
350.00	0.00	42	1,198.44	0.00	0.00	0.00
360.00	0.00	42	1,198.44	0.00	0.00	0.00
370.00	0.00	42	1,198.44	0.00	0.00	0.00
380.00	0.00	42	1,198.44	0.00	0.00	0.00
390.00	0.00	42	1,198.44	0.00	0.00	0.00
400.00	0.00	42	1,198.44	0.00	0.00	0.00
410.00	0.00	42	1,198.44	0.00	0.00	0.00
420.00	0.00	42	1,198.44	0.00	0.00	0.00
430.00	0.00	42	1,198.44	0.00	0.00	0.00
440.00	0.00	42	1,198.44	0.00	0.00	0.00
450.00	0.00	42	1,198.44	0.00	0.00	0.00
460.00	0.00	42	1,198.44	0.00	0.00	0.00
470.00	0.00	42	1,198.44	0.00	0.00	0.00
480.00	0.00	42	1,198.44	0.00	0.00	0.00

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Stage-Discharge for Pond 4P: 200th Street Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,198.00	0.00	0.00	0.00	1,203.80	85.99	85.99	0.00
1,198.10	0.00	0.00	0.00	1,203.90	86.98	86.98	0.00
1,198.20	0.00	0.00	0.00	1,204.00	87.95	87.95	0.00
1,198.30	0.00	0.00	0.00	1,204.10	89.23	88.92	0.31
1,198.40	0.00	0.00	0.00	1,204.20	101.81	89.88	11.94
1,198.50	0.06	0.06	0.00	1,204.30	137.64	90.82	46.82
1,198.60	0.42	0.42	0.00	1,204.40	195.65	91.76	103.89
1,198.70	1.02	1.02	0.00	1,204.50	276.51	92.69	183.83
1,198.80	1.79	1.79	0.00	1,204.60	381.60	93.60	288.00
1,198.90	2.70	2.70	0.00	1,204.70	512.40	94.51	417.89
1,199.00	3.73	3.73	0.00	1,204.80	670.38	95.41	574.97
1,199.10	4.86	4.86	0.00	1,204.90	856.97	96.30	760.67
1,199.20	6.10	6.10	0.00	1,205.00	1,073.55	97.18	976.36
1,199.30	7.42	7.42	0.00	1,205.10	1,249.00	98.06	1,150.94
1,199.40	8.83	8.83	0.00	1,205.20	1,390.14	98.93	1,291.21
1,199.50	10.31	10.31	0.00	1,205.30	1,514.47	99.79	1,414.68
1,199.60	11.87	11.87	0.00	1,205.40	1,627.47	100.64	1,526.84
1,199.70	13.50	13.50	0.00	1,205.50	1,732.02	101.48	1,630.54
1,199.80	15.20	15.20	0.00	1,205.60	1,829.89	102.32	1,727.57
1,199.90	16.96	16.96	0.00	1,205.70	1,922.28	103.15	1,819.13
1,200.00	18.79	18.79	0.00	1,205.80	2,010.06	103.97	1,906.08
1,200.10	20.68	20.68	0.00	1,205.90	2,093.88	104.79	1,989.09
1,200.20	22.63	22.63	0.00	1,206.00	2,174.26	105.60	2,068.66
1,200.30	24.63	24.63	0.00	1,206.10	2,251.61	106.41	2,145.20
1,200.40	26.69	26.69	0.00	1,206.20	2,326.24	107.21	2,219.03
1,200.50	28.81	28.81	0.00	1,206.30	2,398.43	108.00	2,290.43
1,200.60	30.97	30.97	0.00	1,206.40	2,468.42	108.79	2,359.64
1,200.70	33.19	33.19	0.00	1,206.50	2,536.40	109.57	2,426.83
1,200.80	35.46	35.46	0.00	1,206.60	2,602.53	110.34	2,492.19
1,200.90	37.78	37.78	0.00	1,206.70	2,666.97	111.11	2,555.85
1,201.00	40.15	40.15	0.00	1,206.80	2,729.83	111.88	2,617.95
1,201.10	42.56	42.56	0.00	1,206.90	2,791.23	112.64	2,678.59
1,201.20	44.51	44.51	0.00	1,207.00	2,851.27	113.39	2,737.87
1,201.30	47.35	47.35	0.00	1,207.10	2,910.03	114.14	2,795.89
1,201.40	50.03	50.03	0.00	1,207.20	2,967.60	114.89	2,852.72
1,201.50	52.57	52.57	0.00	1,207.30	3,024.05	115.63	2,908.42
1,201.60	54.99	54.99	0.00	1,207.40	3,079.44	116.36	2,963.07
1,201.70	57.31	57.31	0.00	1,207.50	3,133.82	117.09	3,016.73
1,201.80	59.55	59.55	0.00	1,207.60	3,187.26	117.82	3,069.44
1,201.90	61.70	61.70	0.00	1,207.70	3,239.80	118.54	3,121.26
1,202.00	63.77	63.77	0.00	1,207.80	3,291.48	119.26	3,172.22
1,202.10	65.79	65.79	0.00	1,207.90	3,342.35	119.97	3,222.37
1,202.20	67.74	67.74	0.00	1,208.00	3,392.44	120.68	3,271.76
1,202.30	69.43	69.43	0.00				
1,202.40	70.66	70.66	0.00				
1,202.50	71.87	71.87	0.00				
1,202.60	73.05	73.05	0.00				
1,202.70	74.22	74.22	0.00				
1,202.80	75.37	75.37	0.00				
1,202.90	76.50	76.50	0.00				
1,203.00	77.61	77.61	0.00				
1,203.10	78.71	78.71	0.00				
1,203.20	79.79	79.79	0.00				
1,203.30	80.86	80.86	0.00				
1,203.40	81.91	81.91	0.00				
1,203.50	82.95	82.95	0.00				
1,203.60	83.97	83.97	0.00				
1,203.70	84.99	84.99	0.00				

IA-340-8 - Proposed Conditions*MSE 24-hr 3 25-Year Rainfall=5.62"*

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Stage-Area-Storage for Pond 4P: 200th Street Culvert

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,198.00	0	0	1,203.80	693,911	1,236,181
1,198.10	44	2	1,203.90	710,289	1,306,391
1,198.20	87	9	1,204.00	726,668	1,378,239
1,198.30	131	20	1,204.10	739,065	1,451,526
1,198.40	174	35	1,204.20	751,462	1,526,052
1,198.50	218	55	1,204.30	763,860	1,601,818
1,198.60	262	78	1,204.40	776,257	1,678,824
1,198.70	305	107	1,204.50	788,654	1,757,070
1,198.80	349	140	1,204.60	801,051	1,836,555
1,198.90	392	177	1,204.70	813,448	1,917,280
1,199.00	436	218	1,204.80	825,846	1,999,244
1,199.10	479	264	1,204.90	838,243	2,082,449
1,199.20	523	314	1,205.00	850,640	2,166,893
1,199.30	566	368	1,205.10	862,754	2,252,563
1,199.40	610	427	1,205.20	874,868	2,339,444
1,199.50	654	490	1,205.30	886,982	2,427,536
1,199.60	697	558	1,205.40	899,096	2,516,840
1,199.70	741	630	1,205.50	911,210	2,607,356
1,199.80	784	706	1,205.60	923,324	2,699,082
1,199.90	828	787	1,205.70	935,438	2,792,020
1,200.00	871	872	1,205.80	947,552	2,886,170
1,200.10	14,052	1,618	1,205.90	959,666	2,981,531
1,200.20	27,234	3,682	1,206.00	971,780	3,078,103
1,200.30	40,415	7,064	1,206.10	983,990	3,175,891
1,200.40	53,596	11,765	1,206.20	996,200	3,274,901
1,200.50	66,778	17,784	1,206.30	1,008,410	3,375,131
1,200.60	79,959	25,120	1,206.40	1,020,620	3,476,583
1,200.70	93,140	33,775	1,206.50	1,032,830	3,579,255
1,200.80	106,321	43,748	1,206.60	1,045,039	3,683,149
1,200.90	119,503	55,040	1,206.70	1,057,249	3,788,263
1,201.00	132,684	67,649	1,206.80	1,069,459	3,894,599
1,201.10	151,219	81,844	1,206.90	1,081,669	4,002,155
1,201.20	169,754	97,893	1,207.00	1,093,879	4,110,933
1,201.30	188,288	115,795	1,207.10	1,105,322	4,220,893
1,201.40	206,823	135,550	1,207.20	1,116,765	4,331,997
1,201.50	225,358	157,160	1,207.30	1,128,209	4,444,246
1,201.60	243,893	180,622	1,207.40	1,139,652	4,557,639
1,201.70	262,428	205,938	1,207.50	1,151,095	4,672,176
1,201.80	280,962	233,108	1,207.60	1,162,538	4,787,858
1,201.90	299,497	262,131	1,207.70	1,173,981	4,904,684
1,202.00	318,032	293,007	1,207.80	1,185,425	5,022,654
1,202.10	342,517	326,034	1,207.90	1,196,868	5,141,769
1,202.20	367,002	361,510	1,208.00	1,208,311	5,262,028
1,202.30	391,487	399,435			
1,202.40	415,972	439,808			
1,202.50	440,457	482,629			
1,202.60	464,942	527,899			
1,202.70	489,427	575,618			
1,202.80	513,912	625,785			
1,202.90	538,397	678,400			
1,203.00	562,882	733,464			
1,203.10	579,261	790,571			
1,203.20	595,639	849,316			
1,203.30	612,018	909,699			
1,203.40	628,396	971,720			
1,203.50	644,775	1,035,378			
1,203.60	661,154	1,100,675			
1,203.70	677,532	1,167,609			

IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Time span=0.00-480.00 hrs, dt=0.05 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: North-East Runoff Area=456.820 ac 0.00% Impervious Runoff Depth=6.19"
Flow Length=6,885' Slope=0.0327 '/' Tc=62.5 min CN=88 Runoff=1,551.78 cfs 235.542 af

Subcatchment 3S: Direct Rainfall in Runoff Area=4.720 ac 100.00% Impervious Runoff Depth=7.37"
Flow Length=836' Tc=2.2 min CN=98 Runoff=60.29 cfs 2.899 af

Subcatchment 4S: South Drainage Area Runoff Area=164.040 ac 0.00% Impervious Runoff Depth=6.19"
Flow Length=5,631' Slope=0.0327 '/' Tc=53.2 min CN=88 Runoff=619.23 cfs 84.581 af

Pond 2P: Proposed Outlet Peak Elev=1,197.58' Storage=36.654 af Inflow=1,641.34 cfs 313.299 af
Primary=1,391.12 cfs 308.998 af Secondary=114.54 cfs 4.301 af Outflow=1,505.66 cfs 313.299 af

Pond 3P: Nelson Ave Culvert Peak Elev=1,199.51' Storage=8.476 af Inflow=1,391.12 cfs 308.998 af
Primary=304.03 cfs 193.421 af Secondary=1,086.37 cfs 115.577 af Outflow=1,390.41 cfs 308.998 af

Pond 4P: 200th Street Culvert Peak Elev=1,204.43' Storage=1,705,136 cf Inflow=619.23 cfs 84.581 af
Primary=92.07 cfs 74.858 af Secondary=130.91 cfs 9.722 af Outflow=222.99 cfs 84.580 af

Total Runoff Area = 625.580 ac Runoff Volume = 323.022 af Average Runoff Depth = 6.20"
99.25% Pervious = 620.860 ac 0.75% Impervious = 4.720 ac

Summary for Subcatchment 1S: North-East Drainage Area

North-East Watershed Area of 456.82 acres modeled as separate watershed area from South drainage and wetland area itself.

Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data for the complete watershed.

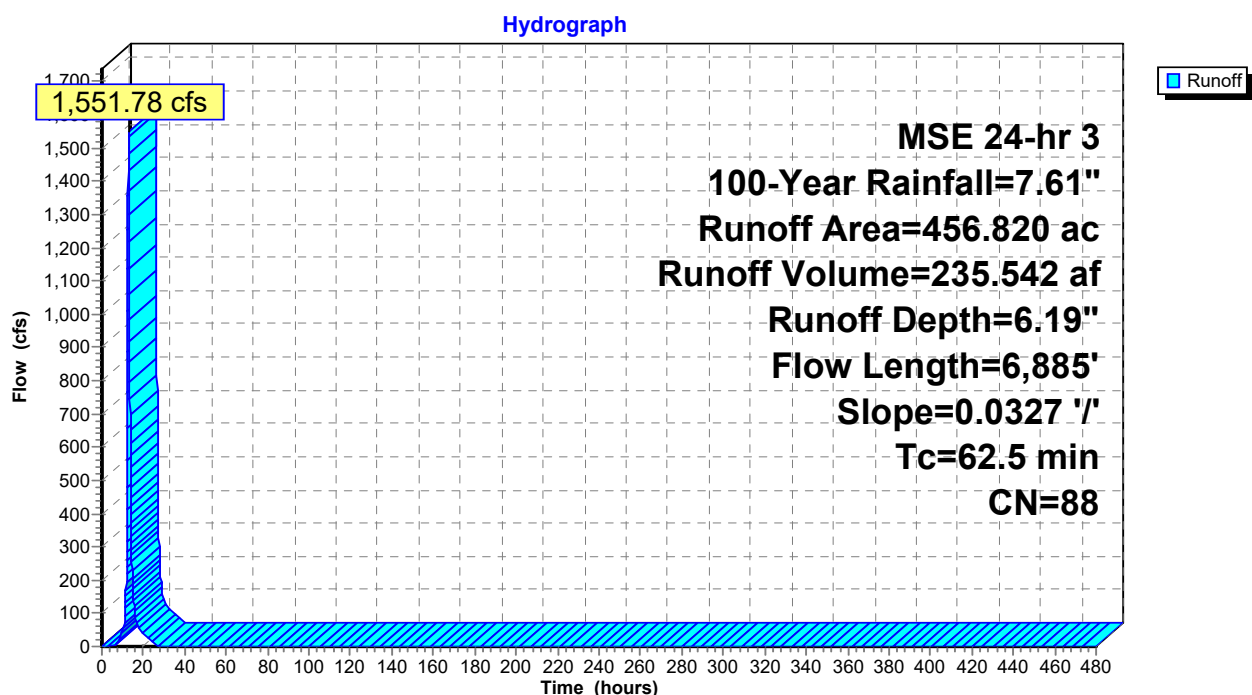
Runoff = 1,551.78 cfs @ 12.82 hrs, Volume= 235.542 af, Depth= 6.19"
Routed to Pond 2P : Proposed Outlet Devices

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.61"

Area (ac)	CN	Description
* 456.820	88	Weighted Average
456.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	6,885	0.0327	1.84		Lag/CN Method,

Subcatchment 1S: North-East Drainage Area



IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Subcatchment 1S: North-East Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	7.61	6.19	0.00
5.00	0.29	0.00	0.00	295.00	7.61	6.19	0.00
10.00	1.05	0.28	48.47	300.00	7.61	6.19	0.00
15.00	6.83	5.42	151.45	305.00	7.61	6.19	0.00
20.00	7.41	5.99	42.20	310.00	7.61	6.19	0.00
25.00	7.61	6.19	4.50	315.00	7.61	6.19	0.00
30.00	7.61	6.19	0.00	320.00	7.61	6.19	0.00
35.00	7.61	6.19	0.00	325.00	7.61	6.19	0.00
40.00	7.61	6.19	0.00	330.00	7.61	6.19	0.00
45.00	7.61	6.19	0.00	335.00	7.61	6.19	0.00
50.00	7.61	6.19	0.00	340.00	7.61	6.19	0.00
55.00	7.61	6.19	0.00	345.00	7.61	6.19	0.00
60.00	7.61	6.19	0.00	350.00	7.61	6.19	0.00
65.00	7.61	6.19	0.00	355.00	7.61	6.19	0.00
70.00	7.61	6.19	0.00	360.00	7.61	6.19	0.00
75.00	7.61	6.19	0.00	365.00	7.61	6.19	0.00
80.00	7.61	6.19	0.00	370.00	7.61	6.19	0.00
85.00	7.61	6.19	0.00	375.00	7.61	6.19	0.00
90.00	7.61	6.19	0.00	380.00	7.61	6.19	0.00
95.00	7.61	6.19	0.00	385.00	7.61	6.19	0.00
100.00	7.61	6.19	0.00	390.00	7.61	6.19	0.00
105.00	7.61	6.19	0.00	395.00	7.61	6.19	0.00
110.00	7.61	6.19	0.00	400.00	7.61	6.19	0.00
115.00	7.61	6.19	0.00	405.00	7.61	6.19	0.00
120.00	7.61	6.19	0.00	410.00	7.61	6.19	0.00
125.00	7.61	6.19	0.00	415.00	7.61	6.19	0.00
130.00	7.61	6.19	0.00	420.00	7.61	6.19	0.00
135.00	7.61	6.19	0.00	425.00	7.61	6.19	0.00
140.00	7.61	6.19	0.00	430.00	7.61	6.19	0.00
145.00	7.61	6.19	0.00	435.00	7.61	6.19	0.00
150.00	7.61	6.19	0.00	440.00	7.61	6.19	0.00
155.00	7.61	6.19	0.00	445.00	7.61	6.19	0.00
160.00	7.61	6.19	0.00	450.00	7.61	6.19	0.00
165.00	7.61	6.19	0.00	455.00	7.61	6.19	0.00
170.00	7.61	6.19	0.00	460.00	7.61	6.19	0.00
175.00	7.61	6.19	0.00	465.00	7.61	6.19	0.00
180.00	7.61	6.19	0.00	470.00	7.61	6.19	0.00
185.00	7.61	6.19	0.00	475.00	7.61	6.19	0.00
190.00	7.61	6.19	0.00	480.00	7.61	6.19	0.00
195.00	7.61	6.19	0.00				
200.00	7.61	6.19	0.00				
205.00	7.61	6.19	0.00				
210.00	7.61	6.19	0.00				
215.00	7.61	6.19	0.00				
220.00	7.61	6.19	0.00				
225.00	7.61	6.19	0.00				
230.00	7.61	6.19	0.00				
235.00	7.61	6.19	0.00				
240.00	7.61	6.19	0.00				
245.00	7.61	6.19	0.00				
250.00	7.61	6.19	0.00				
255.00	7.61	6.19	0.00				
260.00	7.61	6.19	0.00				
265.00	7.61	6.19	0.00				
270.00	7.61	6.19	0.00				
275.00	7.61	6.19	0.00				
280.00	7.61	6.19	0.00				
285.00	7.61	6.19	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Subcatchment 3S: Direct Rainfall in Wetland

Direct rainfall into wetland area itself.

[49] Hint: $T_c < 2dt$ may require smaller dt

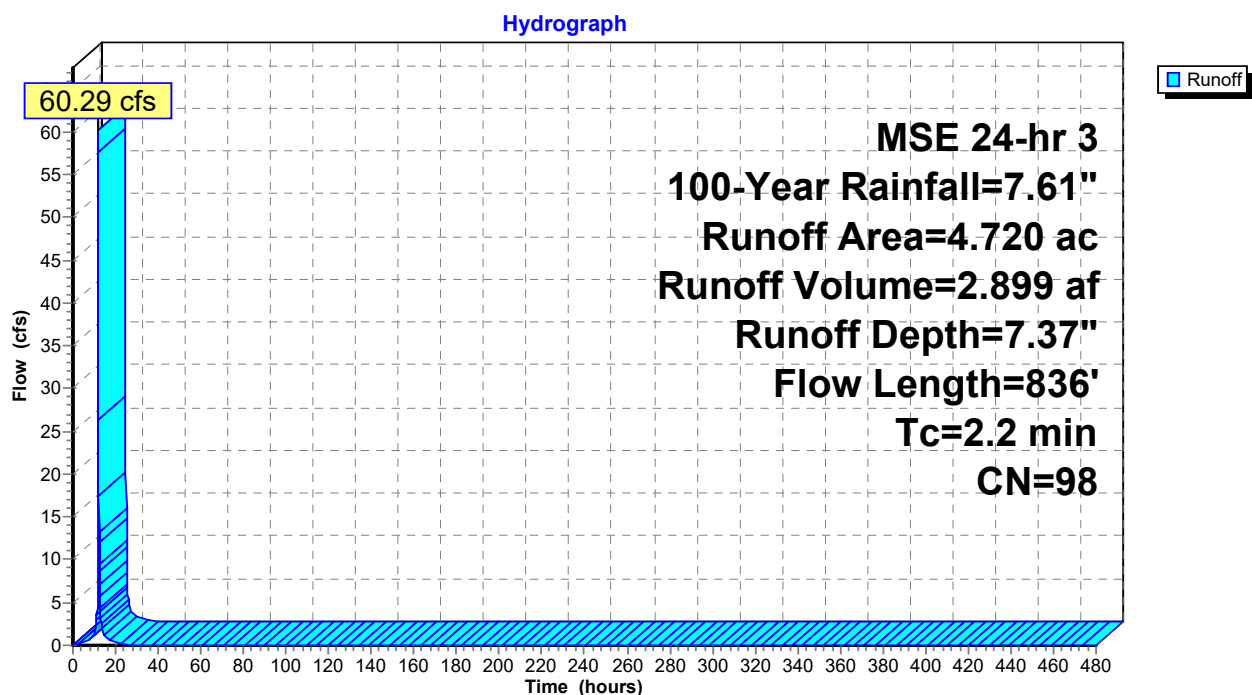
Runoff = 60.29 cfs @ 12.08 hrs, Volume= 2.899 af, Depth= 7.37"
Routed to Pond 2P : Proposed Outlet Devices

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, $dt=0.05$ hrs
MSE 24-hr 3 100-Year Rainfall=7.61"

Area (ac)	CN	Description
4.720	98	Water Surface, HSG A
4.720		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	836		6.22		Lake or Reservoir, Mean Depth= 1.20'

Subcatchment 3S: Direct Rainfall in Wetland



IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Subcatchment 3S: Direct Rainfall in Wetland

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	7.61	7.37	0.00
5.00	0.29	0.13	0.35	295.00	7.61	7.37	0.00
10.00	1.05	0.84	1.28	300.00	7.61	7.37	0.00
15.00	6.83	6.59	1.15	305.00	7.61	7.37	0.00
20.00	7.41	7.17	0.38	310.00	7.61	7.37	0.00
25.00	7.61	7.37	0.00	315.00	7.61	7.37	0.00
30.00	7.61	7.37	0.00	320.00	7.61	7.37	0.00
35.00	7.61	7.37	0.00	325.00	7.61	7.37	0.00
40.00	7.61	7.37	0.00	330.00	7.61	7.37	0.00
45.00	7.61	7.37	0.00	335.00	7.61	7.37	0.00
50.00	7.61	7.37	0.00	340.00	7.61	7.37	0.00
55.00	7.61	7.37	0.00	345.00	7.61	7.37	0.00
60.00	7.61	7.37	0.00	350.00	7.61	7.37	0.00
65.00	7.61	7.37	0.00	355.00	7.61	7.37	0.00
70.00	7.61	7.37	0.00	360.00	7.61	7.37	0.00
75.00	7.61	7.37	0.00	365.00	7.61	7.37	0.00
80.00	7.61	7.37	0.00	370.00	7.61	7.37	0.00
85.00	7.61	7.37	0.00	375.00	7.61	7.37	0.00
90.00	7.61	7.37	0.00	380.00	7.61	7.37	0.00
95.00	7.61	7.37	0.00	385.00	7.61	7.37	0.00
100.00	7.61	7.37	0.00	390.00	7.61	7.37	0.00
105.00	7.61	7.37	0.00	395.00	7.61	7.37	0.00
110.00	7.61	7.37	0.00	400.00	7.61	7.37	0.00
115.00	7.61	7.37	0.00	405.00	7.61	7.37	0.00
120.00	7.61	7.37	0.00	410.00	7.61	7.37	0.00
125.00	7.61	7.37	0.00	415.00	7.61	7.37	0.00
130.00	7.61	7.37	0.00	420.00	7.61	7.37	0.00
135.00	7.61	7.37	0.00	425.00	7.61	7.37	0.00
140.00	7.61	7.37	0.00	430.00	7.61	7.37	0.00
145.00	7.61	7.37	0.00	435.00	7.61	7.37	0.00
150.00	7.61	7.37	0.00	440.00	7.61	7.37	0.00
155.00	7.61	7.37	0.00	445.00	7.61	7.37	0.00
160.00	7.61	7.37	0.00	450.00	7.61	7.37	0.00
165.00	7.61	7.37	0.00	455.00	7.61	7.37	0.00
170.00	7.61	7.37	0.00	460.00	7.61	7.37	0.00
175.00	7.61	7.37	0.00	465.00	7.61	7.37	0.00
180.00	7.61	7.37	0.00	470.00	7.61	7.37	0.00
185.00	7.61	7.37	0.00	475.00	7.61	7.37	0.00
190.00	7.61	7.37	0.00	480.00	7.61	7.37	0.00
195.00	7.61	7.37	0.00				
200.00	7.61	7.37	0.00				
205.00	7.61	7.37	0.00				
210.00	7.61	7.37	0.00				
215.00	7.61	7.37	0.00				
220.00	7.61	7.37	0.00				
225.00	7.61	7.37	0.00				
230.00	7.61	7.37	0.00				
235.00	7.61	7.37	0.00				
240.00	7.61	7.37	0.00				
245.00	7.61	7.37	0.00				
250.00	7.61	7.37	0.00				
255.00	7.61	7.37	0.00				
260.00	7.61	7.37	0.00				
265.00	7.61	7.37	0.00				
270.00	7.61	7.37	0.00				
275.00	7.61	7.37	0.00				
280.00	7.61	7.37	0.00				
285.00	7.61	7.37	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Subcatchment 4S: South Drainage Area

South Watershed Area of 164.04 acres modeled as sub-watershed since this watershed routes through existing road culvert.

Time of Concentration calculated taking the longest distance along the flow path (from StreamStats) and average land slope of 3.27% from LiDAR data from complete watershed.

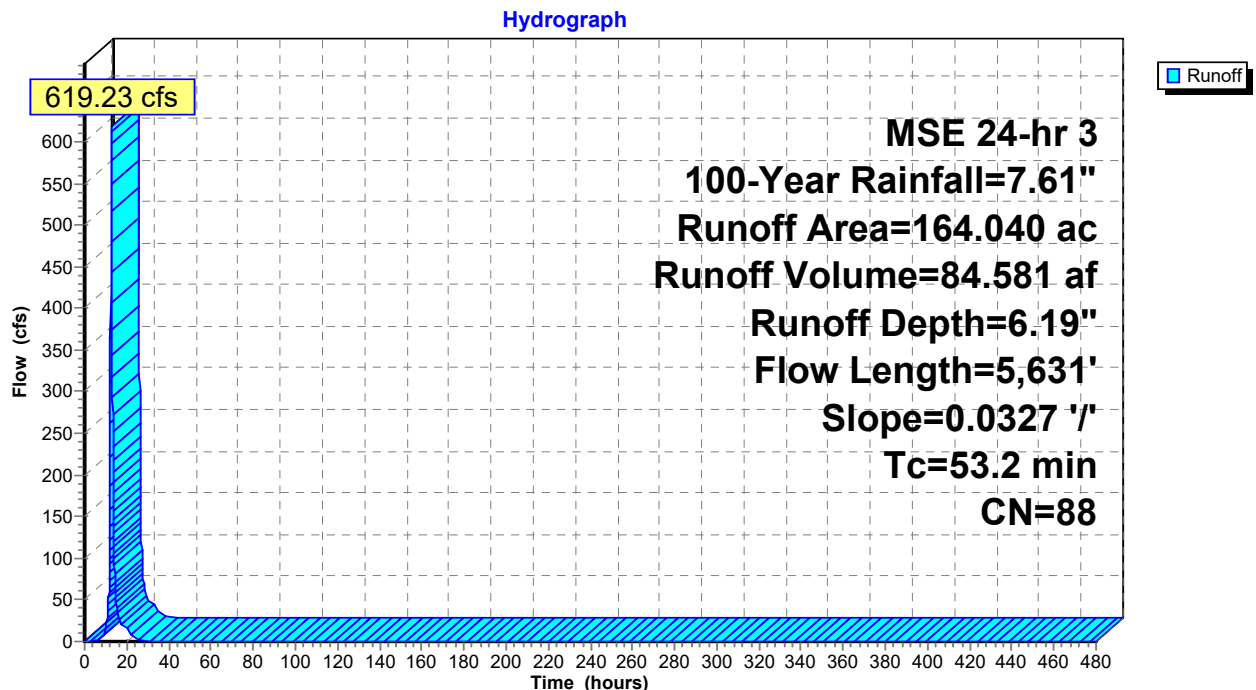
Runoff = 619.23 cfs @ 12.70 hrs, Volume= 84.581 af, Depth= 6.19"
Routed to Pond 4P : 200th Street Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.61"

Area (ac)	CN	Description
* 164.040	88	Weighted Average
164.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.2	5,631	0.0327	1.76		Lag/CN Method,

Subcatchment 4S: South Drainage Area



IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Subcatchment 4S: South Drainage Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	290.00	7.61	6.19	0.00
5.00	0.29	0.00	0.00	295.00	7.61	6.19	0.00
10.00	1.05	0.28	19.20	300.00	7.61	6.19	0.00
15.00	6.83	5.42	47.36	305.00	7.61	6.19	0.00
20.00	7.41	5.99	14.81	310.00	7.61	6.19	0.00
25.00	7.61	6.19	1.02	315.00	7.61	6.19	0.00
30.00	7.61	6.19	0.00	320.00	7.61	6.19	0.00
35.00	7.61	6.19	0.00	325.00	7.61	6.19	0.00
40.00	7.61	6.19	0.00	330.00	7.61	6.19	0.00
45.00	7.61	6.19	0.00	335.00	7.61	6.19	0.00
50.00	7.61	6.19	0.00	340.00	7.61	6.19	0.00
55.00	7.61	6.19	0.00	345.00	7.61	6.19	0.00
60.00	7.61	6.19	0.00	350.00	7.61	6.19	0.00
65.00	7.61	6.19	0.00	355.00	7.61	6.19	0.00
70.00	7.61	6.19	0.00	360.00	7.61	6.19	0.00
75.00	7.61	6.19	0.00	365.00	7.61	6.19	0.00
80.00	7.61	6.19	0.00	370.00	7.61	6.19	0.00
85.00	7.61	6.19	0.00	375.00	7.61	6.19	0.00
90.00	7.61	6.19	0.00	380.00	7.61	6.19	0.00
95.00	7.61	6.19	0.00	385.00	7.61	6.19	0.00
100.00	7.61	6.19	0.00	390.00	7.61	6.19	0.00
105.00	7.61	6.19	0.00	395.00	7.61	6.19	0.00
110.00	7.61	6.19	0.00	400.00	7.61	6.19	0.00
115.00	7.61	6.19	0.00	405.00	7.61	6.19	0.00
120.00	7.61	6.19	0.00	410.00	7.61	6.19	0.00
125.00	7.61	6.19	0.00	415.00	7.61	6.19	0.00
130.00	7.61	6.19	0.00	420.00	7.61	6.19	0.00
135.00	7.61	6.19	0.00	425.00	7.61	6.19	0.00
140.00	7.61	6.19	0.00	430.00	7.61	6.19	0.00
145.00	7.61	6.19	0.00	435.00	7.61	6.19	0.00
150.00	7.61	6.19	0.00	440.00	7.61	6.19	0.00
155.00	7.61	6.19	0.00	445.00	7.61	6.19	0.00
160.00	7.61	6.19	0.00	450.00	7.61	6.19	0.00
165.00	7.61	6.19	0.00	455.00	7.61	6.19	0.00
170.00	7.61	6.19	0.00	460.00	7.61	6.19	0.00
175.00	7.61	6.19	0.00	465.00	7.61	6.19	0.00
180.00	7.61	6.19	0.00	470.00	7.61	6.19	0.00
185.00	7.61	6.19	0.00	475.00	7.61	6.19	0.00
190.00	7.61	6.19	0.00	480.00	7.61	6.19	0.00
195.00	7.61	6.19	0.00				
200.00	7.61	6.19	0.00				
205.00	7.61	6.19	0.00				
210.00	7.61	6.19	0.00				
215.00	7.61	6.19	0.00				
220.00	7.61	6.19	0.00				
225.00	7.61	6.19	0.00				
230.00	7.61	6.19	0.00				
235.00	7.61	6.19	0.00				
240.00	7.61	6.19	0.00				
245.00	7.61	6.19	0.00				
250.00	7.61	6.19	0.00				
255.00	7.61	6.19	0.00				
260.00	7.61	6.19	0.00				
265.00	7.61	6.19	0.00				
270.00	7.61	6.19	0.00				
275.00	7.61	6.19	0.00				
280.00	7.61	6.19	0.00				
285.00	7.61	6.19	0.00				

IA-340-8 - Proposed Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Pond 2P: Proposed Outlet Devices

Water in wetland starting at 1094.1' (NWL)

Inflow Area = 625.580 ac, 0.75% Impervious, Inflow Depth = 6.01" for 100-Year event
 Inflow = 1,641.34 cfs @ 12.83 hrs, Volume= 313.299 af
 Outflow = 1,505.66 cfs @ 13.02 hrs, Volume= 313.299 af, Atten= 8%, Lag= 11.4 min
 Primary = 1,391.12 cfs @ 13.02 hrs, Volume= 308.998 af
 Routed to Pond 3P : Nelson Ave Culvert
 Secondary = 114.54 cfs @ 13.02 hrs, Volume= 4.301 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Starting Elev= 1,194.10' Surf.Area= 4.997 ac Storage= 7.192 af
 Peak Elev= 1,197.58' @ 13.02 hrs Surf.Area= 14.550 ac Storage= 36.654 af (29.461 af above start)

Plug-Flow detention time= 38.7 min calculated for 306.107 af (98% of inflow)
 Center-of-Mass det. time= 18.1 min (880.2 - 862.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,192.00'	85.494 af	Wetland Storage (Prismatic) Listed below

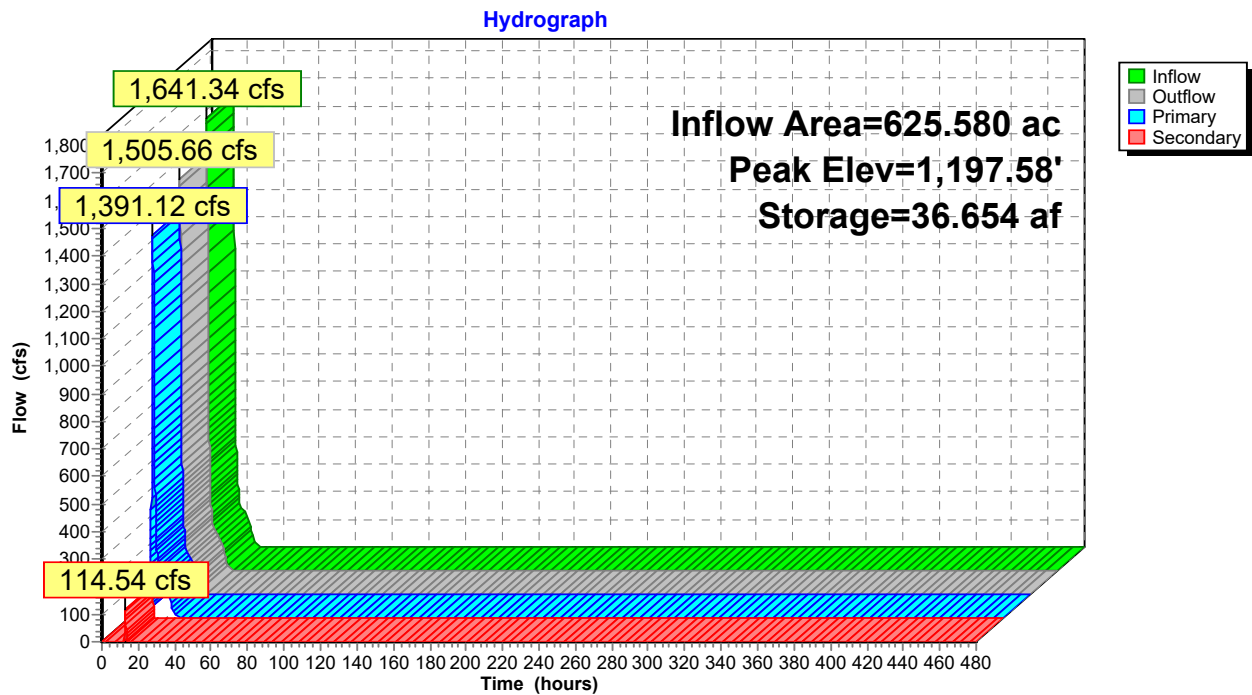
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,192.00	0.000	0.000	0.000
1,193.00	4.363	2.181	2.181
1,194.00	4.690	4.526	6.708
1,194.10	4.997	0.484	7.192
1,195.00	5.272	4.621	11.813
1,196.00	7.894	6.583	18.396
1,197.00	12.049	9.971	28.368
1,198.00	16.333	14.191	42.559
1,198.70	20.079	12.744	55.303
1,199.00	21.492	6.236	61.539
1,200.00	26.419	23.955	85.494

Device	Routing	Invert	Outlet Devices
#1	Primary	1,194.10'	Asymmetrical Sheet Pile Weir, C= 3.27 Offset (feet) -47.00 -45.00 -37.00 -30.00 30.00 37.00 45.00 47.00 Height (feet) 4.60 3.60 3.60 0.00 0.00 3.60 3.60 4.60
#2	Secondary	1,197.10'	Auxillary Spillway in Berm, C= 3.27 Offset (feet) -66.00 -50.00 50.00 66.00 Height (feet) 1.60 0.00 0.00 1.60

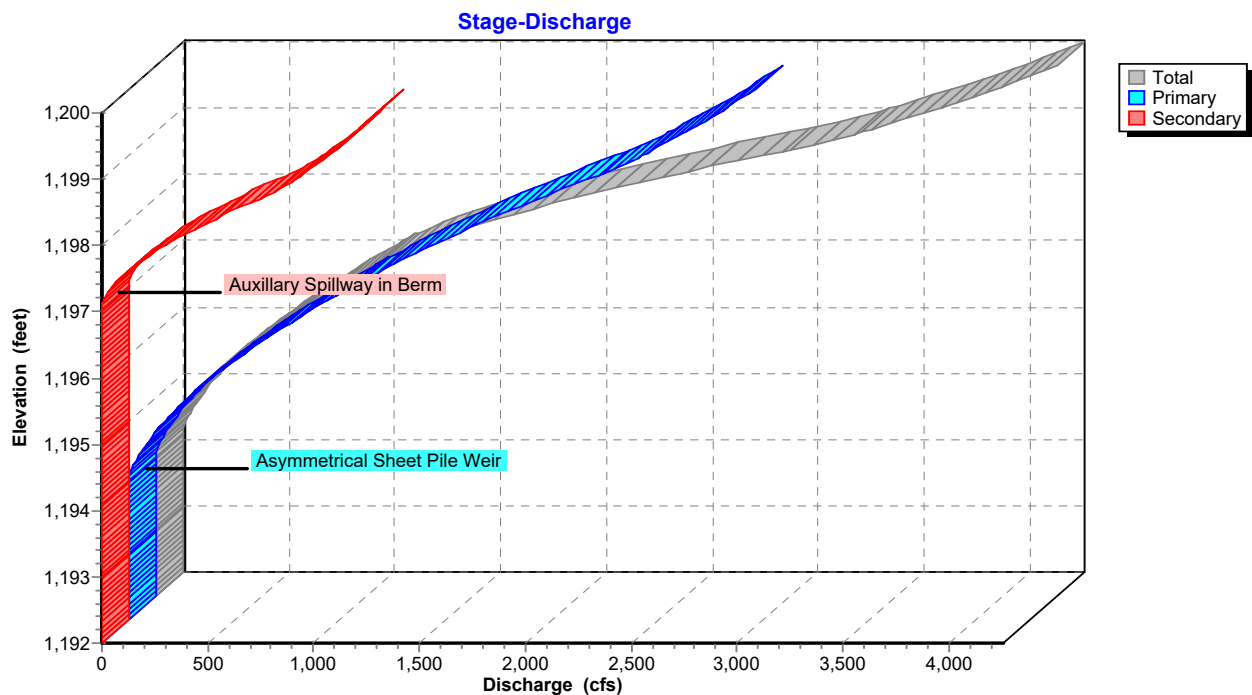
Primary OutFlow Max=1,389.78 cfs @ 13.02 hrs HW=1,197.58' (Free Discharge)
 ↑1=Asymmetrical Sheet Pile Weir (Weir Controls 1,389.78 cfs @ 5.43 fps)

Secondary OutFlow Max=113.59 cfs @ 13.02 hrs HW=1,197.58' (Free Discharge)
 ↑2=Auxillary Spillway in Berm (Weir Controls 113.59 cfs @ 2.15 fps)

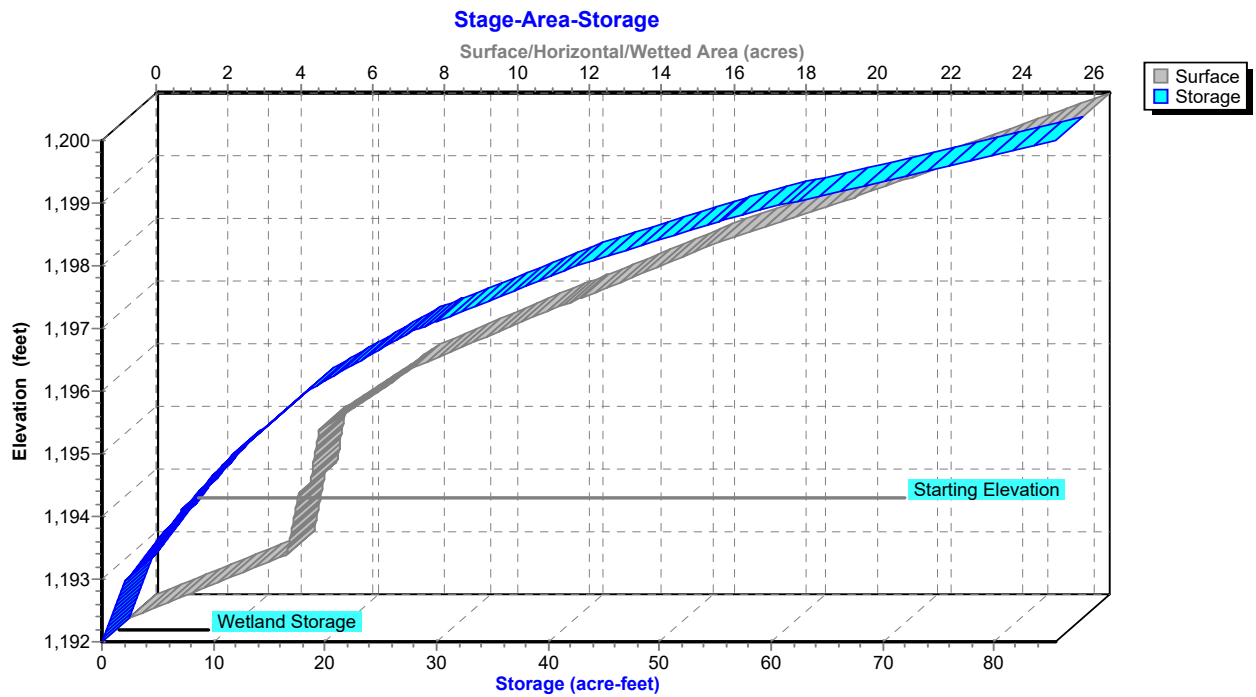
Pond 2P: Proposed Outlet Devices



Pond 2P: Proposed Outlet Devices



Pond 2P: Proposed Outlet Devices



IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Pond 2P: Proposed Outlet Devices

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	7.192	1,194.10	0.00	0.00	0.00
10.00	68.61	9.360	1,194.52	54.59	54.59	0.00
20.00	112.97	10.765	1,194.80	115.98	115.98	0.00
30.00	0.00	7.209	1,194.10	0.16	0.16	0.00
40.00	0.00	7.192	1,194.10	0.00	0.00	0.00
50.00	0.00	7.192	1,194.10	0.00	0.00	0.00
60.00	0.00	7.192	1,194.10	0.00	0.00	0.00
70.00	0.00	7.192	1,194.10	0.00	0.00	0.00
80.00	0.00	7.192	1,194.10	0.00	0.00	0.00
90.00	0.00	7.192	1,194.10	0.00	0.00	0.00
100.00	0.00	7.192	1,194.10	0.00	0.00	0.00
110.00	0.00	7.192	1,194.10	0.00	0.00	0.00
120.00	0.00	7.192	1,194.10	0.00	0.00	0.00
130.00	0.00	7.192	1,194.10	0.00	0.00	0.00
140.00	0.00	7.192	1,194.10	0.00	0.00	0.00
150.00	0.00	7.192	1,194.10	0.00	0.00	0.00
160.00	0.00	7.192	1,194.10	0.00	0.00	0.00
170.00	0.00	7.192	1,194.10	0.00	0.00	0.00
180.00	0.00	7.192	1,194.10	0.00	0.00	0.00
190.00	0.00	7.192	1,194.10	0.00	0.00	0.00
200.00	0.00	7.192	1,194.10	0.00	0.00	0.00
210.00	0.00	7.192	1,194.10	0.00	0.00	0.00
220.00	0.00	7.192	1,194.10	0.00	0.00	0.00
230.00	0.00	7.192	1,194.10	0.00	0.00	0.00
240.00	0.00	7.192	1,194.10	0.00	0.00	0.00
250.00	0.00	7.192	1,194.10	0.00	0.00	0.00
260.00	0.00	7.192	1,194.10	0.00	0.00	0.00
270.00	0.00	7.192	1,194.10	0.00	0.00	0.00
280.00	0.00	7.192	1,194.10	0.00	0.00	0.00
290.00	0.00	7.192	1,194.10	0.00	0.00	0.00
300.00	0.00	7.192	1,194.10	0.00	0.00	0.00
310.00	0.00	7.192	1,194.10	0.00	0.00	0.00
320.00	0.00	7.192	1,194.10	0.00	0.00	0.00
330.00	0.00	7.192	1,194.10	0.00	0.00	0.00
340.00	0.00	7.192	1,194.10	0.00	0.00	0.00
350.00	0.00	7.192	1,194.10	0.00	0.00	0.00
360.00	0.00	7.192	1,194.10	0.00	0.00	0.00
370.00	0.00	7.192	1,194.10	0.00	0.00	0.00
380.00	0.00	7.192	1,194.10	0.00	0.00	0.00
390.00	0.00	7.192	1,194.10	0.00	0.00	0.00
400.00	0.00	7.192	1,194.10	0.00	0.00	0.00
410.00	0.00	7.192	1,194.10	0.00	0.00	0.00
420.00	0.00	7.192	1,194.10	0.00	0.00	0.00
430.00	0.00	7.192	1,194.10	0.00	0.00	0.00
440.00	0.00	7.192	1,194.10	0.00	0.00	0.00
450.00	0.00	7.192	1,194.10	0.00	0.00	0.00
460.00	0.00	7.192	1,194.10	0.00	0.00	0.00
470.00	0.00	7.192	1,194.10	0.00	0.00	0.00
480.00	0.00	7.192	1,194.10	0.00	0.00	0.00

IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Stage-Discharge for Pond 2P: Proposed Outlet Devices

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,192.00	0.00	0.00	0.00	1,197.80	1,734.21	1,531.98	202.24
1,192.10	0.00	0.00	0.00	1,197.90	1,850.19	1,601.23	248.96
1,192.20	0.00	0.00	0.00	1,198.00	1,971.80	1,672.50	299.30
1,192.30	0.00	0.00	0.00	1,198.10	2,098.78	1,745.62	353.16
1,192.40	0.00	0.00	0.00	1,198.20	2,230.94	1,820.49	410.46
1,192.50	0.00	0.00	0.00	1,198.30	2,368.14	1,897.03	471.12
1,192.60	0.00	0.00	0.00	1,198.40	2,510.28	1,975.18	535.10
1,192.70	0.00	0.00	0.00	1,198.50	2,657.26	2,054.92	602.34
1,192.80	0.00	0.00	0.00	1,198.60	2,809.03	2,136.20	672.83
1,192.90	0.00	0.00	0.00	1,198.70	2,965.52	2,219.00	746.51
1,193.00	0.00	0.00	0.00	1,198.80	3,103.21	2,293.56	809.65
1,193.10	0.00	0.00	0.00	1,198.90	3,225.81	2,361.48	864.33
1,193.20	0.00	0.00	0.00	1,199.00	3,339.88	2,425.52	914.36
1,193.30	0.00	0.00	0.00	1,199.10	3,447.68	2,486.65	961.03
1,193.40	0.00	0.00	0.00	1,199.20	3,550.49	2,545.42	1,005.07
1,193.50	0.00	0.00	0.00	1,199.30	3,649.13	2,602.20	1,046.94
1,193.60	0.00	0.00	0.00	1,199.40	3,744.20	2,657.23	1,086.97
1,193.70	0.00	0.00	0.00	1,199.50	3,836.14	2,710.73	1,125.41
1,193.80	0.00	0.00	0.00	1,199.60	3,925.31	2,762.86	1,162.45
1,193.90	0.00	0.00	0.00	1,199.70	4,011.98	2,813.73	1,198.25
1,194.00	0.00	0.00	0.00	1,199.80	4,096.39	2,863.45	1,232.94
1,194.10	0.00	0.00	0.00	1,199.90	4,178.74	2,912.13	1,266.61
1,194.20	6.22	6.22	0.00	1,200.00	4,259.18	2,959.82	1,299.36
1,194.30	17.64	17.64	0.00				
1,194.40	32.49	32.49	0.00				
1,194.50	50.15	50.15	0.00				
1,194.60	70.27	70.27	0.00				
1,194.70	92.60	92.60	0.00				
1,194.80	116.99	116.99	0.00				
1,194.90	143.30	143.30	0.00				
1,195.00	171.43	171.43	0.00				
1,195.10	201.29	201.29	0.00				
1,195.20	232.81	232.81	0.00				
1,195.30	265.94	265.94	0.00				
1,195.40	300.61	300.61	0.00				
1,195.50	336.80	336.80	0.00				
1,195.60	374.46	374.46	0.00				
1,195.70	413.55	413.55	0.00				
1,195.80	454.05	454.05	0.00				
1,195.90	495.93	495.93	0.00				
1,196.00	539.15	539.15	0.00				
1,196.10	583.71	583.71	0.00				
1,196.20	629.58	629.58	0.00				
1,196.30	676.74	676.74	0.00				
1,196.40	725.18	725.18	0.00				
1,196.50	774.87	774.87	0.00				
1,196.60	825.82	825.82	0.00				
1,196.70	877.99	877.99	0.00				
1,196.80	931.38	931.38	0.00				
1,196.90	985.99	985.99	0.00				
1,197.00	1,041.79	1,041.79	0.00				
1,197.10	1,098.78	1,098.78	0.00				
1,197.20	1,167.37	1,156.95	10.42				
1,197.30	1,246.01	1,216.29	29.72				
1,197.40	1,331.82	1,276.80	55.02				
1,197.50	1,423.83	1,338.46	85.37				
1,197.60	1,521.51	1,401.27	120.24				
1,197.70	1,624.50	1,465.23	159.27				

IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Stage-Area-Storage for Pond 2P: Proposed Outlet Devices

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,192.00	0.000	0.000	1,197.80	15.476	39.721
1,192.10	0.436	0.218	1,197.90	15.905	41.140
1,192.20	0.873	0.436	1,198.00	16.333	42.559
1,192.30	1.309	0.654	1,198.10	16.868	44.379
1,192.40	1.745	0.873	1,198.20	17.403	46.200
1,192.50	2.181	1.091	1,198.30	17.938	48.021
1,192.60	2.618	1.309	1,198.40	18.474	49.841
1,192.70	3.054	1.527	1,198.50	19.009	51.662
1,192.80	3.490	1.745	1,198.60	19.544	53.482
1,192.90	3.927	1.963	1,198.70	20.079	55.303
1,193.00	4.363	2.181	1,198.80	20.550	57.382
1,193.10	4.396	2.634	1,198.90	21.021	59.460
1,193.20	4.428	3.087	1,199.00	21.492	61.539
1,193.30	4.461	3.539	1,199.10	21.985	63.934
1,193.40	4.494	3.992	1,199.20	22.477	66.330
1,193.50	4.526	4.445	1,199.30	22.970	68.725
1,193.60	4.559	4.897	1,199.40	23.463	71.121
1,193.70	4.592	5.350	1,199.50	23.955	73.516
1,193.80	4.625	5.803	1,199.60	24.448	75.912
1,193.90	4.657	6.255	1,199.70	24.941	78.308
1,194.00	4.690	6.708	1,199.80	25.434	80.703
1,194.10	4.997	7.192	1,199.90	25.926	83.099
1,194.20	5.028	7.706	1,200.00	26.419	85.494
1,194.30	5.058	8.219			
1,194.40	5.089	8.733			
1,194.50	5.119	9.246			
1,194.60	5.150	9.760			
1,194.70	5.180	10.273			
1,194.80	5.211	10.786			
1,194.90	5.241	11.300			
1,195.00	5.272	11.813			
1,195.10	5.534	12.472			
1,195.20	5.796	13.130			
1,195.30	6.059	13.788			
1,195.40	6.321	14.447			
1,195.50	6.583	15.105			
1,195.60	6.845	15.763			
1,195.70	7.107	16.422			
1,195.80	7.370	17.080			
1,195.90	7.632	17.738			
1,196.00	7.894	18.396			
1,196.10	8.309	19.394			
1,196.20	8.725	20.391			
1,196.30	9.140	21.388			
1,196.40	9.556	22.385			
1,196.50	9.971	23.382			
1,196.60	10.387	24.379			
1,196.70	10.803	25.376			
1,196.80	11.218	26.374			
1,196.90	11.634	27.371			
1,197.00	12.049	28.368			
1,197.10	12.477	29.787			
1,197.20	12.906	31.206			
1,197.30	13.334	32.625			
1,197.40	13.763	34.044			
1,197.50	14.191	35.463			
1,197.60	14.619	36.882			
1,197.70	15.048	38.302			

IA-340-8 - Proposed Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Pond 3P: Nelson Ave Culvert

[44] Hint: Outlet device #1 is below defined storage

[81] Warning: Exceeded Pond 2P by 3.18' @ 14.85 hrs

Inflow Area = 625.580 ac, 0.75% Impervious, Inflow Depth = 5.93" for 100-Year event
 Inflow = 1,391.12 cfs @ 13.02 hrs, Volume= 308.998 af
 Outflow = 1,390.41 cfs @ 13.03 hrs, Volume= 308.998 af, Atten= 0%, Lag= 1.0 min
 Primary = 304.03 cfs @ 13.03 hrs, Volume= 193.421 af
 Secondary = 1,086.37 cfs @ 13.03 hrs, Volume= 115.577 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs

Peak Elev= 1,199.51' @ 13.03 hrs Surf.Area= 2.695 ac Storage= 8.476 af

Plug-Flow detention time= 7.0 min calculated for 308.998 af (100% of inflow)

Center-of-Mass det. time= 7.0 min (888.6 - 881.6)

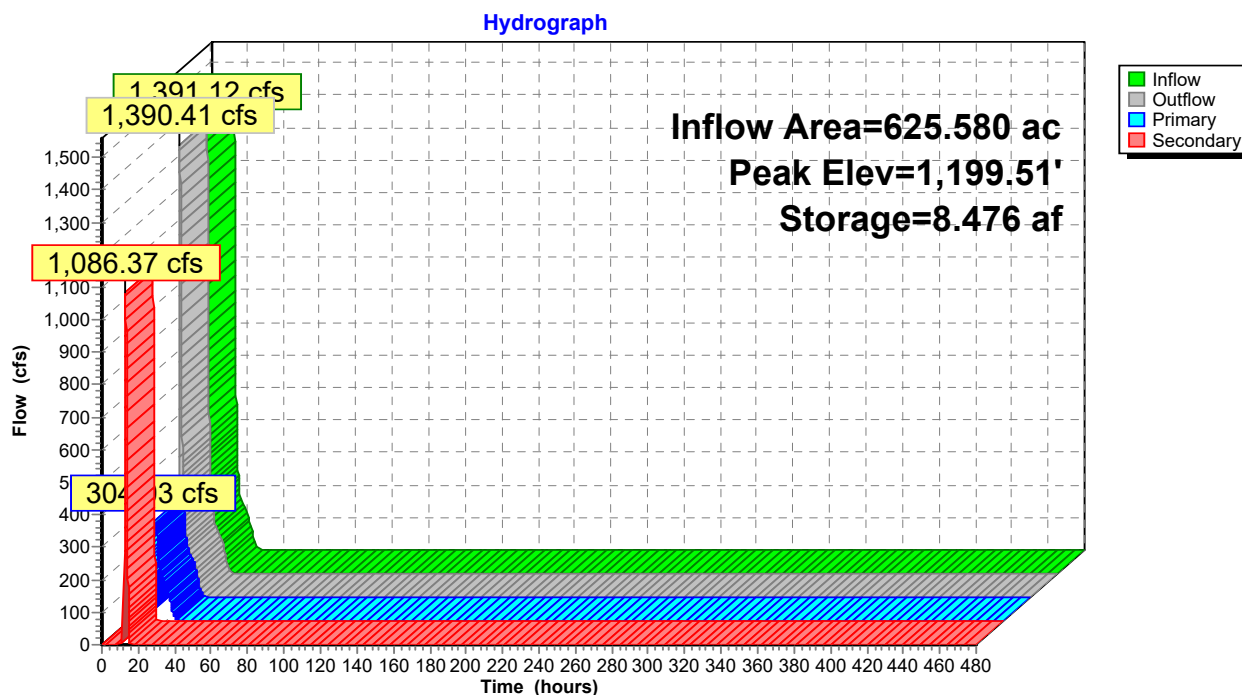
Volume	Invert	Avail.Storage	Storage Description
#1	1,190.00'	9.786 af	Storage Btw Berm and Road (Prismatic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,190.00	0.000	0.000	0.000
1,191.00	0.023	0.011	0.011
1,192.00	0.089	0.056	0.068
1,193.00	0.411	0.250	0.317
1,194.00	0.648	0.529	0.847
1,195.00	0.846	0.747	1.594
1,196.00	1.025	0.936	2.529
1,197.00	1.234	1.130	3.659
1,198.00	1.520	1.377	5.036
1,199.00	2.596	2.058	7.094
1,200.00	2.789	2.692	9.786

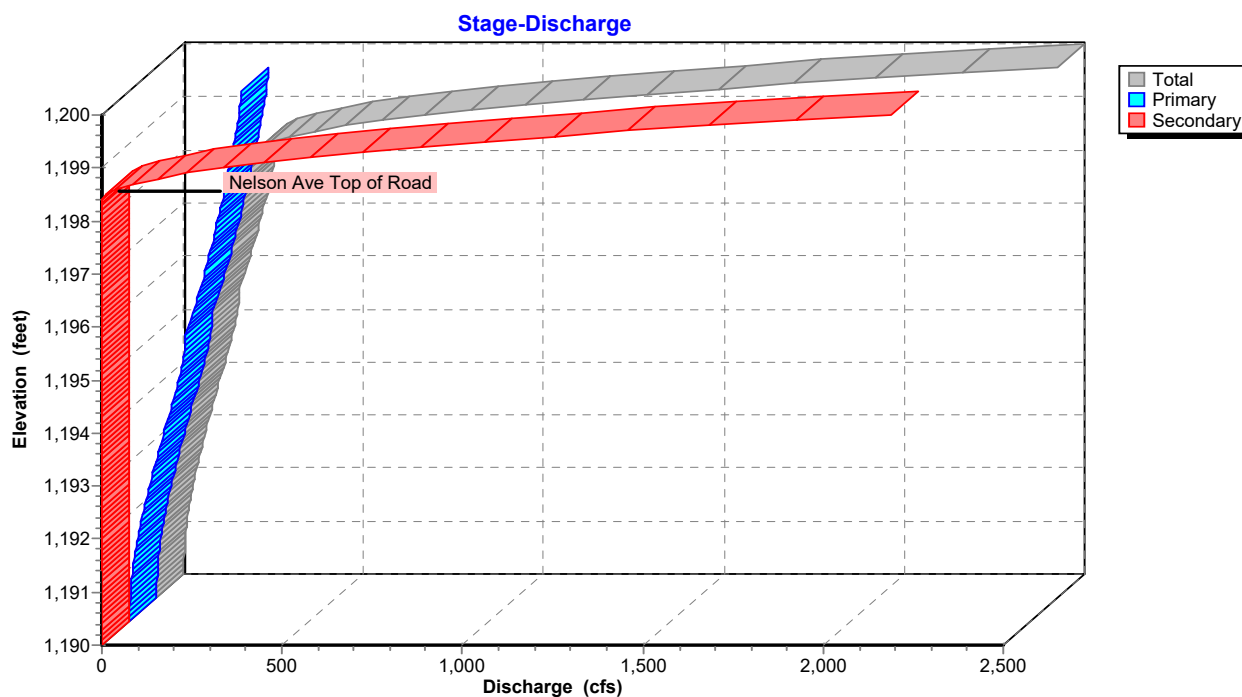
Device	Routing	Invert	Outlet Devices
#1	Primary	1,189.62'	91.0" W x 52.0" H Ellipse Nelson Ave Road Culvert L= 70.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 1,189.62' / 1,189.62' S= 0.0000 ' Cc= 0.900 n= 0.025, Flow Area= 25.81 sf
#2	Secondary	1,198.34'	Nelson Ave Top of Road, C= 3.27 Offset (feet) -257.75 -118.35 118.35 291.17 Elev. (feet) 1,200.00 1,198.34 1,198.64 1,200.00

Primary OutFlow Max=304.02 cfs @ 13.03 hrs HW=1,199.51' (Free Discharge)↑**1=Nelson Ave Road Culvert** (Inlet Controls 304.02 cfs @ 11.78 fps)**Secondary OutFlow** Max=1,084.33 cfs @ 13.03 hrs HW=1,199.51' (Free Discharge)↑**2=Nelson Ave Top of Road** (Weir Controls 1,084.33 cfs @ 2.21 fps)

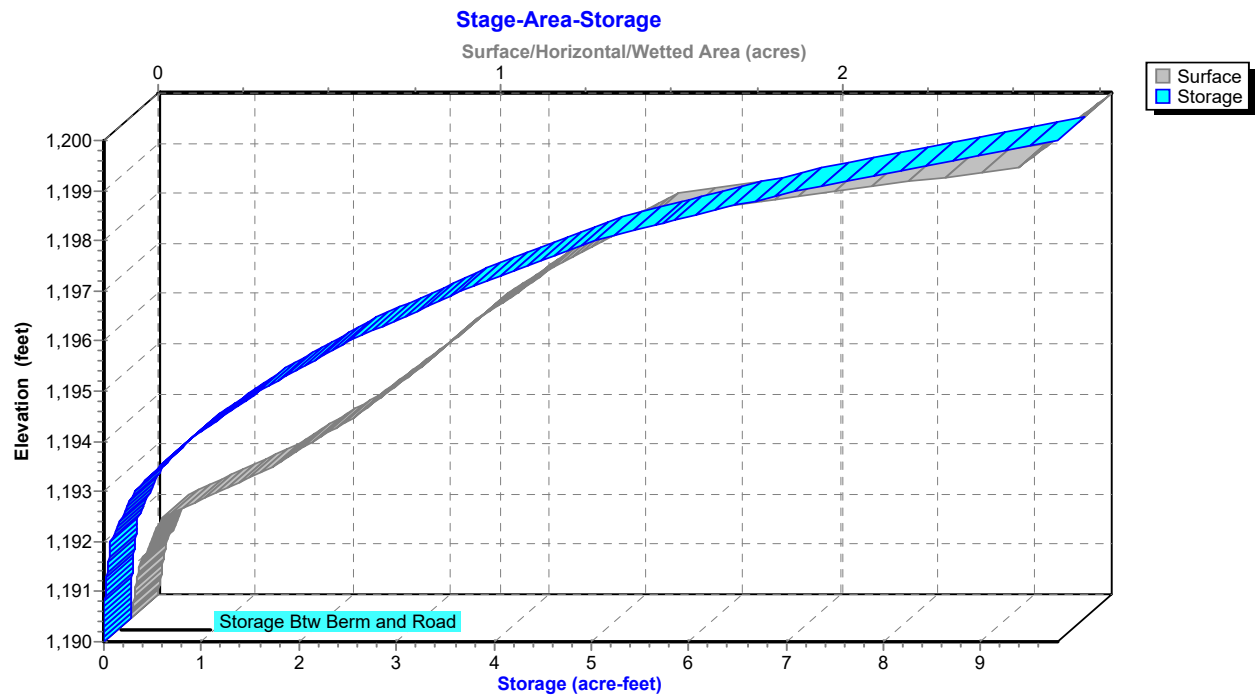
Pond 3P: Nelson Ave Culvert



Pond 3P: Nelson Ave Culvert



Pond 3P: Nelson Ave Culvert



IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Hydrograph for Pond 3P: Nelson Ave Culvert

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	1,190.00	0.00	0.00	0.00
10.00	54.59	0.167	1,192.40	50.99	50.99	0.00
20.00	115.98	0.893	1,194.06	118.60	118.60	0.00
30.00	0.16	0.000	1,190.02	0.16	0.16	0.00
40.00	0.00	0.000	1,190.00	0.00	0.00	0.00
50.00	0.00	0.000	1,190.00	0.00	0.00	0.00
60.00	0.00	0.000	1,190.00	0.00	0.00	0.00
70.00	0.00	0.000	1,190.00	0.00	0.00	0.00
80.00	0.00	0.000	1,190.00	0.00	0.00	0.00
90.00	0.00	0.000	1,190.00	0.00	0.00	0.00
100.00	0.00	0.000	1,190.00	0.00	0.00	0.00
110.00	0.00	0.000	1,190.00	0.00	0.00	0.00
120.00	0.00	0.000	1,190.00	0.00	0.00	0.00
130.00	0.00	0.000	1,190.00	0.00	0.00	0.00
140.00	0.00	0.000	1,190.00	0.00	0.00	0.00
150.00	0.00	0.000	1,190.00	0.00	0.00	0.00
160.00	0.00	0.000	1,190.00	0.00	0.00	0.00
170.00	0.00	0.000	1,190.00	0.00	0.00	0.00
180.00	0.00	0.000	1,190.00	0.00	0.00	0.00
190.00	0.00	0.000	1,190.00	0.00	0.00	0.00
200.00	0.00	0.000	1,190.00	0.00	0.00	0.00
210.00	0.00	0.000	1,190.00	0.00	0.00	0.00
220.00	0.00	0.000	1,190.00	0.00	0.00	0.00
230.00	0.00	0.000	1,190.00	0.00	0.00	0.00
240.00	0.00	0.000	1,190.00	0.00	0.00	0.00
250.00	0.00	0.000	1,190.00	0.00	0.00	0.00
260.00	0.00	0.000	1,190.00	0.00	0.00	0.00
270.00	0.00	0.000	1,190.00	0.00	0.00	0.00
280.00	0.00	0.000	1,190.00	0.00	0.00	0.00
290.00	0.00	0.000	1,190.00	0.00	0.00	0.00
300.00	0.00	0.000	1,190.00	0.00	0.00	0.00
310.00	0.00	0.000	1,190.00	0.00	0.00	0.00
320.00	0.00	0.000	1,190.00	0.00	0.00	0.00
330.00	0.00	0.000	1,190.00	0.00	0.00	0.00
340.00	0.00	0.000	1,190.00	0.00	0.00	0.00
350.00	0.00	0.000	1,190.00	0.00	0.00	0.00
360.00	0.00	0.000	1,190.00	0.00	0.00	0.00
370.00	0.00	0.000	1,190.00	0.00	0.00	0.00
380.00	0.00	0.000	1,190.00	0.00	0.00	0.00
390.00	0.00	0.000	1,190.00	0.00	0.00	0.00
400.00	0.00	0.000	1,190.00	0.00	0.00	0.00
410.00	0.00	0.000	1,190.00	0.00	0.00	0.00
420.00	0.00	0.000	1,190.00	0.00	0.00	0.00
430.00	0.00	0.000	1,190.00	0.00	0.00	0.00
440.00	0.00	0.000	1,190.00	0.00	0.00	0.00
450.00	0.00	0.000	1,190.00	0.00	0.00	0.00
460.00	0.00	0.000	1,190.00	0.00	0.00	0.00
470.00	0.00	0.000	1,190.00	0.00	0.00	0.00
480.00	0.00	0.000	1,190.00	0.00	0.00	0.00

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Stage-Discharge for Pond 3P: Nelson Ave Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,190.00	0.00	0.00	0.00	1,195.80	176.07	176.07	0.00
1,190.10	0.85	0.85	0.00	1,195.90	180.77	180.77	0.00
1,190.20	1.38	1.38	0.00	1,196.00	185.35	185.35	0.00
1,190.30	2.06	2.06	0.00	1,196.10	189.83	189.83	0.00
1,190.40	2.89	2.89	0.00	1,196.20	194.20	194.20	0.00
1,190.50	3.89	3.89	0.00	1,196.30	198.47	198.47	0.00
1,190.60	5.05	5.05	0.00	1,196.40	202.66	202.66	0.00
1,190.70	6.38	6.38	0.00	1,196.50	206.76	206.76	0.00
1,190.80	7.86	7.86	0.00	1,196.60	210.78	210.78	0.00
1,190.90	9.51	9.51	0.00	1,196.70	214.72	214.72	0.00
1,191.00	11.32	11.32	0.00	1,196.80	218.60	218.60	0.00
1,191.10	13.28	13.28	0.00	1,196.90	222.41	222.41	0.00
1,191.20	15.40	15.40	0.00	1,197.00	226.15	226.15	0.00
1,191.30	17.66	17.66	0.00	1,197.10	229.83	229.83	0.00
1,191.40	20.07	20.07	0.00	1,197.20	233.45	233.45	0.00
1,191.50	22.62	22.62	0.00	1,197.30	237.02	237.02	0.00
1,191.60	25.30	25.30	0.00	1,197.40	240.54	240.54	0.00
1,191.70	28.11	28.11	0.00	1,197.50	244.00	244.00	0.00
1,191.80	31.05	31.05	0.00	1,197.60	247.42	247.42	0.00
1,191.90	34.11	34.11	0.00	1,197.70	250.79	250.79	0.00
1,192.00	37.29	37.29	0.00	1,197.80	254.11	254.11	0.00
1,192.10	40.58	40.58	0.00	1,197.90	257.39	257.39	0.00
1,192.20	43.97	43.97	0.00	1,198.00	260.63	260.63	0.00
1,192.30	47.46	47.46	0.00	1,198.10	263.83	263.83	0.00
1,192.40	51.05	51.05	0.00	1,198.20	267.00	267.00	0.00
1,192.50	54.72	54.72	0.00	1,198.30	270.12	270.12	0.00
1,192.60	58.48	58.48	0.00	1,198.40	274.22	273.21	1.01
1,192.70	62.32	62.32	0.00	1,198.50	287.96	276.26	11.69
1,192.80	66.22	66.22	0.00	1,198.60	318.65	279.29	39.36
1,192.90	70.20	70.20	0.00	1,198.70	370.30	282.28	88.03
1,193.00	74.23	74.23	0.00	1,198.80	440.24	285.23	155.01
1,193.10	78.31	78.31	0.00	1,198.90	526.28	288.16	238.12
1,193.20	82.44	82.44	0.00	1,199.00	627.82	291.06	336.76
1,193.30	86.61	86.61	0.00	1,199.10	744.64	293.93	450.71
1,193.40	90.80	90.80	0.00	1,199.20	876.76	296.77	579.99
1,193.50	95.02	95.02	0.00	1,199.30	1,024.26	299.59	724.68
1,193.60	99.24	99.24	0.00	1,199.40	1,186.72	301.77	884.95
1,193.70	103.47	103.47	0.00	1,199.50	1,364.77	303.77	1,061.00
1,193.80	107.70	107.70	0.00	1,199.60	1,558.82	305.75	1,253.07
1,193.90	111.90	111.90	0.00	1,199.70	1,769.11	307.72	1,461.39
1,194.00	116.07	116.07	0.00	1,199.80	1,995.89	309.68	1,686.22
1,194.10	120.21	120.21	0.00	1,199.90	2,239.44	311.62	1,927.81
1,194.20	124.28	124.28	0.00	1,200.00	2,500.00	313.55	2,186.45
1,194.30	128.28	128.28	0.00				
1,194.40	132.20	132.20	0.00				
1,194.50	136.00	136.00	0.00				
1,194.60	139.67	139.67	0.00				
1,194.70	143.17	143.17	0.00				
1,194.80	146.48	146.48	0.00				
1,194.90	149.56	149.56	0.00				
1,195.00	152.33	152.33	0.00				
1,195.10	154.71	154.71	0.00				
1,195.20	156.57	156.57	0.00				
1,195.30	157.61	157.61	0.00				
1,195.40	155.83	155.83	0.00				
1,195.50	161.13	161.13	0.00				
1,195.60	166.26	166.26	0.00				
1,195.70	171.23	171.23	0.00				

IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Stage-Area-Storage for Pond 3P: Nelson Ave Culvert

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
1,190.00	0.000	0.000	1,195.80	0.989	2.342
1,190.10	0.002	0.001	1,195.90	1.007	2.436
1,190.20	0.005	0.002	1,196.00	1.025	2.529
1,190.30	0.007	0.003	1,196.10	1.046	2.642
1,190.40	0.009	0.005	1,196.20	1.067	2.755
1,190.50	0.011	0.006	1,196.30	1.088	2.868
1,190.60	0.014	0.007	1,196.40	1.109	2.981
1,190.70	0.016	0.008	1,196.50	1.130	3.094
1,190.80	0.018	0.009	1,196.60	1.150	3.207
1,190.90	0.021	0.010	1,196.70	1.171	3.320
1,191.00	0.023	0.011	1,196.80	1.192	3.433
1,191.10	0.030	0.017	1,196.90	1.213	3.546
1,191.20	0.036	0.023	1,197.00	1.234	3.659
1,191.30	0.043	0.028	1,197.10	1.263	3.797
1,191.40	0.049	0.034	1,197.20	1.291	3.934
1,191.50	0.056	0.040	1,197.30	1.320	4.072
1,191.60	0.063	0.045	1,197.40	1.348	4.210
1,191.70	0.069	0.051	1,197.50	1.377	4.347
1,191.80	0.076	0.056	1,197.60	1.406	4.485
1,191.90	0.082	0.062	1,197.70	1.434	4.623
1,192.00	0.089	0.068	1,197.80	1.463	4.761
1,192.10	0.121	0.092	1,197.90	1.491	4.898
1,192.20	0.153	0.118	1,198.00	1.520	5.036
1,192.30	0.186	0.142	1,198.10	1.628	5.242
1,192.40	0.218	0.168	1,198.20	1.735	5.448
1,192.50	0.250	0.192	1,198.30	1.843	5.653
1,192.60	0.282	0.217	1,198.40	1.950	5.859
1,192.70	0.314	0.243	1,198.50	2.058	6.065
1,192.80	0.347	0.267	1,198.60	2.166	6.271
1,192.90	0.379	0.293	1,198.70	2.273	6.477
1,193.00	0.411	0.317	1,198.80	2.381	6.682
1,193.10	0.435	0.370	1,198.90	2.488	6.888
1,193.20	0.458	0.423	1,199.00	2.596	7.094
1,193.30	0.482	0.476	1,199.10	2.615	7.363
1,193.40	0.506	0.529	1,199.20	2.635	7.633
1,193.50	0.529	0.582	1,199.30	2.654	7.902
1,193.60	0.553	0.635	1,199.40	2.673	8.171
1,193.70	0.577	0.688	1,199.50	2.692	8.440
1,193.80	0.601	0.741	1,199.60	2.712	8.709
1,193.90	0.624	0.794	1,199.70	2.731	8.979
1,194.00	0.648	0.847	1,199.80	2.750	9.248
1,194.10	0.668	0.922	1,199.90	2.770	9.517
1,194.20	0.688	0.996	1,200.00	2.789	9.786
1,194.30	0.707	1.071			
1,194.40	0.727	1.146			
1,194.50	0.747	1.220			
1,194.60	0.767	1.295			
1,194.70	0.787	1.370			
1,194.80	0.806	1.445			
1,194.90	0.826	1.519			
1,195.00	0.846	1.594			
1,195.10	0.864	1.688			
1,195.20	0.882	1.781			
1,195.30	0.900	1.875			
1,195.40	0.918	1.968			
1,195.50	0.936	2.062			
1,195.60	0.953	2.155			
1,195.70	0.971	2.249			

IA-340-8 - Proposed Conditions

MSE 24-hr 3 100-Year Rainfall=7.61"

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Summary for Pond 4P: 200th Street Culvert

Inflow Area = 164.040 ac, 0.00% Impervious, Inflow Depth = 6.19" for 100-Year event
 Inflow = 619.23 cfs @ 12.70 hrs, Volume= 84.581 af
 Outflow = 222.99 cfs @ 13.49 hrs, Volume= 84.580 af, Atten= 64%, Lag= 47.3 min
 Primary = 92.07 cfs @ 13.49 hrs, Volume= 74.858 af
 Routed to Pond 2P : Proposed Outlet Devices
 Secondary = 130.91 cfs @ 13.49 hrs, Volume= 9.722 af

Routing by Stor-Ind method, Time Span= 0.00-480.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,204.43' @ 13.49 hrs Surf.Area= 780,448 sf Storage= 1,705,136 cf

Plug-Flow detention time= 150.0 min calculated for 84.571 af (100% of inflow)
 Center-of-Mass det. time= 149.9 min (966.1 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,198.00'	5,262,028 cf	Storage South of 200th Street Culvert (Prismatic) Listed below (Recalculated)

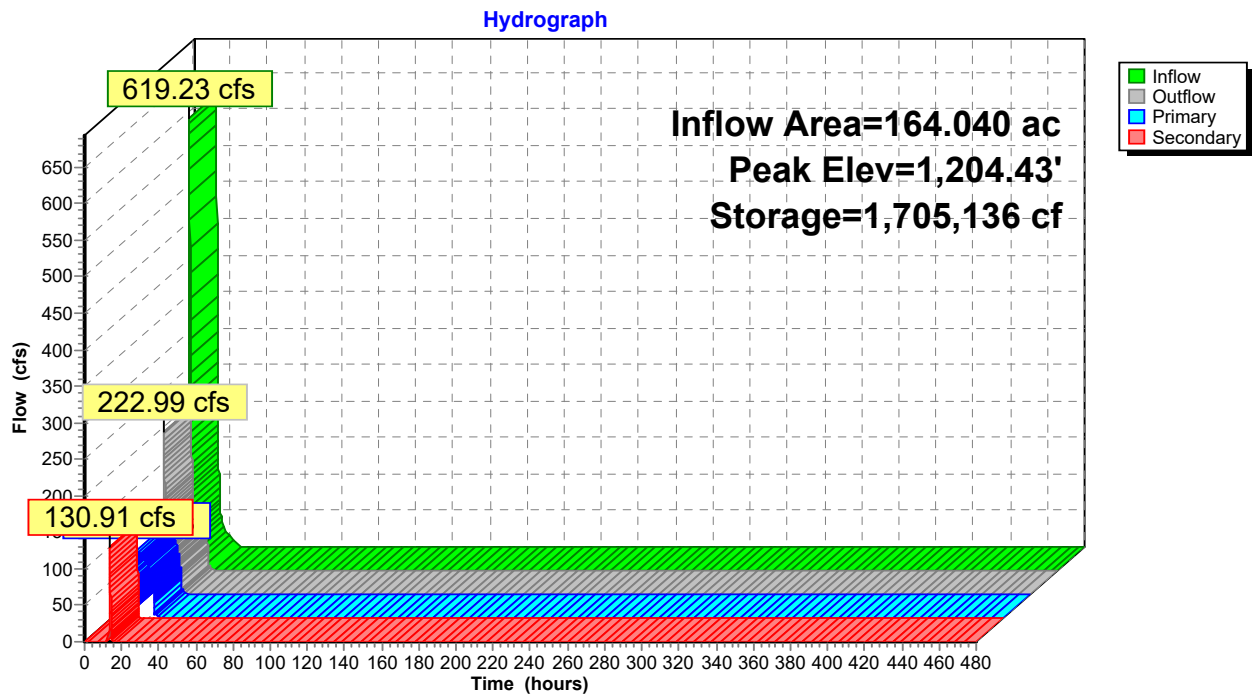
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,198.00	0	0	0
1,199.00	436	218	218
1,200.00	871	654	872
1,201.00	132,684	66,778	67,649
1,202.00	318,032	225,358	293,007
1,203.00	562,882	440,457	733,464
1,204.00	726,668	644,775	1,378,239
1,205.00	850,640	788,654	2,166,893
1,206.00	971,780	911,210	3,078,103
1,207.00	1,093,879	1,032,830	4,110,933
1,208.00	1,208,311	1,151,095	5,262,028

Device	Routing	Invert	Outlet Devices
#1	Primary	1,198.44'	48.0" W x 24.0" H Box 2'x4' Road Culvert L= 25.0' Box, 30-75° wingwalls, square crown, Ke= 0.400 Inlet / Outlet Invert= 1,198.44' / 1,198.44' S= 0.0000 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 8.00 sf
#2	Secondary	1,204.07'	200th St Top of Road, C= 3.27 Offset (feet) -234.90 169.69 318.45 441.99 Height (feet) 1.13 0.20 0.34 1.13

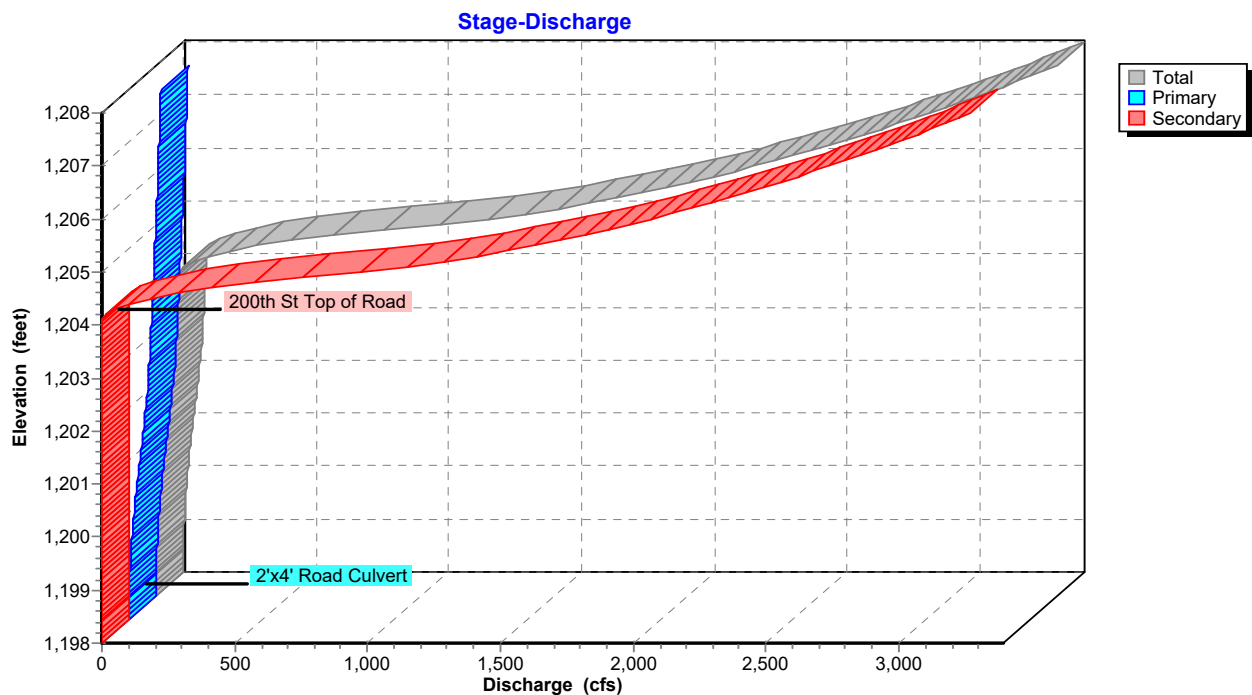
Primary OutFlow Max=92.07 cfs @ 13.49 hrs HW=1,204.43' (Free Discharge)
 ↑ **1=2'x4' Road Culvert** (Inlet Controls 92.07 cfs @ 11.51 fps)

Secondary OutFlow Max=128.07 cfs @ 13.49 hrs HW=1,204.43' (Free Discharge)
 ↑ **2=200th St Top of Road** (Weir Controls 128.07 cfs @ 1.07 fps)

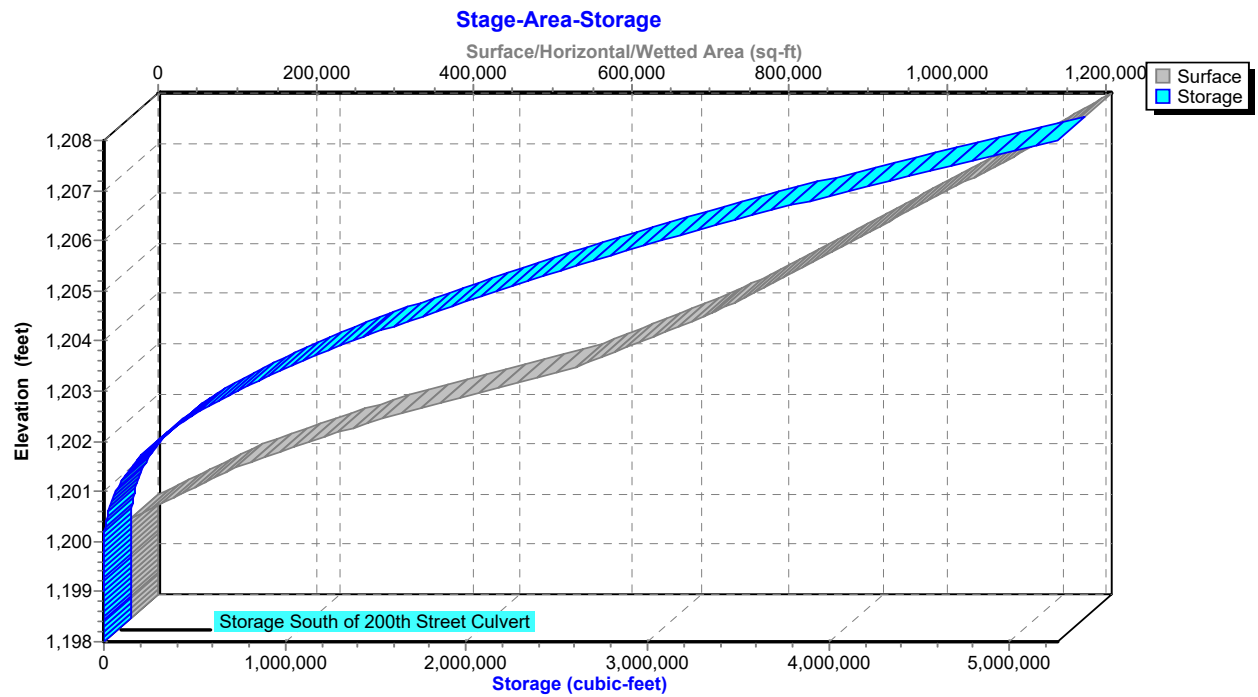
Pond 4P: 200th Street Culvert



Pond 4P: 200th Street Culvert



Pond 4P: 200th Street Culvert



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Hydrograph for Pond 4P: 200th Street Culvert

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	1,198.00	0.00	0.00	0.00
10.00	19.20	899	1,200.00	18.86	18.86	0.00
20.00	14.81	430,943	1,202.38	70.39	70.39	0.00
30.00	0.00	42	1,198.44	0.00	0.00	0.00
40.00	0.00	42	1,198.44	0.00	0.00	0.00
50.00	0.00	42	1,198.44	0.00	0.00	0.00
60.00	0.00	42	1,198.44	0.00	0.00	0.00
70.00	0.00	42	1,198.44	0.00	0.00	0.00
80.00	0.00	42	1,198.44	0.00	0.00	0.00
90.00	0.00	42	1,198.44	0.00	0.00	0.00
100.00	0.00	42	1,198.44	0.00	0.00	0.00
110.00	0.00	42	1,198.44	0.00	0.00	0.00
120.00	0.00	42	1,198.44	0.00	0.00	0.00
130.00	0.00	42	1,198.44	0.00	0.00	0.00
140.00	0.00	42	1,198.44	0.00	0.00	0.00
150.00	0.00	42	1,198.44	0.00	0.00	0.00
160.00	0.00	42	1,198.44	0.00	0.00	0.00
170.00	0.00	42	1,198.44	0.00	0.00	0.00
180.00	0.00	42	1,198.44	0.00	0.00	0.00
190.00	0.00	42	1,198.44	0.00	0.00	0.00
200.00	0.00	42	1,198.44	0.00	0.00	0.00
210.00	0.00	42	1,198.44	0.00	0.00	0.00
220.00	0.00	42	1,198.44	0.00	0.00	0.00
230.00	0.00	42	1,198.44	0.00	0.00	0.00
240.00	0.00	42	1,198.44	0.00	0.00	0.00
250.00	0.00	42	1,198.44	0.00	0.00	0.00
260.00	0.00	42	1,198.44	0.00	0.00	0.00
270.00	0.00	42	1,198.44	0.00	0.00	0.00
280.00	0.00	42	1,198.44	0.00	0.00	0.00
290.00	0.00	42	1,198.44	0.00	0.00	0.00
300.00	0.00	42	1,198.44	0.00	0.00	0.00
310.00	0.00	42	1,198.44	0.00	0.00	0.00
320.00	0.00	42	1,198.44	0.00	0.00	0.00
330.00	0.00	42	1,198.44	0.00	0.00	0.00
340.00	0.00	42	1,198.44	0.00	0.00	0.00
350.00	0.00	42	1,198.44	0.00	0.00	0.00
360.00	0.00	42	1,198.44	0.00	0.00	0.00
370.00	0.00	42	1,198.44	0.00	0.00	0.00
380.00	0.00	42	1,198.44	0.00	0.00	0.00
390.00	0.00	42	1,198.44	0.00	0.00	0.00
400.00	0.00	42	1,198.44	0.00	0.00	0.00
410.00	0.00	42	1,198.44	0.00	0.00	0.00
420.00	0.00	42	1,198.44	0.00	0.00	0.00
430.00	0.00	42	1,198.44	0.00	0.00	0.00
440.00	0.00	42	1,198.44	0.00	0.00	0.00
450.00	0.00	42	1,198.44	0.00	0.00	0.00
460.00	0.00	42	1,198.44	0.00	0.00	0.00
470.00	0.00	42	1,198.44	0.00	0.00	0.00
480.00	0.00	42	1,198.44	0.00	0.00	0.00

IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Stage-Discharge for Pond 4P: 200th Street Culvert

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,198.00	0.00	0.00	0.00	1,203.80	85.99	85.99	0.00
1,198.10	0.00	0.00	0.00	1,203.90	86.98	86.98	0.00
1,198.20	0.00	0.00	0.00	1,204.00	87.95	87.95	0.00
1,198.30	0.00	0.00	0.00	1,204.10	89.23	88.92	0.31
1,198.40	0.00	0.00	0.00	1,204.20	101.81	89.88	11.94
1,198.50	0.06	0.06	0.00	1,204.30	137.64	90.82	46.82
1,198.60	0.42	0.42	0.00	1,204.40	195.65	91.76	103.89
1,198.70	1.02	1.02	0.00	1,204.50	276.51	92.69	183.83
1,198.80	1.79	1.79	0.00	1,204.60	381.60	93.60	288.00
1,198.90	2.70	2.70	0.00	1,204.70	512.40	94.51	417.89
1,199.00	3.73	3.73	0.00	1,204.80	670.38	95.41	574.97
1,199.10	4.86	4.86	0.00	1,204.90	856.97	96.30	760.67
1,199.20	6.10	6.10	0.00	1,205.00	1,073.55	97.18	976.36
1,199.30	7.42	7.42	0.00	1,205.10	1,249.00	98.06	1,150.94
1,199.40	8.83	8.83	0.00	1,205.20	1,390.14	98.93	1,291.21
1,199.50	10.31	10.31	0.00	1,205.30	1,514.47	99.79	1,414.68
1,199.60	11.87	11.87	0.00	1,205.40	1,627.47	100.64	1,526.84
1,199.70	13.50	13.50	0.00	1,205.50	1,732.02	101.48	1,630.54
1,199.80	15.20	15.20	0.00	1,205.60	1,829.89	102.32	1,727.57
1,199.90	16.96	16.96	0.00	1,205.70	1,922.28	103.15	1,819.13
1,200.00	18.79	18.79	0.00	1,205.80	2,010.06	103.97	1,906.08
1,200.10	20.68	20.68	0.00	1,205.90	2,093.88	104.79	1,989.09
1,200.20	22.63	22.63	0.00	1,206.00	2,174.26	105.60	2,068.66
1,200.30	24.63	24.63	0.00	1,206.10	2,251.61	106.41	2,145.20
1,200.40	26.69	26.69	0.00	1,206.20	2,326.24	107.21	2,219.03
1,200.50	28.81	28.81	0.00	1,206.30	2,398.43	108.00	2,290.43
1,200.60	30.97	30.97	0.00	1,206.40	2,468.42	108.79	2,359.64
1,200.70	33.19	33.19	0.00	1,206.50	2,536.40	109.57	2,426.83
1,200.80	35.46	35.46	0.00	1,206.60	2,602.53	110.34	2,492.19
1,200.90	37.78	37.78	0.00	1,206.70	2,666.97	111.11	2,555.85
1,201.00	40.15	40.15	0.00	1,206.80	2,729.83	111.88	2,617.95
1,201.10	42.56	42.56	0.00	1,206.90	2,791.23	112.64	2,678.59
1,201.20	44.51	44.51	0.00	1,207.00	2,851.27	113.39	2,737.87
1,201.30	47.35	47.35	0.00	1,207.10	2,910.03	114.14	2,795.89
1,201.40	50.03	50.03	0.00	1,207.20	2,967.60	114.89	2,852.72
1,201.50	52.57	52.57	0.00	1,207.30	3,024.05	115.63	2,908.42
1,201.60	54.99	54.99	0.00	1,207.40	3,079.44	116.36	2,963.07
1,201.70	57.31	57.31	0.00	1,207.50	3,133.82	117.09	3,016.73
1,201.80	59.55	59.55	0.00	1,207.60	3,187.26	117.82	3,069.44
1,201.90	61.70	61.70	0.00	1,207.70	3,239.80	118.54	3,121.26
1,202.00	63.77	63.77	0.00	1,207.80	3,291.48	119.26	3,172.22
1,202.10	65.79	65.79	0.00	1,207.90	3,342.35	119.97	3,222.37
1,202.20	67.74	67.74	0.00	1,208.00	3,392.44	120.68	3,271.76
1,202.30	69.43	69.43	0.00				
1,202.40	70.66	70.66	0.00				
1,202.50	71.87	71.87	0.00				
1,202.60	73.05	73.05	0.00				
1,202.70	74.22	74.22	0.00				
1,202.80	75.37	75.37	0.00				
1,202.90	76.50	76.50	0.00				
1,203.00	77.61	77.61	0.00				
1,203.10	78.71	78.71	0.00				
1,203.20	79.79	79.79	0.00				
1,203.30	80.86	80.86	0.00				
1,203.40	81.91	81.91	0.00				
1,203.50	82.95	82.95	0.00				
1,203.60	83.97	83.97	0.00				
1,203.70	84.99	84.99	0.00				

IA-340-8 - Proposed Conditions*MSE 24-hr 3 100-Year Rainfall=7.61"*

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Stage-Area-Storage for Pond 4P: 200th Street Culvert

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,198.00	0	0	1,203.80	693,911	1,236,181
1,198.10	44	2	1,203.90	710,289	1,306,391
1,198.20	87	9	1,204.00	726,668	1,378,239
1,198.30	131	20	1,204.10	739,065	1,451,526
1,198.40	174	35	1,204.20	751,462	1,526,052
1,198.50	218	55	1,204.30	763,860	1,601,818
1,198.60	262	78	1,204.40	776,257	1,678,824
1,198.70	305	107	1,204.50	788,654	1,757,070
1,198.80	349	140	1,204.60	801,051	1,836,555
1,198.90	392	177	1,204.70	813,448	1,917,280
1,199.00	436	218	1,204.80	825,846	1,999,244
1,199.10	479	264	1,204.90	838,243	2,082,449
1,199.20	523	314	1,205.00	850,640	2,166,893
1,199.30	566	368	1,205.10	862,754	2,252,563
1,199.40	610	427	1,205.20	874,868	2,339,444
1,199.50	654	490	1,205.30	886,982	2,427,536
1,199.60	697	558	1,205.40	899,096	2,516,840
1,199.70	741	630	1,205.50	911,210	2,607,356
1,199.80	784	706	1,205.60	923,324	2,699,082
1,199.90	828	787	1,205.70	935,438	2,792,020
1,200.00	871	872	1,205.80	947,552	2,886,170
1,200.10	14,052	1,618	1,205.90	959,666	2,981,531
1,200.20	27,234	3,682	1,206.00	971,780	3,078,103
1,200.30	40,415	7,064	1,206.10	983,990	3,175,891
1,200.40	53,596	11,765	1,206.20	996,200	3,274,901
1,200.50	66,778	17,784	1,206.30	1,008,410	3,375,131
1,200.60	79,959	25,120	1,206.40	1,020,620	3,476,583
1,200.70	93,140	33,775	1,206.50	1,032,830	3,579,255
1,200.80	106,321	43,748	1,206.60	1,045,039	3,683,149
1,200.90	119,503	55,040	1,206.70	1,057,249	3,788,263
1,201.00	132,684	67,649	1,206.80	1,069,459	3,894,599
1,201.10	151,219	81,844	1,206.90	1,081,669	4,002,155
1,201.20	169,754	97,893	1,207.00	1,093,879	4,110,933
1,201.30	188,288	115,795	1,207.10	1,105,322	4,220,893
1,201.40	206,823	135,550	1,207.20	1,116,765	4,331,997
1,201.50	225,358	157,160	1,207.30	1,128,209	4,444,246
1,201.60	243,893	180,622	1,207.40	1,139,652	4,557,639
1,201.70	262,428	205,938	1,207.50	1,151,095	4,672,176
1,201.80	280,962	233,108	1,207.60	1,162,538	4,787,858
1,201.90	299,497	262,131	1,207.70	1,173,981	4,904,684
1,202.00	318,032	293,007	1,207.80	1,185,425	5,022,654
1,202.10	342,517	326,034	1,207.90	1,196,868	5,141,769
1,202.20	367,002	361,510	1,208.00	1,208,311	5,262,028
1,202.30	391,487	399,435			
1,202.40	415,972	439,808			
1,202.50	440,457	482,629			
1,202.60	464,942	527,899			
1,202.70	489,427	575,618			
1,202.80	513,912	625,785			
1,202.90	538,397	678,400			
1,203.00	562,882	733,464			
1,203.10	579,261	790,571			
1,203.20	595,639	849,316			
1,203.30	612,018	909,699			
1,203.40	628,396	971,720			
1,203.50	644,775	1,035,378			
1,203.60	661,154	1,100,675			
1,203.70	677,532	1,167,609			

IA-340-8 - Proposed Conditions*Multi-Event Tables*

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Events for Subcatchment 1S: North-East Drainage Area

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.52	824.59	122.391	3.22
25-Year	5.62	1,084.28	162.199	4.26
100-Year	7.61	1,551.78	235.542	6.19

IA-340-8 - Proposed Conditions*Multi-Event Tables*

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Events for Subcatchment 3S: Direct Rainfall in Wetland

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.52	35.67	1.685	4.28
25-Year	5.62	44.44	2.117	5.38
100-Year	7.61	60.29	2.899	7.37

IA-340-8 - Proposed Conditions

Multi-Event Tables

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Events for Subcatchment 4S: South Drainage Area

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.52	329.11	43.950	3.22
25-Year	5.62	432.57	58.244	4.26
100-Year	7.61	619.23	84.581	6.19

IA-340-8 - Proposed Conditions*Multi-Event Tables*

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Events for Pond 2P: Proposed Outlet Devices

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	899.34	809.43	809.43	0.00	1,196.57	24.060
25-Year	1,164.43	1,052.24	1,052.24	0.00	1,197.02	28.630
100-Year	1,641.34	1,505.66	1,391.12	114.54	1,197.58	36.654

IA-340-8 - Proposed Conditions*Multi-Event Tables*

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Events for Pond 3P: Nelson Ave Culvert

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	809.43	808.47	295.30	513.17	1,199.15	7.493
25-Year	1,052.24	1,051.65	299.95	751.70	1,199.32	7.947
100-Year	1,391.12	1,390.41	304.03	1,086.37	1,199.51	8.476

IA-340-8 - Proposed Conditions*Multi-Event Tables*

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Events for Pond 4P: 200th Street Culvert

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	329.11	79.58	79.58	0.00	1,203.18	837,620
25-Year	432.57	85.77	85.77	0.00	1,203.78	1,221,379
100-Year	619.23	222.99	92.07	130.91	1,204.43	1,705,136

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Multi-Event Tables

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GREAT LAKES/ATLANTIC REGION
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Appendix A-3
StreamStats Report

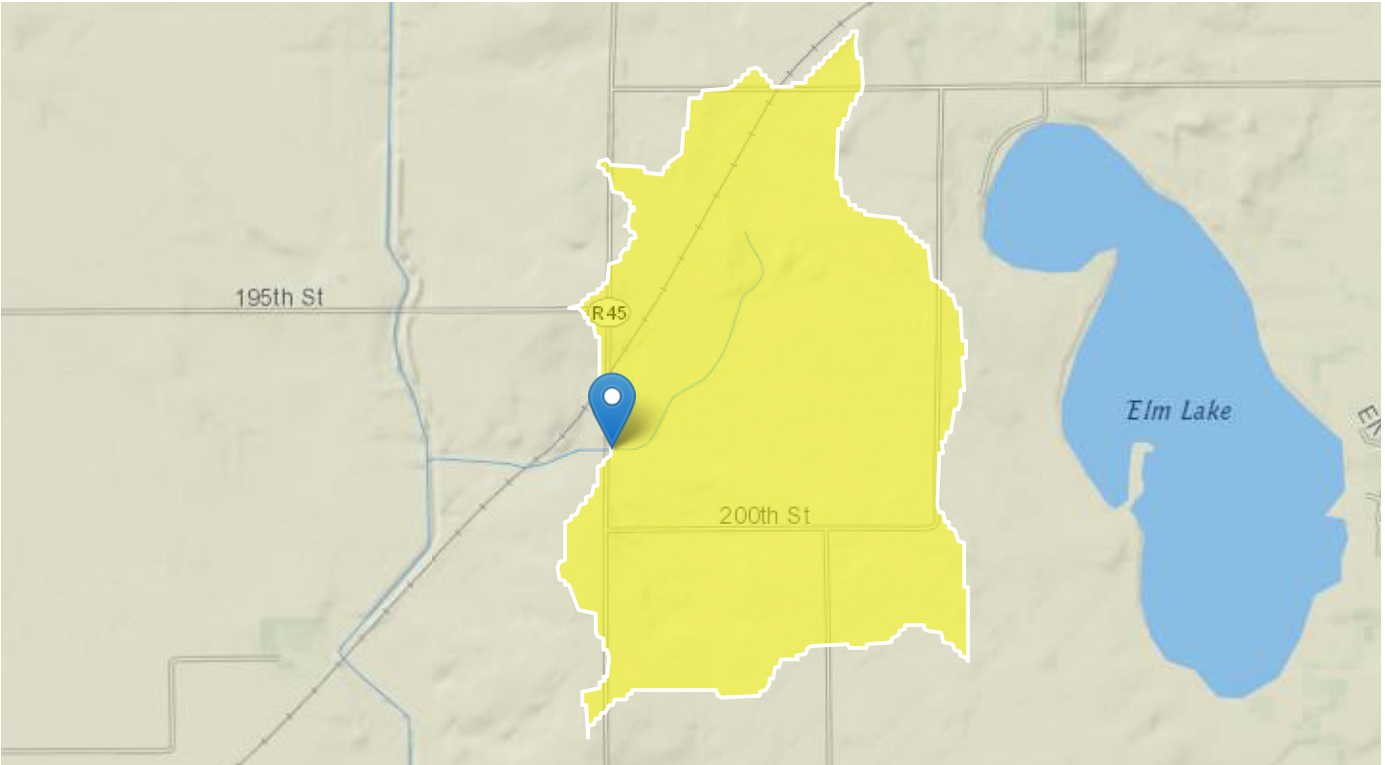
IA-340-8 - StreamStats Report - Complete Watershed

Region ID: IA

Workspace ID: IA20230824144517712000

Clicked Point (Latitude, Longitude): 42.76333, -93.70529

Time: 2023-08-24 09:45:41 -0500



+ Collapse All

> Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BFI	Proportion of mean annual flow that is from ground water (base flow)	0.57024	dimensionless
BSLDEM10M	Mean basin slope computed from 10 m DEM	1.63	percent
CCM	Constant of channel maintenance computed as drainage area divided by total stream length	0.86	square mile per mile
CSL100	Longest flow path slope in feet per miles, using DEM	27.8	feet per mi
DRNAREA	Area that drains to a point on a stream	0.98	square miles

Parameter Code	Parameter Description	Value	Unit
HYSEP	Median percentage of baseflow to annual streamflow	57.18	percent
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.32	inches
PRECIP	Mean Annual Precipitation	33.11	inches
RSD	Relative stream density first defined in SIR 2012_5171	1.52	dimensionless
SSURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SSURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	90.7	percent
SSURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	7.84	percent
SSURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	0	percent
STREAM_VARG	Streamflow variability index as defined in WRIR 02-4068, computed from regional grid	0.569	dimensionless
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	1.134	miles
TAU_ANN_G	Tau, Average annual base-flow recession time constant as defined in SIR 2008-5065	22.32	days

➤ Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Region 1 2013 5086]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.98	square miles	0.06	5464
I24H10Y	24 Hour 10 Year Precipitation	4.32	inches	3.58	4.5
CCM	Constant of Channel Maintenance	0.86	square mile per mile	0.11	3.87
STRMTOT	Stream Length Total	1.134	miles		

Peak-Flow Statistics Flow Report [Peak Region 1 2013 5086]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	Plu	ASEp
50-percent AEP flood	48.7	ft ³ /s	24.8	95.8	41.6
20-percent AEP flood	124	ft ³ /s	72.2	213	32.6
10-percent AEP flood	195	ft ³ /s	115	332	31.8
4-percent AEP flood	299	ft ³ /s	172	521	33.2
2-percent AEP flood	384	ft ³ /s	212	695	35.6
1-percent AEP flood	477	ft ³ /s	254	895	38
0.5-percent AEP flood	582	ft ³ /s	296	1140	41
0.2-percent AEP flood	704	ft ³ /s	337	1470	45.2

Peak-Flow Statistics Citations

Eash, D.A., Barnes, K.K., and Veilleux, A.G., 2013, Methods for estimating annual exceedance-probability discharges for streams in Iowa, based on data through water year 2010: U.S. Geological Survey Scientific Investigations Report 2013-5086, 63 p. with a (<http://pubs.usgs.gov/sir/2013/5086/>)

➤ Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Northwest annual 2012 5171]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.98	square miles	23.4	5464
BFI	Base Flow Index	0.57024	dimensionless	0.358	0.623
SSURGOA	SSURGO Percent Hydrologic Soil Type A	0	percent	0	7.87

Low-Flow Statistics Disclaimers [Low Flow Northwest annual 2012 5171]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [Low Flow Northwest annual 2012 5171]

Statistic	Value	Unit
1 Day 10 Year Low Flow	0.00063	ft^3/s
7 Day 10 Year Low Flow	0.0009	ft^3/s
30 Day 10 Year Low Flow	0.00368	ft^3/s
30 Day 5 Year Low Flow	0.0135	ft^3/s

Low-Flow Statistics Citations

Eash, D.A., and Barnes, K.K.,2012, Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa: U.S. Geological Survey Scientific Investigations Report 2012-5171, 99 p. (<http://pubs.usgs.gov/sir/2012/5171/>)

➤ Flow-Duration Statistics

Flow-Duration Statistics Parameters [Statewide Flow Duration 2012 5232]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.98	square miles	15.5	7782
SSURGOC	SSURGO Percent Hydrologic Soil Type C	7.84	percent	0.09	83.5
PRECIP	Mean Annual Precipitation	33.11	inches	27.7	38
RSD	Relative Stream Density	1.52	dimensionless	0.22	0.49
HYSEP	Hydrograph separation percent	57.18	percent	20.3	78
STREAM_VARG	Streamflow Variability Index from Grid	0.569	dimensionless	0.21	0.76
SSURGOB	SSURGO Percent Hydrologic Soil Type B	90.7	percent	5.7	99.4
SSURGOD	SSURGO Percent Hydrologic Soil Type D	0	percent	0	57

Flow-Duration Statistics Disclaimers [Statewide Flow Duration 2012 5232]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Flow-Duration Statistics Flow Report [Statewide Flow Duration 2012 5232]

Statistic	Value	Unit
1 Percent Duration	6.14	ft ³ /s
5 Percent Duration	23.8	ft ³ /s
10 Percent Duration	22	ft ³ /s
15 Percent Duration	0.528	ft ³ /s
20 Percent Duration	0.445	ft ³ /s
30 Percent Duration	0.354	ft ³ /s
40 Percent Duration	0.27	ft ³ /s
50 Percent Duration	0.219	ft ³ /s
60 Percent Duration	0.164	ft ³ /s
70 Percent Duration	0.102	ft ³ /s
80 Percent Duration	0.0305	ft ³ /s
85 Percent Duration	0.0199	ft ³ /s
90 Percent Duration	0.0128	ft ³ /s
95 Percent Duration	0.00485	ft ³ /s
99 Percent Duration	0.00153	ft ³ /s

Flow-Duration Statistics Citations

Linhart, S.M., Nania, J.F., Sanders, C.L., Jr., and Archfield, S.A., 2012, Computing daily mean streamflow at ungaged locations in Iowa by using the Flow Anywhere and Flow Duration Curve Transfer statistical methods: U.S. Geological Survey Scientific Investigations Report 2012–5232, 50 p. (<http://pubs.usgs.gov/sir/2012/5232/>)

➤ Seasonal Flow Statistics

Seasonal Flow Statistics Parameters [Low Flow Northwest Apr Jun 2016 5111]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.98	square miles	7.42	5460
SSURGOA	SSURGO Percent Hydrologic Soil Type A	0	percent	0.014	7.89
SSURGOD	SSURGO Percent Hydrologic Soil Type D	0	percent	0	11.4

Seasonal Flow Statistics Parameters [Low Flow Northwest Oct Dec 2016 5111]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.98	square miles	7.42	5460
SSURGOA	SSURGO Percent Hydrologic Soil Type A	0	percent	0.014	7.89
SSURGOD	SSURGO Percent Hydrologic Soil Type D	0	percent	0	11.4

Seasonal Flow Statistics Disclaimers [Low Flow Northwest Apr Jun 2016 5111]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Seasonal Flow Statistics Flow Report [Low Flow Northwest Apr Jun 2016 5111]

Statistic	Value	Unit
Apr to Jun 1 Day 10 Year Low Flow	0.000762	ft ³ /s
Apr to Jun 7 Day 10 Year Low Flow	0.0011	ft ³ /s
Apr to Jun 30 Day 10 Year Low Flow	0.00344	ft ³ /s

Seasonal Flow Statistics Disclaimers [Low Flow Northwest Oct Dec 2016 5111]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Seasonal Flow Statistics Flow Report [Low Flow Northwest Oct Dec 2016 5111]

Statistic	Value	Unit
1 Day 10 Year lowflow Oct to Dec	0.0000138	ft ³ /s
7 Day 10 Year lowflow Oct to Dec	0.0000236	ft ³ /s
Oct_to_Dec_30_Day_10_Year_Low_Flow	0.000101	ft ³ /s

Seasonal Flow Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Apr to Jun 1 Day 10 Year Low Flow	0.000762	ft ³ /s
Apr to Jun 7 Day 10 Year Low Flow	0.0011	ft ³ /s

Statistic	Value	Unit
Apr to Jun 30 Day 10 Year Low Flow	0.00344	ft ³ /s
1 Day 10 Year lowflow Oct to Dec	0.0000138	ft ³ /s
7 Day 10 Year lowflow Oct to Dec	0.0000236	ft ³ /s
Oct_to_Dec_30_Day_10_Year_Low_Flow	0.000101	ft ³ /s

Seasonal Flow Statistics Citations

Eash, D.A., Barnes, K.K., and O'Shea, P.S., 2016, Methods for estimating selected spring and fall low-flow frequency statistics for ungaged stream sites in Iowa, based on data through June 2014: U.S. Geological Survey Scientific Investigations Report 2016–5111, 32 p. (<http://dx.doi.org/10.3133/sir20165111>)

➤ General Flow Statistics

General Flow Statistics Parameters [Low Flow Northwest annual 2012 5171]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.98	square miles	23.4	5464
TAU_ANN_G	Tau Annual from Grid	22.32	days	21.2	35.8
RSD	Relative Stream Density	1.52	dimensionless	0.189	0.511

General Flow Statistics Disclaimers [Low Flow Northwest annual 2012 5171]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

General Flow Statistics Flow Report [Low Flow Northwest annual 2012 5171]

Statistic	Value	Unit
Harmonic Mean Streamflow	5.6	ft ³ /s

General Flow Statistics Citations

Eash, D.A., and Barnes, K.K., 2012, Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa: U.S. Geological Survey Scientific Investigations Report 2012-5171, 99 p. (<http://pubs.usgs.gov/sir/2012/5171/>)

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or

implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

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Application Version: 4.16.1

StreamStats Services Version: 1.2.22

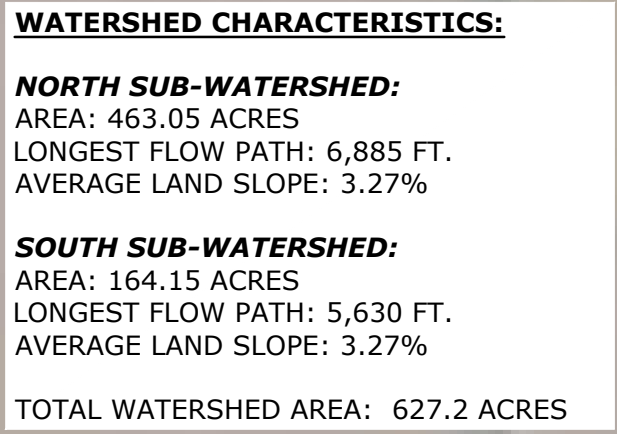
NSS Services Version: 2.2.1



GREAT LAKES/ATLANTIC REGION
7322 Newman Blvd., Bldg. 2
Dexter, MI 48130
(734) 623-2000
www.ducks.org

Appendix A-4
Watershed Characteristics

Iowa - Iowa\02_C3D Projects\IA-340-2 CREP Projects\WRIGHT PETERSON\C3D_DRAWING\LIDAR.dwg, 2/15/2024 2:16 PM, Andrew Schippers, Topo, None



NOT FOR CONSTRUCTION

CURVE NUMBER DESCRIPTION:				
IA-340-8 - Peterson				
CN (STRAIGHT ROW, GOOD CONDITION)	67	78	85	89
HYDRAULIC SOIL GROUP	A	B	C	D
			185.6	0.5
			26.9	9.8
				4.7
				147.4
				200.9
				49.9
TOTALS	0	0	212.5	413.2
TOTAL ACRES	625.7			
PERCENT	0.00%	0.00%	33.96%	66.04%
WEIGHTS	0.00	0.00	28.87	58.77
ADJUSTED CURVE NUMBER	87.64			



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Appendix A-5
Sheet Pile Design

* INPUT DATA *

I.--HEADING
'IA-340-8 - SHEET PILE DESIGN

II.--CONTROL
CANTILEVER WALL DESIGN

FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.50

FS, PASSIVE = 1.5 FOR EMBEDMENT CALCS.
(EM 1110-2-2504, 5-5)

III.--WALL DATA
ELEVATION AT TOP OF WALL = 1194.10 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	1194.10
6.30	1194.10
17.50	1192.30
92.50	1193.00

IV.B.--LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	1191.10
6.50	1191.10
12.50	1193.10
15.50	1193.10
35.50	1191.10

∴ MIN. EMBEDMENT = 3.53'

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE

LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH- ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH- ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT. PASS.
140.00	140.00	10.00	0.00	0.00	0.00	1192.60	0.00	DEF DEF (RIPRAP)
124.00	123.30	20.00	500.00	14.00	350.00	1188.00	0.00	DEF DEF (COMPACTED FILL)
126.60	124.40	20.00	930.00	14.00	700.00	1183.30	0.00	DEF DEF (NATIVE SOIL)
126.10	126.10	20.00	2340.00	14.00	1000.00	1179.30	0.00	DEF DEF (NATIVE SOIL)
131.20	130.00	25.00	2030.00	14.00	960.00			DEF DEF (NATIVE SOIL)

V.B.--LEFTSIDE

LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH- ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH- ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT. PASS.
140.00	140.00	10.00	0.00	0.00	0.00	1189.60	0.00	DEF DEF (RIPRAP)
124.00	123.30	20.00	500.00	14.00	350.00	1188.00	0.00	DEF DEF (COMPACTED FILL)
126.60	124.40	20.00	930.00	14.00	700.00	1183.30	0.00	DEF DEF (NATIVE SOIL)
131.20	130.00	25.00	2030.00	14.00	960.00			DEF DEF (NATIVE SOIL)

(DATA USED FROM
SB #2 ⇒ CONTROLS)

VI.--WATER DATA

UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = 1194.10 (FT)
LEFTSIDE ELEVATION = 1191.10 (FT)
NO SEEPAGE

(DATA USED FROM
SB #2 ⇒ CONTROLS)

VII.--VERTICAL SURCHARGE LOADS
NONE

PROGRAM CHALSH-T-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 13-FEBRUARY-2024

TIME: 9:17:31

* SOIL PRESSURES FOR *
* CANTILEVER WALL DESIGN *

I.--HEADING

'IA-340-S - SHEET PILE DESIGN

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

ELEV. (FT)	NET WATER (PSF)	<---LEFTSIDE--->		<-----NET----->		<---RIGHTSIDE--->	
		PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
1194.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1193.1	62.4	0.0	0.0	117.0	160.3	54.6	98.1
1192.8+	83.2	0.0	0.0	83.2	844.9	0.0	761.7
1192.8-	83.2	0.0	0.0	83.2	622.7	0.0	542.3
1192.6	93.6	0.0	0.0	93.6	855.3	0.0	761.7
1192.1	124.8	0.0	0.0	124.8	1581.2	0.0	1434.4
1191.1	187.2	0.0	0.0	187.2	1837.7	0.0	1630.3
1190.1	187.2	98.1	54.6	89.1	1923.3	0.0	1730.7
1190.0	187.2	205.0	45.8	0.0	1938.0	0.0	1794.6
1189.8+	187.2	761.7	0.0	-463.9	2014.5	0.0	1837.3
1189.8-	187.2	540.5	0.0	-463.9	2014.5	0.0	1927.3
1189.6	187.2	761.7	0.0	-574.5	2032.8	0.0	1845.6
1189.1	187.2	1456.4	0.0	-1269.2	2083.1	0.0	1893.9
1188.1	187.2	1656.6	0.0	-1469.4	2177.4	0.0	1990.2
1188.0	187.2	1783.8	0.0	-1596.6	2299.8	0.0	2112.6
1187.1	187.2	2986.8	0.0	-2799.6	3407.4	0.0	3220.2
1186.1	187.2	3310.7	0.0	-3123.5	3506.0	0.0	3318.8
1185.1	187.2	3632.0	0.0	-3444.8	3497.5	0.0	3310.3
1184.1	187.2	3871.0	0.0	-3683.8	3520.0	0.0	3332.8
1183.3	187.2	9787.9	0.0	-9600.7	6337.8	0.0	6150.6
1183.1	187.2	10565.6	0.0	-10378.4	7031.9	0.0	6844.7
1182.1	187.2	7221.4	0.0	-7034.2	7120.5	0.0	6333.3
1181.1	187.2	7346.0	0.0	-7158.8	7251.7	0.0	7061.5
1180.1	187.2	7459.6	0.0	-7272.4	7388.2	0.0	7201.0
1179.3	187.2	7569.0	0.0	-7381.8	15570.2	0.0	15347.0
1179.1	187.2	7597.9	0.0	-7410.7	15941.3	0.0	15734.1
1178.1	187.2	7742.8	0.0	-7555.6	7719.4	0.0	7332.2
1177.1	187.2	7885.7	0.0	-7698.5	7883.8	0.0	7696.6
1176.1	187.2	8018.8	0.0	-7831.6	8046.6	0.0	7854.4
1175.1	187.2	8119.2	0.0	-7952.0	8203.9	0.0	8016.7
1174.1	187.2	8277.1	0.0	-8093.9	8362.4	0.0	8179.2
1173.1	187.2	8314.6	0.0	-8127.4	8518.3	0.0	8331.1
1172.1	187.2	8442.7	0.0	-8255.5	8673.8	0.0	8486.6
1171.1	187.2	8587.8	0.0	-8400.6	8829.1	0.0	8641.9
1170.1	187.2	8718.1	0.0	-8550.9	8985.0	0.0	8797.8
1169.1	187.2	8889.3	0.0	-8702.1	9141.5	0.0	8956.3
1168.1	187.2	9040.2	0.0	-8853.0	9294.0	0.0	9116.8
1167.1	187.2	9191.0	0.0	-9003.8	9444.7	0.0	9272.5
1166.1	187.2	9341.7	0.0	-9154.5	9625.3	0.0	9439.1
1165.1	187.2	9494.5	0.0	-9307.3	9787.7	0.0	9598.5
1164.1	187.2	9650.8	0.0	-9461.7	9946.1	0.0	9758.9
1163.1	187.2	9808.6	0.0	-9621.4	10106.3	0.0	9919.1
							10319.3
							10239.8

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 13-FEBRUARY-2024

TIME: 9:17:21

 * SUMMARY OF RESULTS FOR *
 * CANTILEVER WALL DESIGN *

I.--HEADING

'IA-340-8 - SHEET PILE DESIGN

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

WALL BOTTOM ELEV. (FT) : 1187.57
 PENETRATION (FT) : 3.53

3.53' + 3' (OUT)

MAX. BEND. MOMENT (LB-FT) : 1.0235E+03
 AT ELEVATION (FT) : 1189.23

= 6.53' MINIMUM SHEET LENGTH

MAX. SCALED DEFL. (LB-IN^3): 1.9337E+07
 AT ELEVATION (FT) : 1194.10

∴ USE NRCS STANDARD SHEET PILE DESIGN

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
 ELASTICITY IN PSI TIMES PILE MOMENT
 OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
 IN INCHES.

*SHEET FULL LENGTH SHEETS = 10.0'*PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 13-FEBRUARY-2024

TIME: 9:17:21

 * COMPLETE OF RESULTS FOR *
 * CANTILEVER WALL DESIGN *

I.--HEADING

'IA-340-8 - SHEET PILE DESIGN

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
1194.10	0.0000E+00	0.	1.9337E+07	0.00
1193.10	1.9504E+01	59.	1.4895E+07	117.03
1192.77	4.4883E+01	92.	1.3419E+07	83.20
1192.60	6.1401E+01	107.	1.2684E+07	93.60
1192.10	1.2771E+02	161.	1.0501E+07	124.80
1191.10	3.6173E+02	317.	6.3451E+06	187.20
1190.10	7.5619E+02	455.	2.8394E+06	89.08
1190.05	7.8073E+02	458.	2.6815E+06	0.00
1189.77	9.0268E+02	393.	1.9249E+06	-463.91
1189.60	9.6121E+02	306.	1.5309E+06	-574.51
1189.10	1.0136E+03	-155.	6.3227E+05	-1269.23
				-1363.17
				739.76

1188.00	2.0540E+02	-844.	5.9127E+03	1135.95
1187.57	0.0000E+00	0.	0.0000E+00	2824.28

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN⁴ TO OBTAIN DEFLECTION
IN INCHES.

III.--WATER AND SOIL PRESSURES

ELEVATION (FT)	WATER PRESSURE (PSF)	<-----SOIL PRESSURES----->			
		<----LEFTSIDE----->		<---RIGHTSIDE----->	
		PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
1194.10	0.	0.	0.	0.	0.
1193.10	62.	0.	0.	55.	98.
1192.77+	83.	0.	0.	0.	762.
1192.77-	83.	0.	0.	0.	541.
1192.60	94.	0.	0.	0.	762.
1192.10	125.	0.	0.	0.	1456.
1191.10	187.	0.	0.	0.	1650.
1190.10	187.	98.	55.	0.	1791.
1190.05	187.	205.	46.	0.	1797.
1189.77+	187.	762.	0.	0.	1827.
1189.77-	187.	541.	0.	0.	1827.
1189.60	187.	762.	0.	0.	1846.
1189.10	187.	1456.	0.	0.	1896.
1188.63	187.	1550.	0.	0.	1940.
1188.10	187.	1657.	0.	0.	1990.
1188.00	187.	1784.	0.	0.	2113.
1187.57	187.	2987.	0.	0.	3220.
1186.10	187.	3311.	0.	0.	3319.

DATE: 13-FEBRUARY-2024

TIME: 9:38:57

* INPUT DATA *

I.--HEADING
'IA-340-8 - SHEET PILE DESIGN

II.--CONTROL
CANTILEVER WALL DESIGN

FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.00

*FS, PASSIVE = 1 FOR MAX. MOMENT
& SHEAR VALUES FOR STRUCTURAL DESIGN
(EM-1110-2-2504, 6-1)*

III.--WALL DATA
ELEVATION AT TOP OF WALL = 1194.10 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE
DIST. FROM WALL (FT) ELEVATION (FT)
0.00 1194.10
6.30 1194.10
17.50 1192.30
92.50 1193.00

*∴ MAX. BENDING MOMENT
= 739.09 ft.-lbs.*

IV.B.--LEFTSIDE
DIST. FROM WALL (FT) ELEVATION (FT)
0.00 1191.70
6.50 1191.70
12.50 1193.10
15.50 1193.10
35.10 1191.10

*∴ MAX. SHEAR
= 885 lbs.*

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE

LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> ACT. PASS.
140.00	140.00	10.00	0.00	0.00	0.00	1192.60	0.00	DEF DEF
124.00	123.30	20.00	500.00	14.00	350.00	1188.00	0.00	DEF DEF
126.00	124.40	20.00	930.00	14.00	700.00	1183.30	0.00	DEF DEF
126.10	126.10	20.00	2340.00	14.00	1000.00	1179.30	0.00	DEF DEF
131.20	130.00	25.00	2030.00	14.00	960.00			DEF DEF

V.B.--LEFTSIDE

LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> ACT. PASS.
140.00	140.00	10.00	0.00	0.00	0.00	1189.60	0.00	DEF DEF
124.00	123.30	20.00	500.00	14.00	350.00	1188.00	0.00	DEF DEF
126.60	124.40	20.00	930.00	14.00	700.00	1183.30	0.00	DEF DEF
131.20	130.00	25.00	2030.00	14.00	960.00			DEF DEF

VI.--WATER DATA

UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = 1194.10 (FT) *(NWL)*
LEFTSIDE ELEVATION = 1191.10 (FT) *(WORST CASE)*
NO SEEPAGE

VII.--VERTICAL SURCHARGE LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 13-FEBRUARY-2024

TIME: 9:39:00

* SOIL PRESSURES FOR *
* CANTILEVER WALL DESIGN *

I.--HEADING

'IA-340-8 - SHEET PILE DESIGN

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

ELEV. (FT)	<-----NET----->						
	NET WATER (PSF)	<---LEFTSIDE--->		(SOIL + WATER)		<--RIGHTSIDE-->	
		PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
1194.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1193.1	62.4	0.0	0.0	117.0	172.6	54.6	110.2
1192.8+	83.2	0.0	0.0	83.2	1323.4	0.0	1240.2
1192.8-	83.2	0.0	0.0	83.2	946.8	0.0	863.6
1192.6	93.6	0.0	0.0	93.6	1333.8	0.0	1240.2
1192.1	124.8	0.0	0.0	124.8	2610.5	0.0	2485.7
1191.7	149.8	0.0	0.0	149.8	2826.0	0.0	2676.2
1191.1	187.2	108.7	53.9	78.5	3018.6	0.0	2885.2
1190.7	187.2	163.4	81.0	23.8	3103.0	0.0	2996.8
1190.5	187.2	187.2	92.8	0.0	3139.5	0.0	3045.0
1190.1	187.2	229.6	113.8	-42.4	3204.3	0.0	3130.9
1189.8+	187.2	1388.5	0.0	-924.3	3361.8	0.0	3174.6
1189.8-	187.2	834.5	0.0	-924.3	3361.8	0.0	3174.6
1189.6	187.2	1388.5	0.0	-1201.3	3401.8	0.0	3214.6
1189.1	187.2	2633.7	0.0	-2446.5	3470.8	0.0	3283.6
1188.1	187.2	3056.4	0.0	-2869.2	3613.3	0.0	3426.1
1188.0	187.2	3298.0	0.0	-3110.8	3838.3	0.0	3651.1
1187.1	187.2	5553.2	0.0	-5366.0	5877.4	0.0	5690.2
1186.1	187.2	6041.0	0.0	-5853.8	5820.5	0.0	5633.3
1185.1	187.2	6364.4	0.0	-6177.2	5895.9	0.0	5708.7
1184.1	187.2	6609.7	0.0	-6422.5	6310.9	0.0	6123.7
1183.3	187.2	22040.1	0.0	-21852.9	11368.5	0.0	11181.3
1183.1	187.2	23762.4	0.0	-23575.2	12617.5	0.0	12430.3
1182.1	187.2	13362.6	0.0	-13175.4	12854.8	0.0	12667.6
1181.1	187.2	13630.9	0.0	-13443.7	13082.8	0.0	12895.6
1180.1	187.2	13850.9	0.0	-13663.7	13302.4	0.0	13115.2
1179.3	187.2	14039.6	0.0	-13852.4	44870.4	0.0	44683.2
1179.1	187.2	14091.5	0.0	-13904.3	46352.4	0.0	46165.2
1178.1	187.2	14334.8	0.0	-14147.6	14548.7	0.0	14361.5
1177.1	187.2	14547.9	0.0	-14360.7	14821.4	0.0	14634.2
1176.1	187.2	14748.7	0.0	-14561.5	15083.5	0.0	14896.3
1175.1	187.2	14966.2	0.0	-14779.0	15335.8	0.0	15148.6
1174.1	187.2	15203.4	0.0	-15016.2	15585.1	0.0	15397.9
1173.1	187.2	15449.5	0.0	-15262.3	15832.8	0.0	15645.6
1172.1	187.2	15694.3	0.0	-15507.1	16082.7	0.0	15895.5
1171.1	187.2	15936.9	0.0	-15749.7	16339.6	0.0	16152.4
1170.1	187.2	16177.9	0.0	-15990.7	16600.6	0.0	16413.4
1169.1	187.2	16417.8	0.0	-16230.6	16861.0	0.0	16673.8
1168.1	187.2	16663.7	0.0	-16476.5	17120.6	0.0	16933.4
1167.1	187.2	16917.5	0.0	-16730.3	17379.7	0.0	17192.5
1166.1	187.2	17172.9	0.0	-16985.7	17638.2	0.0	17451.0
1165.1	187.2	17427.6	0.0	-17240.4	17896.2	0.0	17709.0

1162.1	187.2	18188.4	0.0	-18001.2	18668.2	0.0	18481.0
1161.1	187.2	18441.2	0.0	-18254.0	18924.9	0.0	18737.7

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 13-FEBRUARY-2024

TIME: 9:39:00

* SUMMARY OF RESULTS FOR *
* CANTILEVER WALL DESIGN *

I.--HEADING

'IA-340-8 - SHEET PILE DESIGN

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

~~WALL BOTTOM ELEV. (FT) : 1188.40~~
~~PENETRATION (FT) : 3.30~~

MAX. BEND. MOMENT (LB-FT) : 7.3909E+02
AT ELEVATION (FT) : 1189.67

739.09 ft-lbs.

MAX. SCALED DEFL. (LB-IN^3): 1.0861E+07
AT ELEVATION (FT) : 1194.10

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELLASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 13-FEBRUARY-2024

TIME: 9:39:00

* COMPLETE OF RESULTS FOR *
* CANTILEVER WALL DESIGN *

I.--HEADING

'IA-340-8 - SHEET PILE DESIGN

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
1194.10	0.0000E+00	0.	1.0861E+07	0.00
1193.10	1.9504E+01	59.	8.0489E+06	117.03
1192.77	4.4883E+01	92.	7.1164E+06	83.20
1192.60	6.1401E+01	107.	6.6531E+06	93.60
1192.10	1.2771E+02	161.	5.2846E+06	124.80
1191.70	2.0285E+02	216.	4.2286E+06	149.76
1191.10	3.5520E+02	285.	2.7589E+06	78.51
1190.70	4.7387E+02	305.	1.8960E+06	23.78
1190.48	5.4003E+02	308.	1.4829E+06	0.00
1190.10	6.5722E+02	299.	8.5796E+05	-42.37
				-924.30
				-1201.31

1189.25	6.1937E+02	-645.	9.4093E+04	-2062.71
1189.10	4.9947E+02	-885.	4.6008E+04	-1048.14
1188.40	0.0000E+00	0.	0.0000E+00	3570.76

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN⁴ TO OBTAIN DEFLECTION
IN INCHES.

MAX. SHEAR, $V_{max} = 885 \text{ lbs.}$

III.--WATER AND SOIL PRESSURES

ELEVATION (FT)	WATER PRESSURE (PSF)	<-----SOIL PRESSURES----->			
		<----LEFTSIDE----->		<---RIGHTSIDE----->	
		PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
1194.10	0.	0.	0.	0.	0.
1193.10	62.	0.	0.	55.	110.
1192.77+	83.	0.	0.	0.	1240.
1192.77-	83.	0.	0.	0.	864.
1192.60	94.	0.	0.	0.	1240.
1192.10	125.	0.	0.	0.	2486.
1191.70	150.	0.	0.	0.	2676.
1191.10	187.	109.	54.	0.	2885.
1190.70	187.	163.	81.	0.	2997.
1190.48	187.	187.	93.	0.	3045.
1190.10	187.	230.	114.	0.	3131.
1189.84+	187.	1389.	0.	0.	3175.
1189.84-	187.	834.	0.	0.	3175.
1189.60	187.	1389.	0.	0.	3215.
1189.25	187.	2250.	0.	0.	3262.
1189.10	187.	2634.	0.	0.	3284.
1188.40	187.	3056.	0.	0.	3426.
1188.00	187.	3298.	0.	0.	3651.

IA-340-8 (PETERSON)

2/13/24

SHEET PILE DESIGN

A.S.

Maximum Bending Moment, $M_{max} = 740$ ft.-lbs.

MIN. GRADE STEEL:

Maximum Shear, $V_{max} = 885$ lbs.

- STEEL GRADE: 50 KSI

- PILING TYPE: SCZ

$$S_{allow} = \frac{M_{max}}{f_b} \quad (EM 1110-2-2504, 6-3)$$

$$f_b = 0.5 f_y = 0.5 \times 50,000 \text{ lb/in}^2 = 25,000 \text{ lbs/in}^2$$

$$S_{allow} = \frac{740 \text{ ft.-lbs./ft. wall} \times 12 \text{ in./ft.}}{25,000 \text{ lbs./in}^2} = 0.3552 \text{ in}^3/\text{ft. of wall}$$

$$A_{allow} = \frac{V_{max}}{f_v} \quad (EM 1110-2-2504, 6-4)$$

$$f_v = 0.33 f_y = 0.33 \times 50,000 \text{ lb/in}^2 = 16,500 \text{ lb/in}^2$$

$$A_{allow} = \frac{885 \text{ lbs.}}{16,500 \text{ lbs./in}^2} = 0.05364 \text{ in}^2/\text{ft. of wall}$$

$$\text{Shear Area for Z-shaped Piling, } A_v = \frac{t_w \cdot h}{W} \quad (EM-1110-2-2504, 6-5)$$

USE SCZ ZIN (RECOMMENDED PRODUCT)

$$A_v = \frac{(0.375 \text{ in.}) \cdot (10 \text{ in.})}{\frac{28.5 \text{ in.}}{12 \text{ in./ft.}}} = 1.58 \text{ in}^2/\text{ft. of wall} \gg 0.05 \text{ in}^2/\text{ft. of wall}$$

$$\text{SCZ ZIN Section Modulus} = 21.43 \text{ in}^3/\text{ft} \gg 0.36 \text{ in}^3/\text{ft.}$$

SCZ ZIN OK

DESIGN GRADE: 50 ksi

PILING TYPE: SCZ ZIN, 0.375" THICK

MIN. THICKNESS: 0.25", Section Modulus Min. = 4.4 in³/ft., M.O.I. MIN. = 8.1 in⁴/ft.
(PER NRCS GUIDELINES)



GREAT LAKES/ATLANTIC REGION
7322 Newman Blvd., Bldg. 2
Dexter, MI 48130
(734) 623-2000
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Appendix A-6
CTS Geotechnical Report



Certified Testing Services, Inc.

GEOTECHNICAL ENGINEERING REPORT

**Peterson Site
Project Wri922420D
Wright County, Iowa**

Prepared For:
Ducks Unlimited
Bondurant, Iowa

CTS Project No. G6999



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Signature:

5-19-2023

Name: Matthew R. Dailey, P.E. (date)

License Number: 19700

My license renewal date is December 31, 2023.

Pages or sheets covered by this seal:

This bound report contains 23 pages, including this page.
CTS File Number G6999



Certified Testing Services, Inc.

419 W. 6th Street • P.O. Box 1193 • Sioux City, Iowa 51102 • Phone (712) 252-5132

May 19, 2023

Attn: Mr. Alonzo Barkley
Engineer
Ducks Unlimited
Great Lakes Atlantic Regional Office
305 Deer Ridge Dr NW
Bondurant, Iowa 50035

RE: Geotechnical Engineering Report
Peterson Site
Project Wri922420D
Wright County, Iowa
CTS Job No. G6999

Dear Mr. Barkley:

Certified Testing Services, Inc. is pleased to transmit our Geotechnical Engineering Report for the referenced project. This report includes the results of field and laboratory testing and groundwater information.

We appreciate the opportunity to perform this Geotechnical Study and look forward to continued participation during the construction phases of this project. If you have any questions pertaining to this report or if we may be of further service, please contact our office.

Respectfully submitted,
CERTIFIED TESTING SERVICES, INC.


James A. Bertsch, P.E. IA 12121
Senior Geotechnical Engineer


Matthew R. Dailey, P.E. IA 19700
Geotechnical Department Manager

JAB/MRD/jb

GEOTECHNICAL ENGINEERING REPORT

**PETERSON SITE
PROJECT WRI922420D
WRIGHT COUNTY, IOWA**

CTS PROJECT NO. G6999

PREPARED FOR

**ATTN: MR. ALONZO BARKLEY
ENGINEER
DUCKS UNLIMITED
GREAT LAKES ATLANTIC REGIONAL OFFICE
305 DEER RIDGE DR NW
BONDURANT, IOWA 50035**

MAY 19, 2023

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Soil Classification Chart and General Notes	

PROJECT INFORMATION

Project Authorization

Certified Testing Services, Inc. has completed a subsurface exploration for the Petersen Site Project. Our work was authorized through Ducks Unlimited's Consultant Agreement dated April 18, 2023. This work was performed in general accordance with CTS Proposal Number 6300 dated February 23, 2023.

Project Description

Mr. Alonzo Barkley, Engineer for Great Lakes Atlantic Regional Office of Ducks Unlimited, presented project information through a telephone conversation on February 21, 2023, and emails on February 21 and 22, 2023. The email on February 21, 2023, included a "Schedule B" that had attachments Wri922420D Site Location Map, Wri922420D Site Location Map 2, and IA-340-8 – Soil Boring Scope-2-13-23. The email on February 22, 2023, included Sheet 000 that provided contour elevations. Mr. Andrew Schippers, P.E., Regional Engineer for Great Lakes Atlantic Regional Office of Ducks Unlimited, presented additional project information in an email on April 25, 2023. CTS understands that the project will consist of the construction of a wetland northeast of the intersection of Nelson Avenue and 200th Street in Wright County, Iowa. It is further understood that the high water level will be 1195 feet, the estimated 100 year floor elevation is 1198 feet. We also understand that there is a concern for the residence to the north to get water in their basement based on a basement floor elevation of 1196.4 feet.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site in order to provide laboratory soil data for the materials encountered at the boring locations and provide an opinion on whether or not the wetland will affect the basement of the residence to the north. Our scope of services included performing Boring B1 to a depth of 15 feet below the existing grade and Borings B2 and B3 to depths 25 feet below the existing grade in the wetland area at locations chosen by Ducks Unlimited personnel. The scope of work also included select laboratory testing. The scope of work also included the preparation of this geotechnical report. This report briefly outlines the testing procedures, describes the site and subsurface conditions, and presents soils design parameters. The scope of services does not include an environmental assessment of the site.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The site for the proposed wetland is located northeast of the intersection of Nelson Avenue and 200th Street in Wright County, Iowa. The site is bordered by a residence to the north, agricultural field to the east, 200th Street to the south, and Nelson Avenue to the west. At the time of drilling, the site surface consisted of a harvested agricultural field. The site was

firm at the time of our site visit and the drill rig did not experience difficulty moving around the site.

Subsurface Conditions

The site subsurface conditions were explored with three soil test borings sampled to depths ranging from 15 feet to 25 feet below the existing ground surface at locations chosen by Ducks Unlimited personnel. The boring depths were also chosen by Ducks Unlimited personnel. CTS located the borings in the field using a handheld GPS device. The following table presents the approximate GPS coordinates and elevations for the boring locations and the approximate locations of the borings are also presented on the "Boring Location Plan" included in the Appendix, which is a modified copy of drawing titled, "Soil Boring Scope". Boring B2 was used as a benchmark and an elevation of 1192.8 feet was interpolated from the information provided on the drawing titled, "Soil Boring Scope".

BORING NUMBER	BORING LOCATION	BORING ELEVATIONS
B1	42.76365° N; -93.70456° W	1197.3'
B2	42.76337° N; -94.70505° W	1192.8'
B3	42.76326° N; -94.70505° W	1192.9'

The borings were advanced utilizing hollow stem auger drilling methods and soil samples were routinely obtained during the drilling process. Select soil samples were later tested in the laboratory to determine the material's engineering properties. Soil sampling and laboratory testing were accomplished generally in accordance with ASTM procedures. The borings were backfilled with on-site material after performing our work; however, it should be noted that some settlement of the backfill material may occur and it is the client's responsibility to backfill the borings once we have left the site.

The subsurface conditions below the surface material generally consisted of lean clay with sand glacial sediment, fat clay alluvium, sandy lean clay glacial sediment, lean clay with sand and gravel weathered glacial till, and lean clay with sand glacial till. The boring logs included in the Appendix should be reviewed for specific information at the individual boring locations. The boring logs include soil/rock descriptions, stratifications, penetration resistances, and locations of the samples and laboratory test data. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected at locations other than the boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on the boring logs. Samples that were not altered by laboratory testing will be retained for 30 days from the date of this report and then will be discarded.

Water Level Measurements

Free water was encountered in Boring B2 at a depth of 9 feet below the existing grade at the time of drilling. It should be noted that with the relatively impervious materials

encountered at the site that a long monitoring time would be required to determine the static water level. Water levels should be expected to fluctuate with changes in climatic conditions. The water level measurements presented in this report are the levels that were measured at the time of our field activities and are presented in the following table, as well as the estimated seasonal high water level.

<u>Boring Number</u>	<u>Elevation of Water at Time of Drilling</u>	<u>Seasonal High Water Level*</u>
B1	N/A	1193.3 Feet
B2	1183.8	1192.8 Feet
B3	N/A	1192.9 Feet

* Based on discoloration of soils and groundwater level encountered

EVALUATIONS AND RECOMMENDATIONS

Geotechnical Discussion

It is CTS's opinion based on the permeability test result of 1.3×10^{-7} cm/sec that it is highly unlikely that a pond elevation 1195 feet will cause water to infiltrate into the basement of the residence to the north, based on a top of basement floor elevation of 1196.4 feet. It should be noted that based on the varied soil conditions that can be encountered in a drainage area and the limited amount of soil that was obtained that it is impossible to say that water from the wetland will not be an issue in the basement. It should also be noted that based on the relatively impervious material encountered in the borings that the residence may already be experiencing water issues in the basement from surface water that can be caused by poor drainage around the residence and surface water being trapped on top of the impervious materials that can migrating into the basement.

Laboratory Data

The laboratory data for Borings B2 and B3 that include saturated unit weight, unit weight at the existing moisture content, in-situ moisture content, cohesion, adhesion, angle of internal friction is presented in the "Laboratory Data" section of the Appendix. The results of the permeability test performed on the natural lean clay with sand glacial sediment material in Boring B1 is also presented in the "Laboratory Data" section of the Appendix.

REPORT LIMITATIONS

The laboratory data submitted is for the subsurface information obtained by CTS. Deviations from the subsurface conditions noted in this report will likely be encountered during construction. This report has been prepared for the exclusive use of Ducks Unlimited and their consultants for the specific application to the proposed Petersen Site, Project Wri922420D in Wright County, Iowa.

APPENDIX

BORING LOCATION PLAN

BORING LOGS

LOG OF EXPLORATORY BORING

Sheet 1 of 1



Job Number: **G6999**
 Project: **Peterson Project**
Wri922420D Project
 Date Started: **4/24/23**
 Date Completed: **4/24/23**

Boring No.: **B-1**
 Boring Location: **Wright County, IA**
 Drill Type: **Hollow Stem**
 Ground Elev.: **1197.3**

Depth in Feet	Graphic Log	Sample Type	 Shelby Tube	 Standard Split Spoon	 Water Level ATD	USCS	Blow Counts SPT (N) Blows/Foot	Moisture Content, %	Dry Density (PCF)	% Saturation	Hand Penetrometer (TSF)	Unconfined Comp. Strength (TSF)	Liquid Limit %	Plastic Limit %	Plasticity Index %	Percent Fines
			 Modified California	 Grab Sample	 Water Level @ 24-Hours											
			SOIL DESCRIPTION													
			12-Inch Root and Disturbed Zone													
			LEAN CLAY WITH SAND, Grayish Yellow Brown, Moist to Very Moist, Glacial Sediment			CL		24	95	87	3.00					
5			(Medium Gray and Yellow Brown)					25	98	94	3.00					
			LEAN CLAY WITH SAND AND GRAVEL, Brownish Gray, Very Moist, Weathered Glacial Till			CL		23	103	97	2.50					
10								22	103	95	2.50					
15								25	99	95	2.00					
			END OF BORING AT 15 FEET FREE WATER WAS NOT ENCOUNTERED AT TIME OF DRILLING													

LOG OF EXPLORATORY BORING

Sheet 1 of 1



Job Number: **G6999**
 Project: **Peterson Project**
Wri922420D Project
 Date Started: **4/24/23**
 Date Completed: **4/24/23**

Boring No.: **B-2**
 Boring Location: **Wright County, IA**
 Drill Type: **Hollow Stem**
 Ground Elev.: **1192.8**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	USCS	Blow Counts SPT (N) Blows/Foot	Moisture Content, %	Dry Density (PCF)	% Saturation	Hand Penetrometer (TSF)	Unconfined Comp. Strength (TSF)	Liquid Limit %	Plastic Limit %	Plasticity Index %	Percent Fines
			Shelby Tube Standard Split Spoon Water Level ATD Modified California Grab Sample Water Level @ 24-Hours											
			12-Inch Root and Disturbed Zone											
			FAT CLAY, Dark Gray, Very Moist, Stiff, Alluvium	CH	3-5-6 N= 11	28	93	94						
5			SANDY LEAN CLAY, Yellow Gray, Very Moist to Wet, Medium to Very Stiff, Oxidized, Glacial Sediment (Yellow Brown and Medium Gray Mottled)	CL	2-3-4 N= 7	27	95	96						
					2-4-2 N= 6	21	106	99						
					2-3-3 N= 6	22	100	89						
10					4-7-8 N= 15	21	105	92						
			LEAN CLAY WITH SAND, Dark Gray, Very Moist, Stiff to Very Stiff, Oxidized, Glacial Till	CL	4-7-8 N= 15	19	109	97						
15														
20					3-5-6 N= 11	20	108	99						
					5-7-7 N= 14	18	112	97						
25			END OF BORING AT 25 FEET FREE WATER WAS ENCOUNTERED AT 9 FEET AT TIME OF DRILLING											

LOG OF BORING G6999.GPJ CERTIFIED TESTING.GDT 5/19/23

LOG OF EXPLORATORY BORING

Sheet 1 of 1



Job Number: **G6999**
 Project: **Peterson Project**
Wri922420D Project
 Date Started: **4/24/23**
 Date Completed: **4/24/23**

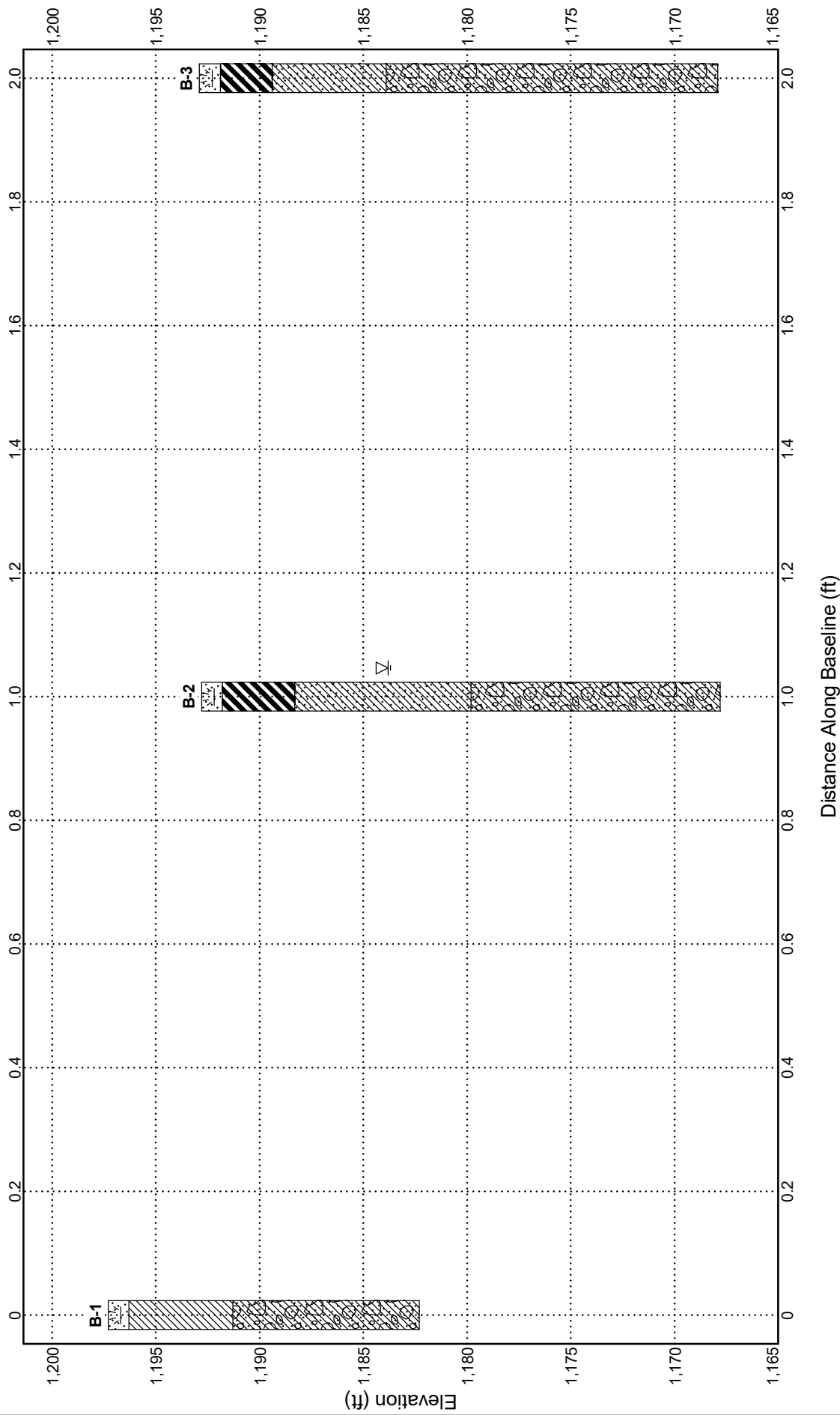
Boring No.: **B-3**
 Boring Location: **Wright County, IA**
 Drill Type: **Hollow Stem**
 Ground Elev.: **1192.9**

Depth in Feet	Graphic Log	Sample Type	 Shelby Tube	 Standard Split Spoon	 Water Level ATD	USCS	Blow Counts SPT (N) Blows/Foot	Moisture Content, %	Dry Density (PCF)	% Saturation	Hand Penetrometer (TSF)	Unconfined Comp. Strength (TSF)	Liquid Limit %	Plastic Limit %	Plasticity Index %	Percent Fines
			 Modified California	 Grab Sample	 Water Level @ 24-Hours											
			SOIL DESCRIPTION													

		12-Inch Root and Disturbed Zone														
		FAT CLAY, Dark Gray, Very Moist, Medium, Alluvium	CH	2-3-3 N= 6	31	88	93						63	28	35	
5		SANDY LEAN CLAY, Yellow Gray, Very Moist, Stiff, Glacial Sediment (Yellow Brown and Medium Gray Mottled)	CL	2-3-4 N= 7 2-4-5 N= 9	22 23	96 100	78 93									
10		LEAN CLAY WITH SAND, Dark Gray, Very Moist, Stiff, Glacial Till	CL	3-5-6 N= 11 2-3-4 N= 7 3-5-6 N= 11 4-5-6 N= 11	25 20 18	99 109 110	98 99 94									
25		END OF BORING AT 25 FEET FREE WATER WAS NOT ENCOUNTERED AT TIME OF DRILLING														

LOG OF BORING G6999.GPJ CERTIFIED TESTING.GDT 5/19/23

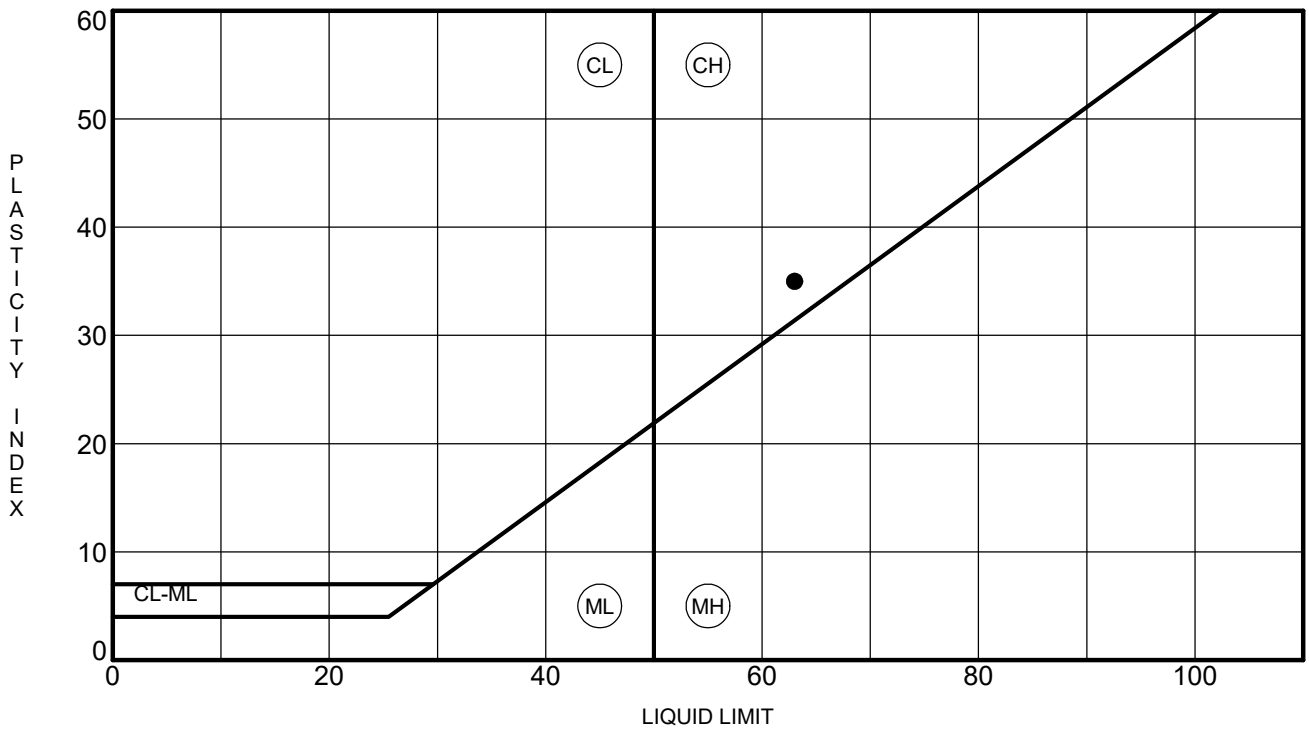
BORING PROFILES



Certified Testing Services, Inc.
419 W. 6th Street, PO Box 1193
Sioux City, Iowa 51102
Telephone: 712-252-5132
Fax: 712-252-0110

Peterson Project Wri922420D Project
Wright County, IA

LABORATORY TEST DATA





Certified Testing Services, Inc.

419 W. 6th Street • P.O. Box 1193 • Sioux City, Iowa 51102 • Phone (712) 252-5132

Laboratory Permeability Test Fixed Wall - ASTM D5856

Project No.:	G6999	Date:	05/16/23	Sample Type:	In-Place (Shelby)
				Sample Description:	Grayish Yellow Brown Lean Clay
Client Name:	Ducks Unlimited			Sampled By:	CTS
	Great Lakes Atlantic Reg. Office			Date Sampled:	04/24/23
	305 Deer Ridge Dr NW			Dates Tested:	05/02/23-05/9/2023
	Bondurant, Iowa 50035			Compaction Method:	N/A
Project Name:	Peterson Site			Permeant Liquid:	De-Aired Water
	Project Wri922420D			Reviewed by:	Matthew R. Dailey, P.E.
Location:	Wright County, Iowa				

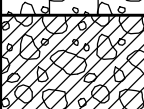
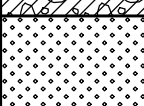
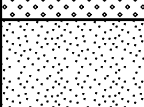
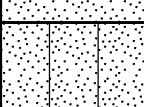
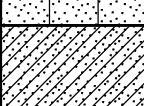
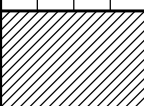
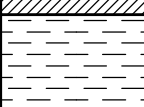
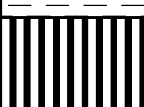
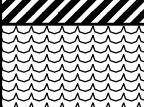
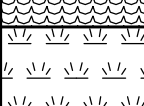
Laboratory Results	
Moisture Content, % (ASTM D2216)	24.7
Dry Density, PCF (ASTM D698)	98.0
Percent Compaction, %	N/A
Permeability, cm/sec	1.3×10^{-7}
Permeability, in/day	0.0044

Location Description: Boring B1 (3.5'-5')

Boring Number	Depth (ft)	Material	Natural Moisture Content (%)	Existing Unit Weight (PCF)	Saturated Unit Weight (PCF)	Internal Friction Angle (Degrees)	Cohesion (PSF)	Adhesion (PSF)	Standard Penetration Test (BPF)
B2	0' to 4.5'	Fat Clay	27.5	118.8	120.6	15	1,700	820	11
	4.5' to 9'	Sandy Lean Clay	21.5	124.4	126.6	20	930	700	6
	9' to 13'	Sandy Lean Clay	21	126.1	126.1	20	2,340	1,000	15
	13' to 25'	Glacial Till	19	130	131.2	25	2,030	960	13
B3	0' to 3.5'	Fat Clay	31	115.3	119.2	15	930	700	6
	3.5' to 9'	Sandy Lean Clay	22.5	116.6	121.7	20	1,250	600	8
	9' to 15'	Glacial Till	23.5	123.5	124	23	1,400	670	9
	15' to 25'	Glacial Till	19	130	131.2	25	1,700	820	11

SOIL CLASSIFICATION CHART AND GENERAL NOTES

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

GENERAL NOTES

SAMPLING SYMBOLS:

	STANDARD PENETRATION TEST – 1 3/8" I.D., 2" O.D.
	SHELBY THIN-WALLED TUBE – 3" O.D. UNDISTURBED SAMPLE
	GRAB SAMPLE
	ROCK CORE
	AUGER SAMPLE
	NO RECOVERY

WATER LEVEL MEASUREMENT SYMBOLS:

	WATER LEVEL AT TIME OF DRILLING
	WATER LEVEL AFTER 7 DAYS

CONSISTENCY OF FINE-GRAINED SOILS	
UNCONFINED COMPRESSIVE STRENGTH, QU, PSF	CONSISTENCY
< 500	VERY SOFT
500 - 1,000	SOFT
1,001 - 2,000	MEDIUM
2,001 - 4,000	STIFF
4,001 - 8,000	VERY STIFF
8,001 - 16,000	HARD
> 16,000	VERY HARD

RELATIVE DENSITY OF COARSE GRAINED SOILS	
N-BLOWS/FT.	RELATIVE DENSITY
0 - 3	VERY LOOSE
4 - 9	LOOSE
10 - 29	MEDIUM DENSE
30 - 49	DENSE
50 - 80	VERY DENSE
80 +	EXTREMELY DENSE

RELATIVE PROPORTIONS OF SAND AND GRAVEL	
DESCRIPTIVE TERM(S) (OF COMPONENTS ALSO PRESENT IN SAMPLE)	PERCENT OF DRY WEIGHT
WITH	15 - 29
MODIFIER	> 30

RELATIVE PROPORTIONS OF FINES	
DESCRIPTIVE TERM(S) (OF COMPONENTS ALSO PRESENT IN SAMPLE)	PERCENT OF DRY WEIGHT
WITH	15 - 29
MODIFIER	> 30

GRAIN SIZE TERMINOLOGY	
MAJOR COMPONENT OF SAMPLE	SIZE RANGE
BOULDERS	OVER 12 IN. (300MM)
COBBLES	12 IN. TO 3 IN. (300 MM TO 75 MM)
GRAVEL	3 IN. TO #4 SIEVE (75MM TO 4.75MM)
SAND	#4 TO #200 SIEVE (4.75MM TO 0.075 MM)
SILT OR CLAY	PASSING #200 SIEVE (0.075MM)

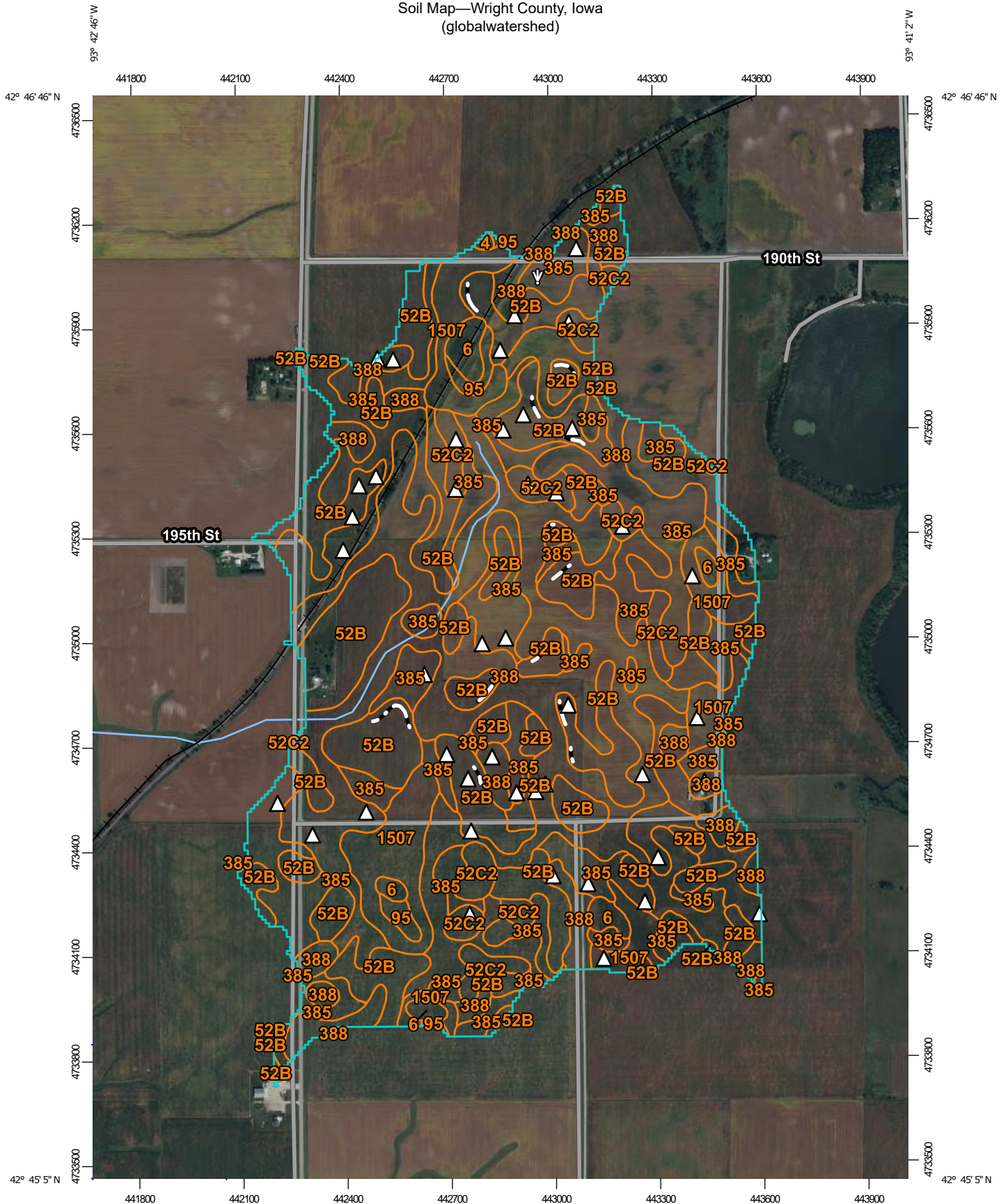




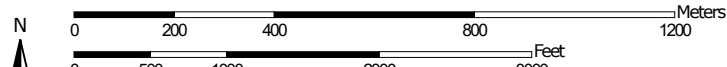
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Appendix A-7
NRCS Soils Report

Soil Map—Wright County, Iowa (globalwatershed)



Map Scale: 1:15,100 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

8/25/2023
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Wright County, Iowa

Survey Area Data: Version 31, Sep 2, 2022

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

Date(s) aerial images were photographed: May 26, 2021—Sep 16, 2021

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

Map Unit Legend

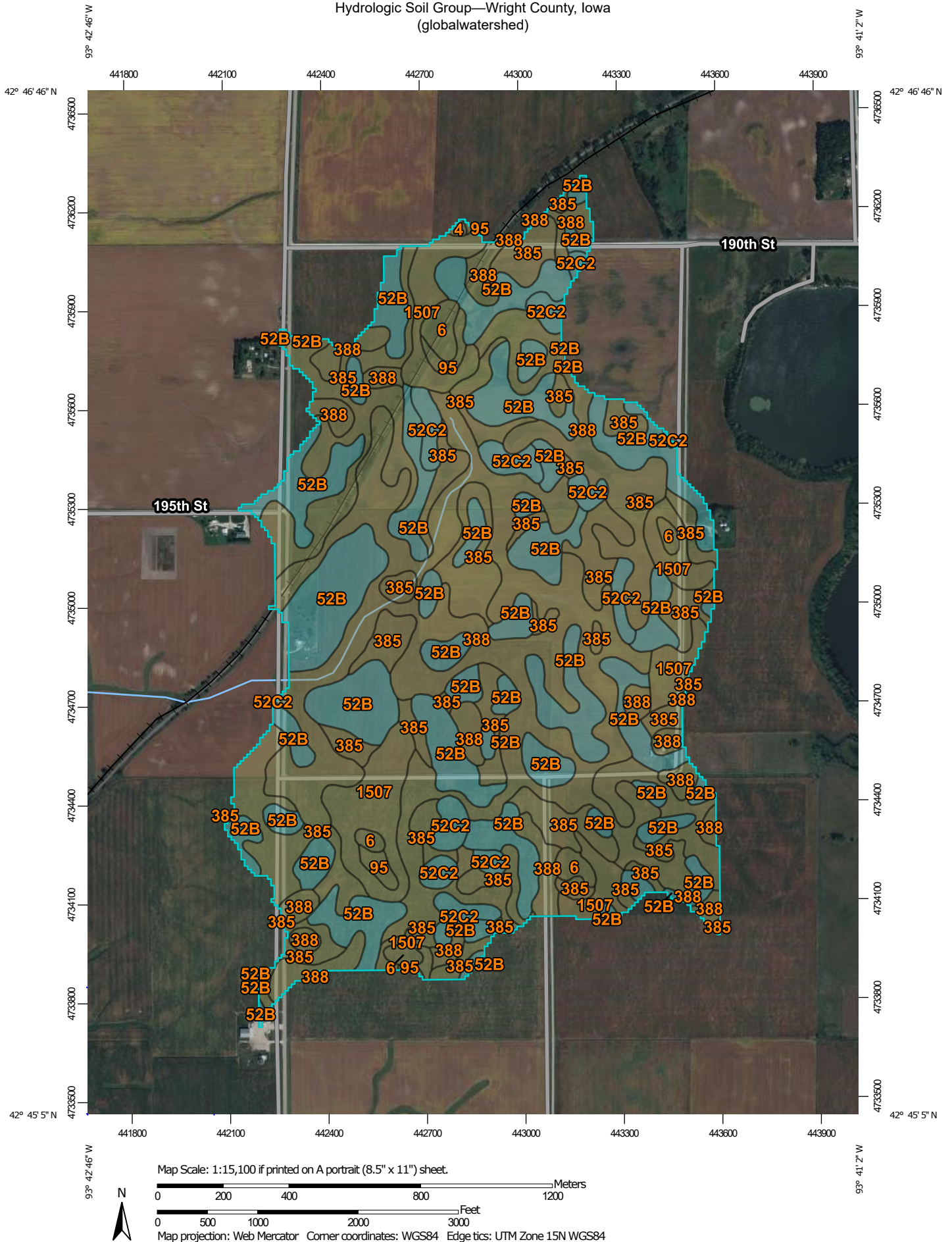
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
4	Knoke silty clay loam, 0 to 1 percent slopes	0.5	0.1%
6	Okoboji silty clay loam, 0 to 1 percent slopes	9.8	1.6%
52B	Bode clay loam, 2 to 6 percent slopes	185.6	29.7%
52C2	Bode clay loam, 6 to 10 percent slopes, moderately eroded	26.9	4.3%
95	Harps clay loam, 0 to 2 percent slopes	4.7	0.7%
385	Guckeen clay loam, 1 to 3 percent slopes	147.4	23.6%
388	Kossuth silty clay loam, 0 to 2 percent slopes	200.9	32.1%
1507	Brownton silty clay loam, 0 to 2 percent slopes	49.9	8.0%
Totals for Area of Interest		625.7	100.0%



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Appendix A-8
NRCS Hydrologic Soils Report

Hydrologic Soil Group—Wright County, Iowa
(globalwatershed)



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.

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Wright County, Iowa

Survey Area Data: Version 31, Sep 2, 2022

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

Date(s) aerial images were photographed: May 26, 2021—Sep 16, 2021

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
4	Knoke silty clay loam, 0 to 1 percent slopes	C/D	0.5	0.1%
6	Okoboji silty clay loam, 0 to 1 percent slopes	C/D	9.8	1.6%
52B	Bode clay loam, 2 to 6 percent slopes	C	185.6	29.7%
52C2	Bode clay loam, 6 to 10 percent slopes, moderately eroded	C	26.9	4.3%
95	Harps clay loam, 0 to 2 percent slopes	C/D	4.7	0.7%
385	Guckeen clay loam, 1 to 3 percent slopes	C/D	147.4	23.6%
388	Kossuth silty clay loam, 0 to 2 percent slopes	C/D	200.9	32.1%
1507	Brownton silty clay loam, 0 to 2 percent slopes	C/D	49.9	8.0%
Totals for Area of Interest			625.7	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



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Appendix A-9
Tile #1 Calculations



United States
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Partially Full Pipe Flow Calculations
Pipes > 1/2 Full

MDNRCS-ENG
Ver 1.0
04/2020

Sheet 1 of 2

Natural Resources Conservation Service

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 8 in

Depth of flow, **y** = 7.44 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.012

Channel bottom
slope, **S** = 0.001 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 0.666667 ft

Pipe Radius, **r** = 0.333333 ft

Circ. Segment Height, **h** = 0.047 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 0.34 ft²

Wetted Perimeter, **P** = 1.7 ft

Hydraulic Radius, **R** = 0.19 ft

Discharge, **Q** = 0.43 cfs

Equations used for calculations:

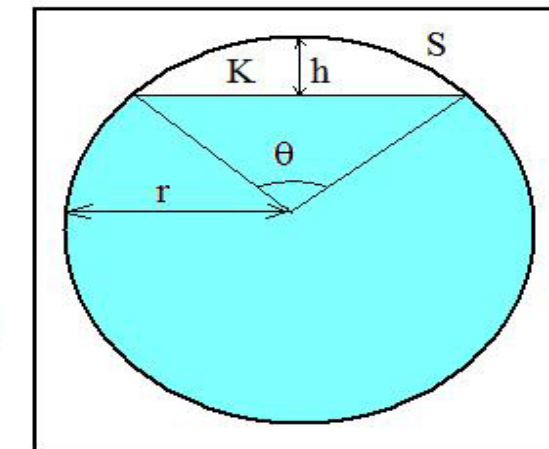
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad (\text{hydraulic radius})$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad (\text{Manning Equation})$$

$$V = Q/A$$



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Partially Full Pipe Flow Calculations Pipes > 1/2 Full

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Sheet 2 of 2

Partially Full Manning

roughness, $n =$

0.012

Ave. Velocity, $V =$

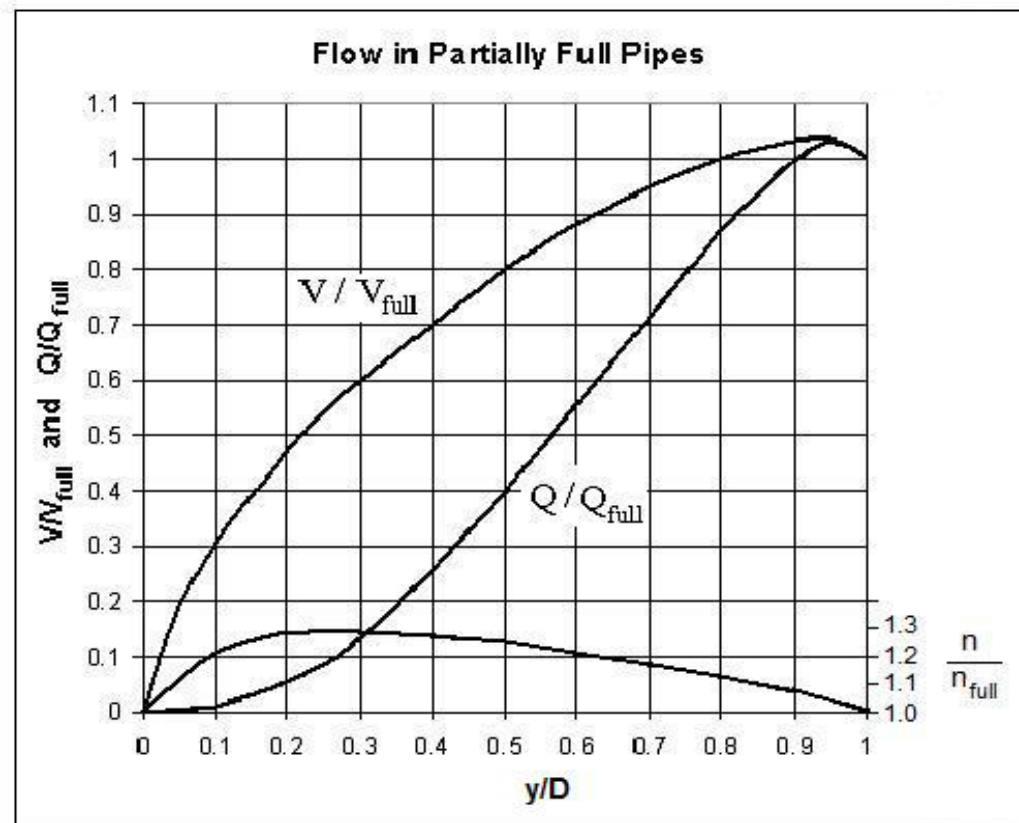
1.27

ft/sec

pipe % full $[(A/A_{full}) * 100\%] =$

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)



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Partially Full Pipe Flow Calculations
Pipes > 1/2 Full

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 5 in

Depth of flow, **y** = 4.65 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.014

Channel bottom
slope, **S** = 0.01107 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 0.416667 ft

Pipe Radius, **r** = 0.208333 ft

Circ. Segment Height, **h** = 0.029 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 0.13 ft²

Wetted Perimeter, **P** = 1.1 ft

Hydraulic Radius, **R** = 0.12 ft

Discharge, **Q** = 0.35 cfs

Equations used for calculations:

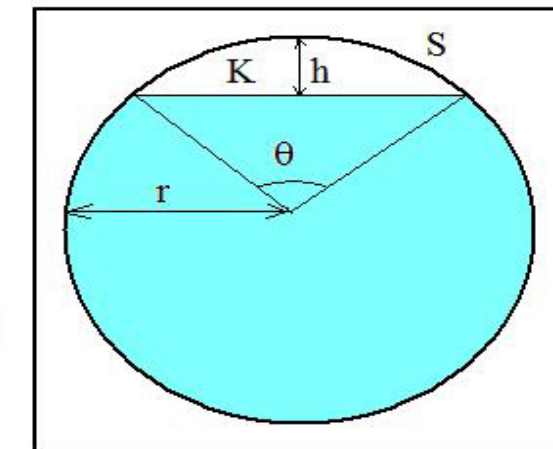
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad (\text{hydraulic radius})$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad (\text{Manning Equation})$$

$$V = Q/A$$



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Partially Full Pipe Flow Calculations Pipes > 1/2 Full

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Sheet 2 of 2

Partially Full Manning

roughness, n =

0.014

Ave. Velocity, V =

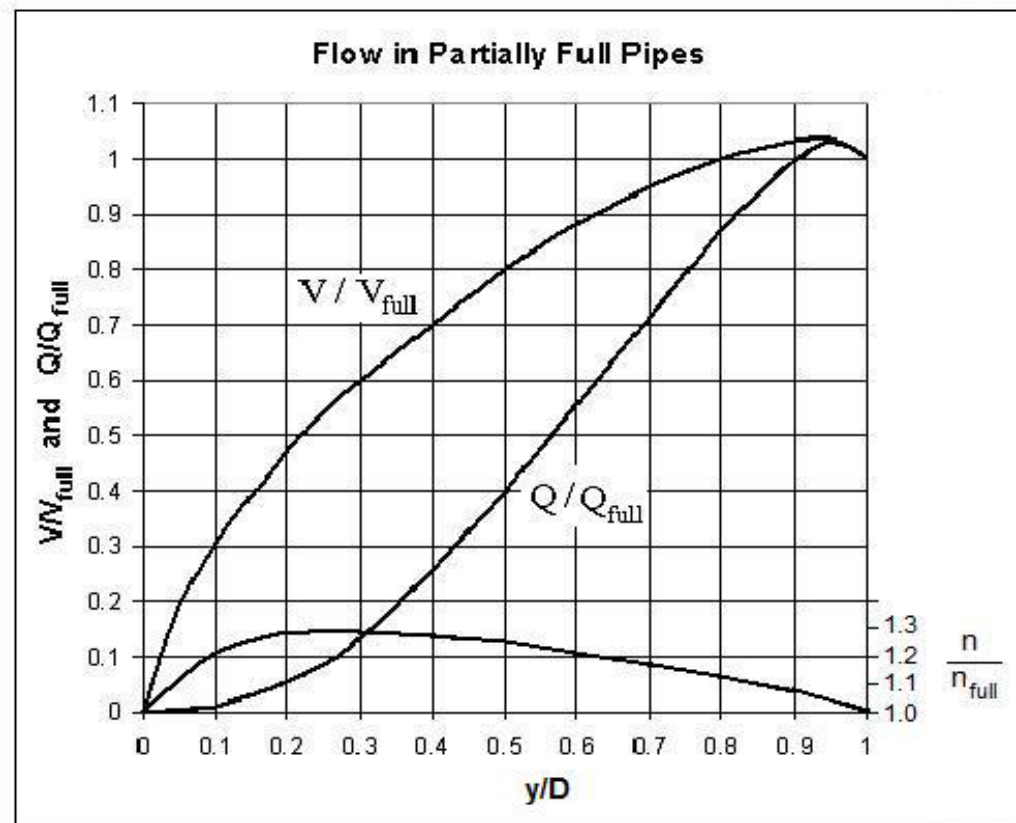
2.66

ft/sec

pipe % full $[(A/A_{full}) * 100\%]$ =

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)



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Appendix A-10
Tile #2 Calculations



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Partially Full Pipe Flow Calculations
Pipes > 1/2 Full

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Sheet 1 of 2

Natural Resources Conservation Service

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 18 in

Depth of flow, **y** = 16.74 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.012

Channel bottom
slope, **S** = 0.001 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 1.5 ft

Pipe Radius, **r** = 0.75 ft

Circ. Segment Height, **h** = 0.105 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 1.71 ft²

Wetted Perimeter, **P** = 3.9 ft

Hydraulic Radius, **R** = 0.44 ft

Discharge, **Q** = 3.75 cfs

Equations used for calculations:

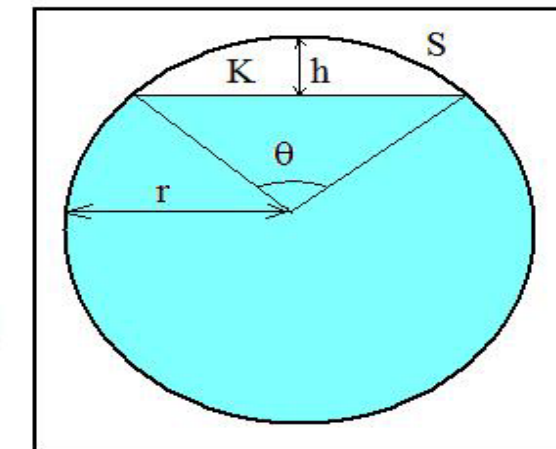
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad \text{(hydraulic radius)}$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad \text{(Manning Equation)}$$

$$V = Q/A$$



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Partially Full Pipe Flow Calculations Pipes > 1/2 Full

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Sheet 2 of 2

Partially Full Manning

roughness, $n =$

0.012

Ave. Velocity, $V =$

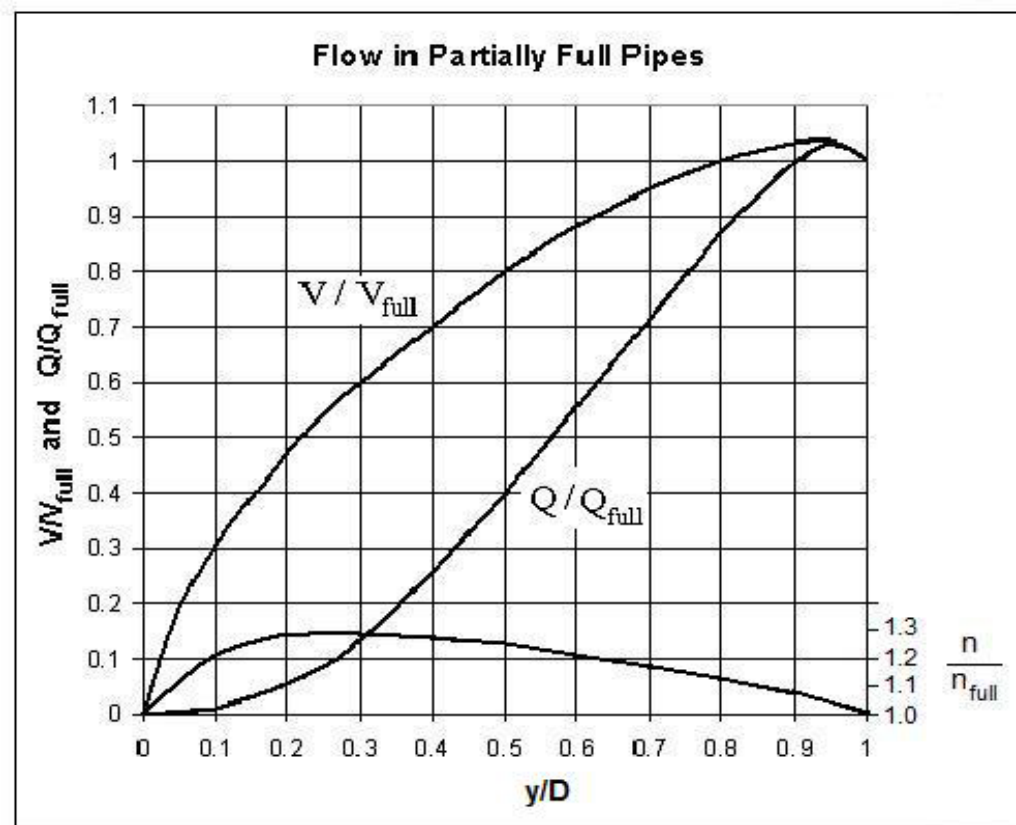
2.19

ft/sec

pipe % full $[(A/A_{full}) * 100\%] =$

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)



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Partially Full Pipe Flow Calculations
Pipes > 1/2 Full

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Sheet 1 of 2

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 12 in

Depth of flow, **y** = 11.16 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.013

Channel bottom
slope, **S** = 0.005375 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 1 ft

Pipe Radius, **r** = 0.5 ft

Circ. Segment Height, **h** = 0.070 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 0.76 ft²

Wetted Perimeter, **P** = 2.6 ft

Hydraulic Radius, **R** = 0.29 ft

Discharge, **Q** = 2.72 cfs

Equations used for calculations:

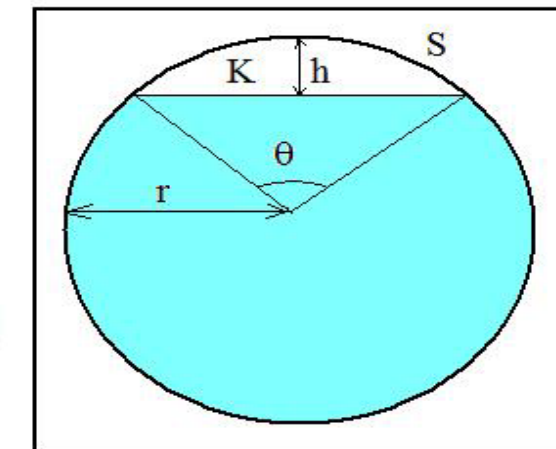
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad (\text{hydraulic radius})$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad (\text{Manning Equation})$$

$$V = Q/A$$



Partially Full Pipe Flow Calculations Pipes > 1/2 Full

Partially Full Manning

roughness, n =

0.013

Ave. Velocity, V =

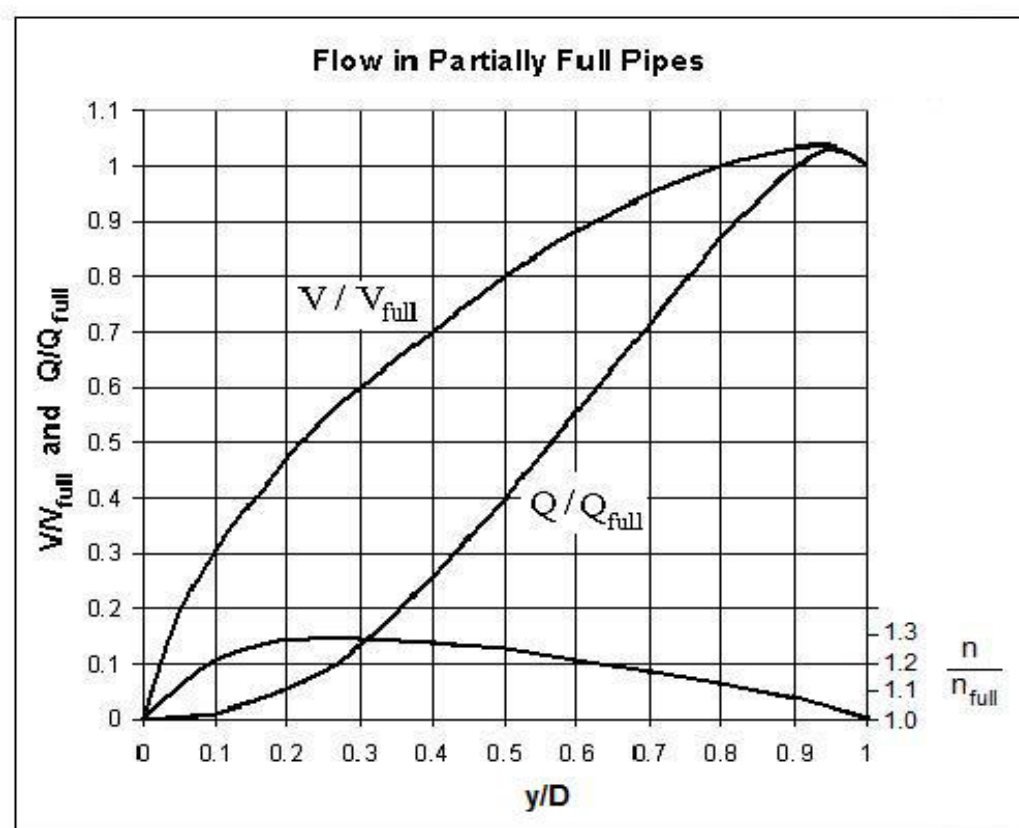
3.57

ft/sec

pipe % full $[(A/A_{full}) * 100\%]$ =

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)



PETERSON WETLAND - NE 12" CONCRETE - EXISTING SLOPES											
POINT #	TOPO REF. #	TOP OF TILE ELEV.	PIPE Ø (IN.)	WALL THICK. (IN.)	CALC. INVERT	EST. DIST. BTW PTS.	CALC. SLOPE	PIPE TYPE	GROUND SHOT	GROUND COVER	NOTES
1	32339	1199.84	12	1.75	1198.69	-		RCP	1203.38	3.54	GS from Lidar Surface
2	32337	1196.93	12	1.75	1195.78	610.63	0.004772	RCP	1201.70	4.77	GS from Combined Surface
3	32334	1196.44	12	1.75	1195.29	90.58	0.005410	RCP	1201.60	5.16	GS from Combined Surface
4	40004	1196.06	12	1.75	1194.91	52.9	0.007105	RCP	1201.15	5.09	GS from Combined Surface
5	40002	1195.52	12	1.75	1194.37	99.32	0.005479	RCP	1199.18	3.66	GS from Combined Surface
6	40006	1194.47	12	1.75	1193.32	201.35	0.005215	RCP	1197.81	3.34	GS from Combined Surface
7	40007	1193.29	12	1.75	1192.14	234.77	0.005008	RCP	1196.80	3.51	GS from Combined Surface
8	40014	1192.92	12	1.75	1191.77	75.51	0.004900	RCP	1196.38	3.46	GS from Combined Surface
9	40016	1191.47	12	1.75	1190.32	283.48	0.005115	RCP	1195.14	3.67	GS from Combined Surface
10	40017	1188.72	14	1	1187.47	175.11	0.016299	Clay	1194.35	5.63	GS from Combined Surface
11	30027	1186.12	14	1	1184.87	548.26	0.004742	Clay	1192.60	6.48	GS from Combined Surface
						AVG. SLOPE	0.006405		AVG. COVER	4.39	
					AVG. 12" SLOPE		0.005375				



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Appendix A-11
Tile #3 Calculations



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Partially Full Pipe Flow Calculations
Pipes > 1/2 Full

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04/2020

Sheet 1 of 2

Natural Resources Conservation Service

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 15 in

Depth of flow, **y** = 13.95 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.012

Channel bottom
slope, **S** = 0.003 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 1.25 ft

Pipe Radius, **r** = 0.625 ft

Circ. Segment Height, **h** = 0.088 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 1.19 ft²

Wetted Perimeter, **P** = 3.3 ft

Hydraulic Radius, **R** = 0.37 ft

Discharge, **Q** = 3.99 cfs

Equations used for calculations:

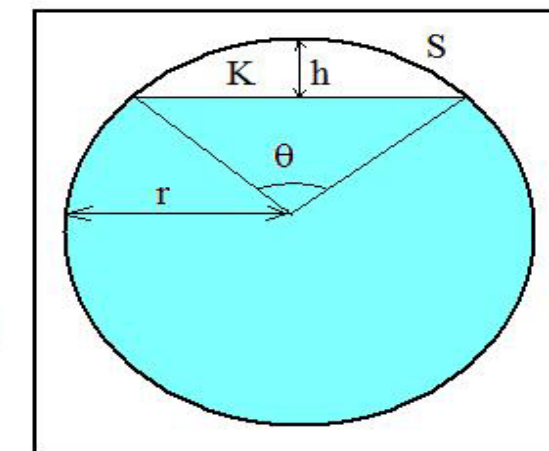
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad \text{(hydraulic radius)}$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad \text{(Manning Equation)}$$

$$V = Q/A$$



Partially Full Pipe Flow Calculations Pipes > 1/2 Full

Partially Full Manning

roughness, $n =$

0.012

Ave. Velocity, $V =$

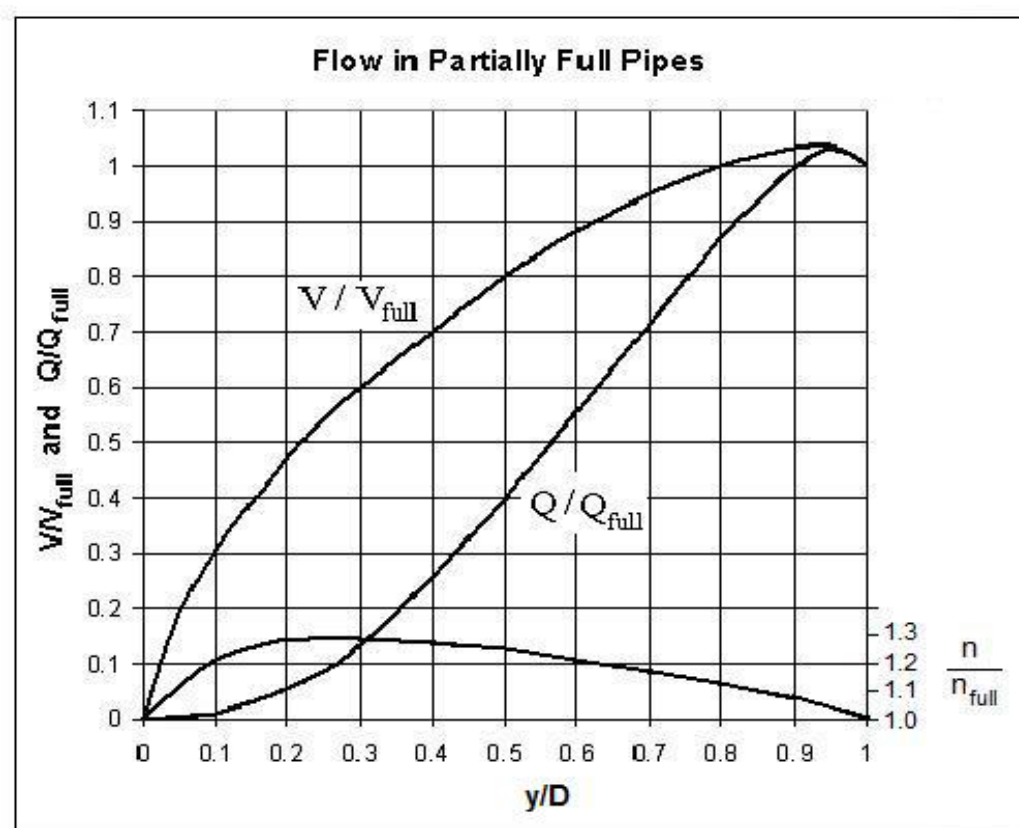
3.36

ft/sec

pipe % full $[(A/A_{full}) * 100\%] =$

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)





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Partially Full Pipe Flow Calculations Pipes > 1/2 Full

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Sheet 1 of 2

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 12 in

Depth of flow, **y** = 11.16 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.013

Channel bottom
slope, **S** = 0.009376 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 1 ft

Pipe Radius, **r** = 0.5 ft

Circ. Segment Height, **h** = 0.070 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 0.76 ft²

Wetted Perimeter, **P** = 2.6 ft

Hydraulic Radius, **R** = 0.29 ft

Discharge, **Q** = 3.59 cfs

Equations used for calculations:

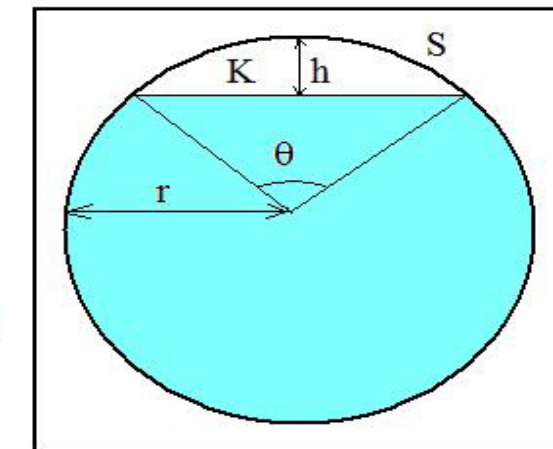
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad (\text{hydraulic radius})$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad (\text{Manning Equation})$$

$$V = Q/A$$



Partially Full Pipe Flow Calculations Pipes > 1/2 Full

Partially Full Manning

roughness, $n =$

0.013

Ave. Velocity, $V =$

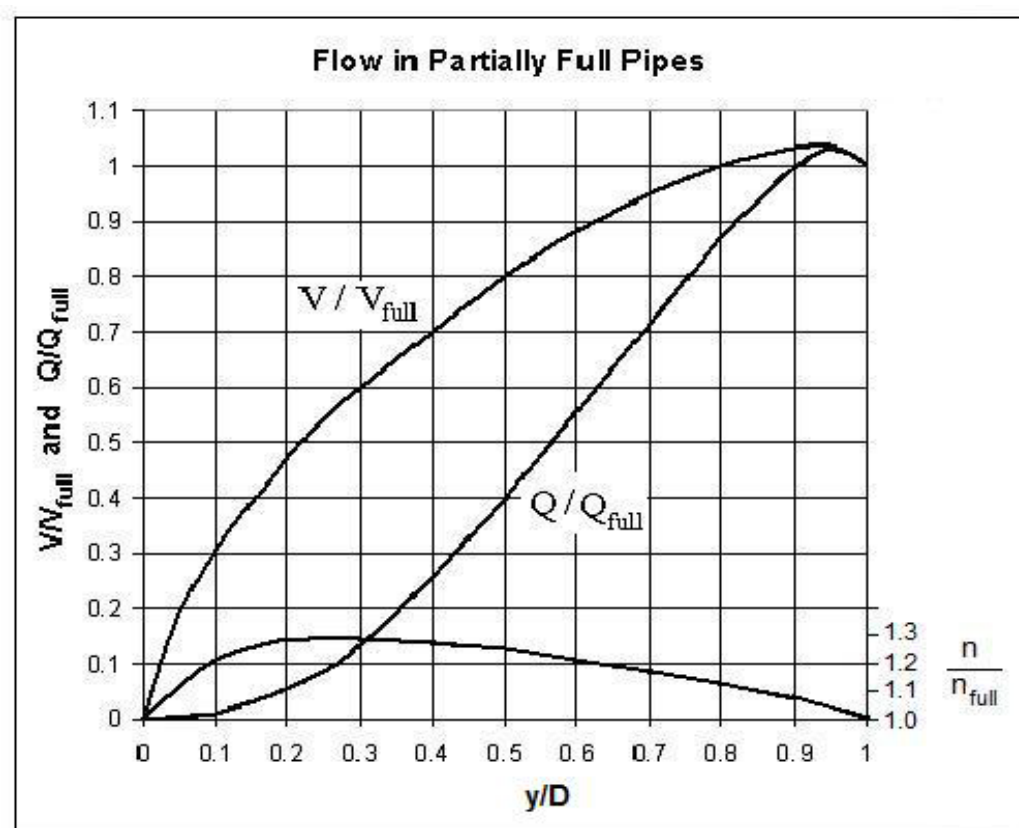
4.72

ft/sec

pipe % full $[(A/A_{full}) * 100\%] =$

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)



WALLACE WETLAND - 12" SE CLAY TILE - EXISTING SLOPES											
<i>POINT #</i>	<i>TOPO REF. #</i>	<i>TOP OF TILE ELEV.</i>	<i>PIPE Ø (IN.)</i>	<i>WALL THICK. (IN.)</i>	<i>CALC. INVERT</i>	<i>EST. DIST. BTW PTS.</i>	<i>CALC. SLOPE</i>	<i>PIPE TYPE</i>	<i>GROUND SHOT</i>	<i>GROUND COVER</i>	<i>NOTES</i>
1	30011	1198.87	12	1	1197.79	-		Clay	1200.40	1.53	
2	30008	1192.71	12	1	1191.63	498.27	0.012363	Clay	1196.55	3.84	GS From Combined Surface
3	30007	1192.22	12	1	1191.14	61.48	0.007916	Clay	1196.05	3.83	GS From Combined Surface
4	30036	1191.32	12	1	1190.24	115.08	0.007850	Clay	1194.80	3.48	
						AVG. SLOPE	0.009376		AVG. COVER	3.17	



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Appendix A-12
Tile #4 Calculations



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Partially Full Pipe Flow Calculations Pipes > 1/2 Full

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04/2020

Sheet 1 of 2

Natural Resources Conservation Service

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 15 in

Depth of flow, **y** = 13.95 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.012

Channel bottom
slope, **S** = 0.0014 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 1.25 ft

Pipe Radius, **r** = 0.625 ft

Circ. Segment Height, **h** = 0.088 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 1.19 ft²

Wetted Perimeter, **P** = 3.3 ft

Hydraulic Radius, **R** = 0.37 ft

Discharge, **Q** = 2.73 cfs

Equations used for calculations:

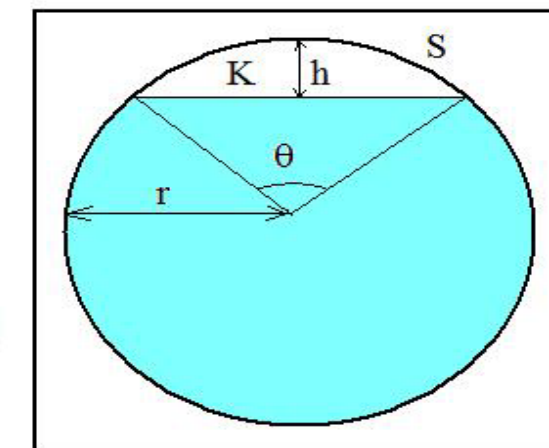
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad (\text{hydraulic radius})$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad (\text{Manning Equation})$$

$$V = Q/A$$



Partially Full Pipe Flow Calculations Pipes > 1/2 Full

Partially Full Manning

roughness, $n =$

0.012

Ave. Velocity, $V =$

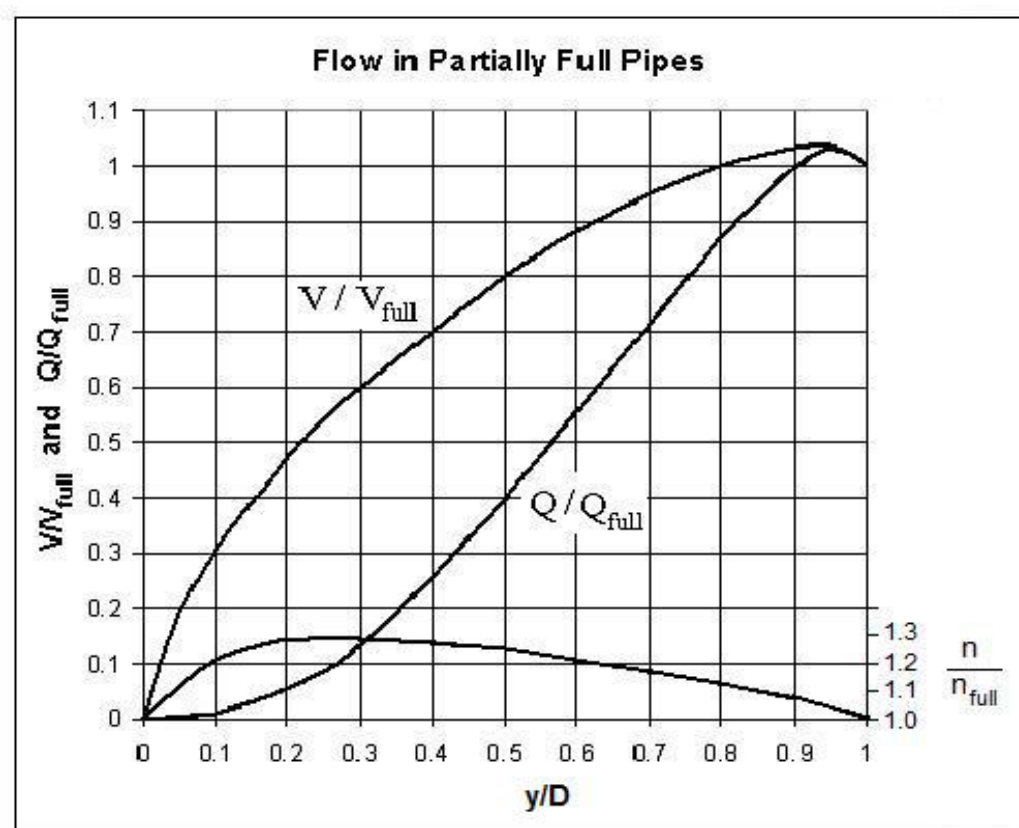
2.29

ft/sec

pipe % full $[(A/A_{full}) * 100\%] =$

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)





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Natural Resources Conservation Service

Partially Full Pipe Flow Calculations Pipes > 1/2 Full

MDNRCS-ENG
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04/2020

Sheet 1 of 2

Landowner: *****	Project: *****	Field: *****
County: *****	State: *****	Tract ID: *****
By: *****	Date: *****	Checked: *****
Subject: *****		Date: *****

Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V

for pipes more than half full

Instructions: Enter values in blue boxes. Spreadsheet calculates values in yellow boxes

Inputs

Pipe Diameter, **D** = 12 in

Depth of flow, **y** = 11.16 in
(must have $y \geq D/2$)

Full Pipe Manning
roughness, **n_{full}** = 0.013

Channel bottom
slope, **S** = 0.005355 ft/ft

Calculations

n/n_{full} = 1.035

Calculations

Pipe Diameter, **D** = 1 ft

Pipe Radius, **r** = 0.5 ft

Circ. Segment Height, **h** = 0.070 ft

Central Angle, **θ** = 1.07 radians

Cross-Sect. Area, **A** = 0.76 ft²

Wetted Perimeter, **P** = 2.6 ft

Hydraulic Radius, **R** = 0.29 ft

Discharge, **Q** = 2.72 cfs

Equations used for calculations:

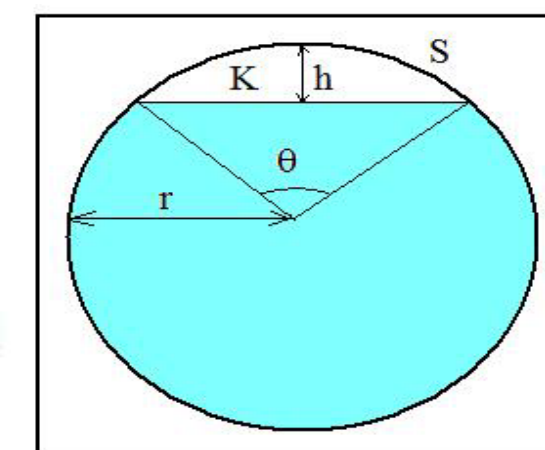
$$r = D/2$$

$$h = 2r - y$$

$$\theta = 2 \arccos \left(\frac{r - h}{r} \right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin \theta)}{2}$$

$$P = 2\pi r - r * \theta$$



Partially Full Pipe Flow Parameters
(More Than Half Full)

$$R = A/P \quad \text{(hydraulic radius)}$$

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2}) \quad \text{(Manning Equation)}$$

$$V = Q/A$$



Partially Full Pipe Flow Calculations
Pipes > 1/2 Full

Partially Full Manning

roughness, $n =$

0.013

Ave. Velocity, $V =$

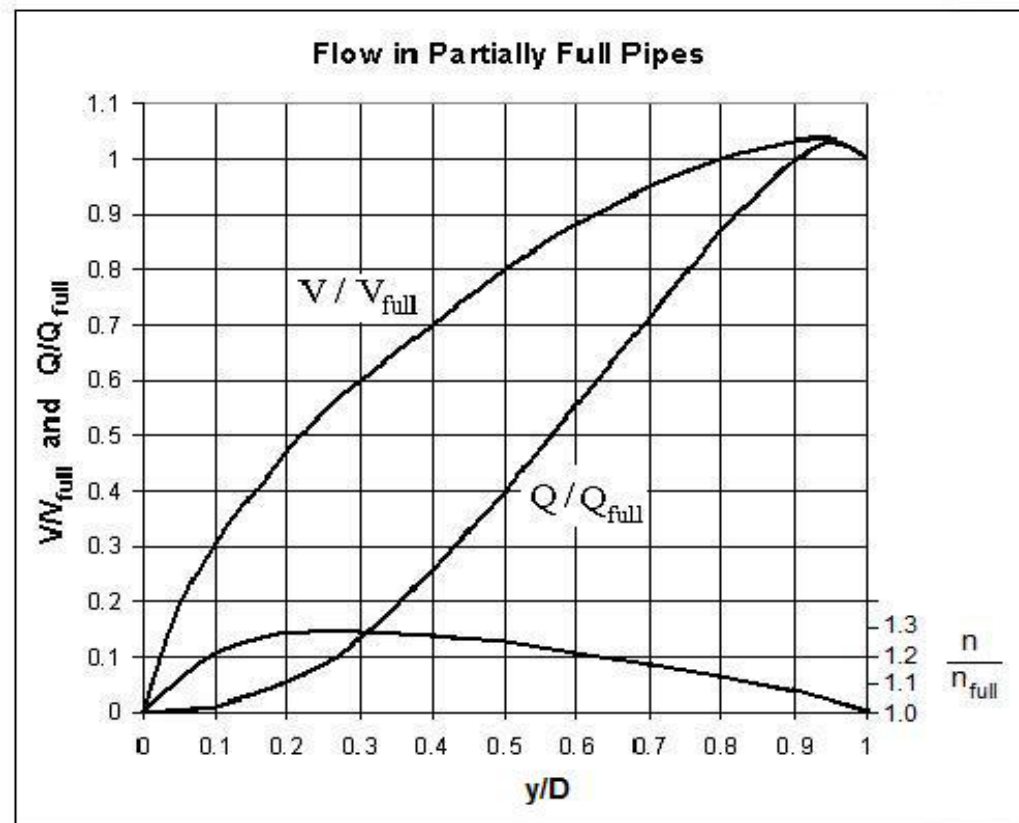
3.57

ft/sec

pipe % full $[(A/A_{full}) * 100\%] =$

96.9%

Equation used for n/n_{full} : $n/n_{full} = 1.25 - (y/D - 0.5) * 0.5$ (for $0.5 \leq y/D \leq 1$)



WALLACE WETLAND - 12" SOUTH CLAY TILE - EXISTING SLOPES											
POINT #	TOPO REF. #	TOP OF TILE ELEV.	PIPE Ø (IN.)	WALL THICK. (IN.)	CALC. INVERT	EST. DIST. BTW PTS.	CALC. SLOPE	PIPE TYPE	GROUND SHOT	GROUND COVER	NOTES
1	31001	1199.53	7	1	1198.86	-		Clay	1203.50	3.97	
2	30055	1197.23	8	1	1196.48	321.72	0.007408	Clay	1201.17	3.94	GS from Lidar Surface
3	30054	1195.74	12	1	1194.66	394.97	0.004616	Clay	1199.80	4.06	
4	30051	1195.57	12	1	1194.49	83.43	0.002038	Clay	1199.70	4.13	GS from Combined Surface
5	30020	1194.91	12	1	1193.83	111.95	0.005866	Clay	1197.40	2.49	
6	30022	1192.91	12	1	1191.83	360.35	0.005550	Clay	1195.10	2.19	
7	30025	1187.60	12	1	1186.52	610.1	0.008703	Clay	1191.70	4.10	
						AVG. SLOPE	0.005697		AVG. COVER	3.55	
					12" AVG. SLOPE		0.005355				



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Appendix A-13
Stilling Basin Riser Calculations

- MAX CAPACITY OF EXISTING 14" ϕ CLAY TILE = 3.85 CFS
- DESIGN RISER SO THAT FULL FLOW INTO EXISTING 14" ϕ PIPE OCCURS WITH 1' OF HEAD OVER RISER RIM

• WEIR FLOW RISER, $Q = C_w L h_r^{3/2}$

$C_w = 3.1$

$L = \pi d = \pi \cdot 1.5' = 4.71' \quad (18" \phi \text{ RISER})$

$h_r = 1.0'$

$Q = 14.6 \text{ CFS} \gg 3.85 \text{ CFS} \quad \text{O.K.}$



DESIGN NOTES

PROJECT IA-340-B - PETERSON

SUBJECT RISER/INTAKE DESIGN (STILLING BASIN)

FILE NO. _____ DATE 2-12-24

BY A.S. CHECKED _____ SHEET 1 OF 1



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Appendix A-14
Sediment Accumulation Calculations

DU PROJECT NO.: IA-340-8
IDALS PROJECT NO.: Wri922420D
DESIGNED BY: A.S.
DATE: 2/12/24

SEDIMENT ACCUMULATION

CONTRIBUTING DRAINAGE AREA ¹ :	627.2	ACRES	0.980	SQMI
STORAGE VOLUME AT NWL ¹ :			7.19	AC-FT
TRAP EFFICIENCY ² :			90	PERCENT
AVG. ANNUAL SHEET AND RILL EROSION ³ :			5.0	TONS/AC/YR
AREA OF DEPRESSIONS NOT SUBJECT TO SEDIMENT DELIVERY ¹ :			0	ACRES
AREA SUBJECT TO SHEET AND RILL EROSION ¹ :			627	ACRES
AVG. ANNUAL SHEET AND RILL EROSION:			3,136	TONS/YR
DELIVERY RATIO ² :			6.5	PERCENT
SHEET AND RILL EROSION DELIVERED TO SITE:			204	TONS/YR
ADJUSTMENT FOR LRA 103 ⁴ :			1.3	FACTOR
ADJUSTED SHEET AND RILL EROSION DELIVERED:			265	TONS/YR
LENGTH OF GULLY EROSION ¹ :			0	FT
AVG. ANNUAL GULLY EROSION RATE ² :			0.00	FT ³ /FT
IN-PLACE DENSITY OF GULLY MATERIAL ² :			90	LB/FT ³
AVG. ANNUAL GULLY EROSION (100% DELIVERED):			0	TON/YR
TOTAL SEDIMENT DELIVERED:			265	TON/YR
WEIGHT OF SEDIMENT RETAINED IN WETLAND AT	90	PERCENT TRAPPED:	238	TON/YR
SEDIMENT ACCUMULATION DURING	150	YEAR PERIOD:	35,774	TONS
ESTIMATE	80	PERCENT OF DELIVERED SEDIMENT WILL BE SUBMERGED ⁵ :	28,619	TONS
VOLUME OF SUBMERGED SEDIMENT ⁵ AT	1,307	TON/AC-FT ² :	21.90	AC-FT
NORMAL POOL VOLUME	7.192	AC-FT	WETLAND STORAGE EXCEEDED	
ESTIMATE	20	PERCENT OF DELIVERED SEDIMENT WILL BE AERATED ⁵ :	7,155	TONS
VOLUME OF AERATED SEDIMENT ⁵ AT	1,742	TON/AC-FT ² :	4.11	AC-FT
WETLAND SEDIMENTATION ACCUMULATION DESIGN STORAGE LIFE:			49	YEARS

REFERENCES:

- ¹ DETERMINED BY ENGINEER.
- ² NRCS, FIELD OFFICE TECHNICAL GUIDE, IOWA, "EROSION AND SEDIMENT DELIVERY", MARCH 1998.
- ³ NATIONAL ACADEMICS PRESS, "SOIL CONSERVATION", CHAPTER 1, PG. 8.
- ⁴ NATIONAL ACADEMICS PRESS, "SOIL CONSERVATION", CHAPTER 3, PG. 51.
- ⁵ NATIONAL ENGINEERING HANDBOOK, CHAPTER 8, SEDIMENT-STORAGE DESIGN CRITERIA.



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Appendix A-15
FEMA Flood Map

National Flood Hazard Layer FIRMette



93°42'28"W 42°46'5"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

93°41'50"W 42°45'38"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **6/2/2022 at 2:25 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



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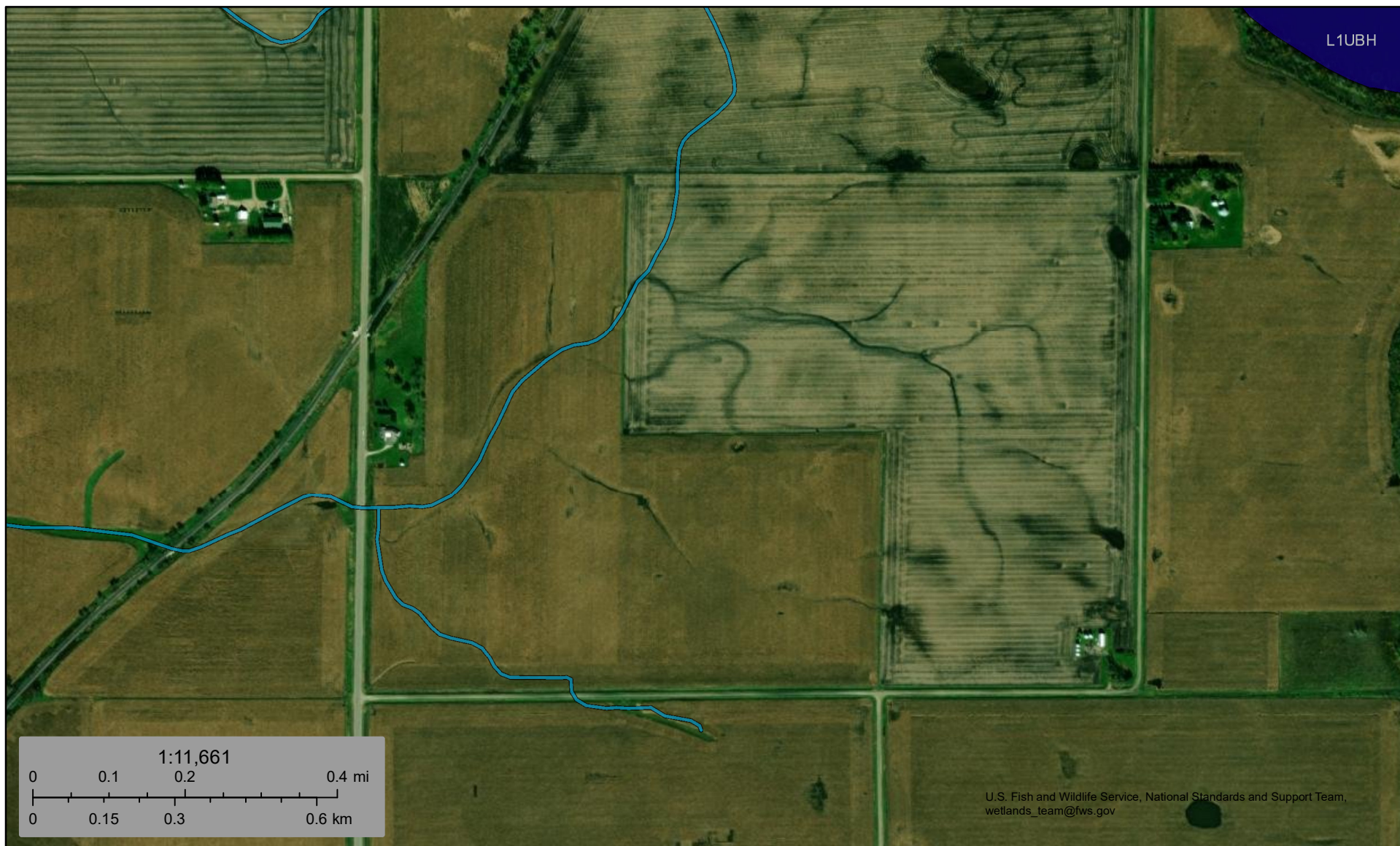
Appendix A-16
FWS Wetland Inventory Map



U.S. Fish and Wildlife Service

National Wetlands Inventory

IA-340-8 - FWS Wetland Inventory Map



February 12, 2024

Wetlands

	Estuarine and Marine Deepwater		Freshwater Emergent Wetland		Lake
	Estuarine and Marine Wetland		Freshwater Forested/Shrub Wetland		Other
			Freshwater Pond		Riverine

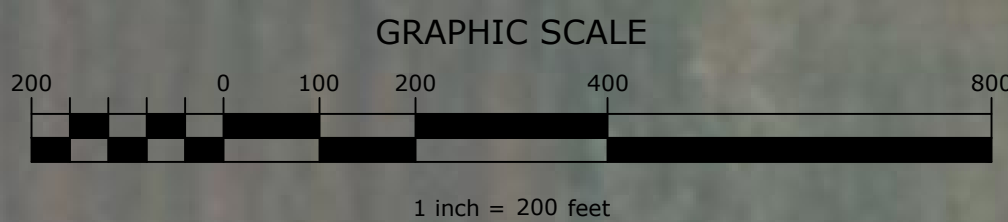
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



GREAT LAKES/ATLANTIC REGION
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Dexter, MI 48130
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Appendix A-17
DU Survey Points Visual Map

C:\Users\aschippers\Ducks Unlimited Incorporated\Iowa - Iowa\02_C3D Projects\IA-340-2 CREP Projects\WRIGHT PETERSON\C3D DRAWING\Wright-Peterson-Base.dwg, 9/19/2024 9:24 AM, Andrew Schippers, Topo, None



NOT FOR CONSTRUCTION