DRAFT STORMWATER REPORT
STH 11 (DURAND AVENUE) AND
CTH J (ENGLISH SETTLEMENT AVENUE)
BURLINGTON, RACINE COUNTY

Project I.D. 1320-07-03

September 2021

Prepared by:

M Squared Engineering, LLC

N19 W6719 Commerce Ct.
Cedarburg, Wisconsin 53012
P: (262) 376-4246
msquared@msquaredengineering.com

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INTRODUCTION

M Squared Engineering LLC (**M²**) has been retained by WisDOT, as a subconsultant to Ayres and Associates, to develop a stormwater report and perform a storm sewer system analysis for the proposed roundabout construction at the intersection of STH-11 (Durand Avenue) and CTH J (English Settlement Avenue) just east of Burlington in Racine County (WisDOT Project No. 1320-07-03).

The project consists of the reconstruction of an existing stop-controlled intersection with a new roundabout to improve traffic operation and enhance safety. There is no change to the number of through travel lanes along either roadway. However, the lane widths will change slightly and the amount of impervious surface within the intersection will increase slightly. The reconstruction of the road includes minor changes to the roadway profile, minimizing any changes to existing drainage patterns along the corridor.

A site location map for the project is included in Figure 1 – Project Location Map. The purpose of this report is to provide stormwater management design calculations and drainage system analysis results along the project corridor for the proposed project. The existing and proposed drainage systems drain to the same individual outfall location in both the existing and proposed conditions, which ultimately drains south to the Hooser Creek Canal.

Figure 1 – Project Location Map

METHODOLOGY

The methodology used in developing this stormwater management plan is as follows:

1. Define existing outfall locations for the project corridor.
2. Delineate/confirm drainage and watershed boundaries.
3. Identify requirements to comply with TRANS 401.
4. Perform stormwater quantity/peak flow calculations (if necessary).
5. Perform drainage system analysis for inlet spread and pipe sizing.
6. Prepare WisDOT stormwater spreadsheets.
7. Summarize the calculations for approval from the WDNR and WisDOT.

Data utilized in this project are noted below.

1. Field survey data provided by various sources.
2. Racine County GIS Mapping / Contours.
3. NRCS Soil Survey for Racine County.
4. Aerial photographs of Racine County.
5. Regulatory FEMA Floodplain Maps.
6. AutoDesk Storm and Sanitary Analysis Software.

The hydrologic analysis was performed in AutoDesk Storm and Sanitary Analysis (SSA) 2020 software using the SCS TR-55 hydrologic method. This was done for each individual drainage basin within the project limits for both the existing and proposed conditions. This allows for the comparison of existing and proposed peak flows draining to each outfall to see where peak flows and headwater elevations are changing. This was also used to check the function of existing and proposed culverts, inlets and storm sewer pipes. In addition, the "hydrodynamic" modeling option was used for the link routing as it provides better modeling results for systems that contain storage nodes, ponding of water and overtopping weirs.

Time of Concentrations (Tc) were developed using the Kirpich Method, which is conservative and simplifies the Tc calculations. However, for several of the large drainage areas that encompass large tracts of farmland, the TR-55 method (using WinTR-55) was utilized to calculate the Tc to ensure the accuracy of the model. The minimum Tc used was 5 minutes. The rainfall utilized was obtained from the Racine County tables using SCS Type II 24-hour distributions in the design software. The hydrologic soil group is primary Type C throughout the project corridor based on the NRCS Web Soil Survey. The NRCS Web Soil Survey data can be found in **Appendix I**.

HYDROLOGIC ANALYSIS

The hydrologic analysis was performed using two individual SSA models. One model covered the existing conditions and one covered the proposed conditions. These models were developed to compare the drainage area, Tc, and runoff curve number changes for each subbasin and the overall outfall drainage area. These models were also used to compare the overall function of the two models, considering system configuration, ditch profiles and cross sections, storage nodes (for ponding of water in various locations) and overtopping weirs. Weirs were used to simulate overtopping of driveways, roads or other site features. This was done to determine how the proposed project affects the overall runoff from the project site.

The rainfall depths (See Table 1) found in the SSA software for Racine County, which come from the WisDOT Civil 3D 2020 resource file package, were used with the SCS Type II distribution for the modeling and are as follows:

Table 1 – Rainfall Depths

Storm (24 Hour)	Rainfall Depth
2-Year	2.7"
10-Year	4"
25-Year	4.6"
100-Year	5.6"

Subbasin drainage areas and the overall watershed drainage area to the outfall point were identified and mapped based on available survey data and Racine County GIS contours where necessary. The most hydraulically remote points were determined for each subbasin for use with the Tc calculations, and the flow paths from these locations were traced. Where TR-55 was utilized for the Tc calculations, stretches where the flow would go through sheet flow, shallow concentrated flow, and channelized flow were noted and accounted for. The slopes and manning's roughness for each stretch were determined, and the flow times for each stretch were computed and totaled together to get the total time of concentration for each flow path. Small drainage areas that primarily drain pavement did not have Tc developed as it was anticipated that these would just have a 5 minute time of concentration (the minimum Tc used). Minor changes to the Tc values can be seen due primarily to the proposed slope changes for ditches and pipe networks along the project corridor.

Table 2 shows the drainage areas and runoff coefficients for the overall site drainage area for existing and proposed conditions. Because of the large off-site areas that drain through the project limits, there is no ultimate change to the overall drainage area. However, there is a small change in the CN for the overall site due to the increase in impervious surface resulting from the proposed roundabout construction. In addition,

the Tc was broken down by subbasin and is not shown here. However, due to the site area and topography, the flow path that makes up the Tc for the overall watershed does not pass through the project site and is not impacted by the proposed project (there is no change to the Tc for the watershed).

Table 2 – Basin Areas

Basin	Area (ac)	CN
Existing	201.84	84.78
Proposed	201.84	88.44
% Change	0.00%	4.32%

The total drainage area flowing to the project outfall did not change between the existing and proposed conditions. In addition, the Tc for the major drainage subbasins did not change between the existing and proposed conditions, as the flow paths were based on off-site areas and were not impacted by the ditch modifications adjacent to the intersection.

The small change to the CN value for the watershed did result in a small increase in the overall flow produced by the watershed. However, this small increase was mitigated through the use of carefully designed culvert and storm sewer pipe sizes, and the use of wide flat bottom ditches to help slow the flow and detain the water prior to the discharge at the outfall point.

Appendix B contains the proposed roundabout plans. Drainage maps that show the Tc flow paths, the outfall point and the subbasin drainage boundaries can be found in **Appendix C** for the existing conditions and **Appendix D** for the proposed conditions.

Appendix E and **Appendix F** contains the SSA modeling results for the pre- and post-construction conditions.

Table 3 below shows the peak flows to the project outfall that were calculated for both the existing and proposed conditions, along with the percent change from existing to proposed.

Table 3 – Summary of Pre and Post Construction Flows

Storm	Existing Peak Flow	Proposed Peak Flow	Change in Peak Flow	% Change
2 Year	62.59	67.09	4.50	7.2%
10 Year	118.19	112.56	-5.63	-4.8%
25 Year	143.27	137.85	-5.42	-3.8%
100 Year	177.00	174.57	-2.43	-1.4%

The 10-year, 25-year and 100-year storms all see a reduction in peak flow. This is due to the widening of some of the ditches around the project site, along with changes to culvert pipe profiles. The 2-year storm does see a slight increase in the peak flow rate. This increase is also due to drainage system (ditch and pipe) changes within the intersection. However, this increase is small by comparison to the capacity of the receiving channel.

An evaluation will be made between the 60% plan submission and the 90% plan submission to determine if measures can be implemented into the project to reduce this overall peak flow rate increase for the 2-year storm. However, it is not believed at this time that this small increase will cause any adverse effects to the downstream receiving channel.

HYDRAULIC ANALYSIS

The hydraulic analysis was performed in SSA but was supplemented for various components by other programs such as Hydraflow Express and WinTR-55. An existing and proposed model were developed. Since there is only one outfall for the project, the model reflects this. The model was analyzed using the Hydrodynamic mode of the software because of the number of storage nodes, flat or back-pitched pipes in the existing condition and the number of overflow spillways that drain various low points in different direction. The tailwater boundary condition type of "normal" was used at the outfall in SSA to function as the assumed tailwater. This provides a reasonable analysis method for the systems. A detailed description of the existing conditions and how the proposed conditions varied from the existing is included in the following sections.

Existing Conditions

The existing conditions were carefully reviewed to ensure the modeling that was performed was as accurate as was practical. The project survey data, county GIS data, Google Earth / Street View and a project site visit were all used to help refine the models to ensure that the existing conditions were accurately modeled. Some of the unique aspects of the existing site conditions that bear particular impact on the modeling are described below.

Farmland and Drain Tiles

The overall drainage area to the outfall for the project includes a significant amount of farmland that drains toward the roads, along the ditches and through the culverts that are within the project limits or just outside the project limits. Based on input from local residents, some of this farmland does have drain tiles installed. The current modeling does not take into effect the impacts that these drain tiles would have on the overall site runoff. The effect of the drain tiles on the overall runoff volumes that drain into the

project site is currently being evaluated and the modeling will be updated in the future should it be determined that this would have a measurable effect on the overall hydraulics of the existing systems.

Ponding and Overflow Weirs

There are numerous locations adjacent to culverts and along the edges of the farm fields that have low points which will pond up with water during large storm events. The ponding is due to topography and undersized culverts under the roadways and driveways "throttling" the flow within the ditches. The modeling indicates that as these low points fill with water, many of them will start overtopping in different directions. Given the size of the drainage areas, large flows from the farm fields will drain towards the roadways, fill these low points, and spread out flooding sections of the farm fields, the roadside ditches and other off-site areas. These overflow locations were identified and carefully worked into the modeling based on the project design survey (supplemented with the County GIS where necessary) to ensure that the site conditions were accurately modeled.

A map showing these ponding areas and their overflow routes is included below.

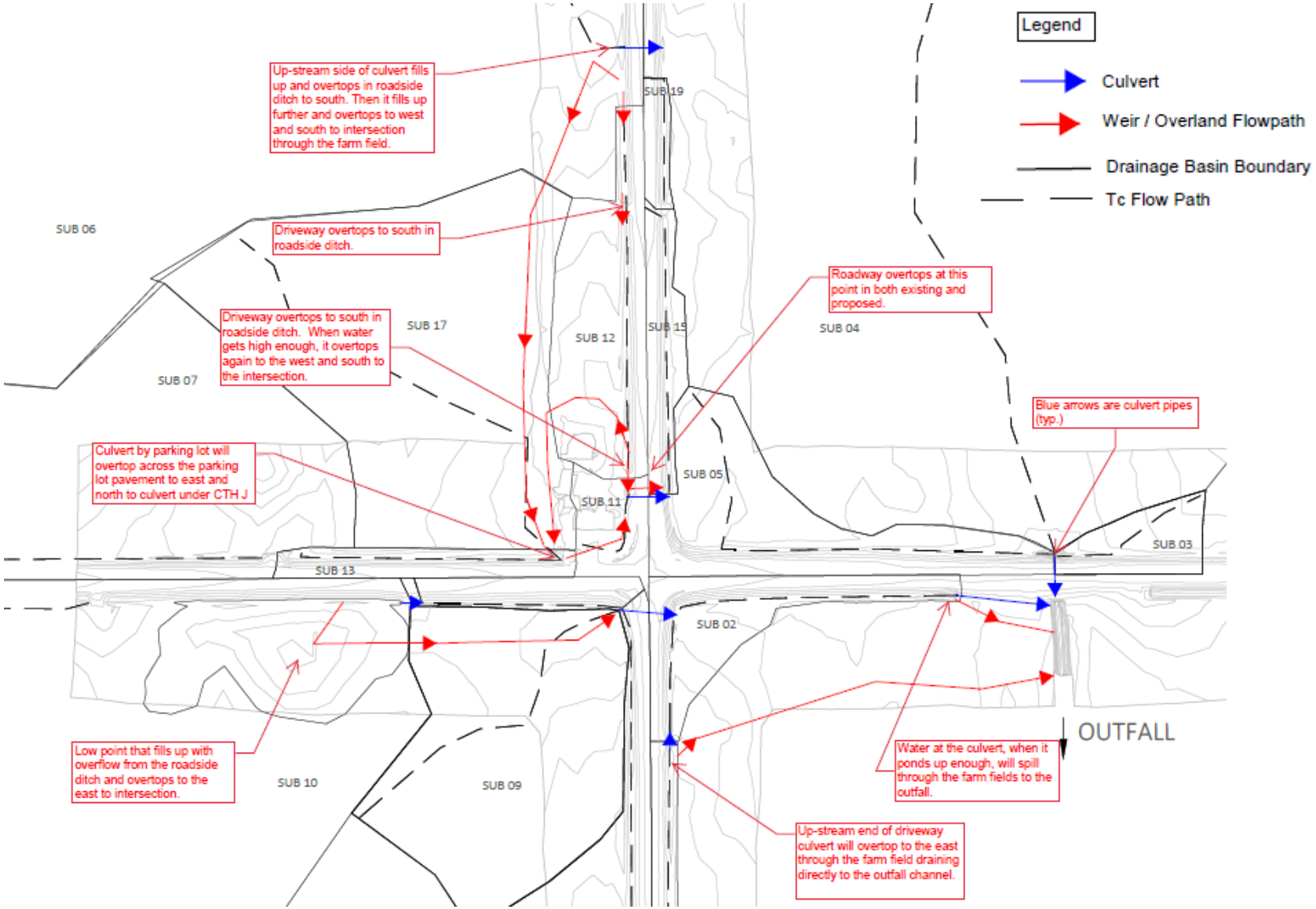


Figure 2 – Ponding and Overflow Location Map

The above graphic matches with reports that have been obtained from local residents about flooding in the area during large rain events. It also matches the sections of the farm fields that, based on aerial imagery, appear to be "wet" or have differing plant growth patterns in the farm fields likely due to prolonged inundation with water.

Roadway Overtopping

There is a low point along CTH J located just north of the intersection with STH 11. This roadway low point is at the same approximate location as an existing crossing culvert under CTH J. Based on the modeling, the roadway appears to overtop at this location in the 10-year storm and all larger storm events.

Capacity / Surcharge

The 25-year storm event was analyzed to check pipe and ditch flow capacities. During this event, the following was observed:

- There is one existing ditch located on the east leg of the intersection between the CTH J crossing culvert and the intersection that is flooded. This ditch is too shallow to convey the design flow and it overtops the ditch banks. Water then sheet flows across the fields towards the 60" pipe that passes under STH 11 to the east.
- There are five pipes that are over capacity. None of these pipes cause any significant headwater issues. They are merely over capacity due to the pipe flow going from gravity flow to pressure flow due to the headwater elevations on the upstream side.
- There are four pipes that are reported as being surcharged. Of these, one is the culvert under CTH J that results in the overtopping of CTH J because the flow to the intersection is greater than the flow capacity of the culvert. A second one is the driveway culvert immediately north of the CTH J crossing culvert, which overtops the driveway and CTH J. The other two pipes cause some additional headwater build-up at the up-stream ends of the pipes.

These are existing conditions and the intent of this description is to document them as such.

Summary

In summary, the existing condition modeling was performed to be as accurate as was practical. Given the existing site conditions and the limitations of the analysis which covers the intersection only, the results produced provide a good picture of the existing conditions. The ponding/flooding concerns in existing conditions that were raised by local residents were validated. Numerous local ponding locations will fill with water during storm events and drain to other low points until the system is balanced. During larger storm events, the ditches will overtop, the roadway will overtop and the area around the intersection will flood with water. The level of flooding at strategic points (outlined below) was documented to provide a comparison between the existing and proposed conditions.

Proposed Conditions

This project involves reconstructing the intersection of CTH J and STH 11 with a new roundabout. Given the type of project, it is not the intent of this project to solve any existing drainage issues in the area. The intent of this project is to make sure the proposed ditches, pipes and inlets meet the FDM requirements to the maximum extent practical and to ensure that any existing flooding, ponding or other issues are not made worse by the proposed project. The proposed analysis was performed with this in mind.

The proposed condition modeling used the existing condition analysis as a base and updated the elements within the intersection that will be modified by the construction of the proposed roundabout. This included modified drainage areas, CN's and Tc values only for the subbasins that were impacted by the proposed roundabout construction. New inlets were added in the intersection where needed and the culverts and pipe systems within the intersection that are impacted by construction are shown to be replaced. Minor size changes to some of the pipes was implemented to ensure the final condition did not make any of the existing flooding situations any worse. However, it was not the intent of the project to rectify the existing flooding issues and concerns or the roadway overtopping.

The ditches throughout the project limits were updated based on the latest proposed project grading to ensure the correct cross sections and slopes were used. The areas that pond water within the intersection were updated to ensure proper storage volumes were taken into consideration with the analysis. Only one of the overtopping weirs was impacted by the proposed construction and required an update; all others match the existing conditions. This is the overtopping elevation of CTH J at the low point in the roadway profile located just north of the intersection. In the proposed condition, the overtopping elevation of CH J was lowered by 0.12'. This will result in the roadway overtopping at a slightly lower elevation, causing it to occur more often than it did in the existing condition. However, this change is minor and the design team is currently evaluating ways to raise up the profile to prevent this and reduce the likelihood of overtopping. Any refinements that will improve this situation will be implemented in the modeling at a future time.

With all the proposed elements worked into the model, the analysis was performed for the various storm events to evaluate how the proposed conditions operated and how the existing headwater elevations and overtopping was impacted.

The table below compares the existing and proposed headwater elevation at several strategic points throughout the intersection. This comparison table was developed to see how the proposed project would impact the system hydraulics.

Table 4 – Headwater Comparisons

		Headwater Elevations							
		2-year		10-year		25-year		100-year	
SSA Node	Location	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.
Jun-12	SW quadrant at intersection	794.44	794.10	795.26	795.28	795.75	795.75	796.32	796.28
Jun-06	NW quadrant west of parking lot	797.11	797.09	797.68	797.63	797.93	797.81	798.03	798.00
Jun-04	NW quadrant, north of lot, at crossing culvert	796.31	796.21	797.67	797.88	798.40	799.77	798.40	799.80
Jun-05	NW quadrant, north of lot at driveway culvert	796.57	796.44	797.67	797.61	797.90	797.80	797.90	797.90
Storage	North of intersection, west side of road	797.74	797.74	797.96	797.96	798.04	798.04	798.18	798.18
Jun-01	E. of intersection, S. of STH 11 at pipe to stream	791.24	791.15	791.72	791.57	791.86	791.74	792.03	791.89
Jun-02	North side of culvert under STH 11	788.60	788.70	789.71	789.72	790.32	790.31	791.27	791.27

This analysis shows a total of four locations / storm combinations that reflect an increase in the headwater elevation from existing to proposed. These locations are marked in green in the above table. There are two additional locations, not marked in the above table, which do show an increase but the increase is less than a quarter of an inch and is not considered substantial enough to warrant a concern.

The increase in headwater for the 2-year storm for the upstream end of the culvert under STH 11 located just east of the project site is directly related to the slight increase in peak flow rate for that storm event. This increase stays entirely within the ditch banks and does not impact any adjacent properties. The other locations are adjacent to the low point in CTH J just north of the intersection. This location also sees surcharging in both the existing and proposed conditions.

The model starts to break down when there is significant surcharging in an area like this and it is not believed that the increase in headwater elevation is as significant as the modeling results show. While the model shows an increase here because the proposed roadway overtopping elevation was lowered, it is not believed that there is an increase in headwater elevation here. This is believed to be a breakdown in the hydraulic model in this location. The design team is currently evaluating ways to refine the modeling to improve the modeling reliability at this location and to improve the hydraulics in this area by adding some wider ditches or refined pipe sizes. These refinements will be made as the roundabout design progresses.

Capacity / Surcharge

The 25-year storm event was analyzed to check pipe and ditch flow capacities in the proposed condition also. During this event, the following was observed:

- There are two proposed ditches located on the east side of CTH J north of CTH 11 that are flooded. One is the same ditch as was flooded in the existing condition. The other is the ditch directly north of that one. Both these ditches are shallow and are overtaxed by the large amount of off-site drainage that flows into them from the surrounding farm fields. The small amount of increased impervious surface that does drain into these ditches does exacerbate the issue slightly. However, they will continue to operate similar in the proposed condition as they do in the existing condition, overtopping their banks and sheet flowing towards the STH 11 crossing culvert.
- There are six pipes that are over capacity in the proposed condition. They are the same pipes that were over capacity in the existing condition with one additional pipe being added because the pipe slope was reduced in the proposed conditions (the pipe size was increased to help offset this). None of these pipes cause any significant headwater issues. They are merely over capacity due to the pipe flow going from gravity flow to pressure flow due to the headwater elevation at the upstream side of the pipe.
- There are four pipes that are reported as being surcharged. These are the same four pipes that are surcharged in the proposed condition. Of these, one is the culvert under CTH J that results in the overtopping of CTH J because the flow to the intersection is greater than the flow capacity of the culvert. A second one is the driveway culvert immediately north of the CTH J crossing culvert, which overtops the driveway and CTH J. The other two pipes cause some additional headwater build-up at the upstream ends of the pipes, but the proposed condition is no worse than the existing condition indicating that the proposed project does not have any adverse effect on the existing site conditions.

In addition to these pipes, there are several nodes that do surcharge in the 25-year and 100-year storms. In the existing condition, the only node that surcharges is the one that causes the overtopping of CTH J. In the proposed condition, there are several others that do surcharge, primarily due to grading changes from the proposed intersection construction. Some of these surcharging issues are a result of model instability and some may be the result of the minor grading changes caused by our project. As the roadway design and ditch grading is finalized, this will be reevaluated to refine the modeling and determine if any of these issues can be resolved through refinements or improvements to the drainage system. Fully solving the surcharging issues or the overtopping of CTH J is out of the scope of this intersection improvement project.

Summary

The intent of this project is to minimize any adverse impacts to the existing conditions by the proposed project. Two ditches are shown as being flooded but this is due to the large off-site drainage areas that flow into the roadside ditches. The proposed

condition is similar to the existing. The pipe surcharging and capacity deficiencies are no worse than the existing condition. The only adverse impact that this project appears to have is on the overtopping of CTH J, which is slightly worse in the proposed condition due in part to the increase in impervious surface and in part due to the lowering of the low point on CTH J. While the impacts are minor, this will be evaluated further in the coming design stages to determine if this can be remedied.

The proposed condition design and modeling will continue to be evaluated to refine the modeling and to see if there are ways that we can minimize the adverse impacts that the proposed condition appears to have on various components of the site. Should a reasonable method of estimating the drain tile flows and their impact on the surface drainage be determined, it is expected that the time of concentration and likely, the overall runoff from those drainage areas will be reduced. This, in turn, will result in lower flooding levels (both in existing and proposed conditions) and a model that operates better with less instability. However, estimating these flows and the impacts of drain tiles when no data about the drain tiles (location, size, slope, etc.) is available is a challenge. To the maximum extent practical, this will be worked into the model during future iterations.

Inlet Spread

The proposed roundabout project has two inlets located along the inside of the roundabout travel lane at a low point to drain the runoff from the center of the roundabout. These two inlets were analyzed to ensure that the proposed spread falls within the allowable half of the travel lane during the 10-year storm event. These two inlets were analyzed for spread with SSA and the results can be found in **Appendix G**. Both of these inlets fall within the allowable spread criteria.

In addition, there is curb and gutter around the exterior edges of the roundabout, which will drain away from the roundabout to flumes that will convey the runoff into the roadside ditch. Spread calculations at the end of each of these curb runs was calculated to ensure that the WisDOT spread criteria was met. The 10-year flow from the SSA models was used in Hydraflow Express to calculate the spread for each of these sections of curb and gutter. All of these sections were found to be in compliance with the WisDOT spreads requirements. The results of this analysis can be found in **Appendix H**.

Additional Considerations

There are several additional considerations that were reviewed and accounted for in some fashion. These considerations ultimately did not change or affect the analysis or stormwater report but should be noted as they do affect ultimate design decisions.

Future Development

Future development within the project site area was not taken into consideration with the proposed analysis. There are no signs of existing development extending to this location and there are no known future developments are within the project site area.

Floodplains

There are no known floodplains within the project limits. A FEMA FIRMette showing the floodplain boundaries and other pertinent data at this location is included in **Appendix K**.

Wetlands

There are some existing wetlands located within the project limits. These were delineated by the project team and can be seen on the plans and in **Appendix J**, which contains the Wisconsin DNR Surface Water Data Viewer map showing the mapped wetlands. Some minor impacts to some of the pocket wetlands is anticipated but the wetlands will not impact the proposed drainage or stormwater management design.

WATER QUALITY TREATMENT ANALYSIS

This project was carefully reviewed against the TRANS 401 requirements. Based on this review, it is believed that this project is exempt from TRANS 401 storm water quality requirements because it is defined as a minor reconstruction of a highway. Under TRANS 401(3)(f), post-construction performance standards under Trans 401.106 do not apply to a project with "…any length of highway that does not widen the roadbed by more than 100 feet, and for which the total length of relocated highway and any added through travel lane does not exceed 1.50 miles." This project does not meet these minimum widening or new travel lane length requirements.

As a result of this, no water quality requirements need to be met by this proposed project. However, it should be noted that several of the existing roadside ditches will be widened into flat bottom ditches, which will function as grass swales providing some water quality benefit to the watershed. Since water quality treatment is not required, calculations to document these benefits have not been performed.

BUFFER AREAS

TRANS 401 also states that "…if minor reconstruction causes a highway to lie within a buffer area, as defined in s. Trans 401.106(6)(a), or increases the area of the roadway that lies within a buffer area, the requirements under Trans 401.106(6) apply to that buffer area." This project does impact several buffer areas (consisting of existing

wetland pockets) and encroaches on some isolated wetlands in a few locations. These impacts/encroachments are primarily related to roadway fill being placed for improved foreslopes or for slightly realigned travel lanes entering or exiting the roundabout. As a result, it is the intent that this project will comply with Trans 401.106(6) for those areas that are in or immediately adjacent to the buffer areas. This will primarily consist of the establishment of a good standing of permanent vegetative cover upon completion of construction. In addition, the ditch foreslopes will function as vegetative buffer strips to help filter water and reduce pollutants from entering the adjacent wetlands.

CONCLUSIONS

This report presents the Stormwater Management Plan for the STH 11 and CTH J Roundabout project planned for Racine County. This report is prepared in accordance with local, state, and federal engineering guidelines.

There will be some refinements to the analysis and the proposed report as the roundabout design progresses.

This project meets or exceeds the requirements of the WisDOT and WDNR with respect to stormwater management and the WisDOT FDM requirements to the maximum extent practical.

Appendix A – WisDOT Stormwater Spreadsheets

Basic Project Information

Project ID: 1320-07-03
Title: STH 11 and CTH J Roundabout
Designer/Checker: David Bachhuber
DOT Region/Firm Name: M Squared Engineering LLC
Date: 9/24/2021

HIGHWAY:	STH 11 and CTH J
LIMITS:	600' from intersection in each direction
COUNTY:	Racine County
DESCRIPTION OF WORK:	Roundabout construction
PROJECT MANAGER:	
PS&E DATE:	November 1, 2023
DESIGN STAGE	☐ **Planning** ☐ **30%** ☑ **60%** ☐ **90%** ☐ **Final**

Drainage Summary

IS THERE A SIGNIFICANT FLOW INCREASE OR DECREASE WITHIN ANY SUB BASIN OF THE PROJECT? IF YES, DESCRIBE THE CAUSE OF THE CHANGE AND WHY IT IS NECESSARY.

There is no significant flow increase or decrease as a result of this project.

IS THERE A SIGNIFICANT IMPERVIOUS AREA CHANGE TO ANY SUB BASIN OF THE PROJECT? IF YES, DESCRIBE THE CAUSE OF THE CHANGE AND WHY IT IS NECESSARY.

There is an increase in impervious surface resulting from the construction of the new roundabout to replace the existing stop controlled intersection. The increase in impervious surface is less than 1 acre and, by comparison to the entire drainage area, is only a small portion of the overall watershed. As a result, there is no significant impervious area change as a result of this project.

HAVE THE DRAINAGE SUB BASIN AREAS OR FLOW PATHS CHANGED SIGNIFICANTLY? IF YES, DESCRIBE THE CAUSE OF THE CHANGE AND WHY IT IS NECESSARY.

No.

DESCRIBE THE PROPOSED DRAINAGE CONVEYANCE AND CONTROL SYSTEMS FOR THE PROJECT.

The proposed drainage conveyance involved ditches along the roadside which drain to the east toward an existing outfall channel that flows south through the existing farm field. The drainage does pass through several culverts which convey the runoff under driveways and under the roadway to the outfall channel.

DESCRIBE THE AQUATIC ORGANISM PASSAGE ISSUES FOR THE PROJECT, IF ANY.

N/A

IF THE DESIGN DOES NOT MEET THE DOT FDM CHAPTER 13 DRAINAGE REQUIREMENTS, EXPLAIN HOW AND WHY.

There are several elements of the design that do not meet Chapter 13 requirements. The full stormwater report has a description of each. They are as follows:

- The north leg of the proposed roundabout will overtop during the 10-year storm and all larger storm events. This is an existing condition that will not be resolved by this project. The exact amount of overtopping will be dictated by how much of the farm field watershed is drainage by drain tiles; this is still being evaluated.
- There are two roadside ditches that will overtop during the 10-year storm event. This is due to the surrounding topography limiting the depth of the ditches and the large farm fields that drain toward and into the roadside ditches. This is an existing condition that will be improved by this project but not brought into compliance.
- There are several pipes and culverts that are over capacity in the 25 year storm event. These should not be an issue as many are due to the ditch flow depths in the upstream and downstream ditches or tailwater conditions.

As the roadway design is refined in the coming months, the analysis will be updated and it is the hope that some of these items that do not meet the Chapter 13 requirements are brought into compliance.

DESCRIBE WDNR COORDINATION. PROVIDE NAME OF WDNR CONTACT AND DATE, AND ATTACH ANY CORRESPONDENCE.

No WDNR coordination has take place to-date.

IF THE DRAINAGE DESIGN MEETS LOCAL, MUNICIPAL OR REGIONAL GUIDELINES THAT EXCEED FDM CHAPTER 13 DRAINAGE REQUIREMENTS, EXPLAIN HOW AND WHY.

N/A

IF A SIGNIFICANT IMPACT TO THE PROJECT OCCURS DUE TO DRAINAGE, PROJECT MANAGER CONCURRENCE IS REQUIRED. (PM SIGN AND DATE)

N/A

Drainage Data

Project ID: 20-730-184
Title: STH 11 and CTH J, City of Burlington
Designer/Checker: David Bachhuber
DOT Region/Firm Name:
Date: 9/24/2021

Section 1: OUTFALL INFORMATION (all projects)

Outfall number	1	2	3	4	5
Outfall discharges to:	Ditch				
Waterway crossing type	Culvert	DD Menu	DD Menu	DD Menu	DD Menu
Previous flooding issues or flow restrictions?	Yes	DD Menu	DD Menu	DD Menu	DD Menu
Is the drainageway a navigable waterway?	No	DD Menu	DD Menu	DD Menu	DD Menu
Waterway designation, if any	N/A	DD Menu	DD Menu	DD Menu	DD Menu

Section 2: BASIC SUB BASIN DRAINAGE INFORMATION (all projects)

Outfall number	1	2	3	4	5
Outfall station	217+56' EB				
Flood design frequency (yrs)	25				
Check design frequency (yrs)	100				
Drainage area (acres)	201.84				
Hydrologic Method	TR-55				
Time of Concentration (min)	See Analysis				
C or CN	See Analysis				
Rainfall intensity (in/hr) (rational method only)	N/A				
Rainfall depth for design storm (in)	4.6				
Design peak flow rate (cfs)	143.27				
Check peak flow rate (cfs)	177				
Hydraulic Design software	Storm and Sanitary Analysis 2020				

29	**Section 3: URBAN/TRANS 401 PROJECTS**					
30	Outfall number	**1**	**2**	**3**	**4**	**5**
31	DOT right-of-way area (ac)	6.46				
32	DOT area/drainage area (%)	3.2%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
33	DOT impervious area--existing (ac)	1.85				
34	DOT impervious area--proposed (ac)	2.57				
35	Impervious area change (ac)	0.72	0	0	0	0
36	Impervious area change (%)	39%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
37	Design peak flow rate--proposed (cfs) pre-detention	137.85				
38	Peak flow rate change (cfs)	-5.42	0	0	0	0
39	Peak flow rate change (%)	-4%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
40	Design peak flow rate--proposed (cfs) post-detention	N/A				
41	2-yr peak flow rate--existing (cfs)	62.59				
42	2-yr peak flow rate--proposed (cfs)	67.09				
43	2-yr peak flow rate--post-detention (cfs)	N/A				

44	**Section 4: CULVERT DESIGN**					
45	**Existing Culvert**					
46	Outfall number	**1**	**2**	**3**	**4**	**5**
47	Culvert present? (Yes or No)	No	DD Menu	DD Menu	DD Menu	DD Menu
48	Shape		DD Menu	DD Menu	DD Menu	DD Menu
49	Material		DD Menu	DD Menu	DD Menu	DD Menu
50	Diameter/span (ft)					
51	Number of barrels					
52	Manning's n					
53	Inlet entrance type		DD Menu	DD Menu	DD Menu	DD Menu
54	Upstream invert (ft)					
55	Downstream invert (ft)					
56	Length (ft)					
57	Slope (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
58	Computed Upstream Water Surface Elevation (ft)					
59	Tailwater elevation					
60	Outlet velocity (ft/s)					
61	**Proposed Culvert Design**					
62	Design ADT					
63	Shape		DD Menu	DD Menu	DD Menu	DD Menu
64	Material		DD Menu	DD Menu	DD Menu	DD Menu
65	Diameter/span (ft)					
66	Number of barrels					
67	Manning's n					
68	Inlet entrance type		DD Menu	DD Menu	DD Menu	DD Menu
69	Upstream invert (ft)					
70	Downstream invert (ft)					
71	Length (ft)					
72	Slope (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
73	Computed Upstream Water Surface Elevation (ft)					
74	Tailwater elevation					
75	Outlet velocity (ft/s)					
76	Change in Upstream Water Surface Elevation (ft)					
77	Riprap outfall (Size riprap or None)					
78	Maximum allowable headwater					
79	Maximum allowable headwater design criteria		DDMenu	DDMenu	DDMenu	DDMenu
80	Station of lowest subgrade shoulder point (0+00)					
81	Elevation of lowest subgrade shoulder point (ft)					
82	Headwater to pipe diameter ratio					
83	**Floodplain Management**					
84	Mapped floodplain	No	DD Menu	DD Menu	DD Menu	DD Menu
85	Increase in headwater		DD Menu	DD Menu	DD Menu	DD Menu
86	**Drainage District Issues**					
87	Is culvert in a drainage district?	Yes	DD Menu	DD Menu	DD Menu	DD Menu
88	Drainage District Name	Hoosier Creek Drainage District				
89	Increase in headwater	DD Menu	DD Menu	DD Menu	DD Menu	DD Menu
90	Drainage board approval?	DD Menu	DD Menu	DD Menu	DD Menu	DD Menu

91	**Aquatic Organism Passage**					
92	Is aquatic organism passage a concern?	No	DD Menu	DD Menu	DD Menu	DD Menu
93	Does WDNR concur with design?		DD Menu	DD Menu	DD Menu	DD Menu
94	Embedment depth (ft)					
95	Embedment material					

96	**Section 5: CULVERT LINER DESIGN**					
97	**Existing Culvert**					
98	Outfall number	**1**	**2**	**3**	**4**	**5**
99	Existing culvert size (ft)	N/A				
100	Pipe material					
101	Pipe condition					
102	Any collapse?		DD Menu	DD Menu	DD Menu	DD Menu
103	Any deflection?		DD Menu	DD Menu	DD Menu	DD Menu
104	Are ends crushed?		DD Menu	DD Menu	DD Menu	DD Menu
105	*n* value existing pipe					
106	Pipe geometry (i.e. circular)		DD Menu	DD Menu	DD Menu	DD Menu
107	Upstream invert (ft)					
108	Downstream invert (ft)					
109	Length (ft)					
110	Slope (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
111	Depth of cover over culvert (ft)					
112	Is overtopping an issue?		DD Menu	DD Menu	DD Menu	DD Menu
113	Upstream flooding risk?		DD Menu	DD Menu	DD Menu	DD Menu
114	Existing Design highwater elevation (ft)					
115	Field verify dimension?		DD Menu	DD Menu	DD Menu	DD Menu
116	**Liner Details**					
117	Estimated Diameter (ft)					
118	Proposed Material					
119	Roughness, n					
120	Upstream invert (ft)					
121	Downstream invert (ft)					
122	Proposed Design highwater elevation (ft)					
123	Change in highwater elevation (ft)					
124	**Floodplain Management**					
125	Mapped floodplain	No	DD Menu	DD Menu	DD Menu	DD Menu
126	Increase in headwater		DD Menu	DD Menu	DD Menu	DD Menu
127	**Drainage District Issues**					
128	Is culvert in a drainage district?	Yes	DD Menu	DD Menu	DD Menu	DD Menu
129	Drainage District Name	Hoosier Creek Drainage District				
130	Has drainage board approved use of a liner?		DD Menu	DD Menu	DD Menu	DD Menu
131	**Aquatic Organism Passage**					
132	Is aquatic organism passage a concern?	No	DD Menu	DD Menu	DD Menu	DD Menu
133	Does WDNR concur with design?		DD Menu	DD Menu	DD Menu	DD Menu

Project Summary

Project ID: 1320-07-03
Title: STH 11 and CTH J Roundabout
Designer/Checker: David Bachhuber
DOT Region/Firm Name: M Squared Engineering LLC
Date: 9/24/2021

HIGHWAY:	STH 11 and CTH J
LIMITS:	600' from intersection in each direction
COUNTY:	Racine County
DESCRIPTION OF WORK:	Roundabout construction
PROJECT MANAGER:	0
PS&E DATE:	November 1, 2023
DESIGN STAGE	60% Design Stage

Water Quality Results Discussion

Water Quality Results Summary	**Total Project Drainage Basin Area**	Grass Swales	Filter Strips	Wet Detention Ponds	Catch-basins	Street Cleaning	Biofilters	Other Devices	Untreated Areas
Drainage Area (ac)	**201.800**			0.000	0.000				201.800
ROW Drainage Area (ac)	**6.300**			0.000	0.000				6.300
Percent TSS Reduction by Treatment Type	**0.0%**			0.0%	0.0%				0.0%

Project Water Quality Objectives

☑ **THE PROJECT IS EXEMPT FROM TRANS 401 STORMWATER QUALITY REQUIREMENTS AND REQUIRES NO FURTHER WATER QUALITY INFORMATION. DESCRIBE BELOW WHY IT IS EXEMPT.**

This project is exempt from TRANS 401 per 401.03 (3) (f). This project does not widen the roadbed by more than 100' and the total length of proposed roadway construction does not exceed 1.5 miles (the total length is under 1/2 mile). As a result, this project does not need to meet the post-construction performance standards. However, some of the existing ditches will be widened to serve as informal grass swales to provide some level of additional water quality in this area beyond the existing condition. Water quality calculations for these ditches was not developed as it is not required.

DESCRIBE THE STORMWATER QUALITY MANAGEMENT REQUIREMENTS PER TRANS 401 OR THE TMDL WASTELOAD ALLOCATION.

☐ **40 % Reduction** ☐ **80 % Reduction** ☑ **Other Reduction** _____

This project is exempt.

IF THE PROJECT REQUIRES STORMWATER MANAGEMENT EXPLAIN HOW THE TRANS 401 2-YR PEAK DISCHARGE REQUIREMENT WAS MET.

This project is exempt.

HAS THE DEPARTMENT AGREED TO MEET ANY LOCAL STORMWATER QUALITY ORDINANCES OR REQUIREMENTS FOR THIS PROJECT? IF SO, DESCRIBE.

No, not at this time.

IF THE PROJECT REQUIRES STORM WATER MANAGEMENT EXPLAIN HOW THE TOTAL SUSPENDED SOLIDS REDUCTION WAS MET. Refer to Water Quality Results Summary above.

This project is exempt. However, widened roadside ditches will serve as grass swales providing some water quality benefit even though the project is exempt.

LIST THE POST CONSTRUCTION STORMWATER QUALITY CONTROL TREATMENT MEASURES FOR THE PROJECT.

N/A

REGIONAL STORMWATER ENGINEER CONCURRENCE (SIGN AND DATE)

Appendix B – Proposed Plans

PROJECT ID: **1320-07-03**

COUNTY: **RACINE**

ORDER OF SHEETS

Section No.	1	Title
Section No.	2	Typical Sections and Details
Section No.	3	Estimate of Quantities
Section No.	3	Miscellaneous Quantities
Section No.	4	Right of Way Plat
Section No.	5	Plan and Profile
Section No.	6	Standard Detail Drawings
Section No.	7	Sign Plates
Section No.	8	Structure Plans
Section No.	9	Computer Earthwork Data
Section No.	9	Cross Sections

TOTAL SHEETS =

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

PLAN OF PROPOSED IMPROVEMENT

STH 11

CTH J

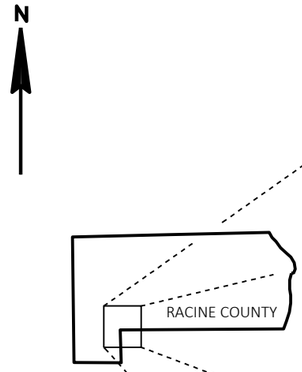
STH 11

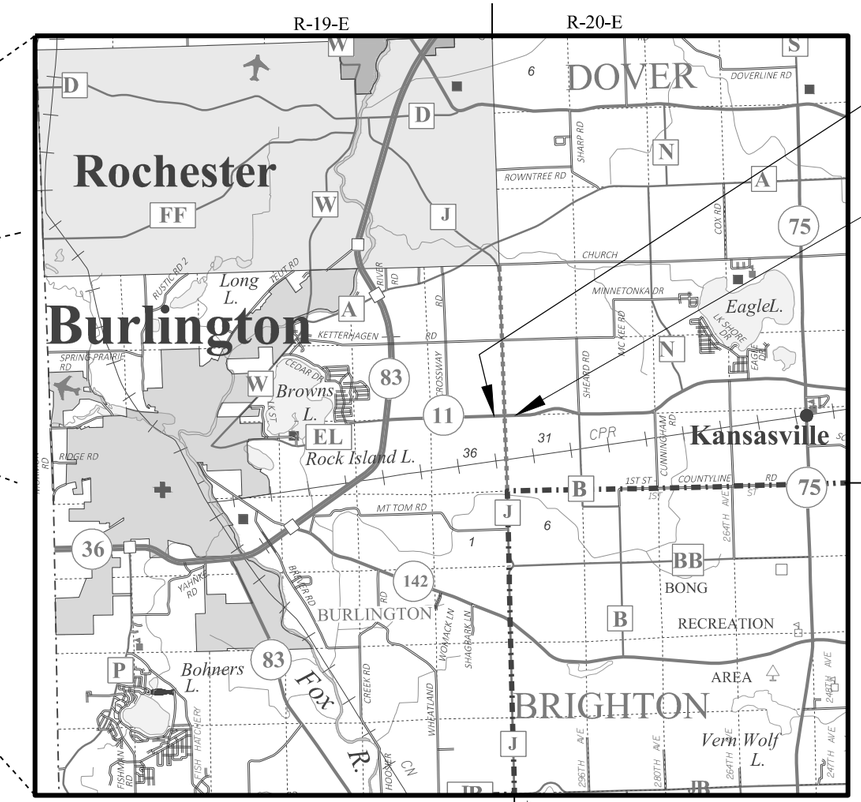
RACINE COUNTY

STATE PROJECT NUMBER
1320-07-03

STATE PROJECT	FEDERAL PROJECT	
	PROJECT	CONTRACT
1320-07-03		

30% PLAN SUBMITTAL





BEGIN PROJECT
STA 205+36.91'EB'
X=530321.886
Y=170366.230

END PROJECT
STA 217+55.93'EB'
X=531530.179
Y=170370.299

T-3-N RACINE COUNTY

T-2-N KENOSHA COUNTY

N

DESIGN DESIGNATION

A.A.D.T.	2017	=	6,800/1,300
A.A.D.T.	2045	=	7,600/1,600
D.H.V.		=	15.0
D.D.		=	60/40
T.		=	15.1%
DESIGN SPEED		=	55 MPH (BOTH STH 11 AND CTH J)
ESALS		=	394 (DESIGN LANE DAILY)

CONVENTIONAL SYMBOLS

PLAN

- CORPORATE LIMITS
- PROPERTY LINE
- LOT LINE
- LIMITED HIGHWAY EASEMENT
- EXISTING RIGHT OF WAY
- PROPOSED OR NEW R/W LINE
- SLOPE INTERCEPT
- REFERENCE LINE (300'EB')
- EXISTING CULVERT
- PROPOSED CULVERT (Box or Pipe)
- COMBUSTIBLE FLUIDS (CAUTION)
- MARSH AREA
- WOODED OR SHRUB AREA

PROFILE

- GRADE LINE
- ORIGINAL GROUND
- MARSH OR ROCK PROFILE (To be noted as such) (ROCK)
- SPECIAL DITCH (LABEL)
- GRADE ELEVATION (95.36)
- CULVERT (Profile View)

UTILITIES

- ELECTRIC (E)
- FIBER OPTIC (FO)
- GAS (G)
- SANITARY SEWER (SAN)
- STORM SEWER (SS)
- TELEPHONE (T)
- WATER (W)
- UTILITY PEDESTAL
- POWER POLE
- TELEPHONE POLE

LAYOUT

SCALE 0 2 MI

TOTAL NET LENGTH OF CENTERLINE =

RACINE COUNTY / KENOSHA COUNTY

HORIZONTAL POSITIONS SHOWN ON THIS PLAN ARE WISCONSIN COUNTY COORDINATE SYSTEM (WCCS), RACINE COUNTY NAD83 (2011), IN U.S. SURVEY FEET. POSITIONS SHOWN ARE GRID COORDINATES, GRID BEARINGS, AND GRID DISTANCES. GRID DISTANCES ARE THE SAME AS GROUND DISTANCES.

ELEVATIONS ARE REFERENCED TO NAVD 88 (2012).

ORIGINAL PLANS PREPARED BY

AYRES ASSOCIATES

DATE: _____ _____ (Professional Engineer Signature)

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

PREPARED BY

Surveyor	AYRES ASSOCIATES
Designer	AYRES ASSOCIATES
Project Manager	NGUYEN LY
Regional Examiner	REGIONAL EXAMINER
Regional Supervisor	BENEDICT ERUCHALU

APPROVED FOR THE DEPARTMENT

DATE: _____ _____ (Signature)

PRE_1

E

FILE NAME : E:\WORK FROM HOME\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\010101-TI.DWG PLOT DATE : 6/30/2021 1:26 PM PLOT BY : MUENCH, DOUGLAS PLOT NAME :

GENERAL NOTES

1. NO TREES OR SHRUBS SHALL BE REMOVED WITHOUT APPROVAL OF THE ENGINEER.
2. THE LOCATIONS OF EXISTING AND PROPOSED UTILITY INSTALLATIONS AS SHOWN ON THE PLAN ARE APPROXIMATE. THERE MAY BE OTHER UTILITY INSTALLATIONS WITHIN THE PROJECT AREA THAT ARE NOT SHOWN.
3. THE CONTRACTOR SHALL COORDINATE HIS CONSTRUCTION ACTIVITIES WITH A CALL TO DIGGERS HOTLINE AND/OR A DIRECT CALL TO THE UTILITIES THAT HAVE FACILITIES IN T HE AREA. NOT ALL UTILITIES ARE MEMBERS OF DIGGERS HOTLINE.
4. A SAW JOINT IS REQUIRED WHERE NEW HMA PAVEMENT MEETS EXISTING HMA PAVEMENT.
5. SAWCUT ASPHALT AT THE MATCHLINE AS SHOWN ON THE PLAN DETAILS OR AS DIRECTED BY THE ENGINEER.
6. PRIOR TO ORDERING DRAINAGE PIPES AND STRUCTURES, VERIFY RELATED DRAINAGE INFORMATION IN THE PLAN AND PROVIDE DOCUMENTATION TO THE ENGINEER.
7. WETLANDS, WATERWAYS, AND OTHER ENVIRONMENTALLY SENSITIVE AREAS SHALL BE PROTECTED AT ALL TIMES. DO NOT STORE EQUIPMENT OR MATERIAL NEAR THESE SITES UNLESS APPROVED BY THE ENGINEER.
8. PLACE EROSION CONTROL DEVICES IN SEQUENCE WITH CONSTRUCTION OPERATIONS OR AS DETERMINED BY THE ENGINEER. EROSION CONTROL FEATURES ARE SHOWN AT APPROXIMATE LOCATIONS, WITH EXACT LOCATIONS TO BE DETERMINED BY THE ENGINEER. REMOVAL OF ITEMS ARE INCIDENTAL TO THE RESPECTIVE EROSION CONTROL BID ITEM COSTS.
9. DO NOT USE FERTILIZER WITHIN 20 FEET OF NAVIGABLE WATERWAYS OR WETLANDS.
10. PLACE SALVAGED TOPSOIL OR TOPSOIL IN ALL GRADED AREAS AS DESIGNATED BY THE ENGINEER IMMEDIATELY AFTER GRADING HAS BEEN COMPLETED. SEED, MULCH AND FERTILIZE ALL AREAS 5 DAYS AFTER PLACEMENT OF SALVAGED TOPSOIL OR TOPSOIL.
11. STATIONING, DISTANCES, AND OFFSETS FOR SIGNS AND TRAFFIC CONTROL DEVICES SHOWN IN THE PLANS ARE APPROXIMATE. EXACT LOCATIONS ARE DETERMINED BY THE ENGINEER.
12. COVER ALL SIGNS IN CONFLICT WITH TRAFFIC CONTROL "IN USE" AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.
13. RESHAPING AND RESTORING OF ANY PREVIOUSLY GRASSED AREAS WHICH ARE DISTURBED BY OPERATIONS OUTSIDE OF THE ENGINEER DETERMINED CONSTRUCTION LIMITS ARE INCIDENTAL TO THE CONTRACT.
14. HMA PAVEMENTS:

    7.75-INCH = ?.??" LOWER LAYER (? ?T 58-28 ?)
    ?.??" MIDDLE LAYER (? ?T 58-28 ?)
    ?.??" UPPER LAYER (? ?T 58-28 ?)

    SHOULDERS
    3.5-INCH = SINGLE LAYER (? ?T 58-28 ?)

    TEMPORARY PAVEMENT
    3.75-INCH = ?.??" LOWER LAYER (? ?T 58-28 ?)
    ?.??" UPPER LAYER (4 ?T 58-28 ?)

STANDARD ABREVIATIONS

A.D.T.	AVERAGE DAILY TRAFFIC
AECP	APRON ENDWALL FOR CULVERT PIPE
AECPRC	APRON ENDWALL FOR CULVERT PIPE REINFORCED CONCRETE
AECPS	APRON ENDWALL FOR CULVERT PIPE STEEL
AECPSAL	APRON ENDWALL FOR CULVERT PIPE SALVAGED
ATMS	ARTERIAL TRAFFIC MANAGEMENT SYSTEM
BM	BENCHMARK
BOC	BACK OF CURB
CBTP	CONCRETE BARRIER TEMPORARY PRECAST
CBSS	CONCRETE BARRIER SINGLE SLOPE
CL	CLASS
CONST	CONSTRUCTION
CP	CONTROL POINT
CPCS	CULVERT PIPE CORRUGATED STEEL
CPRC	CULVERT PIPE REINFORCED CONCRETE
D.D.	DIRECTIONAL DISTRIBUTION
D.H.V.	DESIGN HOURLY VOLUME
EB	EASTBOUND
EXIST	EXISTING
HMA	HOT MIX ASPHALT
H.S.	HIGH STRENGTH
ITS	INTELLIGENT TRAFFIC SYSTEM
MAX	MAXIMUM
MIN	MINIMUM
NB	NORTHBOUND
NOR	NORMAL
PC	POINT OF CURVATURE
PCC	POINT OF COMMON CURVATURE
PI	POINT OF INTERSECTION
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
R/L	REFERENCE LINE
REQ'D	REQUIRED
SB	SOUTHBOUND
SSPRC	STORM SEWER PIPE REINFORCED CONCRETE
T.	PERCENT TRUCKS
TYP	TYPICAL
VAR	VARIABLE
WB	WESTBOUND
Wt.	WEIGHT

ORDER OF SECTION 2 SHEETS

UTILITY CONTACTS

ANR PIPELINE - GAS/PETROLEUM
TODD BRISTER
W3925 PIPELINE LANE
EDEN, WI 53019
PHONE: (920) 477-2235
EMAIL: TODD_BRISTER@TRANSCANADA.COM

CHARTER COMMUNICATIONS - COMMUNICATION LINE
BEAU ABUYU
1320 N DR MARTIN LUTHER KING JR DR
MILWAUKEE, WI 53212
PHONE: (???) ???-????
EMAIL: ???.???@CHARTER.COM

PAETEC COMMUNICATIONS, LLC - COMMUNICATION LINE
314 N DANZ AVE
GREEN BAY, WI 54302-3562
PHONE: (???) ???-????
EMAIL: ???.???@???.COM

TDS METROCOM LLC - COMMUNICATION LINE
525 JUNCTION RD
MADISON, WI 53717
PHONE: (???) ???-????
EMAIL: ???.???@???.COM

SOUTHEAST TELEPHONE COMPANY OF WISCONSIN, LLC DBA TDS TELECOM - COMMUNICATION LINE
525 JUNCTION RD
MADISON, WI 53717
PHONE: (???) ???-????
EMAIL: ???.???@???.COM

WE ENERGIES UTILITY COORDINATOR - ELECTRICITY
KRISTEN RONGHOLT
500 S 116TH ST
WEST ALLIS, WI 53214
PHONE: (???) ???-????
EMAIL: ???.???@???.COM

WE ENERGIES UTILITY COORDINATOR - GAS/PETROLEUM
KRISTEN RONGHOLT
500 S 116TH ST
WEST ALLIS, WI 53214
PHONE: (???) ???-????
EMAIL: ???.???@???.COM

* DENOTES NOT A MEMBER OF DIGGERS HOTLINE

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

NOTE: WIS. STATUTE 182.0175 (1974) REQUIRES MINIMUM OF 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE.

PROJECT CONTACTS

WisDOT PROJECT MANAGER

NGUYEN LY
ADDRESS
PHONE:
EMAIL:

DNR AREA LIASON

BENTON STETZEL
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
141 NW BARSTOW ST, #180
WAUKESHA, WI 53188
PHONE: (262) 623-0194
EMAIL: BENTON.STETZEL@WISCONSIN.GOV

CONSULTANT DESIGN

PHIL BAIN
AYRES ASSOCIATES
20975 SWENSON DRIVE, SUITE 200
WAUKESHA, WI 53186
PHONE: (262) 523-4488
EMAIL: BAINP@AYRESASSOCIATES.COM

2

2

N

COUNTY J

TOWN OF BURLINGTON

TOWN OF DOVER

END CONSTRUCTION
STA. 156+65.96'NB'

158'NB'

156'SB'

156'NB'

BEGIN PROJECT
STA. 205+36.91'EB'

END PROJECT
STA. 217+55.93'EB'

154'SB'

154'NB'

11

204'EB'

206'EB'

206'WB'

208'EB'

208'WB'

210'EB'

210'WB'

214'EB'

214'WB'

216'EB'

216'WB'

218'EB'

11

150'SB'

150'NB'

148'SB'

148'NB'

BEGIN CONSTRUCTION
STA. 147+41.12'NB'

TOWN OF BURLINGTON

TOWN OF DOVER

COUNTY J

PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PROJECT OVERVIEW	SHEET E

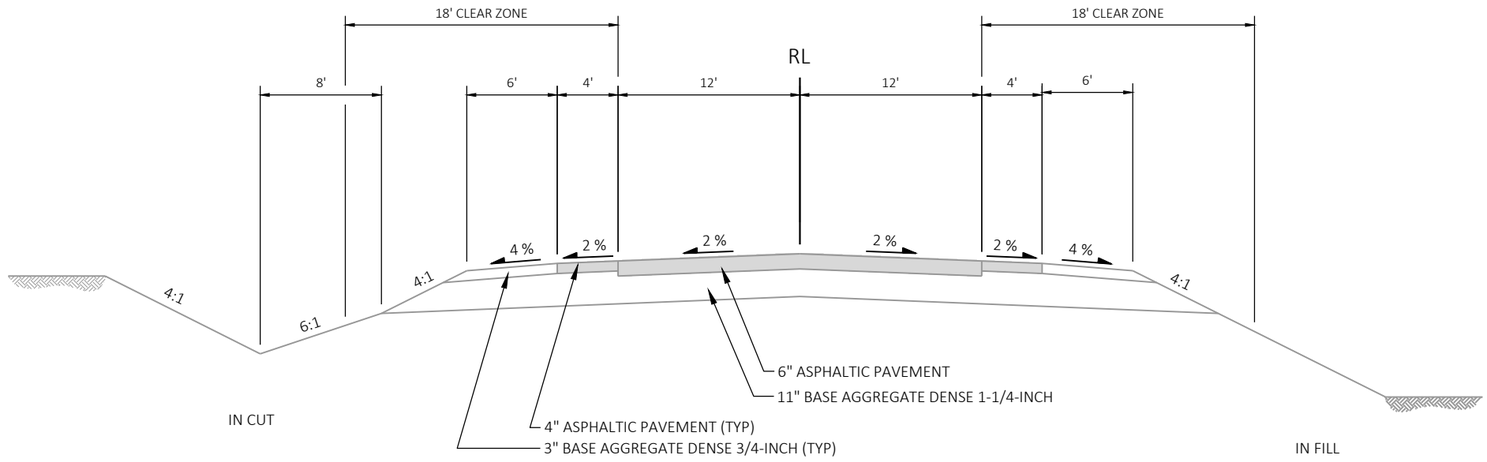
PRE_3

FILE NAME : I:\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\020201-PO.DWG
LAYOUT NAME - 01

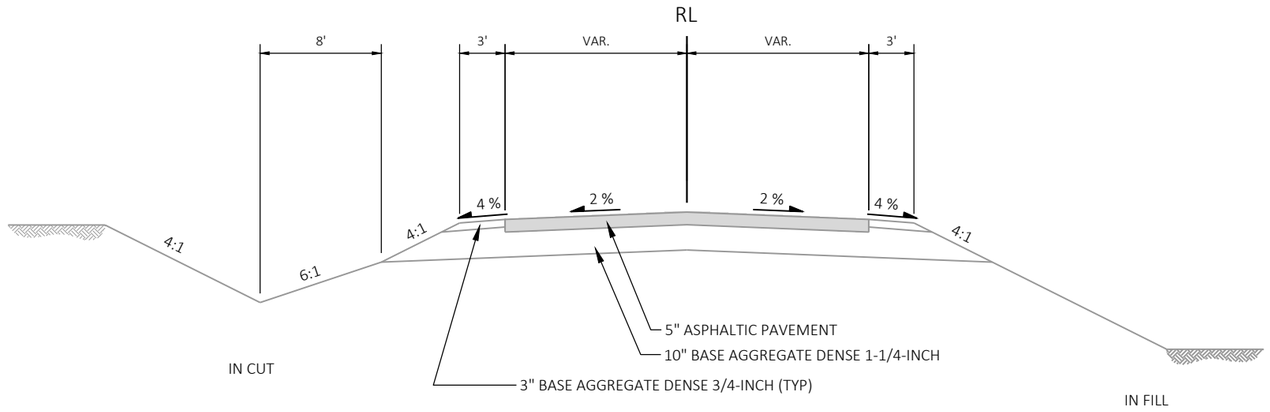
PLOT DATE : 7/19/2021 12:43 PM PLOT BY : MUENCH, DOUGLAS PLOT NAME : PLOT SCALE : 1 IN:200 FT

WISDOT/CADDS SHEET 42

2



TYPICAL EXISTING SECTION - STH 11



TYPICAL EXISTING SECTION - CTH J

PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	TYPICAL SECTIONS	SHEET E

PRE_4

FILE NAME : I:\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\020301-TS.DWG
LAYOUT NAME - ETYP_01

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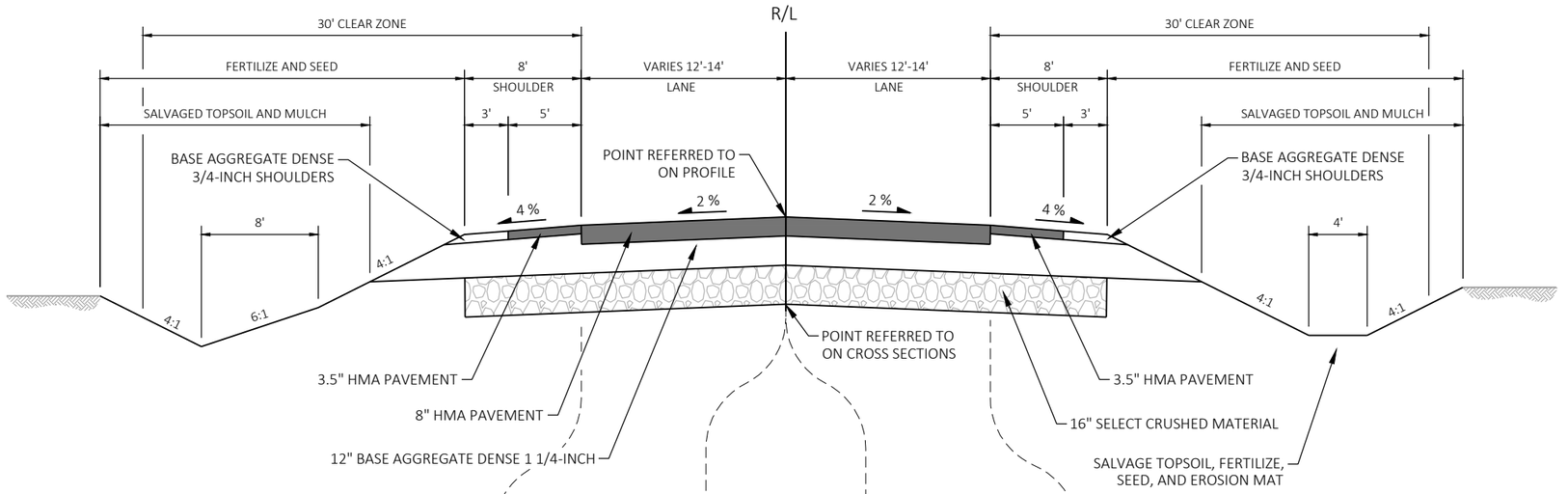
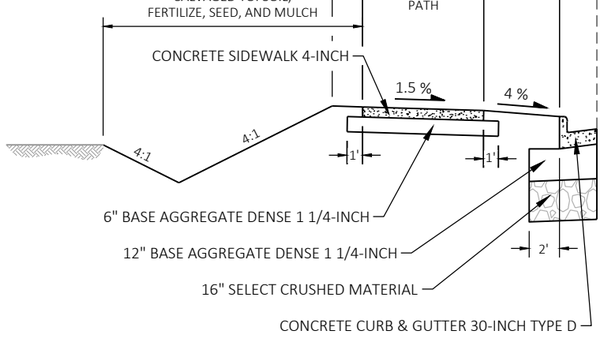
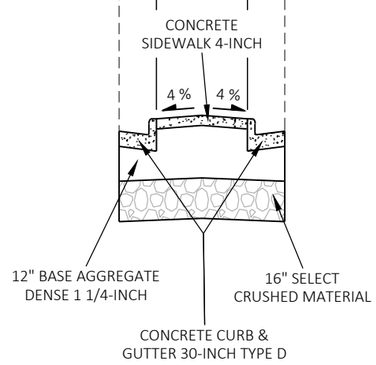




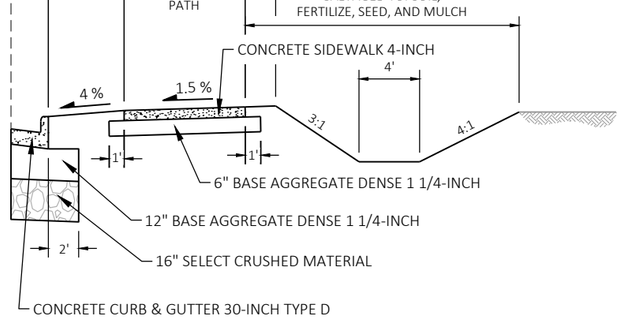
CURB & GUTTER AND PATH , LT

STA 209+64.81'EB' TO STA 210+72.44'EB'
STA 212+33.30'EB' TO STA 213+64.26'EB'



MEDIAN

STA 207+25.81'EB' TO STA 210+72.44'EB'
STA 213+33.30'EB' TO STA 215+81.69'EB'
STA 149+35.73'NB' TO STA 151+31.51'NB'
STA 152+94.61'NB' TO STA 153+53.46'NB'
STA 154+54.88'NB' TO STA 154+91.01'NB'



CURB & GUTTER AND PATH, RT

STA 209+47.50'EB' TO STA 210+72.44'EB'
STA 212+33.30'EB' TO STA 213+49.56'EB'

TYPICAL FINISHED SECTION - STH 11/CTH J

STA 205+36.01'EB' TO STA 210+72.44'EB'
STA 212+33.30'EB' TO STA 217+55.93'EB'
STA 147+41.12'NB' TO STA 153+53.46'NB'
STA 152+94.61'NB' TO STA 156+65.96'NB'

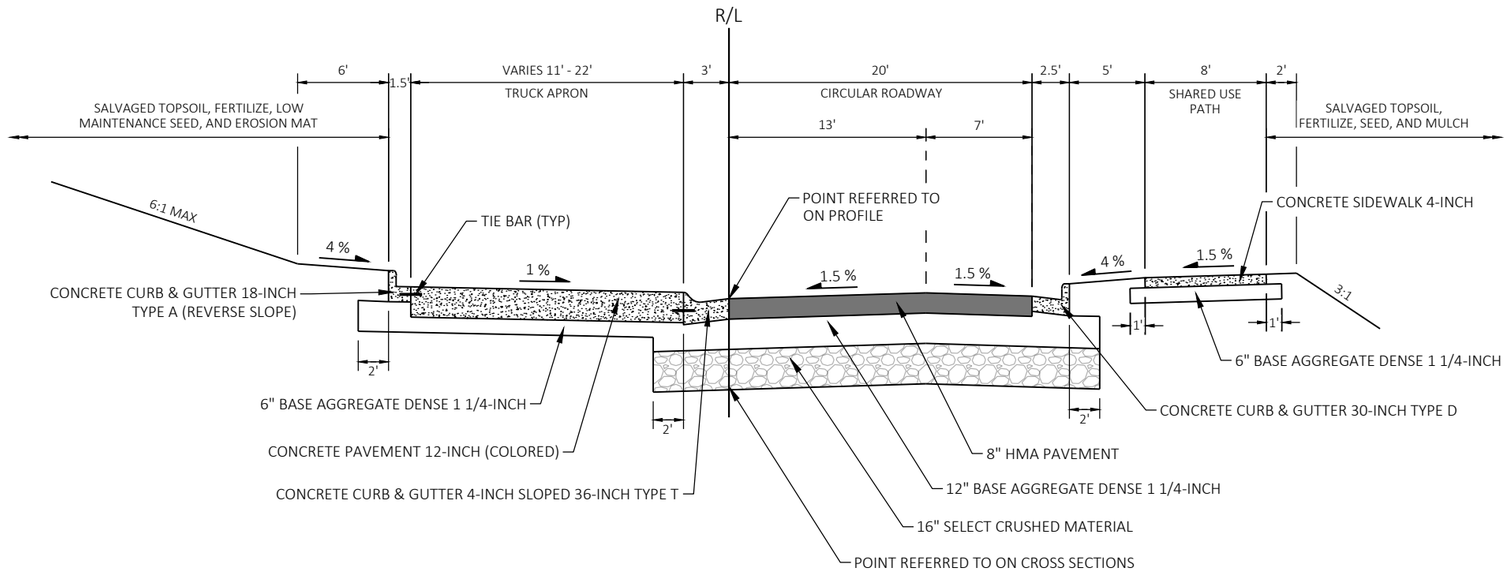
PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	TYPICAL SECTIONS	SHEET E

PRE_5

FILE NAME : I:\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\020301-TS.DWG
LAYOUT NAME - FTYP_01

PLOT DATE : 7/19/2021 12:47 PM PLOT BY : MUENCH, DOUGLAS PLOT NAME : PLOT SCALE : 1 IN:10 FT

2



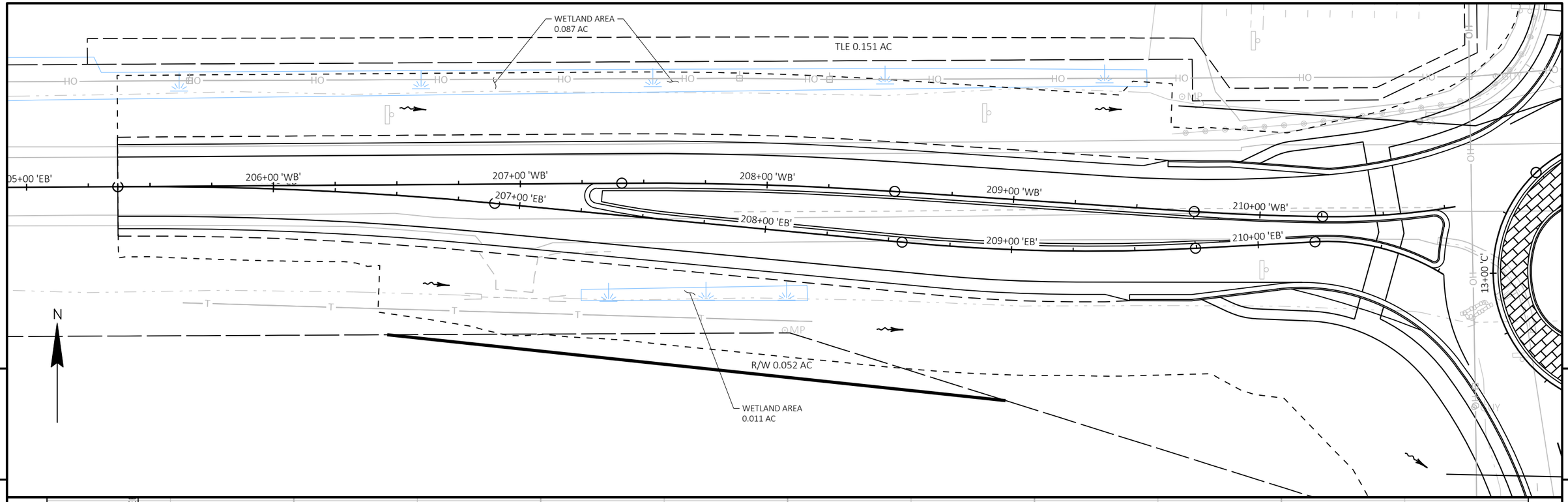
TYPICAL FINISHED HALF-SECTION - ROUNDABOUT

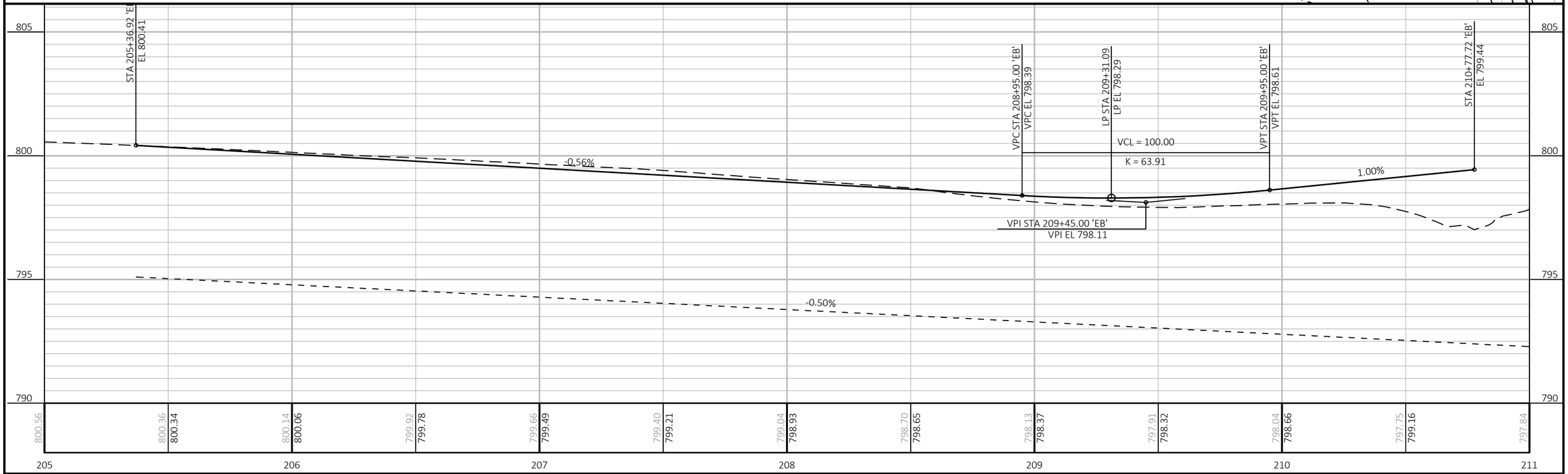
PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	TYPICAL SECTIONS	SHEET E

PRE_6

FILE NAME : I:\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\020301-TS.DWG
LAYOUT NAME - FTYP_02

PLOT DATE : 7/19/2021 12:47 PM PLOT BY : MUENCH, DOUGLAS PLOT NAME : PLOT SCALE : 1 IN:10 FT





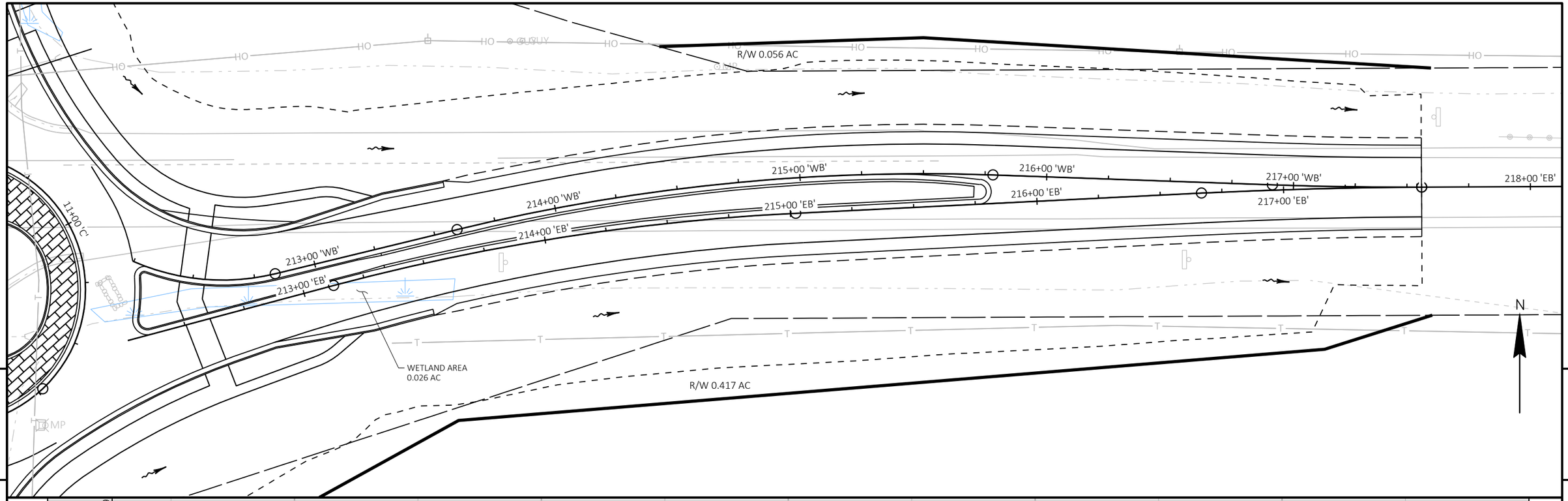
PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: EB STH 11	SHEET E

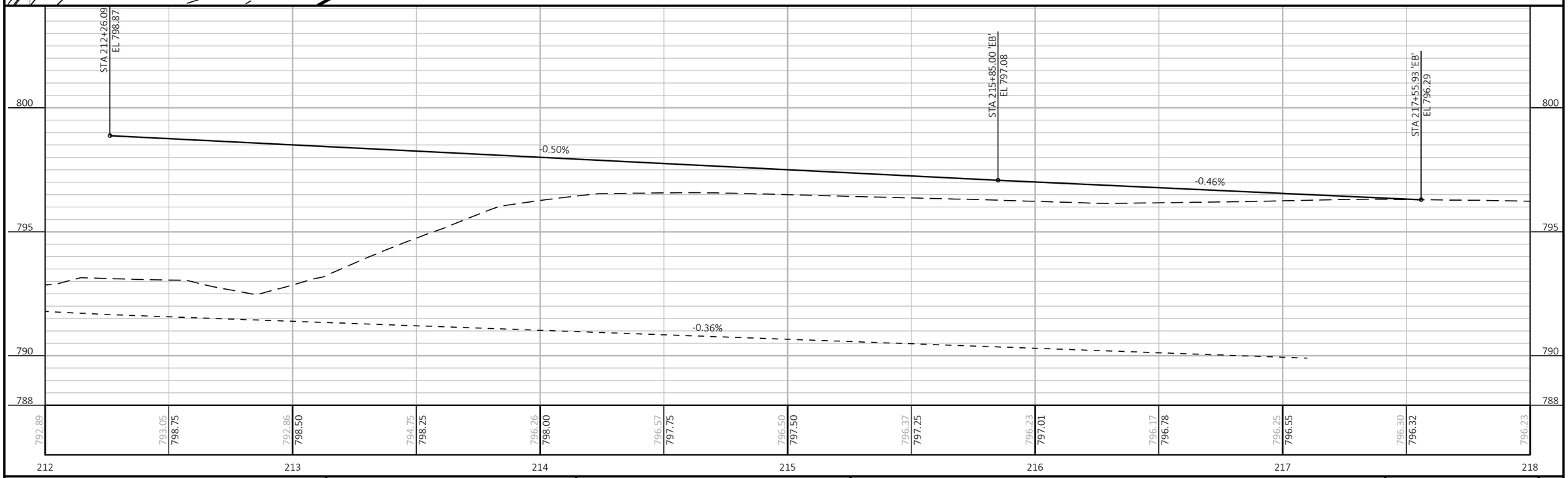
PRE_7

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - EB_01

PLOT DATE : 7/8/2021 8:52 AM PLOT BY : KRUEGER, KIRK PLOT NAME : PLOT SCALE : 1 IN:40 FT

WISDOT/CADDS SHEET 44





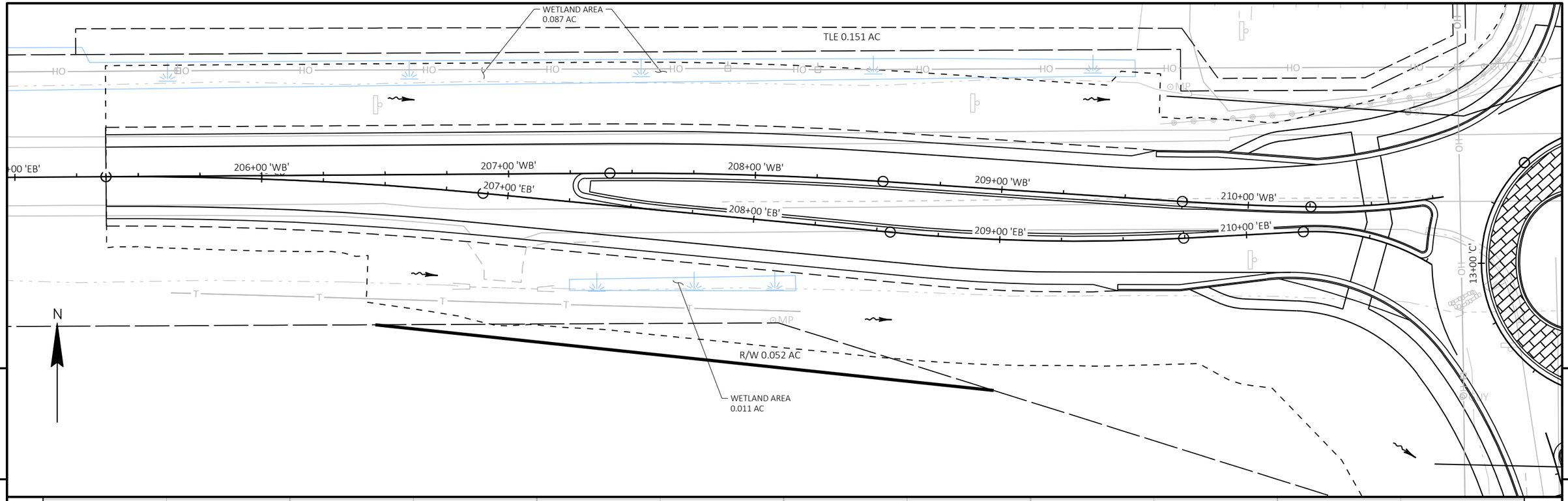
PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: EB STH 11	SHEET E

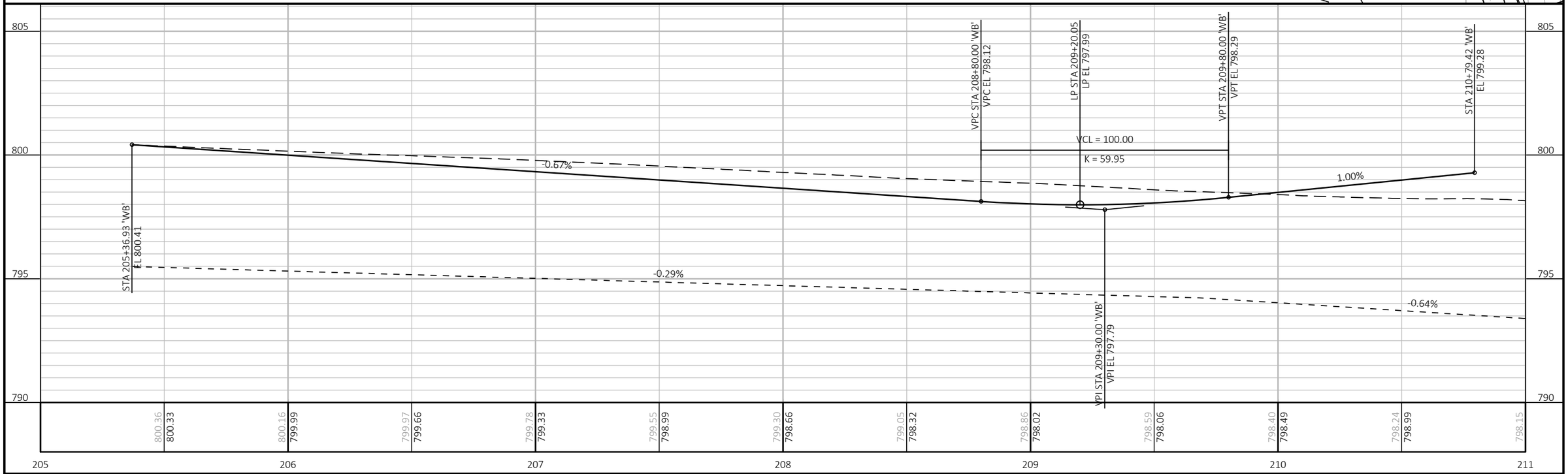
PRE_8

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - EB_02

PLOT DATE : 7/8/2021 8:52 AM PLOT BY : KRUEGER, KIRK PLOT NAME : PLOT SCALE : 1 IN:40 FT

WISDOT/CADDS SHEET 44



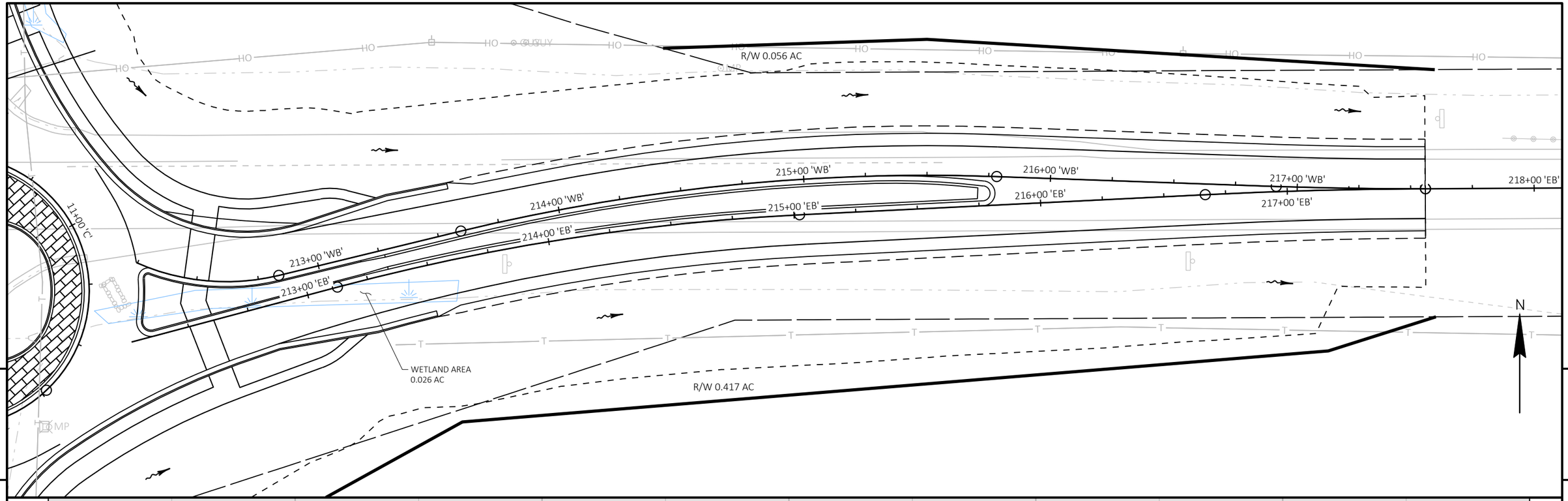


PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: WB STH 11	SHEET E

PRE_9

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - WB_01

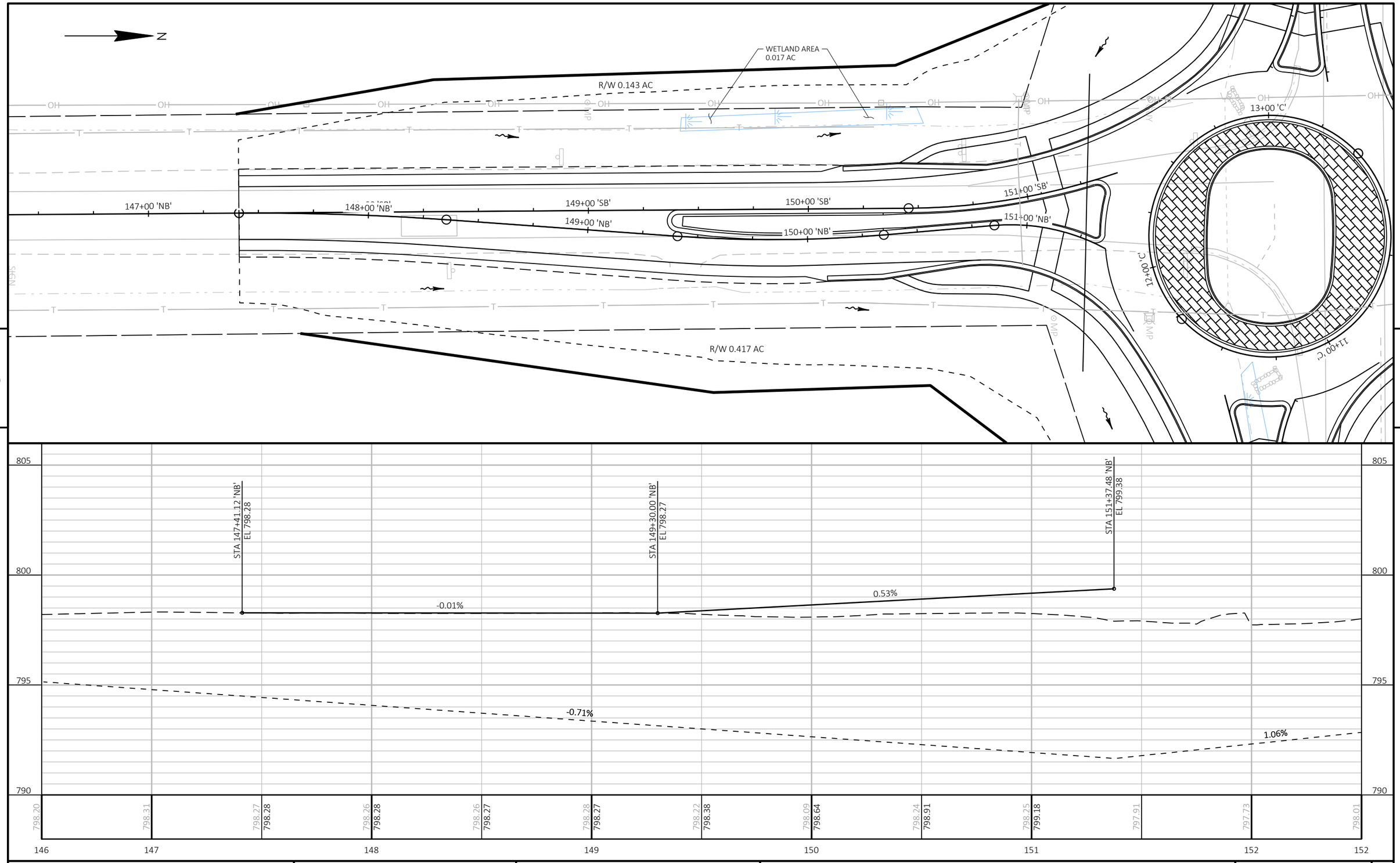
PLOT DATE : 7/8/2021 8:52 AM PLOT BY : KRUEGER, KIRK PLOT NAME : PLOT SCALE : 1 IN:40 FT



PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: WB STH 11	SHEET E

PRE_10

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - WB_02
PLOT DATE : 7/8/2021 8:53 AM
PLOT BY : KRUEGER, KIRK
PLOT NAME :
PLOT SCALE : 1 IN:40 FT
WISDOT/CADDS SHEET 44



5

5

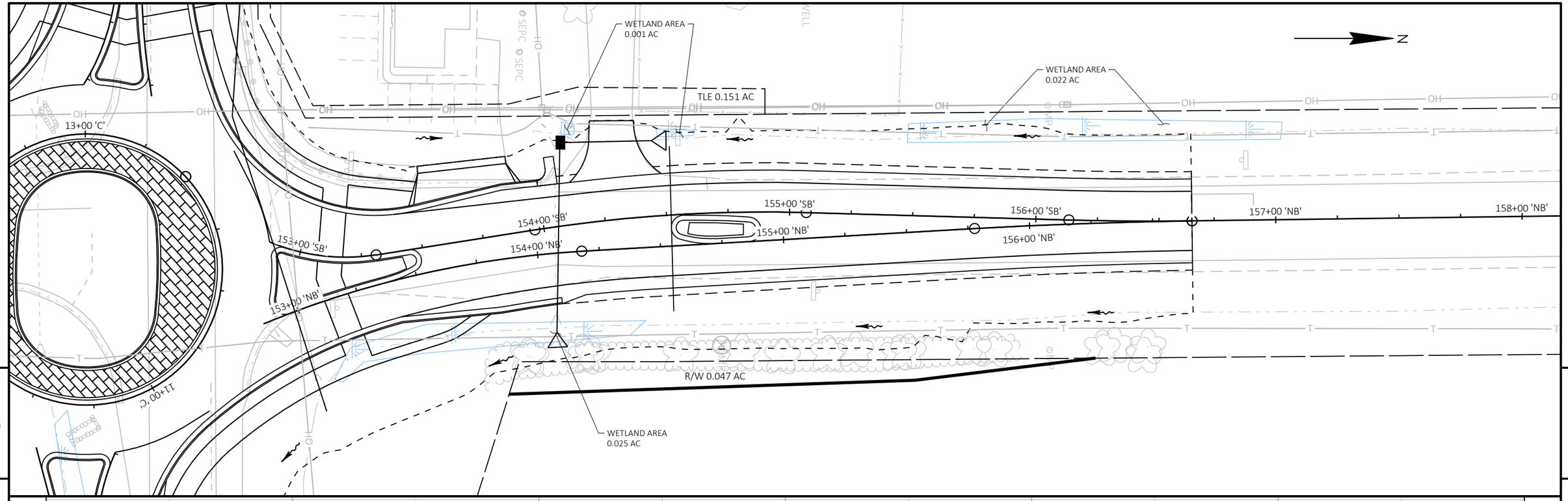
PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: NB CTH J	SHEET E

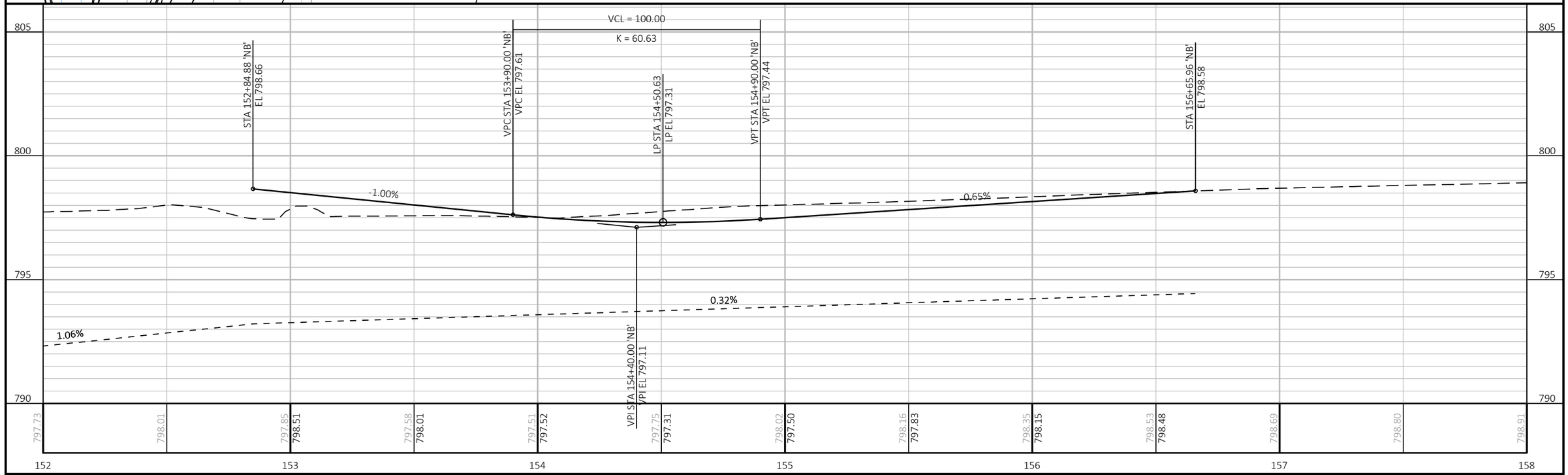
PRE_11

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - NB_01

PLOT DATE : 7/8/2021 8:53 AM PLOT BY : KRUEGER, KIRK PLOT NAME : PLOT SCALE : 1 IN:40 FT

WISDOT/CADDS SHEET 44



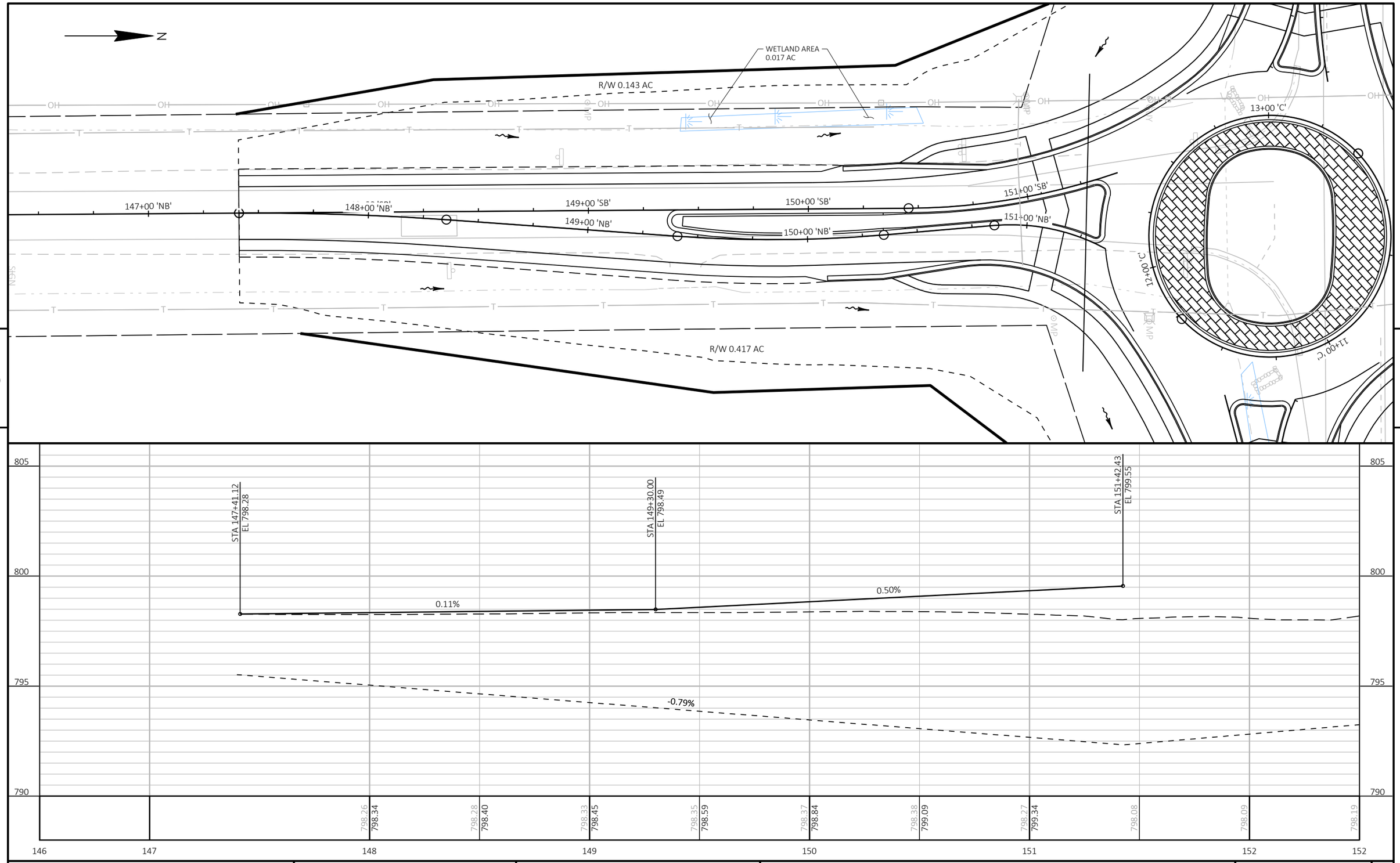


PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: NB CTH J	SHEET E

PRE_12

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - NB_02

PLOT DATE : 7/8/2021 8:53 AM PLOT BY : KRUEGER, KIRK PLOT NAME : PLOT SCALE : 1 IN:40 FT



5

5

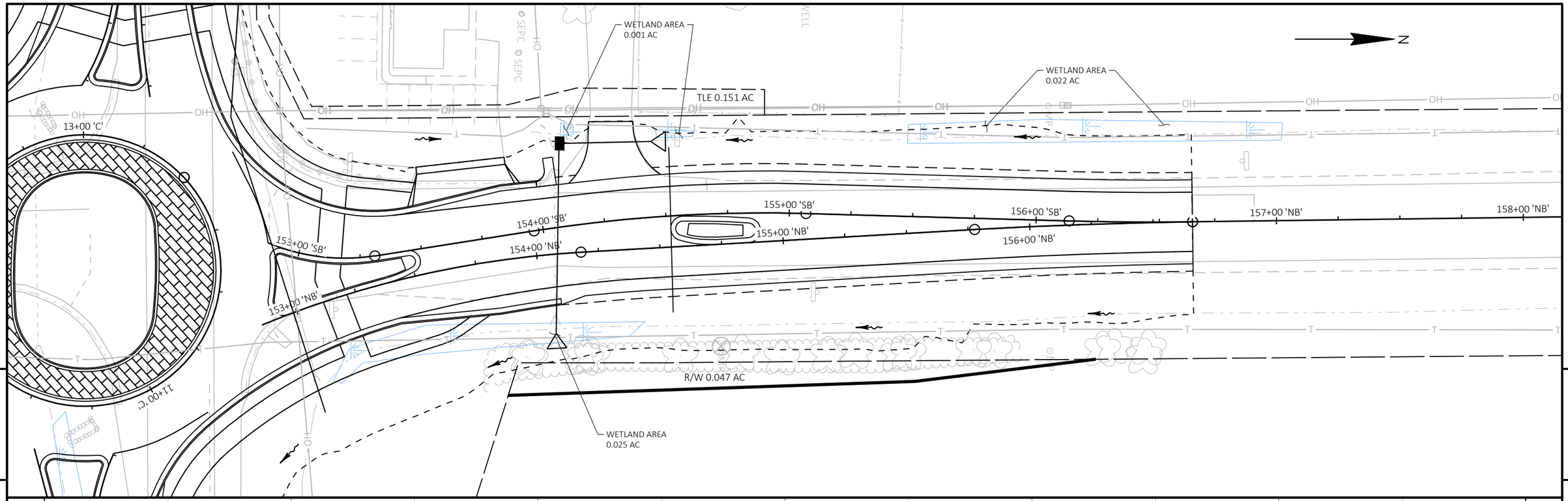
PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: SB CTH J	SHEET E

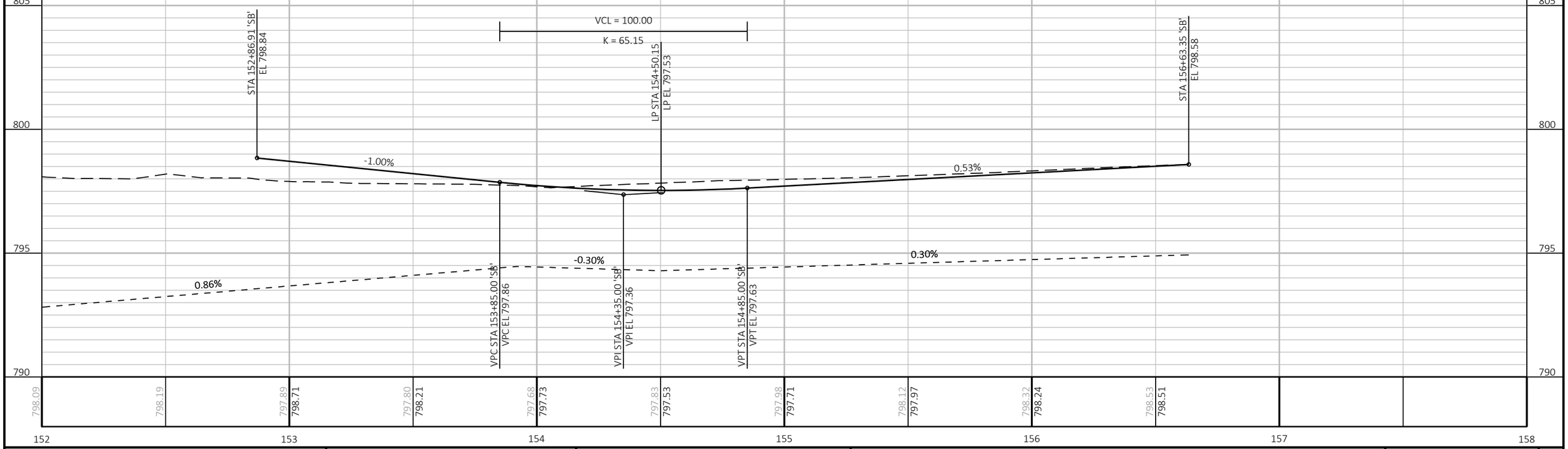
PRE_13

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - SB_01

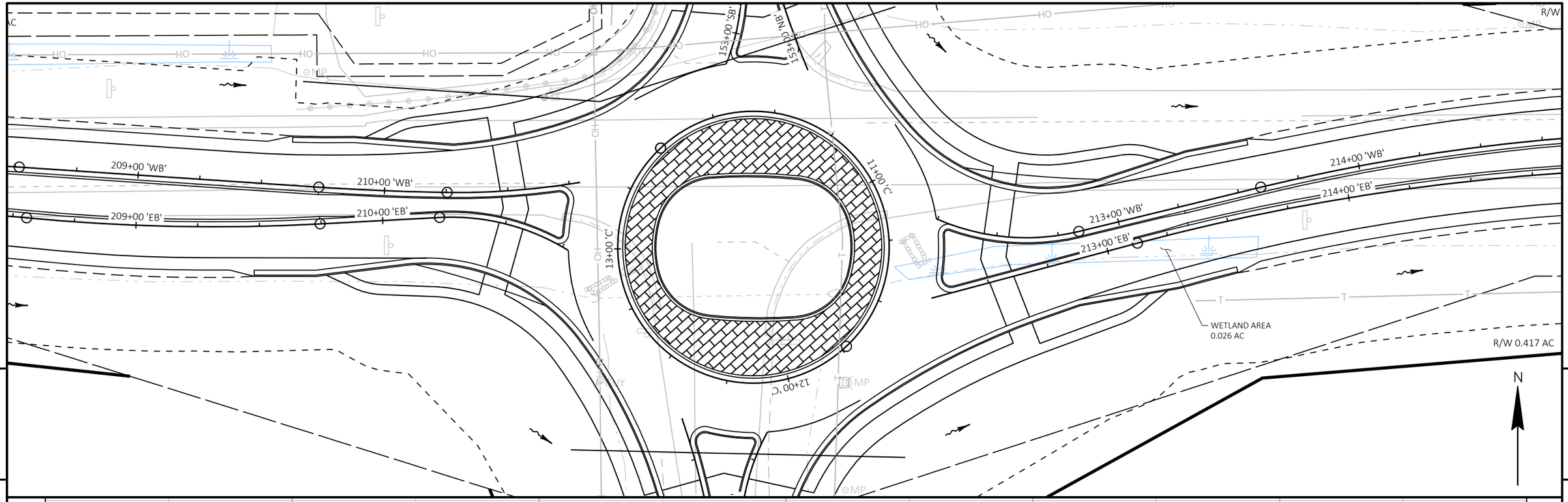
PLOT DATE : 7/8/2021 8:53 AM PLOT BY : KRUEGER, KIRK PLOT NAME : PLOT SCALE : 1 IN:40 FT

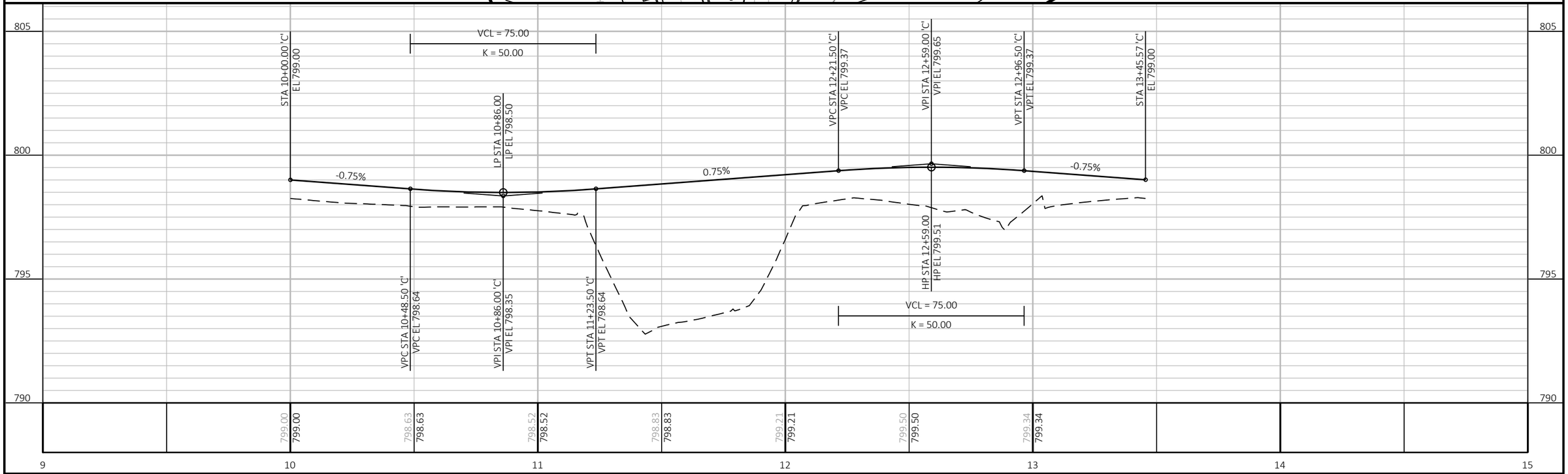
WISDOT/CADDS SHEET 44





PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: SB CTH J	SHEET E





PROJECT NO: 1320-07-03	HWY: STH 11	COUNTY: RACINE	PLAN AND PROFILE: ROUNDABOUT	SHEET E

PRE_15

FILE NAME : \\AYRES_ACTIVE\49\49072100 STH 11 & CTH J\C3D\SHEETSPLAN\050101-PP.DWG
LAYOUT NAME - C_01

PLOT DATE : 7/8/2021 8:53 AM PLOT BY : KRUEGER, KIRK PLOT NAME : PLOT SCALE : 1 IN:40 FT

Appendix C – Existing Drainage Area Maps

M Squared Engineering, LLC

...where engineering solutions meet water quality...

W62 N215 Washington Avenue
Cedarburg, WI 53012
Phone: (262)376-4246
www.msquaredengineering.com

STH 11 AND CTH J ROUNDABOUT

EXISTING DRAINAGE AREAS

DRAWN BY:	PP
DATE:	09/20/2020
CHECKED BY:	
HORIZ. SCALE:	
VERT. SCALE:	
PROJECT NO.	1320-07-03

REVISIONS

DATE:	REVISED BY:

SHEET

1 of 2

SUB 19

SUB 04

SUB 06

SUB 17

SUB 12

SUB 15

SUB 07

SUB 11

SUB 05

SUB 13

SUB 03

SUB 02

OUTFALL

SUB 10

SUB 09

SUB 08

SUB 16

LEGEND

FLOW PATH

DRAINAGE AREAS

EXISTING CONTOURS

N

0 100 200 Feet

M Squared Engineering, LLC

...where engineering solutions meet water quality...

W62 N215 Washington Avenue
Cedarburg, WI 53012
Phone: (262)376-4246
www.msquaredengineering.com

STH 11 AND CTH J ROUNDABOUT

EXISTING DRAINAGE AREAS

DRAWN BY:	PP
DATE:	09/20/2020
CHECKED BY:	
HORIZ. SCALE:	
VERT. SCALE:	
PROJECT NO.	1320-07-03

REVISIONS

DATE:	REVISED BY:

SHEET 2 of 2

Appendix D – Proposed Drainage Area Maps

Sub 06
Sub 19
Sub 04
Sub 15
Sub 17
SUB 11
Sub 12
Sub 30
Sub 23
Sub 31
SUB 27
Sub 29
Sub 05
Sub 03
Sub 13
Sub 07
SUB 18
OUTFALL
Sub 26
Sub 28
Sub 02
Sub 22
Sub 24
SUB 25
Sub 10
SUB 09
Sub 08
Sub 16

LEGEND

FLOW PATH

DRAINAGE AREAS

N

0 200 400 Feet

M SQUARED ENGINEERING, LLC
N19 W6719 COMMERCE CT
CEDARBURG, WI 53012
PHONE: (262) 376-4246
www.MSquaredEngineering.com

STH11 AND CTH J - ROUNDABOUT PROJECT

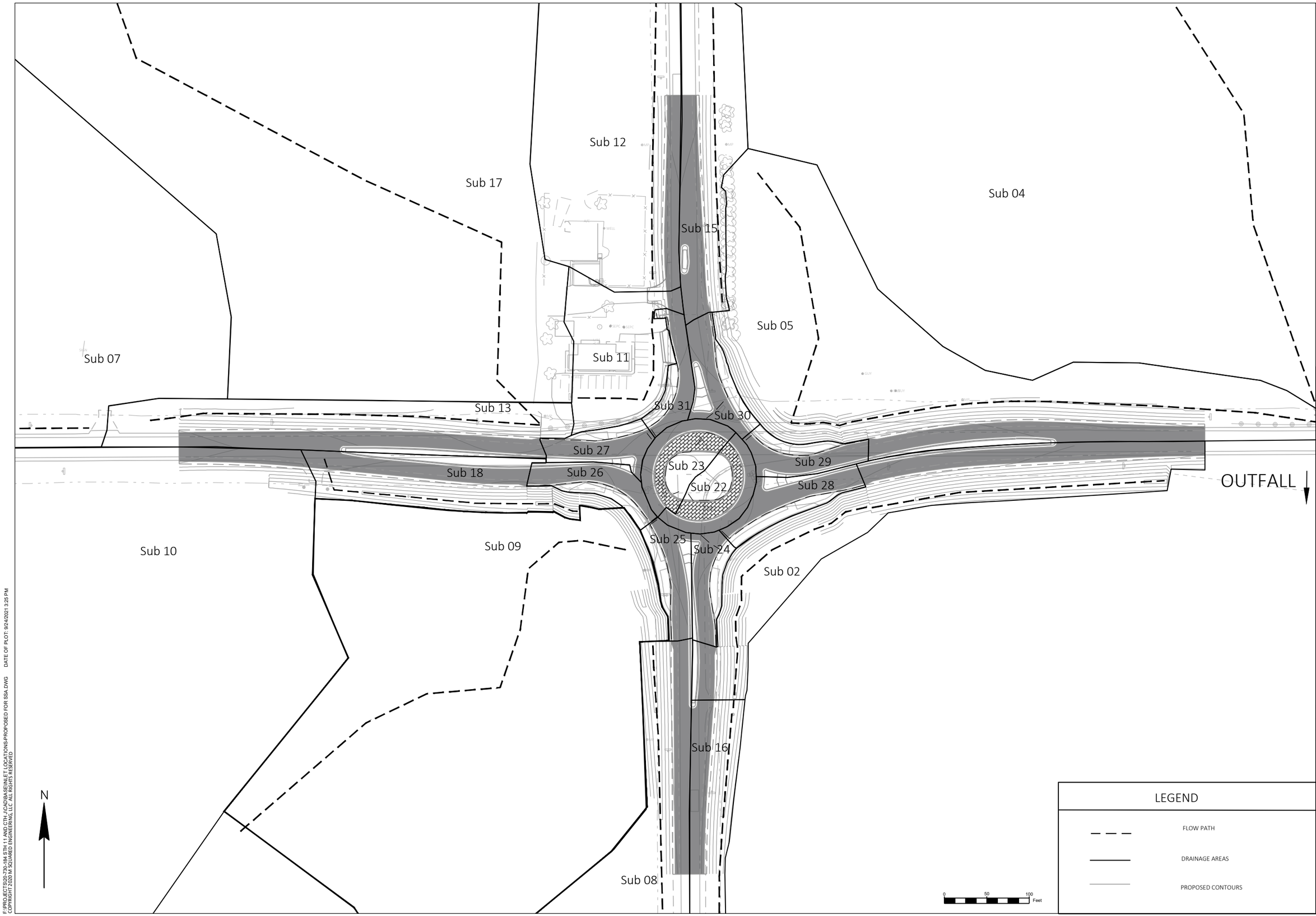
PROPOSED DRAINAGE AREAS

DRAWN BY:	PP
DATE:	09/20/2021
CHECKED BY:	
HORIZ. SCALE:	
VERT. SCALE:	
PROJECT NO.	1320-07-03

REVISIONS

NO.	DATE:	REVISED BY:

SHEET
1 of 2



M SQUARED ENGINEERING, LLC
N19 W6719 COMMERCE CT
CEDARBURG, WI 53012
PHONE: (262) 376-4246
www.MSquaredEngineering.com

STH11 AND CTH J - ROUNDABOUT

PROPOSED DRAINAGE AREAS

DRAWN BY:	PP
DATE:	09/20/2021
CHECKED BY:	
HORIZ. SCALE:	
VERT. SCALE:	
PROJECT NO.	1320-07-03

REVISIONS

NO.	DATE:	REVISED BY:

SHEET

2 of 2

Appendix E – WinTR-55 Calculations

Pooja

Racine MSE3 County, Wisconsin

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
East Drain							
SHEET	99	0.0038	0.060				0.166
SHALLOW	1719	0.0027	0.050				0.570
CHANNEL	148	0.0230	0.040	3.00	60.00	0.761	0.054
Time of Concentration							.79
North Drai							
SHEET	99	0.0200	0.060				0.085
SHALLOW	2759	0.0044	0.050				0.716
CHANNEL	29	0.0172	0.040	7.00	15.00	2.685	0.003
Time of Concentration							.804
West Drain							
SHEET	99	0.0101	0.060				0.112
SHALLOW	1617	0.0093	0.050				0.289
CHANNEL	1030	0.0080	0.040	1.77	11.40	0.963	0.297
Time of Concentration							.698
South West							
SHEET	99	0.0100	0.060				0.112
SHALLOW	995	0.0120	0.050				0.156
CHANNEL	1038	0.0069	0.040	2.64	13.62	1.037	0.278
CHANNEL	550	0.0030	0.040	2.00	9.00	0.749	0.204
Time of Concentration							.75

Appendix F – Existing Condition Storm and Sanitary Analysis Calculations

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.2.165 (Build 0)

****
Project Description
****
File Name ..... Existing Conditions-storage set only.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-27-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 2
Number of subbasins 17
Number of nodes 22
Number of links 32

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	2-year	CUMULATIVE	6.00
Rain Gage-02	2-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.42	749.00	0.6100	484.00	Rain Gage-02
Sub-03	0.65	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.53	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.49	913.00	1.0200	484.00	Rain Gage-02
Sub-06	88.38	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.16	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.41	1068.00	0.4300	484.00	Rain Gage-02
Sub-09	4.69	658.00	0.8200	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.58	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.13	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.67	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.72	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.10	763.00	0.2000	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.55	414.00	1.5400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.44	798.26	0.00	
Jun-04	JUNCTION	793.58	798.40	0.00	
Jun-10	JUNCTION	794.49	795.80	0.00	
Jun-11	JUNCTION	794.31	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	792.86	794.36	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	796.90	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.57	797.90	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.89	793.40	0.00	
Jun-05	STORAGE	793.61	797.90	0.00	
Jun-06	STORAGE	794.56	798.60	0.00	
Jun-12	STORAGE	793.41	797.00	0.00	
Jun-20	STORAGE	794.54	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	38.2	0.0576	0.0250
Link-02	Jun-24	Jun-02	CHANNEL	691.6	1.0252	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-10	Jun-11	CONDUIT	23.3	0.7841	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	4.4550	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	33.2	0.0030	0.0250
Link-18	Jun-10	Jun-01	CHANNEL	237.3	1.9389	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.3541	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	501.1	0.3951	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	124.7	0.5941	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	73.8	0.4474	0.0150
Link-38	Jun-12	Jun-01	CONDUIT	93.7	3.7577	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	98.3	0.7224	0.0250
Link-41	Jun-03	Jun-24	CHANNEL	105.5	0.5499	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	185.4	0.9979	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			

Weir-05	sto	Jun-34	WEIR
Weir-06	Storage	Jun-25	WEIR
Weir-07	Jun-05	Jun-04	WEIR
Weir-08	Jun-01	Jun-28	WEIR
Weir-09	Storage	Jun-06	WEIR
Weir-10	Jun-25	Jun-05	WEIR
Weir-11	Jun-11	Jun-28	WEIR
Weir-12	Jun-05	Jun-06	WEIR
Weir-13	Jun-04	Jun-03	WEIR

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.00	1.00	1	0.79	0.25	0.44
Link-02	TRIANGULAR	1.50	23.00	1	17.25	0.74	66.58
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.97
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	676.12
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	0.65
Link-18	TRIANGULAR	0.50	16.00	1	4.00	0.25	10.25
Link-21	TRAPEZOIDAL	1.50	18.75	1	18.56	0.97	50.28
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	15.10
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	7.02
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.11
Link-38	CIRCULAR	2.00	2.00	1	3.14	0.50	38.01
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	4.64
Link-41	TRAPEZOIDAL	1.30	18.30	1	11.96	0.65	30.81
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	57.74
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches
Total Precipitation	45.379	2.698
Surface Runoff	0.181	0.011
Continuity Error (%)	-0.000	

********** Flow Routing Continuity **********	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	21.498	7.006
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.175	0.057
Continuity Error (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.79	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Paved parking & roofs	0.38	C	98.00
Composite Area & Weighted CN	1.42		82.33

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved parking & roofs	0.46	C	98.00
Composite Area & Weighted CN	2.50		83.54

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00

1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.58	C	98.00
> 75% grass cover, Good	0.84	C	74.00
Composite Area & Weighted CN	3.41		84.48

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.69	C	85.00
Composite Area & Weighted CN	4.69		85.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.11	C	74.00
Paved parking & roofs	0.47	C	98.00
Composite Area & Weighted CN	0.58		93.50

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.42	C	74.00
Paved parking & roofs	0.38	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.13		84.84

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.23	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.67		82.38

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.25	C	98.00
> 75% grass cover, Good	0.47	C	74.00
Composite Area & Weighted CN	0.72		82.34

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.62	C	74.00
Paved parking & roofs	0.48	C	98.00
Composite Area & Weighted CN	1.10		84.49

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.28	C	98.00
> 75% grass cover, Good	0.27	C	74.00
Composite Area & Weighted CN	0.55		86.06

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

```
------------------
Subbasin Sub-02
------------------

        Flow length (ft):                 749.00
        Slope (%):                          0.61
        Computed TOC (minutes):             9.08

------------------
Subbasin Sub-03
------------------

        Flow length (ft):                 302.00
        Slope (%):                          2.89
        Computed TOC (minutes):             2.48

------------------
Subbasin Sub-04
------------------

        User-Defined TOC override (minutes):    47.40

------------------
Subbasin Sub-05
------------------

        Flow length (ft):                 913.00
        Slope (%):                          1.02
        Computed TOC (minutes):             8.68

------------------
Subbasin Sub-06
------------------

        User-Defined TOC override (minutes):    48.24

------------------
Subbasin Sub-07
------------------

        User-Defined TOC override (minutes):    41.88

------------------
Subbasin Sub-08
------------------

        Flow length (ft):                1068.00
        Slope (%):                          0.43
        Computed TOC (minutes):            13.65

------------------
Subbasin Sub-09
------------------

        Flow length (ft):                 658.00
        Slope (%):                          0.82
        Computed TOC (minutes):             7.33

------------------
Subbasin Sub-10
------------------

        User-Defined TOC override (minutes):    45.00

------------------
Subbasin Sub-11
------------------

        Flow length (ft):                 184.60
        Slope (%):                          1.00
        Computed TOC (minutes):             2.55

------------------
Subbasin Sub-12
------------------

        Flow length (ft):                 647.00
        Slope (%):                          0.43
        Computed TOC (minutes):             9.28

------------------
Subbasin Sub-13
------------------

        Flow length (ft):                 485.00
        Slope (%):                          0.25
        Computed TOC (minutes):             9.16

------------------
Subbasin Sub-15
------------------

        Flow length (ft):                 543.00
        Slope (%):                          1.11
        Computed TOC (minutes):             5.63

------------------
Subbasin Sub-16
------------------

        Flow length (ft):                 763.00
        Slope (%):                          0.20
        Computed TOC (minutes):            14.15

------------------
Subbasin Sub-17
------------------

        Flow length (ft):                 915.00
        Slope (%):                          0.81
        Computed TOC (minutes):             9.50

------------------
Subbasin Sub-18
------------------

        Flow length (ft):                 414.00
        Slope (%):                          1.54
        Computed TOC (minutes):             4.03

------------------
Subbasin Sub-19
------------------

        Flow length (ft):                 259.00
        Slope (%):                          1.80
        Computed TOC (minutes):             2.64

**********************
```

Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	2.70	1.17	2.35	82.330	0	00:09:04
Sub-03	2.70	1.25	1.29	83.570	0	00:05:00
Sub-04	2.70	1.34	35.18	85.000	0	00:47:24
Sub-05	2.70	1.24	4.40	83.540	0	00:08:40
Sub-06	2.70	1.27	71.39	83.920	0	00:48:14
Sub-07	2.70	1.33	15.27	84.920	0	00:41:52
Sub-08	2.70	1.30	5.70	84.480	0	00:13:39
Sub-09	2.70	1.34	9.30	85.000	0	00:07:19
Sub-10	2.70	1.32	27.08	84.780	0	00:45:00
Sub-11	2.70	2.01	1.78	93.500	0	00:05:00
Sub-12	2.70	1.33	3.99	84.840	0	00:09:16
Sub-13	2.70	1.17	1.09	82.380	0	00:09:09
Sub-15	2.70	1.17	1.31	82.340	0	00:05:37
Sub-16	2.70	1.30	1.82	84.490	0	00:14:09
Sub-17	2.70	1.34	14.32	85.000	0	00:09:30
Sub-18	2.70	1.41	1.24	86.060	0	00:05:00
Sub-19	2.70	1.34	0.56	85.090	0	00:05:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	0.79	2.83	788.60	0	12:29	0	0	0:00:00
Jun-03	0.25	1.13	794.57	0	13:32	0	0	0:00:00
Jun-04	0.48	2.73	796.31	0	13:31	0	0	0:00:00
Jun-10	0.05	0.26	794.75	0	12:05	0	0	0:00:00
Jun-11	0.20	1.05	795.36	0	12:04	0	0	0:00:00
Jun-21	0.39	1.70	797.16	0	13:10	0	0	0:00:00
Jun-24	0.32	1.07	793.93	0	13:34	0	0	0:00:00
Jun-25	0.32	1.78	797.73	0	12:44	0	0	0:00:00
Jun-28	0.59	2.12	786.24	0	12:50	0	0	0:00:00
Jun-30	0.04	0.47	795.87	0	12:06	0	0	0:00:00
Jun-32	0.04	0.28	792.39	0	11:58	0	0	0:00:00
Jun-34	0.08	0.35	795.74	0	11:58	0	0	0:00:00
Jun-35	0.04	0.17	795.59	0	12:04	0	0	0:00:00
Jun-40	0.76	2.52	796.09	0	13:10	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.30	1.35	791.24	0	12:06	0	0	0:00:00
Jun-05	0.72	2.96	796.57	0	13:31	0	0	0:00:00
Jun-06	0.68	2.55	797.11	0	13:16	0	0	0:00:00
Jun-12	0.24	1.03	794.44	0	12:05	0	0	0:00:00
Jun-20	0.51	1.52	796.06	0	12:51	0	0	0:00:00
sto	0.33	0.60	795.58	0	12:44	0	0	0:00:00
Storage	0.64	2.12	797.74	0	12:44	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	35.82	53.10	0	12:24	0.00		
Jun-03	JUNCTION	1.31	19.95	0	13:31	0.00		
Jun-04	JUNCTION	1.74	19.85	0	13:31	0.00		
Jun-10	JUNCTION	0.00	1.82	0	12:04	0.00		
Jun-11	JUNCTION	1.82	1.82	0	12:04	0.00		
Jun-21	JUNCTION	15.24	19.58	0	12:36	0.00		
Jun-24	JUNCTION	0.00	27.18	0	13:32	0.00		
Jun-25	JUNCTION	0.00	12.29	0	12:43	0.00		
Jun-28	JUNCTION	0.00	63.55	0	12:50	0.00		
Jun-30	JUNCTION	5.69	5.69	0	12:04	0.00		
Jun-32	JUNCTION	1.28	1.28	0	11:57	0.00		
Jun-34	JUNCTION	0.56	0.56	0	11:57	0.00		
Jun-35	JUNCTION	0.00	0.18	0	11:58	0.00		
Jun-40	JUNCTION	0.00	7.25	0	13:21	0.00		
Out-02	OUTFALL	0.00	62.59	0	12:15	0.00		
Jun-01	STORAGE	2.33	19.86	0	12:04	0.00		
Jun-05	STORAGE	3.96	21.97	0	13:16	0.00		
Jun-06	STORAGE	15.34	61.45	0	12:36	0.00		
Jun-12	STORAGE	10.37	16.84	0	12:02	0.00		
Jun-20	STORAGE	27.08	27.08	0	12:22	0.00		
sto	STORAGE	0.00	7.50	0	12:44	0.00		
Storage	STORAGE	71.21	71.21	0	12:24	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	0.056	1	0	12:06	0.005	0	19.58	0.00	0:00:00	0.000
Jun-05	18.691	26	0	13:31	2.035	3	19.78	0.00	0:00:00	0.000
Jun-06	104.118	20	0	13:16	13.958	3	24.07	0.00	0:00:00	0.000
Jun-12	0.478	0	0	12:05	0.029	0	15.96	0.00	0:00:00	0.000
Jun-20	44.503	38	0	12:51	5.581	5	12.69	0.00	0:00:00	0.000
sto	0.186	60	0	12:44	0.090	29	7.50	0.00	0:00:00	0.000
Storage	92.620	17	0	12:44	10.638	2	54.53	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	68.11	16.03	62.59
System	68.11	16.03	62.59

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0	16:04	4.25	1.00	3.32	0.44	7.46	1.00	187	SURCHARGED
Link-02	CHANNEL	0	13:34	2.14	1.00	27.17	66.58	0.41	0.86	0	Calculated
Link-03	CONDUIT	0	12:44	5.69	1.00	7.50	5.42	1.38	0.70	0	> CAPACITY
Link-06	CONDUIT	0	12:29	6.36	1.00	51.73	200.50	0.26	0.46	0	Calculated
Link-10	CONDUIT	0	12:04	2.22	1.00	1.82	2.97	0.61	0.63	0	Calculated
Link-12	CHANNEL	0	12:35	2.52	1.06	28.17	676.12	0.04	0.62	0	Calculated
Link-15	CONDUIT	0	12:44	4.70	1.00	5.36	3.32	1.61	0.88	0	> CAPACITY
Link-16	CONDUIT	0	12:51	3.47	1.00	7.03	0.65	10.89	0.61	0	> CAPACITY
Link-18	CHANNEL	0	12:05	0.78	1.00	1.79	10.25	0.17	0.76	0	Calculated
Link-21	CHANNEL	0	12:06	0.80	1.00	5.41	50.28	0.11	0.50	0	Calculated
Link-23	CHANNEL	0	11:58	0.80	1.00	1.24	9.18	0.14	0.74	0	Calculated
Link-26	CONDUIT	0	11:58	1.01	1.00	0.18	1.00	0.18	0.20	0	Calculated
Link-27	CHANNEL	0	12:04	0.11	1.00	0.14	15.10	0.01	0.56	0	Calculated
Link-36	CONDUIT	0	13:21	4.10	1.00	7.25	7.02	1.03	1.00	355	SURCHARGED
Link-37	CONDUIT	0	13:31	7.53	1.00	19.85	13.11	1.51	0.78	0	> CAPACITY
Link-38	CONDUIT	0	12:05	8.53	1.00	15.96	38.01	0.42	0.59	0	Calculated
Link-39	CONDUIT	0	13:22	4.75	1.00	7.25	4.64	1.56	0.86	0	> CAPACITY
Link-41	CHANNEL	0	13:32	2.32	1.00	19.94	30.81	0.65	0.85	0	Calculated
Link-44	CONDUIT	0	12:06	6.82	1.00	19.58	57.74	0.34	0.43	0	Calculated
Link-45	CHANNEL	0	12:15	6.44	1.00	62.59	938.00	0.07	0.33	0	Calculated
Weir-01	WEIR	0	00:00			0.00			0.00		
Weir-02	WEIR	0	12:51			5.66			0.29		
Weir-04	WEIR	0	12:44			7.50			0.51		
Weir-05	WEIR	0	11:58			0.37			0.47		
Weir-06	WEIR	0	12:43			12.29			0.52		
Weir-07	WEIR	0	13:31			18.40			0.35		
Weir-08	WEIR	0	00:00			0.00			0.00		
Weir-09	WEIR	0	12:44			34.75			0.25		
Weir-10	WEIR	0	00:00			0.00			0.00		
Weir-11	WEIR	0	00:00			0.00			0.00		
Weir-12	WEIR	0	13:16			16.60			0.34		
Weir-13	WEIR	0	00:00			0.00			0.00		

****
Highest Flow Instability Indexes
****
Link Weir-06 (16)
Link Link-15 (15)
Link Link-06 (6)
Link Link-45 (5)
Link Link-12 (4)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-12 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit Link-16.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-21 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-36 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-38 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-39 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.

Analysis began on: Thu Sep 16 21:33:05 2021
Analysis ended on: Thu Sep 16 21:33:24 2021
Total elapsed time: 00:00:19

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.2.165 (Build 0)

****
Project Description
****
File Name ..... Existing Conditions-storage set only.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-27-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 2
Number of subbasins 17
Number of nodes 22
Number of links 32

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	2-year	CUMULATIVE	6.00
Rain Gage-02	10-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.42	749.00	0.6100	484.00	Rain Gage-02
Sub-03	0.65	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.53	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.49	913.00	1.0200	484.00	Rain Gage-02
Sub-06	88.38	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.16	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.41	1068.00	0.4300	484.00	Rain Gage-02
Sub-09	4.69	658.00	0.8200	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.58	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.13	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.67	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.72	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.10	763.00	0.2000	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.55	414.00	1.5400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.44	798.26	0.00	
Jun-04	JUNCTION	793.58	798.40	0.00	
Jun-10	JUNCTION	794.49	795.80	0.00	
Jun-11	JUNCTION	794.31	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	792.86	794.36	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	796.90	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.57	797.90	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.89	793.40	0.00	
Jun-05	STORAGE	793.61	797.90	0.00	
Jun-06	STORAGE	794.56	798.60	0.00	
Jun-12	STORAGE	793.41	797.00	0.00	
Jun-20	STORAGE	794.54	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	38.2	0.0576	0.0250
Link-02	Jun-24	Jun-02	CHANNEL	691.6	1.0252	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-10	Jun-11	CONDUIT	23.3	0.7841	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	4.4550	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	33.2	0.0030	0.0250
Link-18	Jun-10	Jun-01	CHANNEL	237.3	1.9389	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.3541	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	501.1	0.3951	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	124.7	0.5941	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	73.8	0.4474	0.0150
Link-38	Jun-12	Jun-01	CONDUIT	93.7	3.7577	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	98.3	0.7224	0.0250
Link-41	Jun-03	Jun-24	CHANNEL	105.5	0.5499	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	185.4	0.9979	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			

Weir-05	sto	Jun-34	WEIR
Weir-06	Storage	Jun-25	WEIR
Weir-07	Jun-05	Jun-04	WEIR
Weir-08	Jun-01	Jun-28	WEIR
Weir-09	Storage	Jun-06	WEIR
Weir-10	Jun-25	Jun-05	WEIR
Weir-11	Jun-11	Jun-28	WEIR
Weir-12	Jun-05	Jun-06	WEIR
Weir-13	Jun-04	Jun-03	WEIR

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.00	1.00	1	0.79	0.25	0.44
Link-02	TRIANGULAR	1.50	23.00	1	17.25	0.74	66.58
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.97
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	676.12
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	0.65
Link-18	TRIANGULAR	0.50	16.00	1	4.00	0.25	10.25
Link-21	TRAPEZOIDAL	1.50	18.75	1	18.56	0.97	50.28
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	15.10
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	7.02
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.11
Link-38	CIRCULAR	2.00	2.00	1	3.14	0.50	38.01
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	4.64
Link-41	TRAPEZOIDAL	1.30	18.30	1	11.96	0.65	30.81
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	57.74
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches
Total Precipitation	67.228	3.997
Surface Runoff	0.335	0.020
Continuity Error (%)	-0.000	

********** Flow Routing Continuity **********	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	39.891	12.999
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.302	0.098
Continuity Error (%)	-0.001	

****
Composite Curve Number Computations Report
****

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.79	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Paved parking & roofs	0.38	C	98.00
Composite Area & Weighted CN	1.42		82.33

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved parking & roofs	0.46	C	98.00
Composite Area & Weighted CN	2.50		83.54

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00

1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.58	C	98.00
> 75% grass cover, Good	0.84	C	74.00
Composite Area & Weighted CN	3.41		84.48

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.69	C	85.00
Composite Area & Weighted CN	4.69		85.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.11	C	74.00
Paved parking & roofs	0.47	C	98.00
Composite Area & Weighted CN	0.58		93.50

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.42	C	74.00
Paved parking & roofs	0.38	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.13		84.84

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.23	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.67		82.38

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.25	C	98.00
> 75% grass cover, Good	0.47	C	74.00
Composite Area & Weighted CN	0.72		82.34

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.62	C	74.00
Paved parking & roofs	0.48	C	98.00
Composite Area & Weighted CN	1.10		84.49

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.28	C	98.00
> 75% grass cover, Good	0.27	C	74.00
Composite Area & Weighted CN	0.55		86.06

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

```
------------------
Subbasin Sub-02
------------------

        Flow length (ft):                 749.00
        Slope (%):                          0.61
        Computed TOC (minutes):             9.08

------------------
Subbasin Sub-03
------------------

        Flow length (ft):                 302.00
        Slope (%):                          2.89
        Computed TOC (minutes):             2.48

------------------
Subbasin Sub-04
------------------

        User-Defined TOC override (minutes):    47.40

------------------
Subbasin Sub-05
------------------

        Flow length (ft):                 913.00
        Slope (%):                          1.02
        Computed TOC (minutes):             8.68

------------------
Subbasin Sub-06
------------------

        User-Defined TOC override (minutes):    48.24

------------------
Subbasin Sub-07
------------------

        User-Defined TOC override (minutes):    41.88

------------------
Subbasin Sub-08
------------------

        Flow length (ft):                1068.00
        Slope (%):                          0.43
        Computed TOC (minutes):            13.65

------------------
Subbasin Sub-09
------------------

        Flow length (ft):                 658.00
        Slope (%):                          0.82
        Computed TOC (minutes):             7.33

------------------
Subbasin Sub-10
------------------

        User-Defined TOC override (minutes):    45.00

------------------
Subbasin Sub-11
------------------

        Flow length (ft):                 184.60
        Slope (%):                          1.00
        Computed TOC (minutes):             2.55

------------------
Subbasin Sub-12
------------------

        Flow length (ft):                 647.00
        Slope (%):                          0.43
        Computed TOC (minutes):             9.28

------------------
Subbasin Sub-13
------------------

        Flow length (ft):                 485.00
        Slope (%):                          0.25
        Computed TOC (minutes):             9.16

------------------
Subbasin Sub-15
------------------

        Flow length (ft):                 543.00
        Slope (%):                          1.11
        Computed TOC (minutes):             5.63

------------------
Subbasin Sub-16
------------------

        Flow length (ft):                 763.00
        Slope (%):                          0.20
        Computed TOC (minutes):            14.15

------------------
Subbasin Sub-17
------------------

        Flow length (ft):                 915.00
        Slope (%):                          0.81
        Computed TOC (minutes):             9.50

------------------
Subbasin Sub-18
------------------

        Flow length (ft):                 414.00
        Slope (%):                          1.54
        Computed TOC (minutes):             4.03

------------------
Subbasin Sub-19
------------------

        Flow length (ft):                 259.00
        Slope (%):                          1.80
        Computed TOC (minutes):             2.64

**********************
```

Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	4.00	2.23	4.50	82.330	0	00:09:04
Sub-03	4.00	2.33	2.42	83.570	0	00:05:00
Sub-04	4.00	2.46	65.27	85.000	0	00:47:24
Sub-05	4.00	2.33	8.26	83.540	0	00:08:40
Sub-06	4.00	2.36	135.38	83.920	0	00:48:14
Sub-07	4.00	2.45	28.29	84.920	0	00:41:52
Sub-08	4.00	2.41	10.48	84.480	0	00:13:39
Sub-09	4.00	2.46	17.00	85.000	0	00:07:19
Sub-10	4.00	2.44	50.41	84.780	0	00:45:00
Sub-11	4.00	3.27	2.81	93.500	0	00:05:00
Sub-12	4.00	2.44	7.30	84.840	0	00:09:16
Sub-13	4.00	2.23	2.10	82.380	0	00:09:09
Sub-15	4.00	2.23	2.52	82.340	0	00:05:37
Sub-16	4.00	2.41	3.35	84.490	0	00:14:09
Sub-17	4.00	2.46	26.13	85.000	0	00:09:30
Sub-18	4.00	2.55	2.21	86.060	0	00:05:00
Sub-19	4.00	2.46	1.02	85.090	0	00:05:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	1.16	3.94	789.71	0	12:35	0	0	0:00:00
Jun-03	0.45	1.99	795.43	0	13:26	0	0	0:00:00
Jun-04	0.98	4.09	797.67	0	13:07	0	0	0:00:00
Jun-10	0.06	0.33	794.81	0	12:04	0	0	0:00:00
Jun-11	0.26	1.42	795.73	0	12:04	0	0	0:00:00
Jun-21	0.62	2.23	797.68	0	13:24	0	0	0:00:00
Jun-24	0.47	1.30	794.16	0	14:03	0	0	0:00:00
Jun-25	0.54	2.28	798.23	0	12:39	0	0	0:00:00
Jun-28	0.87	2.88	787.00	0	12:37	0	0	0:00:00
Jun-30	0.07	0.66	796.06	0	12:05	0	0	0:00:00
Jun-32	0.06	0.36	792.46	0	11:58	0	0	0:00:00
Jun-34	0.11	0.41	795.80	0	11:58	0	0	0:00:00
Jun-35	0.06	0.20	795.62	0	12:04	0	0	0:00:00
Jun-40	1.06	2.86	796.43	0	13:22	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.44	1.83	791.72	0	12:06	0	0	0:00:00
Jun-05	1.22	4.07	797.67	0	13:25	0	0	0:00:00
Jun-06	1.01	3.12	797.68	0	13:24	0	0	0:00:00
Jun-12	0.36	1.85	795.26	0	12:55	0	0	0:00:00
Jun-20	0.66	1.78	796.32	0	12:38	0	0	0:00:00
sto	0.39	0.60	795.59	0	12:40	0	0	0:00:00
Storage	0.86	2.33	797.96	0	12:41	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	66.49	89.87	0	12:34	0.00		
Jun-03	JUNCTION	2.51	54.87	0	13:15	0.00		
Jun-04	JUNCTION	2.76	124.04	0	13:14	0.00		
Jun-10	JUNCTION	0.00	3.18	0	12:04	0.00		
Jun-11	JUNCTION	3.35	3.35	0	12:04	0.00		
Jun-21	JUNCTION	28.25	28.25	0	12:20	0.00		
Jun-24	JUNCTION	0.00	48.98	0	13:26	0.00		
Jun-25	JUNCTION	0.00	33.40	0	12:43	0.00		
Jun-28	JUNCTION	0.00	118.19	0	12:37	0.00		
Jun-30	JUNCTION	10.45	10.45	0	12:03	0.00		
Jun-32	JUNCTION	2.38	2.38	0	11:57	0.00		
Jun-34	JUNCTION	1.01	1.01	0	11:57	0.00		
Jun-35	JUNCTION	0.00	0.26	0	11:58	0.00		
Jun-40	JUNCTION	0.00	8.00	0	13:24	0.00		
Out-02	OUTFALL	0.00	118.19	0	12:38	0.00		
Jun-01	STORAGE	4.49	31.80	0	12:04	0.00		
Jun-05	STORAGE	7.30	105.99	0	13:15	0.00		
Jun-06	STORAGE	28.17	109.74	0	12:26	0.00		
Jun-12	STORAGE	19.02	38.58	0	12:37	0.00		
Jun-20	STORAGE	50.39	50.39	0	12:21	0.00		
sto	STORAGE	0.00	7.89	0	12:40	0.00		
Storage	STORAGE	135.22	146.80	0	12:26	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	0.171	2	0	12:06	0.014	0	31.53	0.00	0:00:00	0.000
Jun-05	61.278	86	0	13:25	9.120	13	123.91	0.00	0:00:00	0.000
Jun-06	220.597	42	0	13:24	35.537	7	65.10	0.00	0:00:00	0.000
Jun-12	12.098	8	0	12:55	0.426	0	30.51	0.00	0:00:00	0.000
Jun-20	66.923	58	0	12:38	9.402	8	35.52	0.00	0:00:00	0.000
sto	0.189	62	0	12:40	0.108	35	7.89	0.00	0:00:00	0.000
Storage	156.292	29	0	12:41	20.694	4	125.35	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	75.76	27.66	118.19
System	75.76	27.66	118.19

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0	18:02	4.25	1.00	3.32	0.44	7.46	1.00	346	SURCHARGED
Link-02	CHANNEL	0	13:58	3.03	1.00	45.47	66.58	0.68	0.93	0	Calculated
Link-03	CONDUIT	0	12:41	5.96	1.00	7.88	5.42	1.45	0.70	0	> CAPACITY
Link-06	CONDUIT	0	12:35	6.88	1.00	89.38	200.50	0.45	0.63	0	Calculated
Link-10	CONDUIT	0	12:04	3.07	1.00	3.18	2.97	1.07	0.79	0	> CAPACITY
Link-12	CHANNEL	0	12:23	2.97	1.06	43.42	676.12	0.06	0.79	0	Calculated
Link-15	CONDUIT	0	12:34	5.11	1.00	5.91	3.32	1.78	1.00	188	SURCHARGED
Link-16	CONDUIT	0	12:38	3.85	1.00	9.29	0.65	14.38	0.72	0	> CAPACITY
Link-18	CHANNEL	0	12:04	1.17	1.00	3.16	10.25	0.31	0.82	0	Calculated
Link-21	CHANNEL	0	12:05	0.90	1.00	10.06	50.28	0.20	0.71	0	Calculated
Link-23	CHANNEL	0	11:58	1.27	1.00	2.35	9.18	0.26	0.80	0	Calculated
Link-26	CONDUIT	0	11:58	1.17	1.00	0.26	1.00	0.26	0.24	0	Calculated
Link-27	CHANNEL	0	12:04	0.10	1.00	0.20	15.10	0.01	0.58	0	Calculated
Link-36	CONDUIT	0	13:24	4.53	1.00	8.00	7.02	1.14	1.00	487	SURCHARGED
Link-37	CONDUIT	0	13:07	9.60	1.00	26.46	13.11	2.02	1.00	0	> CAPACITY
Link-38	CONDUIT	0	12:55	10.12	1.00	30.51	38.01	0.80	0.92	0	Calculated
Link-39	CONDUIT	0	13:24	4.76	1.00	8.00	4.64	1.72	0.93	0	> CAPACITY
Link-41	CHANNEL	0	13:40	3.43	1.00	40.99	30.81	1.33	1.00	7	FLOODED
Link-44	CONDUIT	0	12:06	7.60	1.00	31.53	57.74	0.55	0.57	0	Calculated
Link-45	CHANNEL	0	12:38	7.38	1.00	118.19	938.00	0.13	0.44	0	Calculated
Weir-01	WEIR	0	13:15			4.05			0.15		
Weir-02	WEIR	0	12:38			26.24			0.55		
Weir-04	WEIR	0	12:40			7.89			0.52		
Weir-05	WEIR	0	11:58			0.75			0.66		
Weir-06	WEIR	0	12:43			33.40			0.71		
Weir-07	WEIR	0	13:13			122.84			0.96		
Weir-08	WEIR	0	00:00			0.00			0.00		
Weir-09	WEIR	0	12:40			84.75			0.38		
Weir-10	WEIR	0	12:39			0.48			0.00		
Weir-11	WEIR	0	12:04			0.17			0.43		
Weir-12	WEIR	0	12:41			57.48			0.82		
Weir-13	WEIR	0	13:15			29.84			0.23		

****
Highest Flow Instability Indexes
****
Link Weir-06 (25)
Link Link-15 (24)
Link Weir-07 (18)
Link Link-01 (17)
Link Link-37 (16)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-12 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit Link-16.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-21 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-36 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-38 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-39 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.

Analysis began on: Thu Sep 16 21:37:35 2021
Analysis ended on: Thu Sep 16 21:37:47 2021
Total elapsed time: 00:00:12

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.2.165 (Build 0)

****
Project Description
****
File Name ..... Existing Conditions-storage set only.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-27-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 2
Number of subbasins 17
Number of nodes 22
Number of links 32

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	2-year	CUMULATIVE	6.00
Rain Gage-02	25-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.42	749.00	0.6100	484.00	Rain Gage-02
Sub-03	0.65	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.53	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.49	913.00	1.0200	484.00	Rain Gage-02
Sub-06	88.38	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.16	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.41	1068.00	0.4300	484.00	Rain Gage-02
Sub-09	4.69	658.00	0.8200	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.58	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.13	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.67	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.72	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.10	763.00	0.2000	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.55	414.00	1.5400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.44	798.26	0.00	
Jun-04	JUNCTION	793.58	798.40	0.00	
Jun-10	JUNCTION	794.49	795.80	0.00	
Jun-11	JUNCTION	794.31	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	792.86	794.36	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	796.90	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.57	797.90	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.89	793.40	0.00	
Jun-05	STORAGE	793.61	797.90	0.00	
Jun-06	STORAGE	794.56	798.60	0.00	
Jun-12	STORAGE	793.41	797.00	0.00	
Jun-20	STORAGE	794.54	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	38.2	0.0576	0.0250
Link-02	Jun-24	Jun-02	CHANNEL	691.6	1.0252	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-10	Jun-11	CONDUIT	23.3	0.7841	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	4.4550	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	33.2	0.0030	0.0250
Link-18	Jun-10	Jun-01	CHANNEL	237.3	1.9389	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.3541	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	501.1	0.3951	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	124.7	0.5941	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	73.8	0.4474	0.0150
Link-38	Jun-12	Jun-01	CONDUIT	93.7	3.7577	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	98.3	0.7224	0.0250
Link-41	Jun-03	Jun-24	CHANNEL	105.5	0.5499	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	185.4	0.9979	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			

Weir-05	sto	Jun-34	WEIR
Weir-06	Storage	Jun-25	WEIR
Weir-07	Jun-05	Jun-04	WEIR
Weir-08	Jun-01	Jun-28	WEIR
Weir-09	Storage	Jun-06	WEIR
Weir-10	Jun-25	Jun-05	WEIR
Weir-11	Jun-11	Jun-28	WEIR
Weir-12	Jun-05	Jun-06	WEIR
Weir-13	Jun-04	Jun-03	WEIR

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.00	1.00	1	0.79	0.25	0.44
Link-02	TRIANGULAR	1.50	23.00	1	17.25	0.74	66.58
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.97
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	676.12
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	0.65
Link-18	TRIANGULAR	0.50	16.00	1	4.00	0.25	10.25
Link-21	TRAPEZOIDAL	1.50	18.75	1	18.56	0.97	50.28
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	15.10
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	7.02
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.11
Link-38	CIRCULAR	2.00	2.00	1	3.14	0.50	38.01
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	4.64
Link-41	TRAPEZOIDAL	1.30	18.30	1	11.96	0.65	30.81
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	57.74
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches
Total Precipitation	77.312	4.597
Surface Runoff	0.410	0.024
Continuity Error (%)	-0.000	

********** Flow Routing Continuity **********	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	73.530	23.961
Initial Stored Volume	0.000	0.000
Final Stored Volume	11.734	3.824
Continuity Error (%)	-0.847	

****
Composite Curve Number Computations Report
****

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.79	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Paved parking & roofs	0.38	C	98.00
Composite Area & Weighted CN	1.42		82.33

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved parking & roofs	0.46	C	98.00
Composite Area & Weighted CN	2.50		83.54

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00

1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.58	C	98.00
> 75% grass cover, Good	0.84	C	74.00
Composite Area & Weighted CN	3.41		84.48

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.69	C	85.00
Composite Area & Weighted CN	4.69		85.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.11	C	74.00
Paved parking & roofs	0.47	C	98.00
Composite Area & Weighted CN	0.58		93.50

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.42	C	74.00
Paved parking & roofs	0.38	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.13		84.84

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.23	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.67		82.38

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.25	C	98.00
> 75% grass cover, Good	0.47	C	74.00
Composite Area & Weighted CN	0.72		82.34

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.62	C	74.00
Paved parking & roofs	0.48	C	98.00
Composite Area & Weighted CN	1.10		84.49

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.28	C	98.00
> 75% grass cover, Good	0.27	C	74.00
Composite Area & Weighted CN	0.55		86.06

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

```
------------------
Subbasin Sub-02
------------------

        Flow length (ft):                 749.00
        Slope (%):                          0.61
        Computed TOC (minutes):             9.08

------------------
Subbasin Sub-03
------------------

        Flow length (ft):                 302.00
        Slope (%):                          2.89
        Computed TOC (minutes):             2.48

------------------
Subbasin Sub-04
------------------

        User-Defined TOC override (minutes):    47.40

------------------
Subbasin Sub-05
------------------

        Flow length (ft):                 913.00
        Slope (%):                          1.02
        Computed TOC (minutes):             8.68

------------------
Subbasin Sub-06
------------------

        User-Defined TOC override (minutes):    48.24

------------------
Subbasin Sub-07
------------------

        User-Defined TOC override (minutes):    41.88

------------------
Subbasin Sub-08
------------------

        Flow length (ft):                1068.00
        Slope (%):                          0.43
        Computed TOC (minutes):            13.65

------------------
Subbasin Sub-09
------------------

        Flow length (ft):                 658.00
        Slope (%):                          0.82
        Computed TOC (minutes):             7.33

------------------
Subbasin Sub-10
------------------

        User-Defined TOC override (minutes):    45.00

------------------
Subbasin Sub-11
------------------

        Flow length (ft):                 184.60
        Slope (%):                          1.00
        Computed TOC (minutes):             2.55

------------------
Subbasin Sub-12
------------------

        Flow length (ft):                 647.00
        Slope (%):                          0.43
        Computed TOC (minutes):             9.28

------------------
Subbasin Sub-13
------------------

        Flow length (ft):                 485.00
        Slope (%):                          0.25
        Computed TOC (minutes):             9.16

------------------
Subbasin Sub-15
------------------

        Flow length (ft):                 543.00
        Slope (%):                          1.11
        Computed TOC (minutes):             5.63

------------------
Subbasin Sub-16
------------------

        Flow length (ft):                 763.00
        Slope (%):                          0.20
        Computed TOC (minutes):            14.15

------------------
Subbasin Sub-17
------------------

        Flow length (ft):                 915.00
        Slope (%):                          0.81
        Computed TOC (minutes):             9.50

------------------
Subbasin Sub-18
------------------

        Flow length (ft):                 414.00
        Slope (%):                          1.54
        Computed TOC (minutes):             4.03

------------------
Subbasin Sub-19
------------------

        Flow length (ft):                 259.00
        Slope (%):                          1.80
        Computed TOC (minutes):             2.64

**********************
```

Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	4.60	2.75	5.54	82.330	0	00:09:04
Sub-03	4.60	2.87	2.95	83.570	0	00:05:00
Sub-04	4.60	3.00	79.91	85.000	0	00:47:24
Sub-05	4.60	2.86	10.10	83.540	0	00:08:40
Sub-06	4.60	2.90	165.89	83.920	0	00:48:14
Sub-07	4.60	2.99	34.48	84.920	0	00:41:52
Sub-08	4.60	2.95	12.76	84.480	0	00:13:39
Sub-09	4.60	3.00	20.66	85.000	0	00:07:19
Sub-10	4.60	2.98	61.77	84.780	0	00:45:00
Sub-11	4.60	3.86	3.29	93.500	0	00:05:00
Sub-12	4.60	2.98	8.87	84.840	0	00:09:16
Sub-13	4.60	2.76	2.58	82.380	0	00:09:09
Sub-15	4.60	2.75	3.10	82.340	0	00:05:37
Sub-16	4.60	2.95	4.08	84.490	0	00:14:09
Sub-17	4.60	3.00	31.72	85.000	0	00:09:30
Sub-18	4.60	3.10	2.67	86.060	0	00:05:00
Sub-19	4.60	3.01	1.24	85.090	0	00:05:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	1.74	4.55	790.32	0	12:31	0	0	0:00:00
Jun-03	0.87	3.87	797.31	0	12:57	0	0	0:00:00
Jun-04	0.24	4.82	798.40	0	12:57	0	0	0:00:00
Jun-10	0.07	0.34	794.82	0	12:04	0	0	0:00:00
Jun-11	0.27	1.51	795.82	0	12:04	0	0	0:00:00
Jun-21	1.26	2.48	797.93	0	13:17	0	0	0:00:00
Jun-24	0.72	1.30	794.16	0	12:56	0	0	0:00:00
Jun-25	1.06	2.70	798.65	0	12:43	0	0	0:00:00
Jun-28	1.25	3.16	787.28	0	12:31	0	0	0:00:00
Jun-30	0.08	0.74	796.14	0	12:05	0	0	0:00:00
Jun-32	0.07	0.39	792.49	0	11:58	0	0	0:00:00
Jun-34	0.12	0.49	795.88	0	13:03	0	0	0:00:00
Jun-35	0.07	0.84	796.26	0	13:03	0	0	0:00:00
Jun-40	1.61	3.02	796.59	0	13:14	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.48	1.97	791.86	0	12:06	0	0	0:00:00
Jun-05	2.26	4.29	797.90	0	13:05	115.46	545	0:00:00
Jun-06	1.75	3.37	797.93	0	13:17	0	0	0:00:00
Jun-12	0.42	2.34	795.75	0	13:01	0	0	0:00:00
Jun-20	0.70	1.87	796.41	0	12:35	0	0	0:00:00
sto	0.41	0.62	795.60	0	13:03	0	0	0:00:00
Storage	1.29	2.42	798.04	0	12:41	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	81.05	112.37	0	12:28	0.00		
Jun-03	JUNCTION	3.09	180.88	0	12:56	0.00		
Jun-04	JUNCTION	3.22	173.06	0	12:55	0.00		
Jun-10	JUNCTION	0.00	3.47	0	12:04	0.00		
Jun-11	JUNCTION	4.07	4.07	0	12:04	0.00		
Jun-21	JUNCTION	34.40	34.40	0	12:20	0.00		
Jun-24	JUNCTION	0.00	48.68	0	12:50	0.00		
Jun-25	JUNCTION	0.00	52.08	0	12:39	0.00		
Jun-28	JUNCTION	0.00	143.27	0	12:31	0.00		
Jun-30	JUNCTION	12.72	12.72	0	12:04	0.00		
Jun-32	JUNCTION	2.91	2.91	0	11:57	0.00		
Jun-34	JUNCTION	1.22	1.60	0	13:03	0.00		
Jun-35	JUNCTION	0.00	5.66	0	12:59	0.00		
Jun-40	JUNCTION	0.00	8.27	0	13:15	0.00		
Out-02	OUTFALL	0.00	143.27	0	12:31	0.00		
Jun-01	STORAGE	5.54	35.22	0	12:04	0.00		
Jun-05	STORAGE	8.87	114.16	0	12:51	54.55	0	13:17
Jun-06	STORAGE	34.26	134.10	0	12:34	0.00		
Jun-12	STORAGE	23.10	51.45	0	12:34	0.00		
Jun-20	STORAGE	61.71	61.71	0	12:22	0.00		
sto	STORAGE	0.00	9.54	0	13:03	0.00		
Storage	STORAGE	165.73	199.22	0	12:31	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	0.236	2	0	12:06	0.020	0	34.95	0.00	0:00:00	0.000
Jun-05	71.371	100	0	13:05	34.238	48	172.53	0.00	0:00:00	0.000
Jun-06	294.969	56	0	13:17	137.126	26	93.04	0.00	0:00:00	0.000
Jun-12	34.084	23	0	13:01	1.581	1	31.62	0.00	0:00:00	0.000
Jun-20	75.054	65	0	12:35	10.539	9	47.48	0.00	0:00:00	0.000
sto	0.203	66	0	13:03	0.122	40	9.54	0.00	0:00:00	0.000
Storage	186.634	34	0	12:41	70.398	13	167.42	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	77.69	47.79	143.27
System	77.69	47.79	143.27

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0	13:51	5.34	1.00	3.84	0.44	8.64	1.00	71	SURCHARGED
Link-02	CHANNEL	0	13:43	3.03	1.00	45.46	66.58	0.68	0.93	0	Calculated
Link-03	CONDUIT	0	12:41	6.06	1.00	8.02	5.42	1.48	0.71	0	> CAPACITY
Link-06	CONDUIT	0	12:31	7.35	1.00	111.39	200.50	0.56	0.72	0	Calculated
Link-10	CONDUIT	0	12:04	3.30	1.00	3.47	2.97	1.17	0.80	0	> CAPACITY
Link-12	CHANNEL	0	12:20	2.96	1.06	49.62	676.12	0.07	0.86	0	Calculated
Link-15	CONDUIT	0	12:29	5.17	1.00	6.01	3.32	1.81	1.00	689	SURCHARGED
Link-16	CONDUIT	0	12:35	3.97	1.00	10.04	0.65	15.54	0.75	0	> CAPACITY
Link-18	CHANNEL	0	12:04	1.25	1.00	3.46	10.25	0.34	0.83	0	Calculated
Link-21	CHANNEL	0	12:05	1.02	1.00	12.29	50.28	0.24	0.75	0	Calculated
Link-23	CHANNEL	0	11:58	1.47	1.00	2.88	9.18	0.31	0.82	0	Calculated
Link-26	CONDUIT	0	13:03	2.31	1.00	1.53	1.00	1.52	0.53	0	> CAPACITY
Link-27	CHANNEL	0	12:59	1.22	1.00	5.66	15.10	0.37	0.92	0	Calculated
Link-36	CONDUIT	0	13:15	4.68	1.00	8.27	7.02	1.18	1.00	728	SURCHARGED
Link-37	CONDUIT	0	12:46	9.63	1.00	26.53	13.11	2.02	1.00	5	SURCHARGED
Link-38	CONDUIT	0	13:01	10.18	1.00	31.62	38.01	0.83	0.97	0	Calculated
Link-39	CONDUIT	0	13:15	4.82	1.00	8.27	4.64	1.78	0.93	0	> CAPACITY
Link-41	CHANNEL	0	12:50	3.40	1.00	40.63	30.81	1.32	1.00	13	FLOODED
Link-44	CONDUIT	0	12:06	7.77	1.00	34.95	57.74	0.61	0.61	0	Calculated
Link-45	CHANNEL	0	12:31	7.70	1.00	143.27	938.00	0.15	0.49	0	Calculated
Weir-01	WEIR	0	12:57			22.21			0.88		
Weir-02	WEIR	0	12:35			37.44			0.64		
Weir-04	WEIR	0	13:03			9.54			0.57		
Weir-05	WEIR	0	13:03			1.60			0.94		
Weir-06	WEIR	0	12:39			52.08			0.81		
Weir-07	WEIR	0	12:55			171.21			1.00		
Weir-08	WEIR	0	00:00			0.00			0.00		
Weir-09	WEIR	0	12:38			107.58			0.42		
Weir-10	WEIR	0	12:43			4.76			0.29		
Weir-11	WEIR	0	12:04			0.60			0.72		
Weir-12	WEIR	0	12:57			84.94			1.00		
Weir-13	WEIR	0	12:57			171.65			1.00		

****
Highest Flow Instability Indexes
****
Link Link-36 (41)
Link Link-39 (39)
Link Weir-09 (28)
Link Weir-12 (27)
Link Weir-06 (5)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-12 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit Link-16.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-21 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-36 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-38 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-39 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.

Analysis began on: Thu Sep 16 21:41:37 2021
Analysis ended on: Thu Sep 16 21:41:51 2021
Total elapsed time: 00:00:14

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.2.165 (Build 0)

****
Project Description
****
File Name ..... Existing Conditions-storage set only.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-27-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 2
Number of subbasins 17
Number of nodes 22
Number of links 32

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	2-year	CUMULATIVE	6.00
Rain Gage-02	100-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.42	749.00	0.6100	484.00	Rain Gage-02
Sub-03	0.65	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.53	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.49	913.00	1.0200	484.00	Rain Gage-02
Sub-06	88.38	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.16	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.41	1068.00	0.4300	484.00	Rain Gage-02
Sub-09	4.69	658.00	0.8200	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.58	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.13	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.67	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.72	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.10	763.00	0.2000	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.55	414.00	1.5400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.44	798.26	0.00	
Jun-04	JUNCTION	793.58	798.40	0.00	
Jun-10	JUNCTION	794.49	795.80	0.00	
Jun-11	JUNCTION	794.31	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	792.86	794.36	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	796.90	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.57	797.90	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.89	793.40	0.00	
Jun-05	STORAGE	793.61	797.90	0.00	
Jun-06	STORAGE	794.56	798.60	0.00	
Jun-12	STORAGE	793.41	797.00	0.00	
Jun-20	STORAGE	794.54	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	38.2	0.0576	0.0250
Link-02	Jun-24	Jun-02	CHANNEL	691.6	1.0252	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-10	Jun-11	CONDUIT	23.3	0.7841	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	4.4550	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	33.2	0.0030	0.0250
Link-18	Jun-10	Jun-01	CHANNEL	237.3	1.9389	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.3541	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	501.1	0.3951	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	124.7	0.5941	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	73.8	0.4474	0.0150
Link-38	Jun-12	Jun-01	CONDUIT	93.7	3.7577	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	98.3	0.7224	0.0250
Link-41	Jun-03	Jun-24	CHANNEL	105.5	0.5499	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	185.4	0.9979	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			

Weir-05	sto	Jun-34	WEIR
Weir-06	Storage	Jun-25	WEIR
Weir-07	Jun-05	Jun-04	WEIR
Weir-08	Jun-01	Jun-28	WEIR
Weir-09	Storage	Jun-06	WEIR
Weir-10	Jun-25	Jun-05	WEIR
Weir-11	Jun-11	Jun-28	WEIR
Weir-12	Jun-05	Jun-06	WEIR
Weir-13	Jun-04	Jun-03	WEIR

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.00	1.00	1	0.79	0.25	0.44
Link-02	TRIANGULAR	1.50	23.00	1	17.25	0.74	66.58
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.97
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	676.12
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	0.65
Link-18	TRIANGULAR	0.50	16.00	1	4.00	0.25	10.25
Link-21	TRAPEZOIDAL	1.50	18.75	1	18.56	0.97	50.28
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	15.10
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	7.02
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.11
Link-38	CIRCULAR	2.00	2.00	1	3.14	0.50	38.01
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	4.64
Link-41	TRAPEZOIDAL	1.30	18.30	1	11.96	0.65	30.81
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	57.74
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches
Total Precipitation	94.119	5.596
Surface Runoff	0.538	0.032
Continuity Error (%)	-0.000	

********** Flow Routing Continuity **********	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	81.358	26.512
Initial Stored Volume	0.000	0.000
Final Stored Volume	11.786	3.841
Continuity Error (%)	-0.655	

****
Composite Curve Number Computations Report
****

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.79	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Paved parking & roofs	0.38	C	98.00
Composite Area & Weighted CN	1.42		82.33

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved parking & roofs	0.46	C	98.00
Composite Area & Weighted CN	2.50		83.54

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00

1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.58	C	98.00
> 75% grass cover, Good	0.84	C	74.00
Composite Area & Weighted CN	3.41		84.48

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.69	C	85.00
Composite Area & Weighted CN	4.69		85.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.11	C	74.00
Paved parking & roofs	0.47	C	98.00
Composite Area & Weighted CN	0.58		93.50

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.42	C	74.00
Paved parking & roofs	0.38	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.13		84.84

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.23	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.67		82.38

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.25	C	98.00
> 75% grass cover, Good	0.47	C	74.00
Composite Area & Weighted CN	0.72		82.34

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.62	C	74.00
Paved parking & roofs	0.48	C	98.00
Composite Area & Weighted CN	1.10		84.49

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.28	C	98.00
> 75% grass cover, Good	0.27	C	74.00
Composite Area & Weighted CN	0.55		86.06

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

```
------------------
Subbasin Sub-02
------------------

        Flow length (ft):                 749.00
        Slope (%):                          0.61
        Computed TOC (minutes):             9.08

------------------
Subbasin Sub-03
------------------

        Flow length (ft):                 302.00
        Slope (%):                          2.89
        Computed TOC (minutes):             2.48

------------------
Subbasin Sub-04
------------------

        User-Defined TOC override (minutes):    47.40

------------------
Subbasin Sub-05
------------------

        Flow length (ft):                 913.00
        Slope (%):                          1.02
        Computed TOC (minutes):             8.68

------------------
Subbasin Sub-06
------------------

        User-Defined TOC override (minutes):    48.24

------------------
Subbasin Sub-07
------------------

        User-Defined TOC override (minutes):    41.88

------------------
Subbasin Sub-08
------------------

        Flow length (ft):                1068.00
        Slope (%):                          0.43
        Computed TOC (minutes):            13.65

------------------
Subbasin Sub-09
------------------

        Flow length (ft):                 658.00
        Slope (%):                          0.82
        Computed TOC (minutes):             7.33

------------------
Subbasin Sub-10
------------------

        User-Defined TOC override (minutes):    45.00

------------------
Subbasin Sub-11
------------------

        Flow length (ft):                 184.60
        Slope (%):                          1.00
        Computed TOC (minutes):             2.55

------------------
Subbasin Sub-12
------------------

        Flow length (ft):                 647.00
        Slope (%):                          0.43
        Computed TOC (minutes):             9.28

------------------
Subbasin Sub-13
------------------

        Flow length (ft):                 485.00
        Slope (%):                          0.25
        Computed TOC (minutes):             9.16

------------------
Subbasin Sub-15
------------------

        Flow length (ft):                 543.00
        Slope (%):                          1.11
        Computed TOC (minutes):             5.63

------------------
Subbasin Sub-16
------------------

        Flow length (ft):                 763.00
        Slope (%):                          0.20
        Computed TOC (minutes):            14.15

------------------
Subbasin Sub-17
------------------

        Flow length (ft):                 915.00
        Slope (%):                          0.81
        Computed TOC (minutes):             9.50

------------------
Subbasin Sub-18
------------------

        Flow length (ft):                 414.00
        Slope (%):                          1.54
        Computed TOC (minutes):             4.03

------------------
Subbasin Sub-19
------------------

        Flow length (ft):                 259.00
        Slope (%):                          1.80
        Computed TOC (minutes):             2.64

**********************
```

Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	5.60	3.65	7.31	82.330	0	00:09:04
Sub-03	5.60	3.78	3.86	83.570	0	00:05:00
Sub-04	5.60	3.93	103.94	85.000	0	00:47:24
Sub-05	5.60	3.78	13.22	83.540	0	00:08:40
Sub-06	5.60	3.81	217.82	83.920	0	00:48:14
Sub-07	5.60	3.92	44.96	84.920	0	00:41:52
Sub-08	5.60	3.87	16.57	84.480	0	00:13:39
Sub-09	5.60	3.93	26.78	85.000	0	00:07:19
Sub-10	5.60	3.90	80.60	84.780	0	00:45:00
Sub-11	5.60	4.84	4.07	93.500	0	00:05:00
Sub-12	5.60	3.91	11.52	84.840	0	00:09:16
Sub-13	5.60	3.66	3.40	82.380	0	00:09:09
Sub-15	5.60	3.65	4.08	82.340	0	00:05:37
Sub-16	5.60	3.87	5.30	84.490	0	00:14:09
Sub-17	5.60	3.93	41.16	85.000	0	00:09:30
Sub-18	5.60	4.04	3.44	86.060	0	00:05:00
Sub-19	5.60	3.94	1.60	85.090	0	00:05:00

Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	1.85	5.50	791.27	0	12:24	0	0	0:00:00
Jun-03	0.91	3.42	796.86	0	12:38	0	0	0:00:00
Jun-04	0.24	4.82	798.40	0	12:37	0	0	0:00:00
Jun-10	0.08	0.35	794.84	0	12:04	0	0	0:00:00
Jun-11	0.31	1.62	795.93	0	12:04	0	0	0:00:00
Jun-21	1.29	2.58	798.03	0	12:59	0	0	0:00:00
Jun-24	0.75	1.32	794.18	0	12:38	0	0	0:00:00
Jun-25	1.11	2.91	798.86	0	13:00	0	0	0:00:00
Jun-28	1.34	3.49	787.61	0	12:24	0	0	0:00:00
Jun-30	0.13	0.92	796.32	0	13:03	0	0	0:00:00
Jun-32	0.07	0.43	792.53	0	11:58	0	0	0:00:00
Jun-34	0.13	0.46	795.85	0	12:46	0	0	0:00:00
Jun-35	0.08	0.73	796.15	0	12:46	0	0	0:00:00
Jun-40	1.66	3.09	796.66	0	12:57	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.57	2.14	792.03	0	12:05	0	0	0:00:00
Jun-05	2.33	4.29	797.90	0	12:41	214.12	601	0:00:00
Jun-06	1.80	3.47	798.03	0	12:58	0	0	0:00:00
Jun-12	0.56	2.91	796.32	0	13:02	0	0	0:00:00
Jun-20	0.79	1.99	796.53	0	12:33	0	0	0:00:00
sto	0.43	0.62	795.60	0	12:46	0	0	0:00:00
Storage	1.36	2.56	798.18	0	12:43	0	0	0:00:00

Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	105.74	143.40	0	12:24	0.00		
Jun-03	JUNCTION	4.06	229.29	0	13:10	0.00		
Jun-04	JUNCTION	3.99	235.44	0	13:12	0.00		
Jun-10	JUNCTION	0.00	3.84	0	12:04	0.00		
Jun-11	JUNCTION	5.29	5.29	0	12:04	0.00		
Jun-21	JUNCTION	44.96	44.96	0	12:20	0.00		
Jun-24	JUNCTION	0.00	47.63	0	13:12	0.00		
Jun-25	JUNCTION	0.00	63.51	0	13:00	0.00		
Jun-28	JUNCTION	0.00	177.00	0	12:24	0.00		
Jun-30	JUNCTION	16.51	16.51	0	12:04	0.00		
Jun-32	JUNCTION	3.80	3.80	0	11:58	0.00		
Jun-34	JUNCTION	1.58	1.58	0	11:58	0.00		
Jun-35	JUNCTION	0.00	3.92	0	12:40	0.00		
Jun-40	JUNCTION	0.00	8.38	0	12:59	0.00		
Out-02	OUTFALL	0.00	177.00	0	12:24	0.00		
Jun-01	STORAGE	7.30	39.53	0	12:04	0.00		
Jun-05	STORAGE	11.51	174.20	0	13:12	122.35	0	13:00
Jun-06	STORAGE	44.52	196.31	0	12:37	0.00		
Jun-12	STORAGE	29.99	69.85	0	12:33	0.00		
Jun-20	STORAGE	80.29	80.29	0	12:22	0.00		
sto	STORAGE	0.00	9.49	0	12:46	0.00		
Storage	STORAGE	217.22	268.03	0	12:25	0.00		

Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	0.342	3	0	12:05	0.031	0	39.16	0.00	0:00:00	0.000
Jun-05	71.371	100	0	12:41	34.862	49	221.36	0.00	0:00:00	0.000
Jun-06	330.079	63	0	12:58	140.669	27	132.56	0.00	0:00:00	0.000
Jun-12	77.348	52	0	13:02	5.391	4	33.79	0.00	0:00:00	0.000
Jun-20	86.812	75	0	12:33	13.809	12	66.62	0.00	0:00:00	0.000
sto	0.203	66	0	12:46	0.129	42	9.49	0.00	0:00:00	0.000
Storage	238.832	44	0	12:43	74.606	14	200.70	0.00	0:00:00	0.000

Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	80.67	50.93	177.00
System	80.67	50.93	177.00

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0	13:09	5.34	1.00	4.06	0.44	9.13	1.00	58	SURCHARGED
Link-02	CHANNEL	0	13:59	3.02	1.00	45.42	66.58	0.68	0.94	0	Calculated
Link-03	CONDUIT	0	12:45	6.22	1.00	8.26	5.42	1.52	0.71	0	> CAPACITY
Link-06	CONDUIT	0	12:24	8.39	1.00	143.39	200.50	0.72	0.81	0	Calculated
Link-10	CONDUIT	0	12:04	3.58	1.00	3.84	2.97	1.29	0.82	0	> CAPACITY
Link-12	CHANNEL	0	12:15	3.01	1.06	55.37	676.12	0.08	0.88	0	Calculated
Link-15	CONDUIT	0	12:20	5.16	1.00	6.17	3.32	1.86	1.00	698	SURCHARGED
Link-16	CONDUIT	0	12:25	4.08	1.00	10.76	0.65	16.65	0.92	0	> CAPACITY
Link-18	CHANNEL	0	12:04	1.34	1.00	3.82	10.25	0.37	0.85	0	Calculated
Link-21	CHANNEL	0	12:05	1.25	1.00	16.07	50.28	0.32	0.81	0	Calculated
Link-23	CHANNEL	0	11:58	1.78	1.00	3.77	9.18	0.41	0.86	0	Calculated
Link-26	CONDUIT	0	12:46	1.97	1.00	1.13	1.00	1.12	0.47	0	> CAPACITY
Link-27	CHANNEL	0	12:40	1.00	1.00	3.92	15.10	0.26	0.86	0	Calculated
Link-36	CONDUIT	0	12:59	4.74	1.00	8.38	7.02	1.19	1.00	732	SURCHARGED
Link-37	CONDUIT	0	12:32	9.64	1.00	26.46	13.11	2.02	1.00	3	SURCHARGED
Link-38	CONDUIT	0	13:03	10.79	1.00	33.79	38.01	0.89	0.99	0	Calculated
Link-39	CONDUIT	0	12:58	4.88	1.00	8.38	4.64	1.81	0.94	0	> CAPACITY
Link-41	CHANNEL	0	13:12	3.28	1.00	39.28	30.81	1.27	1.00	33	FLOODED
Link-44	CONDUIT	0	12:05	7.94	1.00	39.16	57.74	0.68	0.66	0	Calculated
Link-45	CHANNEL	0	12:24	8.07	1.00	177.00	938.00	0.19	0.54	0	Calculated
Weir-01	WEIR	0	12:37			21.68			1.00		
Weir-02	WEIR	0	12:31			56.09			0.76		
Weir-04	WEIR	0	12:46			9.49			0.57		
Weir-05	WEIR	0	12:46			1.23			0.83		
Weir-06	WEIR	0	13:00			63.51			0.93		
Weir-07	WEIR	0	13:00			217.30			1.00		
Weir-08	WEIR	0	00:00			0.00			0.00		
Weir-09	WEIR	0	12:34			143.45			0.51		
Weir-10	WEIR	0	13:00			13.26			0.73		
Weir-11	WEIR	0	12:04			1.45			1.00		
Weir-12	WEIR	0	13:00			116.83			1.00		
Weir-13	WEIR	0	13:11			214.76			1.00		

****
Highest Flow Instability Indexes
****
Link Link-36 (40)
Link Link-39 (39)
Link Weir-09 (22)
Link Weir-12 (21)
Link Weir-06 (8)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-12 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit Link-16.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-21 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-36 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-38 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 117 : Conduit outlet invert elevation defined for Conduit Link-39 is below downstream node invert elevation.
Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.

Analysis began on: Thu Sep 16 21:46:22 2021
Analysis ended on: Thu Sep 16 21:46:35 2021
Total elapsed time: 00:00:13

Appendix G – Proposed Condition Storm and Sanitary Analysis Calculations

****
Project Description
****
File Name ..... Proposed Conditions R2.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-28-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 27
Number of nodes 26
Number of links 37

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-02	2-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.01	680.27	0.4700	484.00	Rain Gage-02
Sub-03	0.64	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.54	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.33	944.03	0.8700	484.00	Rain Gage-02
Sub-06	88.19	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.21	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.24	908.73	0.5100	484.00	Rain Gage-02
Sub-09	4.53	633.32	0.8900	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.43	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.09	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.74	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.74	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.04	777.36	0.3700	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.43	326.96	2.0400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02
Sub-22	0.16	120.60	1.5800	484.00	Rain Gage-02
Sub-23	0.17	133.76	1.4300	484.00	Rain Gage-02
Sub-24	0.11	144.70	0.4700	484.00	Rain Gage-02
Sub-25	0.13	149.80	4.4300	484.00	Rain Gage-02
Sub-26	0.13	172.20	1.0400	484.00	Rain Gage-02
Sub-27	0.11	103.90	0.7220	484.00	Rain Gage-02
Sub-28	0.15	184.80	0.8400	484.00	Rain Gage-02
Sub-29	0.12	155.80	0.7200	484.00	Rain Gage-02
Sub-30	0.14	137.70	1.3000	484.00	Rain Gage-02
Sub-31	0.10	174.20	2.7000	484.00	Rain Gage-02

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.64	798.04	0.00	
Jun-04	JUNCTION	794.00	798.40	0.00	
Jun-10	JUNCTION	792.95	795.80	0.00	
Jun-11	JUNCTION	793.13	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	793.25	794.75	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	797.15	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.80	799.47	0.00	
Jun-46	JUNCTION	792.00	794.50	0.00	
Jun-47	JUNCTION	792.99	798.40	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.90	793.00	0.00	
Jun-05	STORAGE	794.29	797.90	0.00	
Jun-06	STORAGE	794.26	798.60	0.00	
Jun-12	STORAGE	792.37	797.00	0.00	
Jun-20	STORAGE	794.40	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

****
Inlet Summary
****

Inlet ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation ft	Inlet Rim Elevation ft	Ponded Area ft²	Initial Water Elevation ft	Grate Clogging Factor %
Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	1	793.60	798.43	10.00	793.60	0.00
Inlet-02	FHWA HEC-22 GENERIC	N/A	On Grade	1	794.00	798.45	-	794.00	0.00

****
Roadway and Gutter Summary
****

Inlet ID	Roadway Longitudinal Slope	Roadway Cross Slope	Roadway Manning's Roughness	Gutter Cross Slope	Gutter Width	Gutter Depression

	ft/ft	ft/ft		ft/ft	ft	in
Inlet-01	-	0.0150	0.0160	0.0400	2.50	0.00
Inlet-02	0.0250	0.0150	0.0160	0.0400	2.50	0.00

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	34.4	0.8440	0.0150
Link-02	Jun-24	Jun-47	CHANNEL	44.0	0.5912	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-11	Jun-10	CONDUIT	24.6	0.7308	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	5.9600	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	28.0	0.7143	0.0250
Link-18	Jun-10	Jun-46	CHANNEL	172.4	0.5509	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.5392	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	492.4	0.3615	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	121.6	0.3782	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	80.3	0.4486	0.0150
Link-38	Jun-12	Jun-46	CONDUIT	155.5	0.2380	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	139.6	0.3939	0.0150
Link-41	Jun-03	Jun-24	CHANNEL	97.7	0.3993	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	182.7	1.0180	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Link-46	Jun-46	Jun-01	CHANNEL	90.0	0.4444	0.0320
Link-47	Jun-47	Jun-02	CHANNEL	648.5	1.1133	0.0320
Link-48	Inlet-02	Inlet-01	CONDUIT	9.4	4.2553	0.0150
Link-49	Inlet-01	Jun-47	CONDUIT	65.3	0.7662	0.0150
Link-50	Inlet-02	Inlet-01	CHANNEL	10.6	0.1894	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			
Weir-05	sto	Jun-34	WEIR			
Weir-06	Storage	Jun-25	WEIR			
Weir-07	Jun-05	Jun-04	WEIR			
Weir-08	Jun-01	Jun-28	WEIR			
Weir-09	Storage	Jun-06	WEIR			
Weir-10	Jun-25	Jun-05	WEIR			
Weir-11	Jun-11	Jun-28	WEIR			
Weir-12	Jun-05	Jun-06	WEIR			
Weir-13	Jun-04	Jun-03	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.25	1.25	1	1.23	0.31	5.14
Link-02	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	57.13
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.87
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	782.03
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	9.94
Link-18	TRAPEZOIDAL	2.00	20.00	1	24.00	1.17	91.91
Link-21	TRAPEZOIDAL	1.75	16.25	1	17.72	1.06	62.73
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	14.44
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	5.60
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.13
Link-38	CIRCULAR	2.50	2.50	1	4.91	0.63	17.34
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	5.71
Link-41	TRAPEZOIDAL	1.40	18.00	1	15.40	0.84	40.30
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	58.32
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00
Link-46	TRAPEZOIDAL	1.50	16.00	1	15.00	0.92	43.81
Link-47	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	78.40
Link-48	CIRCULAR	1.00	1.00	1	0.79	0.25	6.37
Link-49	CIRCULAR	1.00	1.00	1	0.79	0.25	2.70
Link-50	IRREGULAR	0.33	14.00	1	2.14	0.11	0.97

****
Transect Summary
****

Transect XS-01
Area:

0.0003	0.0010	0.0023	0.0041	0.0063
0.0091	0.0124	0.0162	0.0205	0.0254
0.0307	0.0365	0.0431	0.0506	0.0592
0.0688	0.0794	0.0910	0.1037	0.1173
0.1320	0.1477	0.1644	0.1822	0.2010
0.2207	0.2415	0.2634	0.2862	0.3100
0.3349	0.3608	0.3877	0.4157	0.4446
0.4746	0.5056	0.5376	0.5706	0.6047
0.6397	0.6758	0.7129	0.7510	0.7902
0.8303	0.8715	0.9137	0.9568	1.0000

Hrad:

0.0213	0.0425	0.0638	0.0850	0.1063
0.1275	0.1488	0.1701	0.1913	0.2126
0.2338	0.2551	0.2605	0.2681	0.2788
0.2917	0.3062	0.3218	0.3384	0.3558
0.3737	0.3920	0.4108	0.4299	0.4492
0.4688	0.4886	0.5086	0.5287	0.5489
0.5693	0.5897	0.6103	0.6309	0.6516
0.6724	0.6932	0.7140	0.7350	0.7559
0.7769	0.7980	0.8191	0.8402	0.8613
0.8825	0.9037	0.9249	0.9572	1.0000

Width:

0.0117	0.0235	0.0352	0.0470	0.0587
0.0704	0.0822	0.0939	0.1057	0.1174
0.1292	0.1409	0.1630	0.1866	0.2102
0.2338	0.2574	0.2810	0.3046	0.3281
0.3517	0.3753	0.3989	0.4225	0.4461
0.4697	0.4932	0.5168	0.5404	0.5640
0.5876	0.6112	0.6348	0.6583	0.6819
0.7055	0.7291	0.7527	0.7763	0.7999
0.8234	0.8470	0.8706	0.8942	0.9178
0.9414	0.9650	0.9885	1.0000	1.0000

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches

Total Precipitation	45.410	2.700
Surface Runoff	0.183	0.011
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	21.971	7.159
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.003	0.001
Continuity Error (%)	0.001	

Composite Curve Number Computations Report

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.27	C	98.00
> 75% grass cover, Good	0.50	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Composite Area & Weighted CN	1.01		83.04

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved roads with curbs & sewers	0.28	C	98.00
Composite Area & Weighted CN	2.32		82.40

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00
1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.36	C	98.00
> 75% grass cover, Good	0.89	C	74.00
Composite Area & Weighted CN	3.24		83.44

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.53	C	85.00
> 75% grass cover, Good	0.09	C	74.00
Composite Area & Weighted CN	4.62		84.80

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.12	C	74.00
Paved parking & roofs	0.31	C	98.00

Composite Area & Weighted CN	0.43		91.26

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.28	C	74.00
Paved parking & roofs	0.41	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.02		85.79

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.31	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.74		84.10

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.30	C	98.00
> 75% grass cover, Good	0.44	C	74.00
Composite Area & Weighted CN	0.74		83.69

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.51	C	74.00
Paved parking & roofs	0.53	C	98.00
Composite Area & Weighted CN	1.04		86.24

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.18	C	98.00
> 75% grass cover, Good	0.24	C	74.00
Composite Area & Weighted CN	0.42		84.45

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

Subbasin Sub-22

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.16		91.51

Subbasin Sub-23

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.17		91.69

Subbasin Sub-24

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.28

Subbasin Sub-25

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.13		95.46

Subbasin Sub-26

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.13		94.95

Subbasin Sub-27

Soil/Surface Description	Area (acres)	Soil Group	CN

Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.66

Subbasin Sub-28

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.15		95.47

Subbasin Sub-29

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.12		95.25

Subbasin Sub-30

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.14		95.73

Subbasin Sub-31

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.09	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.10		95.59

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

Subbasin Sub-02

Flow length (ft): 680.27
Slope (%): 0.47
Computed TOC (minutes): 9.32

Subbasin Sub-03

Flow length (ft): 302.00
Slope (%): 2.89
Computed TOC (minutes): 2.48

Subbasin Sub-04

User-Defined TOC override (minutes): 47.40

Subbasin Sub-05

Flow length (ft): 944.03
Slope (%): 0.87
Computed TOC (minutes): 9.46

Subbasin Sub-06

User-Defined TOC override (minutes): 48.24

Subbasin Sub-07

User-Defined TOC override (minutes): 41.88

Subbasin Sub-08

Flow length (ft): 908.73
Slope (%): 0.51
Computed TOC (minutes): 11.29

Subbasin Sub-09

Flow length (ft): 633.32
Slope (%): 0.89
Computed TOC (minutes): 6.90

Subbasin Sub-10

User-Defined TOC override (minutes): 45.00

Subbasin Sub-11

Flow length (ft): 184.60
Slope (%): 1.00
Computed TOC (minutes): 2.55

Subbasin Sub-12

Flow length (ft):	647.00
Slope (%):	0.43
Computed TOC (minutes):	9.28

Subbasin Sub-13

Flow length (ft):	485.00
Slope (%):	0.25
Computed TOC (minutes):	9.16

Subbasin Sub-15

Flow length (ft):	543.00
Slope (%):	1.11
Computed TOC (minutes):	5.63

Subbasin Sub-16

Flow length (ft):	777.36
Slope (%):	0.37
Computed TOC (minutes):	11.33

Subbasin Sub-17

Flow length (ft):	915.00
Slope (%):	0.81
Computed TOC (minutes):	9.50

Subbasin Sub-18

Flow length (ft):	326.96
Slope (%):	2.04
Computed TOC (minutes):	3.01

Subbasin Sub-19

Flow length (ft):	259.00
Slope (%):	1.80
Computed TOC (minutes):	2.64

Subbasin Sub-22

Flow length (ft):	120.60
Slope (%):	1.58
Computed TOC (minutes):	1.54

Subbasin Sub-23

Flow length (ft):	133.76
Slope (%):	1.43
Computed TOC (minutes):	1.74

Subbasin Sub-24

Flow length (ft):	144.70
Slope (%):	0.47
Computed TOC (minutes):	2.83

Subbasin Sub-25

Flow length (ft):	149.80
Slope (%):	4.43
Computed TOC (minutes):	1.23

Subbasin Sub-26

Flow length (ft):	172.20
Slope (%):	1.04
Computed TOC (minutes):	2.38

Subbasin Sub-27

Flow length (ft):	103.90
Slope (%):	0.72
Computed TOC (minutes):	1.86

Subbasin Sub-28

Flow length (ft):	184.80
Slope (%):	0.84
Computed TOC (minutes):	2.73

Subbasin Sub-29

Flow length (ft):	155.80
Slope (%):	0.72
Computed TOC (minutes):	2.54

Subbasin Sub-30

Flow length (ft):	137.70
Slope (%):	1.30
Computed TOC (minutes):	1.84

Subbasin Sub-31

Flow length (ft):	174.20
Slope (%):	2.70
Computed TOC (minutes):	1.67

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	2.70	1.21	1.72	83.040	0	00:09:19
Sub-03	2.70	1.25	1.26	83.570	0	00:05:00
Sub-04	2.70	1.34	35.20	85.000	0	00:47:24
Sub-05	2.70	1.17	3.81	82.400	0	00:09:27
Sub-06	2.70	1.27	71.24	83.920	0	00:48:14
Sub-07	2.70	1.33	15.31	84.920	0	00:41:52
Sub-08	2.70	1.24	5.40	83.440	0	00:11:17
Sub-09	2.70	1.33	8.99	84.800	0	00:06:54
Sub-10	2.70	1.32	27.08	84.780	0	00:45:00
Sub-11	2.70	1.81	1.22	91.260	0	00:05:00
Sub-12	2.70	1.39	4.10	85.790	0	00:09:16
Sub-13	2.70	1.28	1.33	84.100	0	00:09:09
Sub-15	2.70	1.25	1.45	83.690	0	00:05:37
Sub-16	2.70	1.43	1.99	86.240	0	00:11:19
Sub-17	2.70	1.34	14.32	85.000	0	00:09:30
Sub-18	2.70	1.30	0.87	84.450	0	00:05:00
Sub-19	2.70	1.34	0.55	85.090	0	00:05:00
Sub-22	2.70	1.83	0.48	91.510	0	00:05:00
Sub-23	2.70	1.85	0.48	91.690	0	00:05:00
Sub-24	2.70	2.18	0.36	95.280	0	00:05:00
Sub-25	2.70	2.20	0.42	95.460	0	00:05:00
Sub-26	2.70	2.15	0.42	94.950	0	00:05:00
Sub-27	2.70	2.22	0.38	95.660	0	00:05:00
Sub-28	2.70	2.20	0.51	95.470	0	00:05:00
Sub-29	2.70	2.18	0.40	95.250	0	00:05:00
Sub-30	2.70	2.23	0.47	95.730	0	00:05:00
Sub-31	2.70	2.21	0.34	95.590	0	00:05:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	0.42	2.93	788.70	0	12:28	0	0	0:00:00
Jun-03	0.09	0.98	794.62	0	13:35	0	0	0:00:00
Jun-04	0.16	2.21	796.21	0	13:33	0	0	0:00:00
Jun-10	0.01	0.29	793.24	0	12:03	0	0	0:00:00
Jun-11	0.05	0.71	793.84	0	12:02	0	0	0:00:00
Jun-21	0.19	1.75	797.21	0	12:43	0	0	0:00:00
Jun-24	0.14	1.02	794.27	0	13:35	0	0	0:00:00
Jun-25	0.16	1.78	797.73	0	12:44	0	0	0:00:00
Jun-28	0.31	2.19	786.31	0	12:27	0	0	0:00:00
Jun-30	0.02	0.50	795.90	0	12:04	0	0	0:00:00
Jun-32	0.02	0.28	792.38	0	11:58	0	0	0:00:00
Jun-34	0.06	0.35	795.74	0	11:58	0	0	0:00:00
Jun-35	0.03	0.18	795.60	0	12:04	0	0	0:00:00
Jun-40	0.31	2.09	795.89	0	13:17	0	0	0:00:00
Jun-46	0.15	1.06	793.06	0	12:06	0	0	0:00:00
Jun-47	0.12	0.90	793.89	0	13:36	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.16	1.25	791.15	0	12:09	0	0	0:00:00
Jun-05	0.18	2.15	796.44	0	13:33	0	0	0:00:00
Jun-06	0.38	2.83	797.09	0	13:18	0	0	0:00:00
Jun-12	0.24	1.73	794.10	0	12:07	0	0	0:00:00
Jun-20	0.22	1.59	795.99	0	12:51	0	0	0:00:00
sto	0.39	0.60	795.58	0	12:44	0	0	0:00:00
Storage	0.34	2.12	797.74	0	12:44	0	0	0:00:00

****
Node Flow Summary
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Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	35.79	55.55	0	12:24	0.00		
Jun-03	JUNCTION	1.90	17.90	0	13:33	0.00		
Jun-04	JUNCTION	1.53	17.78	0	13:33	0.00		
Jun-10	JUNCTION	0.00	1.99	0	12:02	0.00		
Jun-11	JUNCTION	1.99	1.99	0	12:02	0.00		
Jun-21	JUNCTION	15.28	29.65	0	12:42	0.00		
Jun-24	JUNCTION	0.00	25.76	0	13:34	0.00		
Jun-25	JUNCTION	0.00	13.64	0	12:32	0.00		
Jun-28	JUNCTION	0.00	67.09	0	12:27	0.00		
Jun-30	JUNCTION	5.38	5.38	0	12:02	0.00		
Jun-32	JUNCTION	1.25	1.25	0	11:57	0.00		
Jun-34	JUNCTION	0.54	0.54	0	11:57	0.00		
Jun-35	JUNCTION	0.00	0.18	0	11:58	0.00		
Jun-40	JUNCTION	0.00	7.90	0	13:21	0.00		
Jun-46	JUNCTION	2.44	17.91	0	12:05	0.00		
Jun-47	JUNCTION	0.39	25.82	0	13:35	0.00		
Out-02	OUTFALL	0.00	67.09	0	12:27	0.00		
Jun-01	STORAGE	0.00	17.85	0	12:06	0.00		
Jun-05	STORAGE	4.08	19.81	0	13:18	0.00		
Jun-06	STORAGE	15.87	70.71	0	12:42	0.00		
Jun-12	STORAGE	10.61	18.68	0	12:02	0.00		
Jun-20	STORAGE	27.08	27.08	0	12:22	0.00		
sto	STORAGE	0.00	7.50	0	12:44	0.00		
Storage	STORAGE	71.05	71.05	0	12:24	0.00		

****
Inlet Depth Summary
****

Inlet ID	Max Gutter Spread during Peak Flow ft	Max Gutter Water Elev during Peak Flow ft	Max Gutter Water Depth during Peak Flow ft	Time of Maximum Depth Occurrence days	Time of Maximum Depth Occurrence hh:mm

Inlet-01	3.17	798.49	0.06	0	11:56
Inlet-02	3.74	798.57	0.12	0	11:58

****
Inlet Flow Summary
****

Inlet ID	Peak Flow	Peak Lateral Flow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Total Flooding	Total Time Flooded
	cfs	cfs	cfs	cfs	%	acre-in	minutes
Inlet-01	0.48	0.47	-	-	-	0.000	0
Inlet-02	0.47	0.47	0.46	0.01	98.36	0.000	0

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	1.628	11	0 12:09	0.085	1	17.46	0.00	0:00:00	0.000
Jun-05	14.407	20	0 13:33	0.559	1	17.72	0.00	0:00:00	0.000
Jun-06	106.558	20	0 13:18	7.046	1	29.23	0.00	0:00:00	0.000
Jun-12	4.015	3	0 12:07	0.219	0	14.56	0.00	0:00:00	0.000
Jun-20	38.873	33	0 12:51	1.630	1	12.49	0.00	0:00:00	0.000
sto	0.186	60	0 12:44	0.091	30	7.50	0.00	0:00:00	0.000
Storage	92.459	17	0 12:44	5.350	1	54.39	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	61.11	9.11	67.09
System	61.11	9.11	67.09

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0 12:59	5.32	1.00	6.47	5.14	1.26	1.00	83	SURCHARGED
Link-02	CHANNEL	0 13:35	3.07	1.00	25.76	57.13	0.45	0.64	0	Calculated
Link-03	CONDUIT	0 12:44	5.69	1.00	7.50	5.42	1.38	0.70	0	> CAPACITY
Link-06	CONDUIT	0 12:28	6.36	1.00	54.72	200.50	0.27	0.47	0	Calculated
Link-10	CONDUIT	0 12:02	4.32	1.00	1.99	2.87	0.69	0.40	0	Calculated
Link-12	CHANNEL	0 12:42	2.49	1.16	34.73	782.03	0.04	0.67	0	Calculated
Link-15	CONDUIT	0 12:44	4.70	1.00	5.36	3.32	1.61	0.88	0	> CAPACITY
Link-16	CONDUIT	0 12:51	4.27	1.00	9.59	9.94	0.96	0.67	0	Calculated
Link-18	CHANNEL	0 12:03	0.45	1.00	1.97	91.91	0.02	0.34	0	Calculated
Link-21	CHANNEL	0 12:04	0.60	1.00	5.15	62.73	0.08	0.64	0	Calculated
Link-23	CHANNEL	0 11:58	0.78	1.00	1.22	9.18	0.13	0.73	0	Calculated
Link-26	CONDUIT	0 11:58	1.00	1.00	0.18	1.00	0.18	0.21	0	Calculated
Link-27	CHANNEL	0 12:04	0.26	1.00	0.14	14.44	0.01	0.54	0	Calculated
Link-36	CONDUIT	0 13:21	4.47	1.00	7.90	5.60	1.41	1.00	321	SURCHARGED
Link-37	CONDUIT	0 13:33	7.08	1.00	17.78	13.13	1.35	0.75	0	> CAPACITY
Link-38	CONDUIT	0 12:08	5.40	1.00	14.56	17.34	0.84	0.56	0	Calculated
Link-39	CONDUIT	0 13:20	5.49	1.00	7.90	5.71	1.38	0.84	0	> CAPACITY
Link-41	CHANNEL	0 13:35	1.99	1.00	17.89	40.30	0.44	0.71	0	Calculated
Link-44	CONDUIT	0 12:09	6.69	1.00	17.46	58.32	0.30	0.40	0	Calculated
Link-45	CHANNEL	0 12:27	6.53	1.00	67.09	938.00	0.07	0.34	0	Calculated
Link-46	CHANNEL	0 12:06	2.75	1.00	17.85	43.81	0.41	0.58	0	Calculated
Link-47	CHANNEL	0 13:36	2.16	1.00	25.81	78.40	0.33	0.80	0	Calculated
Link-48	CONDUIT	0 11:58	2.19	1.47	0.46	6.37	0.07	0.31	0	Calculated
Link-49	CONDUIT	0 11:58	2.82	1.00	0.94	2.70	0.35	0.54	0	Calculated
Link-50	CHANNEL	0 11:58	0.18	1.00	0.01	0.97	0.01	0.24	0	Calculated
Weir-01	WEIR	0 00:00			0.00			0.00		
Weir-02	WEIR	0 12:51			2.90			0.22		
Weir-04	WEIR	0 12:44			7.50			0.51		
Weir-05	WEIR	0 11:58			0.36			0.46		
Weir-06	WEIR	0 12:32			13.64			0.52		
Weir-07	WEIR	0 13:33			14.42			0.29		
Weir-08	WEIR	0 00:00			0.00			0.00		
Weir-09	WEIR	0 12:44			34.63			0.25		
Weir-10	WEIR	0 00:00			0.00			0.00		
Weir-11	WEIR	0 00:00			0.00			0.00		
Weir-12	WEIR	0 13:18			14.48			0.32		
Weir-13	WEIR	0 00:00			0.00			0.00		

****
Highest Flow Instability Indexes
****
Link Weir-06 (9)
Link Link-15 (8)
Link Link-06 (4)
Link Link-45 (3)
Link Link-12 (2)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.

```
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-46.

Analysis began on:  Thu Sep 16 21:48:51 2021
Analysis ended on:  Thu Sep 16 21:49:12 2021
Total elapsed time: 00:00:21
```

****
Project Description
****
File Name ..... Proposed Conditions R2.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-28-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 27
Number of nodes 26
Number of links 37

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-02	10-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.01	680.27	0.4700	484.00	Rain Gage-02
Sub-03	0.64	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.54	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.33	944.03	0.8700	484.00	Rain Gage-02
Sub-06	88.19	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.21	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.24	908.73	0.5100	484.00	Rain Gage-02
Sub-09	4.53	633.32	0.8900	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.43	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.09	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.74	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.74	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.04	777.36	0.3700	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.43	326.96	2.0400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02
Sub-22	0.16	120.60	1.5800	484.00	Rain Gage-02
Sub-23	0.17	133.76	1.4300	484.00	Rain Gage-02
Sub-24	0.11	144.70	0.4700	484.00	Rain Gage-02
Sub-25	0.13	149.80	4.4300	484.00	Rain Gage-02
Sub-26	0.13	172.20	1.0400	484.00	Rain Gage-02
Sub-27	0.11	103.90	0.7220	484.00	Rain Gage-02
Sub-28	0.15	184.80	0.8400	484.00	Rain Gage-02
Sub-29	0.12	155.80	0.7200	484.00	Rain Gage-02
Sub-30	0.14	137.70	1.3000	484.00	Rain Gage-02
Sub-31	0.10	174.20	2.7000	484.00	Rain Gage-02

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.64	798.04	0.00	
Jun-04	JUNCTION	794.00	798.40	0.00	
Jun-10	JUNCTION	792.95	795.80	0.00	
Jun-11	JUNCTION	793.13	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	793.25	794.75	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	797.15	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.80	799.47	0.00	
Jun-46	JUNCTION	792.00	794.50	0.00	
Jun-47	JUNCTION	792.99	798.40	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.90	793.00	0.00	
Jun-05	STORAGE	794.29	797.90	0.00	
Jun-06	STORAGE	794.26	798.60	0.00	
Jun-12	STORAGE	792.37	797.00	0.00	
Jun-20	STORAGE	794.40	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

****
Inlet Summary
****

Inlet ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation ft	Inlet Rim Elevation ft	Ponded Area ft²	Initial Water Elevation ft	Grate Clogging Factor %
Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	1	793.60	798.43	10.00	793.60	0.00
Inlet-02	FHWA HEC-22 GENERIC	N/A	On Grade	1	794.00	798.45	-	794.00	0.00

****
Roadway and Gutter Summary
****

Inlet ID	Roadway Longitudinal Slope	Roadway Cross Slope	Roadway Manning's Roughness	Gutter Cross Slope	Gutter Width	Gutter Depression

	ft/ft	ft/ft		ft/ft	ft	in
Inlet-01	-	0.0150	0.0160	0.0400	2.50	0.00
Inlet-02	0.0250	0.0150	0.0160	0.0400	2.50	0.00

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	34.4	0.8440	0.0150
Link-02	Jun-24	Jun-47	CHANNEL	44.0	0.5912	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-11	Jun-10	CONDUIT	24.6	0.7308	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	5.9600	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	28.0	0.7143	0.0250
Link-18	Jun-10	Jun-46	CHANNEL	172.4	0.5509	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.5392	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	492.4	0.3615	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	121.6	0.3782	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	80.3	0.4486	0.0150
Link-38	Jun-12	Jun-46	CONDUIT	155.5	0.2380	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	139.6	0.3939	0.0150
Link-41	Jun-03	Jun-24	CHANNEL	97.7	0.3993	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	182.7	1.0180	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Link-46	Jun-46	Jun-01	CHANNEL	90.0	0.4444	0.0320
Link-47	Jun-47	Jun-02	CHANNEL	648.5	1.1133	0.0320
Link-48	Inlet-02	Inlet-01	CONDUIT	9.4	4.2553	0.0150
Link-49	Inlet-01	Jun-47	CONDUIT	65.3	0.7662	0.0150
Link-50	Inlet-02	Inlet-01	CHANNEL	10.6	0.1894	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			
Weir-05	sto	Jun-34	WEIR			
Weir-06	Storage	Jun-25	WEIR			
Weir-07	Jun-05	Jun-04	WEIR			
Weir-08	Jun-01	Jun-28	WEIR			
Weir-09	Storage	Jun-06	WEIR			
Weir-10	Jun-25	Jun-05	WEIR			
Weir-11	Jun-11	Jun-28	WEIR			
Weir-12	Jun-05	Jun-06	WEIR			
Weir-13	Jun-04	Jun-03	WEIR			

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Cross Section Summary
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Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.25	1.25	1	1.23	0.31	5.14
Link-02	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	57.13
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.87
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	782.03
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	9.94
Link-18	TRAPEZOIDAL	2.00	20.00	1	24.00	1.17	91.91
Link-21	TRAPEZOIDAL	1.75	16.25	1	17.72	1.06	62.73
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	14.44
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	5.60
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.13
Link-38	CIRCULAR	2.50	2.50	1	4.91	0.63	17.34
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	5.71
Link-41	TRAPEZOIDAL	1.40	18.00	1	15.40	0.84	40.30
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	58.32
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00
Link-46	TRAPEZOIDAL	1.50	16.00	1	15.00	0.92	43.81
Link-47	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	78.40
Link-48	CIRCULAR	1.00	1.00	1	0.79	0.25	6.37
Link-49	CIRCULAR	1.00	1.00	1	0.79	0.25	2.70
Link-50	IRREGULAR	0.33	14.00	1	2.14	0.11	0.97

****
Transect Summary
****

Transect XS-01
Area:

0.0003	0.0010	0.0023	0.0041	0.0063
0.0091	0.0124	0.0162	0.0205	0.0254
0.0307	0.0365	0.0431	0.0506	0.0592
0.0688	0.0794	0.0910	0.1037	0.1173
0.1320	0.1477	0.1644	0.1822	0.2010
0.2207	0.2415	0.2634	0.2862	0.3100
0.3349	0.3608	0.3877	0.4157	0.4446
0.4746	0.5056	0.5376	0.5706	0.6047
0.6397	0.6758	0.7129	0.7510	0.7902
0.8303	0.8715	0.9137	0.9568	1.0000

Hrad:

0.0213	0.0425	0.0638	0.0850	0.1063
0.1275	0.1488	0.1701	0.1913	0.2126
0.2338	0.2551	0.2605	0.2681	0.2788
0.2917	0.3062	0.3218	0.3384	0.3558
0.3737	0.3920	0.4108	0.4299	0.4492
0.4688	0.4886	0.5086	0.5287	0.5489
0.5693	0.5897	0.6103	0.6309	0.6516
0.6724	0.6932	0.7140	0.7350	0.7559
0.7769	0.7980	0.8191	0.8402	0.8613
0.8825	0.9037	0.9249	0.9572	1.0000

Width:

0.0117	0.0235	0.0352	0.0470	0.0587
0.0704	0.0822	0.0939	0.1057	0.1174
0.1292	0.1409	0.1630	0.1866	0.2102
0.2338	0.2574	0.2810	0.3046	0.3281
0.3517	0.3753	0.3989	0.4225	0.4461
0.4697	0.4932	0.5168	0.5404	0.5640
0.5876	0.6112	0.6348	0.6583	0.6819
0.7055	0.7291	0.7527	0.7763	0.7999
0.8234	0.8470	0.8706	0.8942	0.9178
0.9414	0.9650	0.9885	1.0000	1.0000

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches

Total Precipitation	67.274	4.000
Surface Runoff	0.338	0.020
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	40.641	13.244
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.003	0.001
Continuity Error (%)	-0.001	

Composite Curve Number Computations Report

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.27	C	98.00
> 75% grass cover, Good	0.50	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Composite Area & Weighted CN	1.01		83.04

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved roads with curbs & sewers	0.28	C	98.00
Composite Area & Weighted CN	2.32		82.40

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00
1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.36	C	98.00
> 75% grass cover, Good	0.89	C	74.00
Composite Area & Weighted CN	3.24		83.44

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.53	C	85.00
> 75% grass cover, Good	0.09	C	74.00
Composite Area & Weighted CN	4.62		84.80

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.12	C	74.00
Paved parking & roofs	0.31	C	98.00

Composite Area & Weighted CN	0.43		91.26

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.28	C	74.00
Paved parking & roofs	0.41	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.02		85.79

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.31	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.74		84.10

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.30	C	98.00
> 75% grass cover, Good	0.44	C	74.00
Composite Area & Weighted CN	0.74		83.69

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.51	C	74.00
Paved parking & roofs	0.53	C	98.00
Composite Area & Weighted CN	1.04		86.24

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.18	C	98.00
> 75% grass cover, Good	0.24	C	74.00
Composite Area & Weighted CN	0.42		84.45

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

Subbasin Sub-22

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.16		91.51

Subbasin Sub-23

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.17		91.69

Subbasin Sub-24

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.28

Subbasin Sub-25

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.13		95.46

Subbasin Sub-26

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.13		94.95

Subbasin Sub-27

Soil/Surface Description	Area (acres)	Soil Group	CN

Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.66

Subbasin Sub-28

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.15		95.47

Subbasin Sub-29

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.12		95.25

Subbasin Sub-30

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.14		95.73

Subbasin Sub-31

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.09	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.10		95.59

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

Subbasin Sub-02

Flow length (ft): 680.27
Slope (%): 0.47
Computed TOC (minutes): 9.32

Subbasin Sub-03

Flow length (ft): 302.00
Slope (%): 2.89
Computed TOC (minutes): 2.48

Subbasin Sub-04

User-Defined TOC override (minutes): 47.40

Subbasin Sub-05

Flow length (ft): 944.03
Slope (%): 0.87
Computed TOC (minutes): 9.46

Subbasin Sub-06

User-Defined TOC override (minutes): 48.24

Subbasin Sub-07

User-Defined TOC override (minutes): 41.88

Subbasin Sub-08

Flow length (ft): 908.73
Slope (%): 0.51
Computed TOC (minutes): 11.29

Subbasin Sub-09

Flow length (ft): 633.32
Slope (%): 0.89
Computed TOC (minutes): 6.90

Subbasin Sub-10

User-Defined TOC override (minutes): 45.00

Subbasin Sub-11

Flow length (ft): 184.60
Slope (%): 1.00
Computed TOC (minutes): 2.55

Subbasin Sub-12

Flow length (ft):	647.00
Slope (%):	0.43
Computed TOC (minutes):	9.28

Subbasin Sub-13

Flow length (ft):	485.00
Slope (%):	0.25
Computed TOC (minutes):	9.16

Subbasin Sub-15

Flow length (ft):	543.00
Slope (%):	1.11
Computed TOC (minutes):	5.63

Subbasin Sub-16

Flow length (ft):	777.36
Slope (%):	0.37
Computed TOC (minutes):	11.33

Subbasin Sub-17

Flow length (ft):	915.00
Slope (%):	0.81
Computed TOC (minutes):	9.50

Subbasin Sub-18

Flow length (ft):	326.96
Slope (%):	2.04
Computed TOC (minutes):	3.01

Subbasin Sub-19

Flow length (ft):	259.00
Slope (%):	1.80
Computed TOC (minutes):	2.64

Subbasin Sub-22

Flow length (ft):	120.60
Slope (%):	1.58
Computed TOC (minutes):	1.54

Subbasin Sub-23

Flow length (ft):	133.76
Slope (%):	1.43
Computed TOC (minutes):	1.74

Subbasin Sub-24

Flow length (ft):	144.70
Slope (%):	0.47
Computed TOC (minutes):	2.83

Subbasin Sub-25

Flow length (ft):	149.80
Slope (%):	4.43
Computed TOC (minutes):	1.23

Subbasin Sub-26

Flow length (ft):	172.20
Slope (%):	1.04
Computed TOC (minutes):	2.38

Subbasin Sub-27

Flow length (ft):	103.90
Slope (%):	0.72
Computed TOC (minutes):	1.86

Subbasin Sub-28

Flow length (ft):	184.80
Slope (%):	0.84
Computed TOC (minutes):	2.73

Subbasin Sub-29

Flow length (ft):	155.80
Slope (%):	0.72
Computed TOC (minutes):	2.54

Subbasin Sub-30

Flow length (ft):	137.70
Slope (%):	1.30
Computed TOC (minutes):	1.84

Subbasin Sub-31

Flow length (ft): 174.20
Slope (%): 2.70
Computed TOC (minutes): 1.67

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	4.00	2.29	3.25	83.040	0	00:09:19
Sub-03	4.00	2.33	2.37	83.570	0	00:05:00
Sub-04	4.00	2.46	65.30	85.000	0	00:47:24
Sub-05	4.00	2.24	7.30	82.400	0	00:09:27
Sub-06	4.00	2.36	135.09	83.920	0	00:48:14
Sub-07	4.00	2.45	28.37	84.920	0	00:41:52
Sub-08	4.00	2.32	10.12	83.440	0	00:11:17
Sub-09	4.00	2.44	16.50	84.800	0	00:06:54
Sub-10	4.00	2.44	50.41	84.780	0	00:45:00
Sub-11	4.00	3.04	1.99	91.260	0	00:05:00
Sub-12	4.00	2.53	7.37	85.790	0	00:09:16
Sub-13	4.00	2.38	2.47	84.100	0	00:09:09
Sub-15	4.00	2.34	2.71	83.690	0	00:05:37
Sub-16	4.00	2.57	3.55	86.240	0	00:11:19
Sub-17	4.00	2.46	26.13	85.000	0	00:09:30
Sub-18	4.00	2.41	1.61	84.450	0	00:05:00
Sub-19	4.00	2.46	1.00	85.090	0	00:05:00
Sub-22	4.00	3.07	0.78	91.510	0	00:05:00
Sub-23	4.00	3.08	0.78	91.690	0	00:05:00
Sub-24	4.00	3.46	0.55	95.280	0	00:05:00
Sub-25	4.00	3.48	0.65	95.460	0	00:05:00
Sub-26	4.00	3.42	0.64	94.950	0	00:05:00
Sub-27	4.00	3.50	0.59	95.660	0	00:05:00
Sub-28	4.00	3.48	0.78	95.470	0	00:05:00
Sub-29	4.00	3.45	0.61	95.250	0	00:05:00
Sub-30	4.00	3.51	0.72	95.730	0	00:05:00
Sub-31	4.00	3.49	0.52	95.590	0	00:05:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	0.62	3.95	789.72	0	12:27	0	0	0:00:00
Jun-03	0.18	2.00	795.64	0	13:12	0	0	0:00:00
Jun-04	0.38	3.88	797.88	0	13:10	0	0	0:00:00
Jun-10	0.03	0.40	793.35	0	12:02	0	0	0:00:00
Jun-11	0.06	1.00	794.13	0	12:02	0	0	0:00:00
Jun-21	0.29	2.30	797.75	0	12:33	0	0	0:00:00
Jun-24	0.21	1.40	794.65	0	13:50	0	0	0:00:00
Jun-25	0.27	2.31	798.26	0	12:44	0	0	0:00:00
Jun-28	0.46	2.81	786.93	0	12:34	0	0	0:00:00
Jun-30	0.04	0.71	796.11	0	12:04	0	0	0:00:00
Jun-32	0.03	0.36	792.46	0	11:58	0	0	0:00:00
Jun-34	0.07	0.40	795.80	0	11:58	0	0	0:00:00
Jun-35	0.04	0.23	795.65	0	13:18	0	0	0:00:00
Jun-40	0.43	2.40	796.20	0	13:17	0	0	0:00:00
Jun-46	0.21	1.29	793.29	0	12:05	0	0	0:00:00
Jun-47	0.18	1.28	794.27	0	13:13	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.23	1.67	791.57	0	13:04	0	0	0:00:00
Jun-05	0.38	3.32	797.61	0	13:20	0	0	0:00:00
Jun-06	0.55	3.37	797.63	0	13:18	0	0	0:00:00
Jun-12	0.35	2.91	795.28	0	13:00	0	0	0:00:00
Jun-20	0.29	1.88	796.28	0	12:39	0	0	0:00:00
sto	0.42	0.60	795.59	0	12:40	0	0	0:00:00
Storage	0.45	2.33	797.96	0	12:41	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	66.46	90.46	0	12:22	0.00		
Jun-03	JUNCTION	3.40	114.80	0	13:10	0.00		
Jun-04	JUNCTION	2.46	152.35	0	13:10	0.00		
Jun-10	JUNCTION	0.00	3.55	0	12:02	0.00		
Jun-11	JUNCTION	3.55	3.55	0	12:02	0.00		
Jun-21	JUNCTION	28.33	53.35	0	12:31	0.00		
Jun-24	JUNCTION	0.00	56.05	0	13:50	0.00		
Jun-25	JUNCTION	0.00	33.09	0	12:45	0.00		
Jun-28	JUNCTION	0.00	112.56	0	12:34	0.00		
Jun-30	JUNCTION	10.11	10.11	0	12:02	0.00		
Jun-32	JUNCTION	2.34	2.34	0	11:58	0.00		
Jun-34	JUNCTION	0.98	0.98	0	11:58	0.00		
Jun-35	JUNCTION	0.00	0.61	0	13:13	0.00		
Jun-40	JUNCTION	0.00	8.68	0	13:02	0.00		
Jun-46	JUNCTION	4.37	28.10	0	12:04	0.00		
Jun-47	JUNCTION	0.60	53.89	0	13:06	0.00		
Out-02	OUTFALL	0.00	112.56	0	12:34	0.00		
Jun-01	STORAGE	0.00	28.02	0	12:05	0.00		
Jun-05	STORAGE	7.37	133.91	0	13:12	0.00		
Jun-06	STORAGE	29.03	149.48	0	12:31	0.00		
Jun-12	STORAGE	19.29	36.54	0	12:39	0.00		
Jun-20	STORAGE	50.39	50.39	0	12:22	0.00		
sto	STORAGE	0.00	7.89	0	12:40	0.00		
Storage	STORAGE	134.93	146.51	0	12:26	0.00		

****
Inlet Depth Summary
****

Inlet ID	Max Gutter Spread during Peak Flow ft	Max Gutter Water Elev during Peak Flow ft	Max Gutter Water Depth during Peak Flow ft	Time of Maximum Depth Occurrence days	Time of Maximum Depth Occurrence hh:mm

Inlet-01	6.57	798.54	0.11	0	13:12
Inlet-02	5.15	798.59	0.14	0	13:14

****
Inlet Flow Summary
****

Inlet ID	Peak Flow	Peak Lateral Flow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Total Flooding	Total Time Flooded
	cfs	cfs	cfs	cfs	%	acre-in	minutes
Inlet-01	0.83	0.76	-	-	-	0.000	0
Inlet-02	0.77	0.77	0.71	0.06	92.23	0.000	0

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	3.260	21	0 13:04	0.202	1	27.60	0.00	0:00:00	0.000
Jun-05	57.596	82	0 13:20	3.672	5	152.23	0.00	0:00:00	0.000
Jun-06	212.282	40	0 13:18	16.419	3	79.59	0.00	0:00:00	0.000
Jun-12	21.975	15	0 13:00	0.797	1	27.10	0.00	0:00:00	0.000
Jun-20	63.180	54	0 12:39	3.031	3	33.85	0.00	0:00:00	0.000
sto	0.189	62	0 12:40	0.101	33	7.89	0.00	0:00:00	0.000
Storage	155.920	28	0 12:41	10.117	2	124.29	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	64.74	16.47	112.56
System	64.74	16.47	112.56

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0 16:20	5.32	1.00	6.46	5.14	1.26	1.00	232	SURCHARGED
Link-02	CHANNEL	0 13:06	3.87	1.00	53.79	57.13	0.94	0.90	0	Calculated
Link-03	CONDUIT	0 12:41	5.96	1.00	7.88	5.42	1.45	0.70	0	> CAPACITY
Link-06	CONDUIT	0 12:27	6.89	1.00	89.70	200.50	0.45	0.63	0	Calculated
Link-10	CONDUIT	0 12:02	5.00	1.00	3.55	2.87	1.24	0.56	0	> CAPACITY
Link-12	CHANNEL	0 12:31	3.25	1.16	68.55	782.03	0.09	0.82	0	Calculated
Link-15	CONDUIT	0 12:38	5.12	1.00	5.94	3.32	1.79	1.00	170	SURCHARGED
Link-16	CONDUIT	0 12:39	4.61	1.00	12.17	9.94	1.22	0.78	0	> CAPACITY
Link-18	CHANNEL	0 12:02	0.57	1.00	3.52	91.91	0.04	0.42	0	Calculated
Link-21	CHANNEL	0 12:04	0.96	1.00	9.79	62.73	0.16	0.70	0	Calculated
Link-23	CHANNEL	0 11:58	1.26	1.00	2.30	9.18	0.25	0.80	0	Calculated
Link-26	CONDUIT	0 11:58	1.16	1.00	0.26	1.00	0.26	0.24	0	Calculated
Link-27	CHANNEL	0 13:13	0.23	1.00	0.57	14.44	0.04	0.61	0	Calculated
Link-36	CONDUIT	0 13:02	4.91	1.00	8.68	5.60	1.55	1.00	443	SURCHARGED
Link-37	CONDUIT	0 13:01	9.20	1.00	24.76	13.13	1.89	1.00	0	> CAPACITY
Link-38	CONDUIT	0 13:00	6.80	1.00	27.10	17.34	1.56	0.76	0	> CAPACITY
Link-39	CONDUIT	0 13:02	5.42	1.00	8.68	5.71	1.52	0.97	0	> CAPACITY
Link-41	CHANNEL	0 13:50	3.09	1.00	47.52	40.30	1.18	1.00	19	FLOODED
Link-44	CONDUIT	0 13:04	7.43	1.00	27.60	58.32	0.47	0.52	0	Calculated
Link-45	CHANNEL	0 12:34	7.30	1.00	112.56	938.00	0.12	0.43	0	Calculated
Link-46	CHANNEL	0 12:05	3.13	1.00	28.02	43.81	0.64	0.72	0	Calculated
Link-47	CHANNEL	0 13:55	3.51	1.00	53.06	78.40	0.68	0.93	0	Calculated
Link-48	CONDUIT	0 11:58	2.28	1.47	0.69	6.37	0.11	0.48	0	Calculated
Link-49	CONDUIT	0 11:58	3.08	1.00	1.53	2.70	0.57	0.84	0	Calculated
Link-50	CHANNEL	0 11:58	0.23	1.00	0.07	0.97	0.07	0.44	0	Calculated
Weir-01	WEIR	0 13:10			10.83			0.59		
Weir-02	WEIR	0 12:39			21.68			0.51		
Weir-04	WEIR	0 12:40			7.89			0.52		
Weir-05	WEIR	0 11:58			0.72			0.65		
Weir-06	WEIR	0 12:45			33.09			0.72		
Weir-07	WEIR	0 13:10			150.39			1.00		
Weir-08	WEIR	0 00:00			0.00			0.00		
Weir-09	WEIR	0 12:40			84.61			0.38		
Weir-10	WEIR	0 12:41			0.51			0.00		
Weir-11	WEIR	0 00:00			0.00			0.00		
Weir-12	WEIR	0 12:42			57.91			0.77		
Weir-13	WEIR	0 13:10			91.23			0.73		

****
Highest Flow Instability Indexes
****
Link Weir-06 (12)
Link Link-15 (11)
Link Weir-07 (9)
Link Link-01 (8)
Link Weir-12 (7)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.

```
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-46.

Analysis began on:  Thu Sep 16 21:52:39 2021
Analysis ended on:  Thu Sep 16 21:53:00 2021
Total elapsed time: 00:00:21
```

****
Project Description
****
File Name ..... Proposed Conditions R2.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-28-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 27
Number of nodes 26
Number of links 37

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-02	25-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.01	680.27	0.4700	484.00	Rain Gage-02
Sub-03	0.64	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.54	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.33	944.03	0.8700	484.00	Rain Gage-02
Sub-06	88.19	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.21	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.24	908.73	0.5100	484.00	Rain Gage-02
Sub-09	4.53	633.32	0.8900	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.43	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.09	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.74	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.74	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.04	777.36	0.3700	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.43	326.96	2.0400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02
Sub-22	0.16	120.60	1.5800	484.00	Rain Gage-02
Sub-23	0.17	133.76	1.4300	484.00	Rain Gage-02
Sub-24	0.11	144.70	0.4700	484.00	Rain Gage-02
Sub-25	0.13	149.80	4.4300	484.00	Rain Gage-02
Sub-26	0.13	172.20	1.0400	484.00	Rain Gage-02
Sub-27	0.11	103.90	0.7220	484.00	Rain Gage-02
Sub-28	0.15	184.80	0.8400	484.00	Rain Gage-02
Sub-29	0.12	155.80	0.7200	484.00	Rain Gage-02
Sub-30	0.14	137.70	1.3000	484.00	Rain Gage-02
Sub-31	0.10	174.20	2.7000	484.00	Rain Gage-02

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.64	798.04	0.00	
Jun-04	JUNCTION	794.00	798.40	0.00	
Jun-10	JUNCTION	792.95	795.80	0.00	
Jun-11	JUNCTION	793.13	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	793.25	794.75	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	797.15	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.80	799.47	0.00	
Jun-46	JUNCTION	792.00	794.50	0.00	
Jun-47	JUNCTION	792.99	798.40	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.90	793.00	0.00	
Jun-05	STORAGE	794.29	797.90	0.00	
Jun-06	STORAGE	794.26	798.60	0.00	
Jun-12	STORAGE	792.37	797.00	0.00	
Jun-20	STORAGE	794.40	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

****
Inlet Summary
****

Inlet ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation ft	Inlet Rim Elevation ft	Ponded Area ft²	Initial Water Elevation ft	Grate Clogging Factor %
Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	1	793.60	798.43	10.00	793.60	0.00
Inlet-02	FHWA HEC-22 GENERIC	N/A	On Grade	1	794.00	798.45	-	794.00	0.00

****
Roadway and Gutter Summary
****

Inlet ID	Roadway Longitudinal Slope	Roadway Cross Slope	Roadway Manning's Roughness	Gutter Cross Slope	Gutter Width	Gutter Depression

	ft/ft	ft/ft		ft/ft	ft	in
Inlet-01	-	0.0150	0.0160	0.0400	2.50	0.00
Inlet-02	0.0250	0.0150	0.0160	0.0400	2.50	0.00

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	34.4	0.8440	0.0150
Link-02	Jun-24	Jun-47	CHANNEL	44.0	0.5912	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-11	Jun-10	CONDUIT	24.6	0.7308	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	5.9600	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	28.0	0.7143	0.0250
Link-18	Jun-10	Jun-46	CHANNEL	172.4	0.5509	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.5392	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	492.4	0.3615	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	121.6	0.3782	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	80.3	0.4486	0.0150
Link-38	Jun-12	Jun-46	CONDUIT	155.5	0.2380	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	139.6	0.3939	0.0150
Link-41	Jun-03	Jun-24	CHANNEL	97.7	0.3993	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	182.7	1.0180	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Link-46	Jun-46	Jun-01	CHANNEL	90.0	0.4444	0.0320
Link-47	Jun-47	Jun-02	CHANNEL	648.5	1.1133	0.0320
Link-48	Inlet-02	Inlet-01	CONDUIT	9.4	4.2553	0.0150
Link-49	Inlet-01	Jun-47	CONDUIT	65.3	0.7662	0.0150
Link-50	Inlet-02	Inlet-01	CHANNEL	10.6	0.1894	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			
Weir-05	sto	Jun-34	WEIR			
Weir-06	Storage	Jun-25	WEIR			
Weir-07	Jun-05	Jun-04	WEIR			
Weir-08	Jun-01	Jun-28	WEIR			
Weir-09	Storage	Jun-06	WEIR			
Weir-10	Jun-25	Jun-05	WEIR			
Weir-11	Jun-11	Jun-28	WEIR			
Weir-12	Jun-05	Jun-06	WEIR			
Weir-13	Jun-04	Jun-03	WEIR			

****
Cross Section Summary
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Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.25	1.25	1	1.23	0.31	5.14
Link-02	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	57.13
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.87
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	782.03
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	9.94
Link-18	TRAPEZOIDAL	2.00	20.00	1	24.00	1.17	91.91
Link-21	TRAPEZOIDAL	1.75	16.25	1	17.72	1.06	62.73
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	14.44
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	5.60
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.13
Link-38	CIRCULAR	2.50	2.50	1	4.91	0.63	17.34
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	5.71
Link-41	TRAPEZOIDAL	1.40	18.00	1	15.40	0.84	40.30
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	58.32
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00
Link-46	TRAPEZOIDAL	1.50	16.00	1	15.00	0.92	43.81
Link-47	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	78.40
Link-48	CIRCULAR	1.00	1.00	1	0.79	0.25	6.37
Link-49	CIRCULAR	1.00	1.00	1	0.79	0.25	2.70
Link-50	IRREGULAR	0.33	14.00	1	2.14	0.11	0.97

****
Transect Summary
****

Transect XS-01
Area:

0.0003	0.0010	0.0023	0.0041	0.0063
0.0091	0.0124	0.0162	0.0205	0.0254
0.0307	0.0365	0.0431	0.0506	0.0592
0.0688	0.0794	0.0910	0.1037	0.1173
0.1320	0.1477	0.1644	0.1822	0.2010
0.2207	0.2415	0.2634	0.2862	0.3100
0.3349	0.3608	0.3877	0.4157	0.4446
0.4746	0.5056	0.5376	0.5706	0.6047
0.6397	0.6758	0.7129	0.7510	0.7902
0.8303	0.8715	0.9137	0.9568	1.0000

Hrad:

0.0213	0.0425	0.0638	0.0850	0.1063
0.1275	0.1488	0.1701	0.1913	0.2126
0.2338	0.2551	0.2605	0.2681	0.2788
0.2917	0.3062	0.3218	0.3384	0.3558
0.3737	0.3920	0.4108	0.4299	0.4492
0.4688	0.4886	0.5086	0.5287	0.5489
0.5693	0.5897	0.6103	0.6309	0.6516
0.6724	0.6932	0.7140	0.7350	0.7559
0.7769	0.7980	0.8191	0.8402	0.8613
0.8825	0.9037	0.9249	0.9572	1.0000

Width:

0.0117	0.0235	0.0352	0.0470	0.0587
0.0704	0.0822	0.0939	0.1057	0.1174
0.1292	0.1409	0.1630	0.1866	0.2102
0.2338	0.2574	0.2810	0.3046	0.3281
0.3517	0.3753	0.3989	0.4225	0.4461
0.4697	0.4932	0.5168	0.5404	0.5640
0.5876	0.6112	0.6348	0.6583	0.6819
0.7055	0.7291	0.7527	0.7763	0.7999
0.8234	0.8470	0.8706	0.8942	0.9178
0.9414	0.9650	0.9885	1.0000	1.0000

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches

Total Precipitation	77.365	4.600
Surface Runoff	0.414	0.025
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	49.858	16.247
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.003	0.001
Continuity Error (%)	-0.005	

Composite Curve Number Computations Report

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.27	C	98.00
> 75% grass cover, Good	0.50	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Composite Area & Weighted CN	1.01		83.04

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved roads with curbs & sewers	0.28	C	98.00
Composite Area & Weighted CN	2.32		82.40

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00
1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.36	C	98.00
> 75% grass cover, Good	0.89	C	74.00
Composite Area & Weighted CN	3.24		83.44

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.53	C	85.00
> 75% grass cover, Good	0.09	C	74.00
Composite Area & Weighted CN	4.62		84.80

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.12	C	74.00
Paved parking & roofs	0.31	C	98.00

Composite Area & Weighted CN	0.43		91.26

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.28	C	74.00
Paved parking & roofs	0.41	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.02		85.79

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.31	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.74		84.10

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.30	C	98.00
> 75% grass cover, Good	0.44	C	74.00
Composite Area & Weighted CN	0.74		83.69

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.51	C	74.00
Paved parking & roofs	0.53	C	98.00
Composite Area & Weighted CN	1.04		86.24

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.18	C	98.00
> 75% grass cover, Good	0.24	C	74.00
Composite Area & Weighted CN	0.42		84.45

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

Subbasin Sub-22

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.16		91.51

Subbasin Sub-23

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.17		91.69

Subbasin Sub-24

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.28

Subbasin Sub-25

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.13		95.46

Subbasin Sub-26

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.13		94.95

Subbasin Sub-27

Soil/Surface Description	Area (acres)	Soil Group	CN

Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.66

Subbasin Sub-28

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.15		95.47

Subbasin Sub-29

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.12		95.25

Subbasin Sub-30

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.14		95.73

Subbasin Sub-31

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.09	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.10		95.59

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

Subbasin Sub-02

Flow length (ft): 680.27
Slope (%): 0.47
Computed TOC (minutes): 9.32

Subbasin Sub-03

Flow length (ft): 302.00
Slope (%): 2.89
Computed TOC (minutes): 2.48

Subbasin Sub-04

User-Defined TOC override (minutes): 47.40

Subbasin Sub-05

Flow length (ft): 944.03
Slope (%): 0.87
Computed TOC (minutes): 9.46

Subbasin Sub-06

User-Defined TOC override (minutes): 48.24

Subbasin Sub-07

User-Defined TOC override (minutes): 41.88

Subbasin Sub-08

Flow length (ft): 908.73
Slope (%): 0.51
Computed TOC (minutes): 11.29

Subbasin Sub-09

Flow length (ft): 633.32
Slope (%): 0.89
Computed TOC (minutes): 6.90

Subbasin Sub-10

User-Defined TOC override (minutes): 45.00

Subbasin Sub-11

Flow length (ft): 184.60
Slope (%): 1.00
Computed TOC (minutes): 2.55

Subbasin Sub-12

Flow length (ft):	647.00
Slope (%):	0.43
Computed TOC (minutes):	9.28

Subbasin Sub-13

Flow length (ft):	485.00
Slope (%):	0.25
Computed TOC (minutes):	9.16

Subbasin Sub-15

Flow length (ft):	543.00
Slope (%):	1.11
Computed TOC (minutes):	5.63

Subbasin Sub-16

Flow length (ft):	777.36
Slope (%):	0.37
Computed TOC (minutes):	11.33

Subbasin Sub-17

Flow length (ft):	915.00
Slope (%):	0.81
Computed TOC (minutes):	9.50

Subbasin Sub-18

Flow length (ft):	326.96
Slope (%):	2.04
Computed TOC (minutes):	3.01

Subbasin Sub-19

Flow length (ft):	259.00
Slope (%):	1.80
Computed TOC (minutes):	2.64

Subbasin Sub-22

Flow length (ft):	120.60
Slope (%):	1.58
Computed TOC (minutes):	1.54

Subbasin Sub-23

Flow length (ft):	133.76
Slope (%):	1.43
Computed TOC (minutes):	1.74

Subbasin Sub-24

Flow length (ft):	144.70
Slope (%):	0.47
Computed TOC (minutes):	2.83

Subbasin Sub-25

Flow length (ft):	149.80
Slope (%):	4.43
Computed TOC (minutes):	1.23

Subbasin Sub-26

Flow length (ft):	172.20
Slope (%):	1.04
Computed TOC (minutes):	2.38

Subbasin Sub-27

Flow length (ft):	103.90
Slope (%):	0.72
Computed TOC (minutes):	1.86

Subbasin Sub-28

Flow length (ft):	184.80
Slope (%):	0.84
Computed TOC (minutes):	2.73

Subbasin Sub-29

Flow length (ft):	155.80
Slope (%):	0.72
Computed TOC (minutes):	2.54

Subbasin Sub-30

Flow length (ft):	137.70
Slope (%):	1.30
Computed TOC (minutes):	1.84

Subbasin Sub-31

Flow length (ft):	174.20
Slope (%):	2.70
Computed TOC (minutes):	1.67

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	4.60	2.82	3.99	83.040	0	00:09:19
Sub-03	4.60	2.87	2.90	83.570	0	00:05:00
Sub-04	4.60	3.00	79.94	85.000	0	00:47:24
Sub-05	4.60	2.76	8.98	82.400	0	00:09:27
Sub-06	4.60	2.90	165.53	83.920	0	00:48:14
Sub-07	4.60	2.99	34.58	84.920	0	00:41:52
Sub-08	4.60	2.85	12.38	83.440	0	00:11:17
Sub-09	4.60	2.98	20.06	84.800	0	00:06:54
Sub-10	4.60	2.98	61.77	84.780	0	00:45:00
Sub-11	4.60	3.62	2.35	91.260	0	00:05:00
Sub-12	4.60	3.08	8.91	85.790	0	00:09:16
Sub-13	4.60	2.92	3.01	84.100	0	00:09:09
Sub-15	4.60	2.88	3.31	83.690	0	00:05:37
Sub-16	4.60	3.12	4.28	86.240	0	00:11:19
Sub-17	4.60	3.00	31.72	85.000	0	00:09:30
Sub-18	4.60	2.95	1.96	84.450	0	00:05:00
Sub-19	4.60	3.01	1.21	85.090	0	00:05:00
Sub-22	4.60	3.65	0.92	91.510	0	00:05:00
Sub-23	4.60	3.66	0.92	91.690	0	00:05:00
Sub-24	4.60	4.05	0.64	95.280	0	00:05:00
Sub-25	4.60	4.07	0.75	95.460	0	00:05:00
Sub-26	4.60	4.01	0.75	94.950	0	00:05:00
Sub-27	4.60	4.09	0.68	95.660	0	00:05:00
Sub-28	4.60	4.07	0.90	95.470	0	00:05:00
Sub-29	4.60	4.05	0.71	95.250	0	00:05:00
Sub-30	4.60	4.10	0.83	95.730	0	00:05:00
Sub-31	4.60	4.08	0.60	95.590	0	00:05:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	0.69	4.54	790.31	0	12:29	0	0	0:00:00
Jun-03	0.28	4.00	797.64	0	13:48	0	0	0:00:00
Jun-04	0.44	5.77	799.77	0	13:58	0	0	0:00:00
Jun-10	0.03	0.45	793.40	0	12:04	0	0	0:00:00
Jun-11	0.07	1.16	794.29	0	12:02	0	0	0:00:00
Jun-21	0.33	2.45	797.90	0	12:30	0	0	0:00:00
Jun-24	0.24	1.40	794.65	0	13:49	0	0	0:00:00
Jun-25	0.31	2.69	798.64	0	12:41	0	0	0:00:00
Jun-28	0.51	3.10	787.22	0	12:31	0	0	0:00:00
Jun-30	0.04	0.78	796.18	0	12:04	0	0	0:00:00
Jun-32	0.04	0.39	792.49	0	11:58	0	0	0:00:00
Jun-34	0.11	1.23	796.62	0	14:15	0	0	0:00:00
Jun-35	0.09	1.85	797.27	0	13:05	1.10	55	0:00:00
Jun-40	0.47	2.51	796.31	0	13:24	0	0	0:00:00
Jun-46	0.23	1.37	793.37	0	13:01	0	0	0:00:00
Jun-47	0.21	1.32	794.31	0	12:53	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.26	1.84	791.74	0	13:05	0	0	0:00:00
Jun-05	0.45	3.51	797.80	0	13:21	0	0	0:00:00
Jun-06	0.61	3.55	797.81	0	13:20	0	0	0:00:00
Jun-12	0.40	3.38	795.75	0	13:01	0	0	0:00:00
Jun-20	0.32	1.97	796.37	0	12:36	0	0	0:00:00
sto	0.43	0.64	795.63	0	13:07	0	0	0:00:00
Storage	0.50	2.41	798.04	0	12:40	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	81.02	111.56	0	12:27	0.00		
Jun-03	JUNCTION	4.11	255.61	0	13:09	0.00		
Jun-04	JUNCTION	2.89	274.11	0	13:09	0.00		
Jun-10	JUNCTION	0.00	4.28	0	12:02	0.00		
Jun-11	JUNCTION	4.28	4.28	0	12:02	0.00		
Jun-21	JUNCTION	34.50	61.71	0	12:29	0.00		
Jun-24	JUNCTION	0.00	59.64	0	13:25	0.00		
Jun-25	JUNCTION	0.00	51.98	0	12:41	0.00		
Jun-28	JUNCTION	0.00	137.85	0	12:31	0.00		
Jun-30	JUNCTION	12.38	12.38	0	12:02	0.00		
Jun-32	JUNCTION	2.85	2.85	0	11:57	0.00		
Jun-34	JUNCTION	1.19	4.83	0	13:06	0.00		
Jun-35	JUNCTION	0.00	8.01	0	13:01	3.30	0	14:14
Jun-40	JUNCTION	0.00	8.91	0	13:23	0.00		
Jun-46	JUNCTION	5.29	31.95	0	13:00	0.00		
Jun-47	JUNCTION	0.70	53.99	0	12:47	0.00		
Out-02	OUTFALL	0.00	137.85	0	12:31	0.00		
Jun-01	STORAGE	0.00	31.94	0	13:01	0.00		
Jun-05	STORAGE	8.91	257.66	0	13:09	0.00		
Jun-06	STORAGE	35.27	182.77	0	12:29	0.00		
Jun-12	STORAGE	23.41	48.96	0	12:36	0.00		
Jun-20	STORAGE	61.71	61.71	0	12:21	0.00		
sto	STORAGE	0.00	12.32	0	13:06	0.00		
Storage	STORAGE	165.37	195.86	0	12:31	0.00		

****
Inlet Depth Summary
****

Inlet ID	Max Gutter Spread during Peak Flow ft	Max Gutter Water Elev during Peak Flow ft	Max Gutter Water Depth during Peak Flow ft	Time of Maximum Depth Occurrence days	Time of Maximum Depth Occurrence hh:mm

Inlet-01	7.52	798.56	0.13	0	12:52
Inlet-02	5.66	798.60	0.15	0	12:53

****
Inlet Flow Summary
****

Inlet ID	Peak Flow	Peak Lateral Flow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Total Flooding	Total Time Flooded
	cfs	cfs	cfs	cfs	%	acre-in	minutes
Inlet-01	1.00	0.90	-	-	-	0.000	0
Inlet-02	0.90	0.90	0.81	0.10	89.41	0.000	0

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	4.145	27	0 13:05	0.261	2	31.89	0.00	0:00:00	0.000
Jun-05	66.075	94	0 13:21	4.781	7	270.70	0.00	0:00:00	0.000
Jun-06	263.133	49	0 13:20	20.940	4	97.13	0.00	0:00:00	0.000
Jun-12	41.778	28	0 13:01	1.480	1	31.30	0.00	0:00:00	0.000
Jun-20	71.748	62	0 12:36	3.519	3	45.50	0.00	0:00:00	0.000
sto	0.225	73	0 13:07	0.105	34	12.31	0.00	0:00:00	0.000
Storage	185.966	34	0 12:40	12.707	2	167.01	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	65.71	19.64	137.85
System	65.71	19.64	137.85

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0 16:59	5.32	1.00	6.46	5.14	1.26	1.00	295	SURCHARGED
Link-02	CHANNEL	0 12:47	3.89	1.00	53.89	57.13	0.94	0.91	0	Calculated
Link-03	CONDUIT	0 12:41	6.06	1.00	8.01	5.42	1.48	0.71	0	> CAPACITY
Link-06	CONDUIT	0 12:29	7.34	1.00	111.08	200.50	0.55	0.72	0	Calculated
Link-10	CONDUIT	0 12:02	5.15	1.00	4.28	2.87	1.49	0.64	0	> CAPACITY
Link-12	CHANNEL	0 12:29	3.33	1.16	80.70	782.03	0.10	0.86	0	Calculated
Link-15	CONDUIT	0 12:31	5.19	1.00	6.17	3.32	1.86	1.00	217	SURCHARGED
Link-16	CONDUIT	0 12:36	4.70	1.00	12.92	9.94	1.30	0.86	0	> CAPACITY
Link-18	CHANNEL	0 12:01	0.62	1.00	4.16	91.91	0.05	0.45	0	Calculated
Link-21	CHANNEL	0 12:04	1.13	1.00	12.03	62.73	0.19	0.72	0	Calculated
Link-23	CHANNEL	0 11:58	1.45	1.00	2.82	9.18	0.31	0.82	0	Calculated
Link-26	CONDUIT	0 14:15	4.04	1.00	4.78	1.00	4.76	0.99	0	> CAPACITY
Link-27	CHANNEL	0 13:01	1.23	1.00	8.01	14.44	0.55	1.00	88	FLOODED
Link-36	CONDUIT	0 13:23	5.04	1.00	8.91	5.60	1.59	1.00	490	SURCHARGED
Link-37	CONDUIT	0 12:43	9.22	1.00	24.65	13.13	1.88	1.00	109	SURCHARGED
Link-38	CONDUIT	0 13:01	7.68	1.00	31.30	17.34	1.81	0.77	0	> CAPACITY
Link-39	CONDUIT	0 13:22	5.40	1.00	8.91	5.71	1.56	0.97	0	> CAPACITY
Link-41	CHANNEL	0 13:25	3.29	1.00	50.74	40.30	1.26	1.00	75	FLOODED
Link-44	CONDUIT	0 13:05	7.67	1.00	31.89	58.32	0.55	0.57	0	Calculated
Link-45	CHANNEL	0 12:31	7.64	1.00	137.85	938.00	0.15	0.48	0	Calculated
Link-46	CHANNEL	0 13:01	3.24	1.00	31.94	43.81	0.73	0.76	0	Calculated
Link-47	CHANNEL	0 14:45	3.52	1.00	53.15	78.40	0.68	0.94	0	Calculated
Link-48	CONDUIT	0 11:57	2.27	1.47	0.80	6.37	0.13	0.52	0	Calculated
Link-49	CONDUIT	0 11:58	3.24	1.00	1.80	2.70	0.66	0.86	0	Calculated
Link-50	CHANNEL	0 11:57	0.23	1.00	0.10	0.97	0.11	0.52	0	Calculated
Weir-01	WEIR	0 13:09			36.82			1.00		
Weir-02	WEIR	0 12:36			32.58			0.60		
Weir-04	WEIR	0 13:07			12.31			0.66		
Weir-05	WEIR	0 14:15			4.41			1.00		
Weir-06	WEIR	0 12:41			51.98			0.81		
Weir-07	WEIR	0 13:09			267.48			1.00		
Weir-08	WEIR	0 00:00			0.00			0.00		
Weir-09	WEIR	0 12:38			107.57			0.42		
Weir-10	WEIR	0 12:41			4.64			0.28		
Weir-11	WEIR	0 00:00			0.00			0.00		
Weir-12	WEIR	0 12:55			85.78			0.93		
Weir-13	WEIR	0 13:09			251.24			1.00		

****
Highest Flow Instability Indexes
****
Link Weir-06 (14)
Link Link-15 (13)
Link Weir-07 (10)
Link Link-01 (10)
Link Weir-12 (9)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.

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WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-46.

Analysis began on:  Thu Sep 16 21:56:15 2021
Analysis ended on:  Thu Sep 16 21:56:37 2021
Total elapsed time: 00:00:22
```

****
Project Description
****
File Name ..... Proposed Conditions R2.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration..... Kirpich
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. None
Starting Date JUL-26-2021 00:00:00
Ending Date JUL-28-2021 00:00:00
Report Time Step 00:02:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 27
Number of nodes 26
Number of links 37

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-02	100-year	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %	Peak Rate Factor	Raingage
Sub-02	1.01	680.27	0.4700	484.00	Rain Gage-02
Sub-03	0.64	302.00	2.8900	484.00	Rain Gage-02
Sub-04	40.54	1968.00	0.6700	484.00	Rain Gage-02
Sub-05	2.33	944.03	0.8700	484.00	Rain Gage-02
Sub-06	88.19	2886.00	0.5300	484.00	Rain Gage-02
Sub-07	16.21	2738.00	0.8900	484.00	Rain Gage-02
Sub-08	3.24	908.73	0.5100	484.00	Rain Gage-02
Sub-09	4.53	633.32	0.8900	484.00	Rain Gage-02
Sub-10	30.47	2139.00	0.9100	484.00	Rain Gage-02
Sub-11	0.43	184.60	1.0000	484.00	Rain Gage-02
Sub-12	2.09	647.00	0.4300	484.00	Rain Gage-02
Sub-13	0.74	485.00	0.2500	484.00	Rain Gage-02
Sub-15	0.74	543.00	1.1100	484.00	Rain Gage-02
Sub-16	1.04	777.36	0.3700	484.00	Rain Gage-02
Sub-17	7.63	915.00	0.8100	484.00	Rain Gage-02
Sub-18	0.43	326.96	2.0400	484.00	Rain Gage-02
Sub-19	0.26	259.00	1.8000	484.00	Rain Gage-02
Sub-22	0.16	120.60	1.5800	484.00	Rain Gage-02
Sub-23	0.17	133.76	1.4300	484.00	Rain Gage-02
Sub-24	0.11	144.70	0.4700	484.00	Rain Gage-02
Sub-25	0.13	149.80	4.4300	484.00	Rain Gage-02
Sub-26	0.13	172.20	1.0400	484.00	Rain Gage-02
Sub-27	0.11	103.90	0.7220	484.00	Rain Gage-02
Sub-28	0.15	184.80	0.8400	484.00	Rain Gage-02
Sub-29	0.12	155.80	0.7200	484.00	Rain Gage-02
Sub-30	0.14	137.70	1.3000	484.00	Rain Gage-02
Sub-31	0.10	174.20	2.7000	484.00	Rain Gage-02

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Node Summary
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Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-02	JUNCTION	785.77	790.77	0.00	
Jun-03	JUNCTION	793.64	798.04	0.00	
Jun-04	JUNCTION	794.00	798.40	0.00	
Jun-10	JUNCTION	792.95	795.80	0.00	
Jun-11	JUNCTION	793.13	795.90	0.00	
Jun-21	JUNCTION	795.45	798.85	0.00	
Jun-24	JUNCTION	793.25	794.75	0.00	
Jun-25	JUNCTION	795.95	799.32	0.00	
Jun-28	JUNCTION	784.12	791.83	0.00	
Jun-30	JUNCTION	795.40	797.15	0.00	
Jun-32	JUNCTION	792.10	793.10	0.00	
Jun-34	JUNCTION	795.39	796.64	0.00	
Jun-35	JUNCTION	795.42	796.67	0.00	
Jun-40	JUNCTION	793.80	799.47	0.00	
Jun-46	JUNCTION	792.00	794.50	0.00	
Jun-47	JUNCTION	792.99	798.40	0.00	
Out-02	OUTFALL	783.38	789.38	0.00	
Jun-01	STORAGE	789.90	793.00	0.00	
Jun-05	STORAGE	794.29	797.90	0.00	
Jun-06	STORAGE	794.26	798.60	0.00	
Jun-12	STORAGE	792.37	797.00	0.00	
Jun-20	STORAGE	794.40	796.80	0.00	
sto	STORAGE	794.99	795.71	0.00	
Storage	STORAGE	795.63	799.00	0.00	

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Inlet Summary
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Inlet ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation ft	Inlet Rim Elevation ft	Ponded Area ft²	Initial Water Elevation ft	Grate Clogging Factor %
Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	1	793.60	798.43	10.00	793.60	0.00
Inlet-02	FHWA HEC-22 GENERIC	N/A	On Grade	1	794.00	798.45	-	794.00	0.00

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Roadway and Gutter Summary
****

Inlet ID	Roadway Longitudinal Slope	Roadway Cross Slope	Roadway Manning's Roughness	Gutter Cross Slope	Gutter Width	Gutter Depression

	ft/ft	ft/ft		ft/ft	ft	in
Inlet-01	-	0.0150	0.0160	0.0400	2.50	0.00
Inlet-02	0.0250	0.0150	0.0160	0.0400	2.50	0.00

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Link Summary
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Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-05	Jun-04	CONDUIT	34.4	0.8440	0.0150
Link-02	Jun-24	Jun-47	CHANNEL	44.0	0.5912	0.0320
Link-03	Storage	sto	CONDUIT	65.0	0.9863	0.0250
Link-06	Jun-02	Jun-28	CONDUIT	78.7	0.7891	0.0150
Link-10	Jun-11	Jun-10	CONDUIT	24.6	0.7308	0.0250
Link-12	Jun-21	Jun-06	CHANNEL	20.0	5.9600	0.0320
Link-15	Jun-25	Jun-05	CONDUIT	27.6	0.9786	0.0250
Link-16	Jun-20	Jun-12	CONDUIT	28.0	0.7143	0.0250
Link-18	Jun-10	Jun-46	CHANNEL	172.4	0.5509	0.0320
Link-21	Jun-30	Jun-12	CHANNEL	561.9	0.5392	0.0320
Link-23	Jun-32	Jun-02	CHANNEL	267.3	2.3691	0.0320
Link-26	Jun-35	Jun-34	CONDUIT	30.2	0.0894	0.0250
Link-27	Jun-35	Jun-03	CHANNEL	492.4	0.3615	0.0320
Link-36	Jun-06	Jun-40	CONDUIT	121.6	0.3782	0.0150
Link-37	Jun-04	Jun-03	CONDUIT	80.3	0.4486	0.0150
Link-38	Jun-12	Jun-46	CONDUIT	155.5	0.2380	0.0150
Link-39	Jun-40	Jun-24	CONDUIT	139.6	0.3939	0.0150
Link-41	Jun-03	Jun-24	CHANNEL	97.7	0.3993	0.0320
Link-44	Jun-01	Jun-28	CONDUIT	182.7	1.0180	0.0150
Link-45	Jun-28	Out-02	CHANNEL	31.1	2.3817	0.0320
Link-46	Jun-46	Jun-01	CHANNEL	90.0	0.4444	0.0320
Link-47	Jun-47	Jun-02	CHANNEL	648.5	1.1133	0.0320
Link-48	Inlet-02	Inlet-01	CONDUIT	9.4	4.2553	0.0150
Link-49	Inlet-01	Jun-47	CONDUIT	65.3	0.7662	0.0150
Link-50	Inlet-02	Inlet-01	CHANNEL	10.6	0.1894	0.0320
Weir-01	Jun-06	Jun-04	WEIR			
Weir-02	Jun-20	Jun-12	WEIR			
Weir-04	sto	Jun-02	WEIR			
Weir-05	sto	Jun-34	WEIR			
Weir-06	Storage	Jun-25	WEIR			
Weir-07	Jun-05	Jun-04	WEIR			
Weir-08	Jun-01	Jun-28	WEIR			
Weir-09	Storage	Jun-06	WEIR			
Weir-10	Jun-25	Jun-05	WEIR			
Weir-11	Jun-11	Jun-28	WEIR			
Weir-12	Jun-05	Jun-06	WEIR			
Weir-13	Jun-04	Jun-03	WEIR			

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Cross Section Summary
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Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	CIRCULAR	1.25	1.25	1	1.23	0.31	5.14
Link-02	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	57.13
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	5.42
Link-06	CIRCULAR	5.00	5.00	1	19.63	1.25	200.50
Link-10	CIRCULAR	1.25	1.25	1	1.23	0.31	2.87
Link-12	TRIANGULAR	3.40	29.00	1	49.30	1.66	782.03
Link-15	CIRCULAR	1.25	1.25	1	1.23	0.31	3.32
Link-16	CIRCULAR	2.00	2.00	1	3.14	0.50	9.94
Link-18	TRAPEZOIDAL	2.00	20.00	1	24.00	1.17	91.91
Link-21	TRAPEZOIDAL	1.75	16.25	1	17.72	1.06	62.73
Link-23	TRIANGULAR	0.60	9.60	1	2.88	0.30	9.18
Link-26	CIRCULAR	1.25	1.25	1	1.23	0.31	1.00
Link-27	TRIANGULAR	1.00	16.50	1	8.25	0.50	14.44
Link-36	CIRCULAR	1.50	1.50	1	1.77	0.38	5.60
Link-37	CIRCULAR	2.00	2.00	1	3.14	0.50	13.13
Link-38	CIRCULAR	2.50	2.50	1	4.91	0.63	17.34
Link-39	CIRCULAR	1.50	1.50	1	1.77	0.38	5.71
Link-41	TRAPEZOIDAL	1.40	18.00	1	15.40	0.84	40.30
Link-44	CIRCULAR	3.00	3.00	1	7.07	0.75	58.32
Link-45	TRAPEZOIDAL	6.00	20.00	1	66.00	2.79	938.00
Link-46	TRAPEZOIDAL	1.50	16.00	1	15.00	0.92	43.81
Link-47	TRAPEZOIDAL	1.50	19.00	1	17.25	0.89	78.40
Link-48	CIRCULAR	1.00	1.00	1	0.79	0.25	6.37
Link-49	CIRCULAR	1.00	1.00	1	0.79	0.25	2.70
Link-50	IRREGULAR	0.33	14.00	1	2.14	0.11	0.97

****
Transect Summary
****

Transect XS-01
Area:

0.0003	0.0010	0.0023	0.0041	0.0063
0.0091	0.0124	0.0162	0.0205	0.0254
0.0307	0.0365	0.0431	0.0506	0.0592
0.0688	0.0794	0.0910	0.1037	0.1173
0.1320	0.1477	0.1644	0.1822	0.2010
0.2207	0.2415	0.2634	0.2862	0.3100
0.3349	0.3608	0.3877	0.4157	0.4446
0.4746	0.5056	0.5376	0.5706	0.6047
0.6397	0.6758	0.7129	0.7510	0.7902
0.8303	0.8715	0.9137	0.9568	1.0000

Hrad:

0.0213	0.0425	0.0638	0.0850	0.1063
0.1275	0.1488	0.1701	0.1913	0.2126
0.2338	0.2551	0.2605	0.2681	0.2788
0.2917	0.3062	0.3218	0.3384	0.3558
0.3737	0.3920	0.4108	0.4299	0.4492
0.4688	0.4886	0.5086	0.5287	0.5489
0.5693	0.5897	0.6103	0.6309	0.6516
0.6724	0.6932	0.7140	0.7350	0.7559
0.7769	0.7980	0.8191	0.8402	0.8613
0.8825	0.9037	0.9249	0.9572	1.0000

Width:

0.0117	0.0235	0.0352	0.0470	0.0587
0.0704	0.0822	0.0939	0.1057	0.1174
0.1292	0.1409	0.1630	0.1866	0.2102
0.2338	0.2574	0.2810	0.3046	0.3281
0.3517	0.3753	0.3989	0.4225	0.4461
0.4697	0.4932	0.5168	0.5404	0.5640
0.5876	0.6112	0.6348	0.6583	0.6819
0.7055	0.7291	0.7527	0.7763	0.7999
0.8234	0.8470	0.8706	0.8942	0.9178
0.9414	0.9650	0.9885	1.0000	1.0000

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches

Total Precipitation	94.183	5.600
Surface Runoff	0.543	0.032
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	63.128	20.571
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.003	0.001
Continuity Error (%)	-0.033	

Composite Curve Number Computations Report

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.27	C	98.00
> 75% grass cover, Good	0.50	C	74.00
Row crops, straight row, Good	0.24	C	85.00
Composite Area & Weighted CN	1.01		83.04

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	0.34	C	85.00
> 75% grass cover, Good	0.21	C	74.00
Paved parking & roofs	0.10	C	98.00
Composite Area & Weighted CN	0.65		83.57

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	40.06	C	85.00
> 75% grass cover, Good	0.26	C	74.00
Paved parking & roofs	0.21	C	98.00
Composite Area & Weighted CN	40.53		85.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.16	C	85.00
> 75% grass cover, Good	0.88	C	74.00
Paved roads with curbs & sewers	0.28	C	98.00
Composite Area & Weighted CN	2.32		82.40

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
1 acre lots, 20% impervious	4.96	C	79.00
Woods, Good	4.42	C	70.00
Row crops, straight row, Good	78.44	C	85.00
> 75% grass cover, Good	0.30	C	74.00
Paved parking & roofs	0.27	C	98.00
Composite Area & Weighted CN	88.39		83.92

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	1.90	C	74.00
Paved parking & roofs	2.24	C	98.00
Row crops, straight row, Good	7.30	C	85.00
1/4 acre lots, 38% impervious	4.72	C	83.00
Composite Area & Weighted CN	16.16		84.92

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.99	C	85.00
Paved parking & roofs	0.36	C	98.00
> 75% grass cover, Good	0.89	C	74.00
Composite Area & Weighted CN	3.24		83.44

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	4.53	C	85.00
> 75% grass cover, Good	0.09	C	74.00
Composite Area & Weighted CN	4.62		84.80

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	25.80	C	85.00
1/4 acre lots, 38% impervious	2.02	C	83.00
> 75% grass cover, Good	1.55	C	74.00
Paved parking & roofs	1.10	C	98.00
Composite Area & Weighted CN	30.47		84.78

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.12	C	74.00
Paved parking & roofs	0.31	C	98.00

Composite Area & Weighted CN	0.43		91.26

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	1.00	C	85.00
> 75% grass cover, Good	0.28	C	74.00
Paved parking & roofs	0.41	C	98.00
1/4 acre lots, 38% impervious	0.33	C	83.00
Composite Area & Weighted CN	2.02		85.79

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.31	C	98.00
> 75% grass cover, Good	0.43	C	74.00
Composite Area & Weighted CN	0.74		84.10

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.30	C	98.00
> 75% grass cover, Good	0.44	C	74.00
Composite Area & Weighted CN	0.74		83.69

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
> 75% grass cover, Good	0.51	C	74.00
Paved parking & roofs	0.53	C	98.00
Composite Area & Weighted CN	1.04		86.24

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
Row crops, straight row, Good	7.63	C	85.00
Composite Area & Weighted CN	7.63		85.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.18	C	98.00
> 75% grass cover, Good	0.24	C	74.00
Composite Area & Weighted CN	0.42		84.45

Subbasin Sub-19

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	D	98.00
> 75% grass cover, Good	0.14	C	74.00
Composite Area & Weighted CN	0.26		85.09

Subbasin Sub-22

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.16		91.51

Subbasin Sub-23

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.12	C	98.00
> 75% grass cover, Good	0.04	C	74.00
Composite Area & Weighted CN	0.17		91.69

Subbasin Sub-24

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.28

Subbasin Sub-25

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.13		95.46

Subbasin Sub-26

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.13		94.95

Subbasin Sub-27

Soil/Surface Description	Area (acres)	Soil Group	CN

Paved parking & roofs	0.10	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.11		95.66

Subbasin Sub-28

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.02	C	74.00
Composite Area & Weighted CN	0.15		95.47

Subbasin Sub-29

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.11	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.12		95.25

Subbasin Sub-30

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.13	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.14		95.73

Subbasin Sub-31

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved parking & roofs	0.09	C	98.00
> 75% grass cover, Good	0.01	C	74.00
Composite Area & Weighted CN	0.10		95.59

****
Kirpich Time of Concentration Computations Report
****

Tc = (0.0078 * (L^0.77) * (S^-0.385))

Where:

Tc = Time of Concentration (min)
L = Flow length (ft)
S = Slope (ft/ft)

Subbasin Sub-02

Flow length (ft): 680.27
Slope (%): 0.47
Computed TOC (minutes): 9.32

Subbasin Sub-03

Flow length (ft): 302.00
Slope (%): 2.89
Computed TOC (minutes): 2.48

Subbasin Sub-04

User-Defined TOC override (minutes): 47.40

Subbasin Sub-05

Flow length (ft): 944.03
Slope (%): 0.87
Computed TOC (minutes): 9.46

Subbasin Sub-06

User-Defined TOC override (minutes): 48.24

Subbasin Sub-07

User-Defined TOC override (minutes): 41.88

Subbasin Sub-08

Flow length (ft): 908.73
Slope (%): 0.51
Computed TOC (minutes): 11.29

Subbasin Sub-09

Flow length (ft): 633.32
Slope (%): 0.89
Computed TOC (minutes): 6.90

Subbasin Sub-10

User-Defined TOC override (minutes): 45.00

Subbasin Sub-11

Flow length (ft): 184.60
Slope (%): 1.00
Computed TOC (minutes): 2.55

Subbasin Sub-12

Flow length (ft):	647.00
Slope (%):	0.43
Computed TOC (minutes):	9.28

Subbasin Sub-13

Flow length (ft):	485.00
Slope (%):	0.25
Computed TOC (minutes):	9.16

Subbasin Sub-15

Flow length (ft):	543.00
Slope (%):	1.11
Computed TOC (minutes):	5.63

Subbasin Sub-16

Flow length (ft):	777.36
Slope (%):	0.37
Computed TOC (minutes):	11.33

Subbasin Sub-17

Flow length (ft):	915.00
Slope (%):	0.81
Computed TOC (minutes):	9.50

Subbasin Sub-18

Flow length (ft):	326.96
Slope (%):	2.04
Computed TOC (minutes):	3.01

Subbasin Sub-19

Flow length (ft):	259.00
Slope (%):	1.80
Computed TOC (minutes):	2.64

Subbasin Sub-22

Flow length (ft):	120.60
Slope (%):	1.58
Computed TOC (minutes):	1.54

Subbasin Sub-23

Flow length (ft):	133.76
Slope (%):	1.43
Computed TOC (minutes):	1.74

Subbasin Sub-24

Flow length (ft):	144.70
Slope (%):	0.47
Computed TOC (minutes):	2.83

Subbasin Sub-25

Flow length (ft):	149.80
Slope (%):	4.43
Computed TOC (minutes):	1.23

Subbasin Sub-26

Flow length (ft):	172.20
Slope (%):	1.04
Computed TOC (minutes):	2.38

Subbasin Sub-27

Flow length (ft):	103.90
Slope (%):	0.72
Computed TOC (minutes):	1.86

Subbasin Sub-28

Flow length (ft):	184.80
Slope (%):	0.84
Computed TOC (minutes):	2.73

Subbasin Sub-29

Flow length (ft):	155.80
Slope (%):	0.72
Computed TOC (minutes):	2.54

Subbasin Sub-30

Flow length (ft):	137.70
Slope (%):	1.30
Computed TOC (minutes):	1.84

Subbasin Sub-31

Flow length (ft): 174.20
Slope (%): 2.70
Computed TOC (minutes): 1.67

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-02	5.60	3.73	5.23	83.040	0	00:09:19
Sub-03	5.60	3.78	3.78	83.570	0	00:05:00
Sub-04	5.60	3.93	103.99	85.000	0	00:47:24
Sub-05	5.60	3.66	11.82	82.400	0	00:09:27
Sub-06	5.60	3.81	217.35	83.920	0	00:48:14
Sub-07	5.60	3.92	45.09	84.920	0	00:41:52
Sub-08	5.60	3.77	16.18	83.440	0	00:11:17
Sub-09	5.60	3.91	26.03	84.800	0	00:06:54
Sub-10	5.60	3.90	80.60	84.780	0	00:45:00
Sub-11	5.60	4.59	2.94	91.260	0	00:05:00
Sub-12	5.60	4.01	11.51	85.790	0	00:09:16
Sub-13	5.60	3.83	3.92	84.100	0	00:09:09
Sub-15	5.60	3.79	4.32	83.690	0	00:05:37
Sub-16	5.60	4.05	5.51	86.240	0	00:11:19
Sub-17	5.60	3.93	41.16	85.000	0	00:09:30
Sub-18	5.60	3.87	2.55	84.450	0	00:05:00
Sub-19	5.60	3.94	1.56	85.090	0	00:05:00
Sub-22	5.60	4.62	1.15	91.510	0	00:05:00
Sub-23	5.60	4.64	1.15	91.690	0	00:05:00
Sub-24	5.60	5.04	0.78	95.280	0	00:05:00
Sub-25	5.60	5.07	0.92	95.460	0	00:05:00
Sub-26	5.60	5.01	0.92	94.950	0	00:05:00
Sub-27	5.60	5.09	0.83	95.660	0	00:05:00
Sub-28	5.60	5.07	1.11	95.470	0	00:05:00
Sub-29	5.60	5.04	0.88	95.250	0	00:05:00
Sub-30	5.60	5.10	1.02	95.730	0	00:05:00
Sub-31	5.60	5.08	0.74	95.590	0	00:05:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-02	0.82	5.50	791.27	0	12:24	0	0	0:00:00
Jun-03	0.41	4.22	797.86	0	13:58	0	0	0:00:00
Jun-04	0.57	5.80	799.80	0	13:23	8.98	7	0:00:00
Jun-10	0.05	0.55	793.50	0	12:04	0	0	0:00:00
Jun-11	0.08	1.75	794.88	0	12:02	0	0	0:00:00
Jun-21	0.41	2.55	798.00	0	13:00	0	0	0:00:00
Jun-24	0.29	1.41	794.66	0	13:58	0	0	0:00:00
Jun-25	0.40	2.88	798.83	0	12:38	0	0	0:00:00
Jun-28	0.61	3.47	787.59	0	12:35	0	0	0:00:00
Jun-30	0.07	0.90	796.30	0	12:03	0	0	0:00:00
Jun-32	0.04	0.43	792.53	0	11:58	0	0	0:00:00
Jun-34	0.15	1.24	796.63	0	12:46	0	0	0:00:00
Jun-35	0.15	1.85	797.27	0	12:46	5.86	127	0:00:00
Jun-40	0.55	2.59	796.39	0	12:56	0	0	0:00:00
Jun-46	0.27	1.45	793.45	0	12:04	0	0	0:00:00
Jun-47	0.25	1.41	794.40	0	12:39	0	0	0:00:00
Out-02	0.00	0.00	783.38	0	00:00	0	0	0:00:00
Jun-01	0.32	1.99	791.89	0	13:04	0	0	0:00:00
Jun-05	0.57	3.61	797.90	0	12:47	38.22	48	0:00:00
Jun-06	0.73	3.74	798.00	0	13:00	0	0	0:00:00
Jun-12	0.51	3.91	796.28	0	13:01	0	0	0:00:00
Jun-20	0.38	2.10	796.50	0	12:34	0	0	0:00:00
sto	0.44	0.64	795.63	0	12:47	0	0	0:00:00
Storage	0.58	2.55	798.18	0	12:41	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-02	JUNCTION	105.71	143.46	0	12:24	0.00		
Jun-03	JUNCTION	5.30	254.89	0	13:23	0.00		
Jun-04	JUNCTION	3.61	334.24	0	13:38	167.74	0	13:46
Jun-10	JUNCTION	0.00	5.50	0	12:02	0.00		
Jun-11	JUNCTION	5.50	5.50	0	12:02	0.00		
Jun-21	JUNCTION	45.09	58.81	0	12:23	0.00		
Jun-24	JUNCTION	0.00	60.42	0	14:32	0.00		
Jun-25	JUNCTION	0.00	63.21	0	12:38	0.00		
Jun-28	JUNCTION	0.00	174.57	0	12:35	0.00		
Jun-30	JUNCTION	16.18	16.18	0	12:02	0.00		
Jun-32	JUNCTION	3.72	3.72	0	11:57	0.00		
Jun-34	JUNCTION	1.54	4.89	0	12:46	0.00		
Jun-35	JUNCTION	0.00	10.91	0	12:43	5.55	0	12:46
Jun-40	JUNCTION	0.00	9.17	0	12:59	0.00		
Jun-46	JUNCTION	6.84	36.35	0	12:03	0.00		
Jun-47	JUNCTION	0.86	53.77	0	12:34	0.00		
Out-02	OUTFALL	0.00	174.57	0	12:35	0.00		
Jun-01	STORAGE	0.00	36.27	0	12:04	0.00		
Jun-05	STORAGE	11.51	241.07	0	13:23	147.87	0	13:02
Jun-06	STORAGE	45.74	218.01	0	12:33	0.00		
Jun-12	STORAGE	30.28	67.32	0	12:34	0.00		
Jun-20	STORAGE	80.29	80.29	0	12:22	0.00		
sto	STORAGE	0.00	12.71	0	12:46	0.00		
Storage	STORAGE	216.75	267.94	0	12:24	0.00		

****
Inlet Depth Summary
****

Inlet ID	Max Gutter Spread during Peak Flow ft	Max Gutter Water Elev during Peak Flow ft	Max Gutter Water Depth during Peak Flow ft	Time of Maximum Depth Occurrence days	Time of Maximum Depth Occurrence hh:mm

Inlet-01	9.07	798.58	0.15	0	11:58
Inlet-02	6.38	798.61	0.16	0	11:58

****
Inlet Flow Summary
****

Inlet ID	Peak Flow	Peak Lateral Flow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Total Flooding	Total Time Flooded
	cfs	cfs	cfs	cfs	%	acre-in	minutes
Inlet-01	1.29	1.12	-	-	-	0.000	0
Inlet-02	1.12	1.12	0.96	0.17	85.21	0.000	0

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Jun-01	5.057	33	0 13:04	0.404	3	35.76	0.00	0:00:00	0.000
Jun-05	70.451	100	0 12:47	6.913	10	314.38	0.00	0:00:00	0.000
Jun-06	324.419	61	0 13:00	30.445	6	116.99	0.00	0:00:00	0.000
Jun-12	78.012	53	0 13:01	3.635	2	34.98	0.00	0:00:00	0.000
Jun-20	84.254	72	0 12:34	5.169	4	64.23	0.00	0:00:00	0.000
sto	0.227	74	0 12:47	0.111	36	12.67	0.00	0:00:00	0.000
Storage	236.682	43	0 12:41	18.898	3	214.47	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-02	67.24	25.42	174.57
System	67.24	25.42	174.57

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CONDUIT	0 17:54	5.32	1.00	6.46	5.14	1.26	1.00	356	SURCHARGED
Link-02	CHANNEL	0 12:34	3.91	1.00	53.67	57.13	0.94	0.94	0	Calculated
Link-03	CONDUIT	0 12:46	6.21	1.00	8.29	5.42	1.53	0.71	0	> CAPACITY
Link-06	CONDUIT	0 12:24	8.39	1.00	143.44	200.50	0.72	0.81	0	Calculated
Link-10	CONDUIT	0 12:02	5.84	1.00	5.50	2.87	1.91	0.72	0	> CAPACITY
Link-12	CHANNEL	0 12:23	3.66	1.16	95.42	782.03	0.12	0.87	0	Calculated
Link-15	CONDUIT	0 12:21	5.21	1.00	6.23	3.32	1.87	1.00	280	SURCHARGED
Link-16	CONDUIT	0 12:25	4.71	1.00	13.17	9.94	1.32	1.00	16	SURCHARGED
Link-18	CHANNEL	0 12:02	0.68	1.00	5.40	91.91	0.06	0.50	0	Calculated
Link-21	CHANNEL	0 12:03	1.38	1.00	15.78	62.73	0.25	0.76	0	Calculated
Link-23	CHANNEL	0 11:58	1.75	1.00	3.69	9.18	0.40	0.86	0	Calculated
Link-26	CONDUIT	0 12:46	4.05	1.00	4.79	1.00	4.77	0.99	0	> CAPACITY
Link-27	CHANNEL	0 12:43	1.34	1.00	10.91	14.44	0.76	1.00	159	FLOODED
Link-36	CONDUIT	0 12:59	5.19	1.00	9.17	5.60	1.64	1.00	558	SURCHARGED
Link-37	CONDUIT	0 12:31	9.24	1.00	24.72	13.13	1.88	1.00	179	SURCHARGED
Link-38	CONDUIT	0 13:01	8.44	1.00	34.98	17.34	2.02	0.79	0	> CAPACITY
Link-39	CONDUIT	0 12:59	5.35	1.00	9.17	5.71	1.61	0.97	0	> CAPACITY
Link-41	CHANNEL	0 14:32	3.34	1.00	51.50	40.30	1.28	1.00	118	FLOODED
Link-44	CONDUIT	0 13:04	7.85	1.00	35.76	58.32	0.61	0.61	0	Calculated
Link-45	CHANNEL	0 12:35	8.04	1.00	174.57	938.00	0.19	0.53	0	Calculated
Link-46	CHANNEL	0 12:04	3.36	1.00	36.27	43.81	0.83	0.81	0	Calculated
Link-47	CHANNEL	0 15:38	3.52	1.00	53.15	78.40	0.68	0.97	0	Calculated
Link-48	CONDUIT	0 11:57	2.29	1.47	0.95	6.37	0.15	0.62	0	Calculated
Link-49	CONDUIT	0 11:58	3.48	1.00	2.24	2.70	0.83	0.90	0	Calculated
Link-50	CHANNEL	0 11:57	0.27	1.00	0.17	0.97	0.18	0.59	0	Calculated
Weir-01	WEIR	0 13:38			35.60			1.00		
Weir-02	WEIR	0 12:33			51.62			0.73		
Weir-04	WEIR	0 12:47			12.67			0.67		
Weir-05	WEIR	0 12:46			4.43			1.00		
Weir-06	WEIR	0 12:38			63.21			0.92		
Weir-07	WEIR	0 13:23			310.17			1.00		
Weir-08	WEIR	0 00:00			0.00			0.00		
Weir-09	WEIR	0 12:35			144.40			0.50		
Weir-10	WEIR	0 12:38			11.87			0.68		
Weir-11	WEIR	0 00:00			0.00			0.00		
Weir-12	WEIR	0 13:00			101.86			1.00		
Weir-13	WEIR	0 13:23			251.06			1.00		

****
Highest Flow Instability Indexes
****
Link Weir-06 (15)
Link Link-15 (15)
Link Weir-07 (14)
Link Link-01 (13)
Link Link-37 (12)

WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-12 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 116 : Conduit inlet invert elevation defined for Conduit Link-23 is below upstream node invert elevation.
Assumed conduit inlet invert elevation equal to upstream node invert elevation.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-02.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-03.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-04.

```
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-11.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-21.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-24.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-25.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-30.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-34.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-35.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node Jun-46.

Analysis began on:  Thu Sep 16 22:00:40 2021
Analysis ended on:  Thu Sep 16 22:01:02 2021
Total elapsed time: 00:00:22
```

Appendix H – Hydraflow Express Calculations

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Sub-basin 24

Gutter

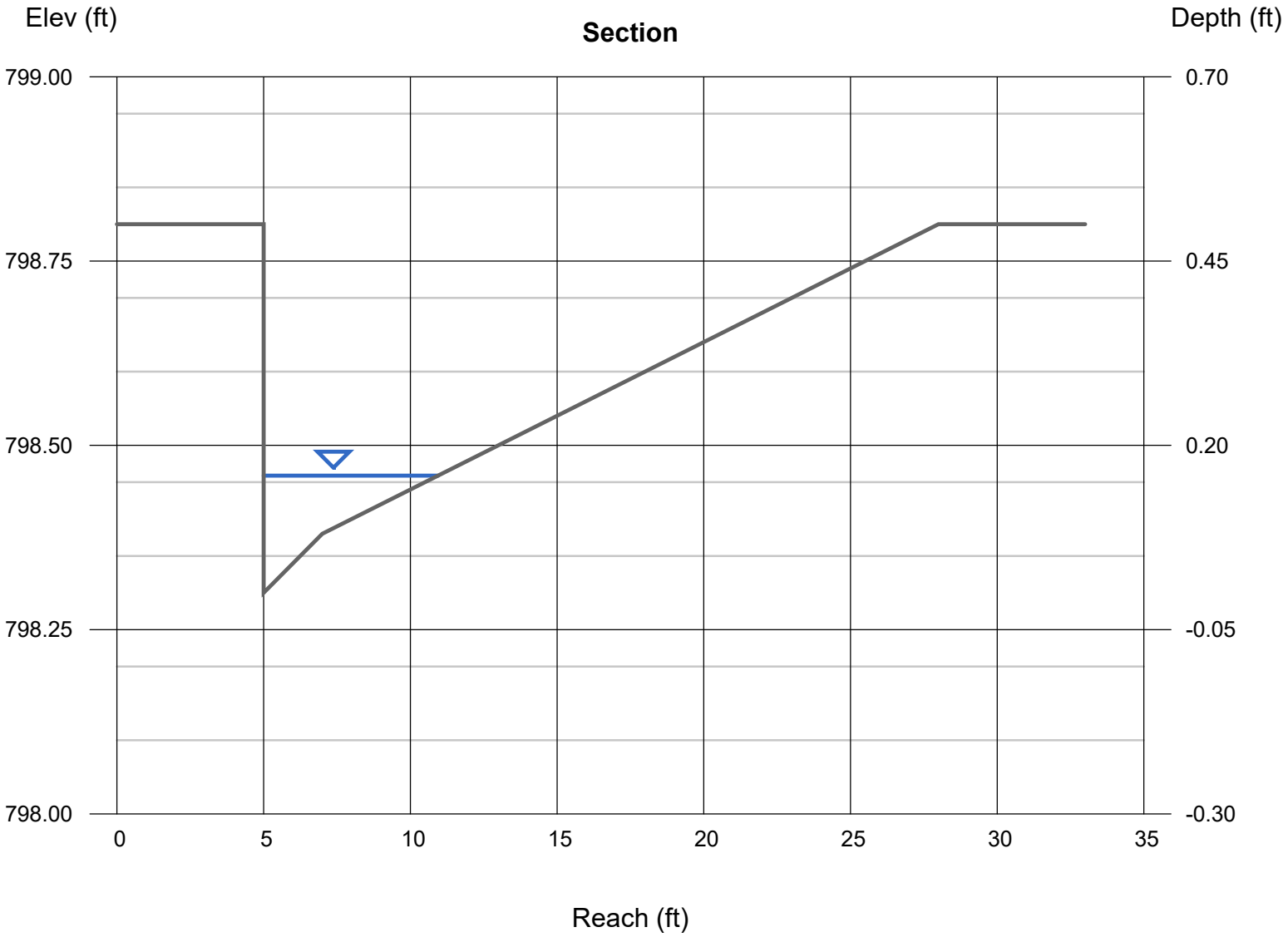
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 798.30
Slope (%)	= 0.49
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.55

Highlighted

Depth (ft)	= 0.16
Q (cfs)	= 0.550
Area (sqft)	= 0.39
Velocity (ft/s)	= 1.40
Wetted Perim (ft)	= 6.11
Crit Depth, Yc (ft)	= 0.16
Spread Width (ft)	= 5.95
EGL (ft)	= 0.19



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Sub-basin 25

Gutter

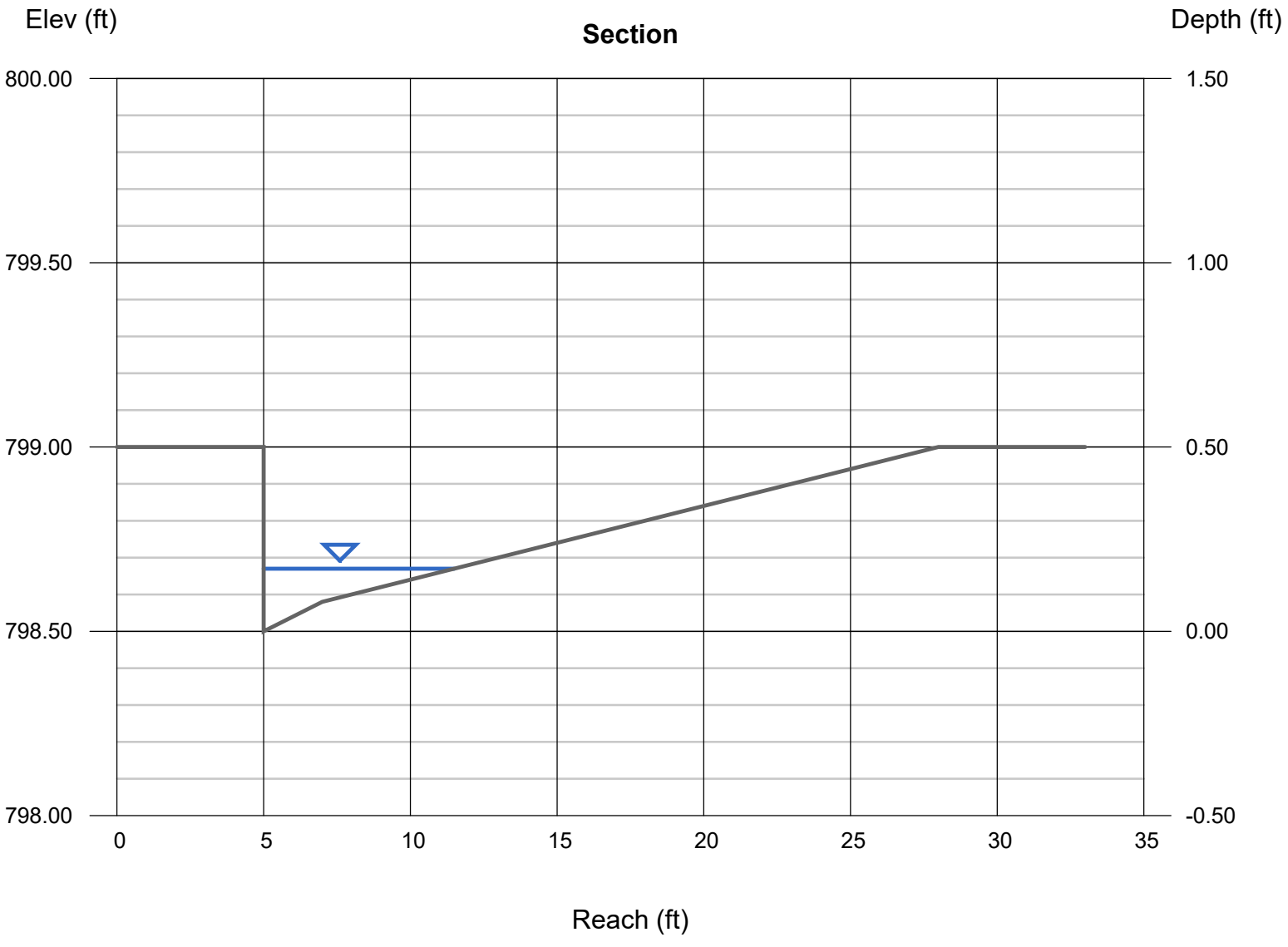
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 798.50
Slope (%)	= 0.45
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.65

Highlighted

Depth (ft)	= 0.17
Q (cfs)	= 0.650
Area (sqft)	= 0.46
Velocity (ft/s)	= 1.41
Wetted Perim (ft)	= 6.67
Crit Depth, Yc (ft)	= 0.17
Spread Width (ft)	= 6.50
EGL (ft)	= 0.20



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Gutter Spread - Subbasin 26

Gutter

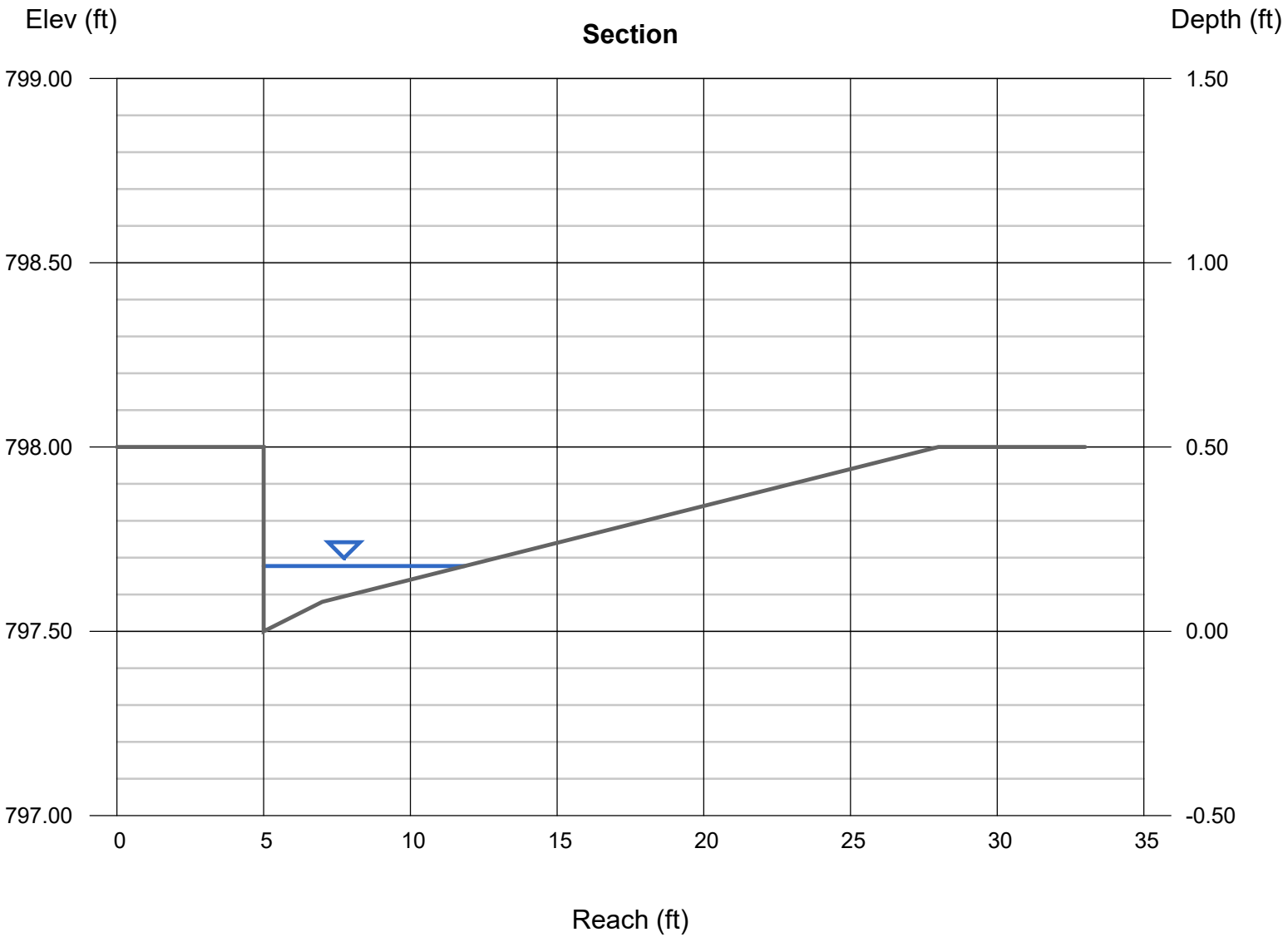
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 797.50
Slope (%)	= 0.34
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.64

Highlighted

Depth (ft)	= 0.18
Q (cfs)	= 0.640
Area (sqft)	= 0.51
Velocity (ft/s)	= 1.26
Wetted Perim (ft)	= 7.03
Crit Depth, Yc (ft)	= 0.17
Spread Width (ft)	= 6.85
EGL (ft)	= 0.20



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Sub-basin 27

Gutter

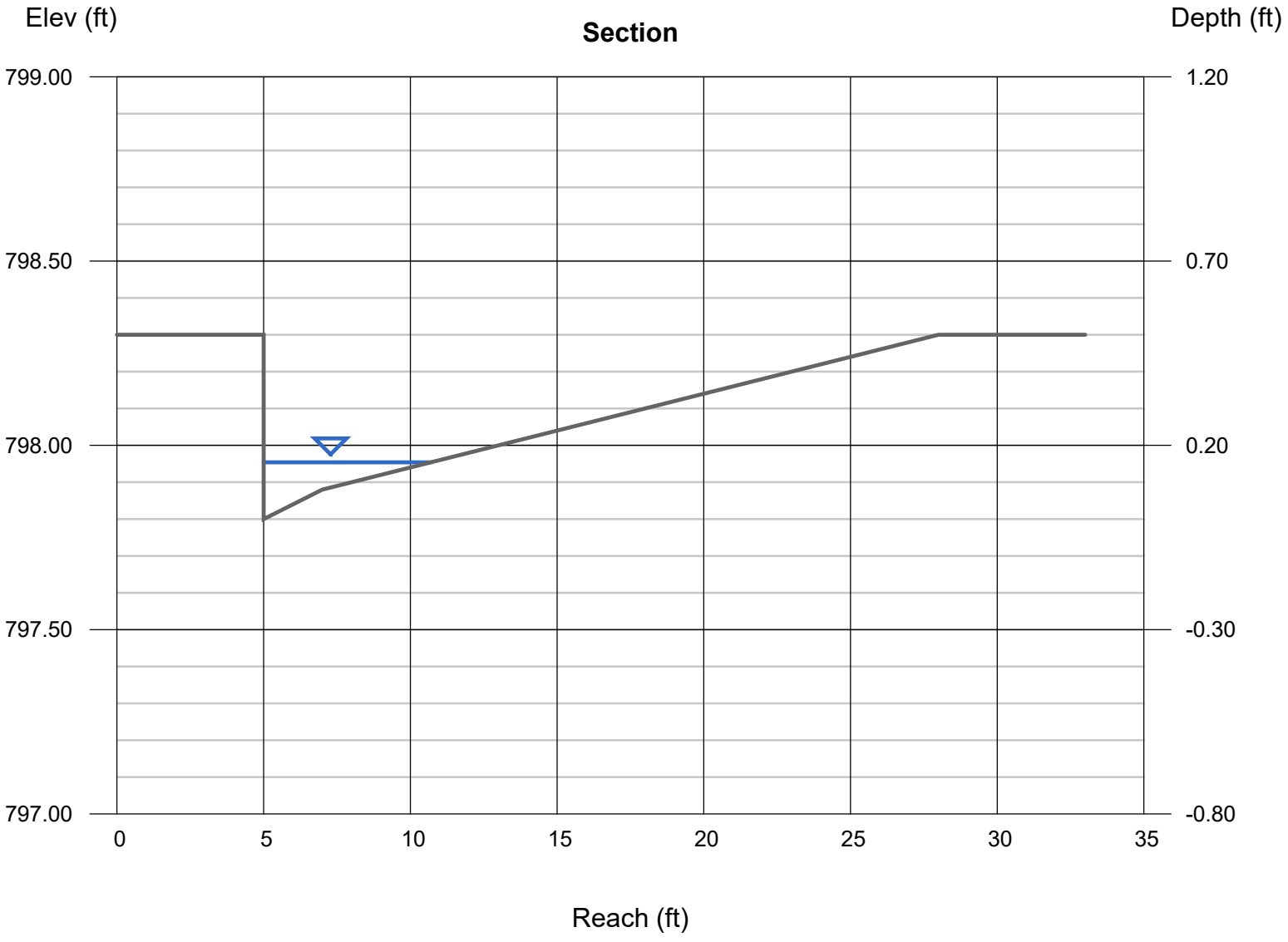
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 797.80
Slope (%)	= 0.69
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.59

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 0.590
Area (sqft)	= 0.36
Velocity (ft/s)	= 1.62
Wetted Perim (ft)	= 5.86
Crit Depth, Yc (ft)	= 0.17
Spread Width (ft)	= 5.70
EGL (ft)	= 0.19



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Sub-basin 28

Gutter

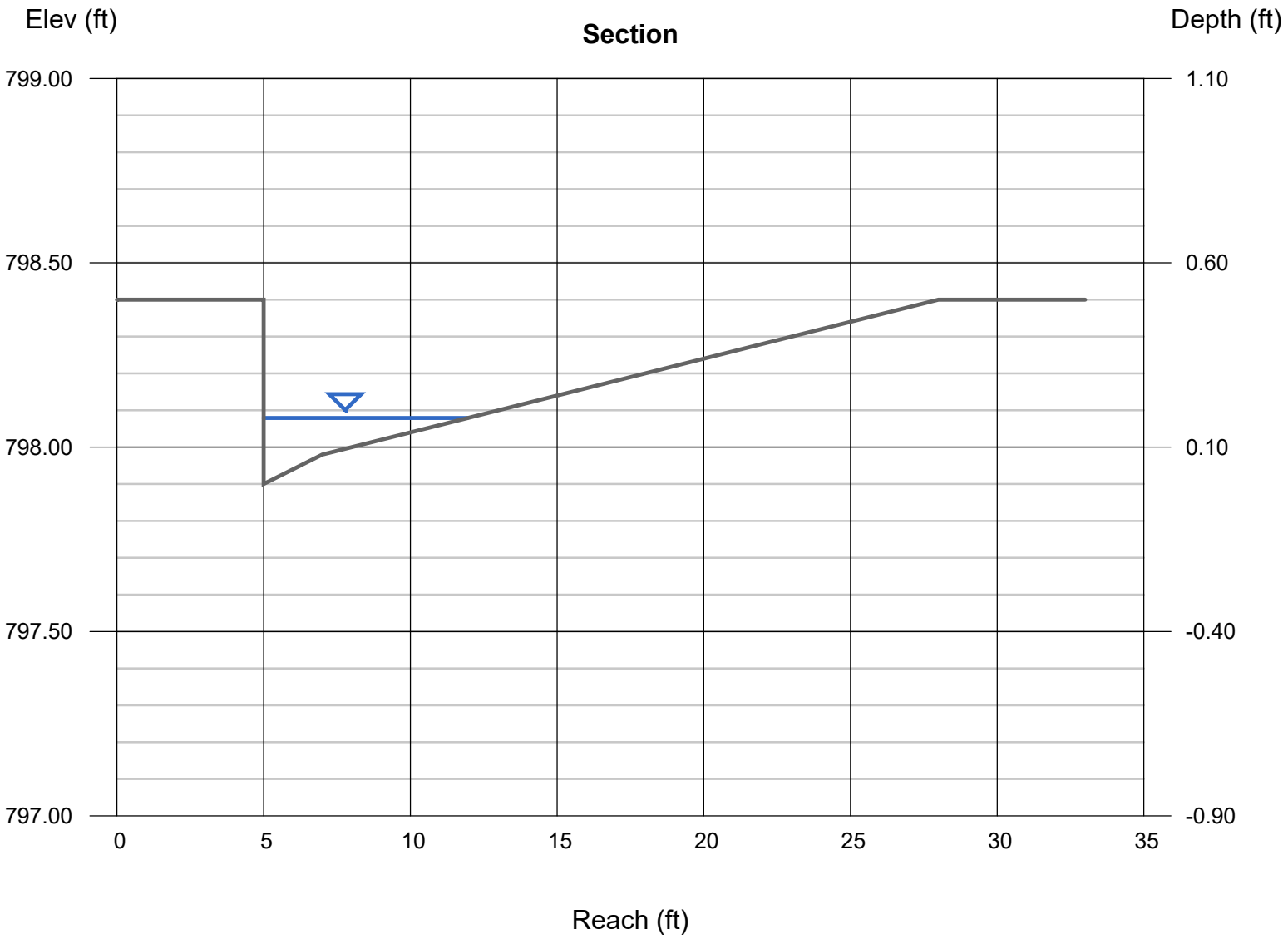
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 797.90
Slope (%)	= 0.47
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.78

Highlighted

Depth (ft)	= 0.18
Q (cfs)	= 0.780
Area (sqft)	= 0.52
Velocity (ft/s)	= 1.49
Wetted Perim (ft)	= 7.13
Crit Depth, Yc (ft)	= 0.18
Spread Width (ft)	= 6.95
EGL (ft)	= 0.21



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Sub-basin 29

Gutter

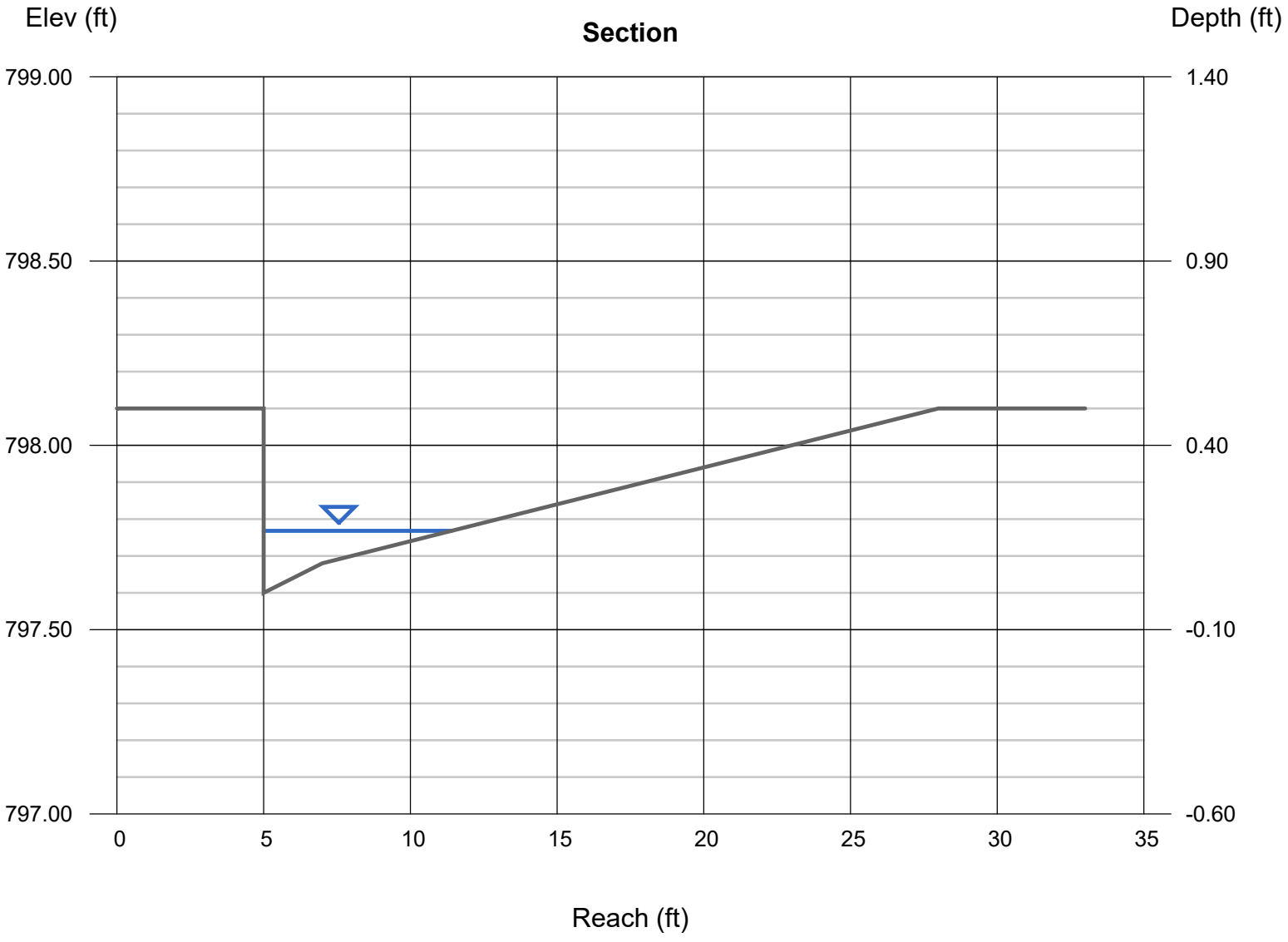
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 797.60
Slope (%)	= 0.43
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.61

Highlighted

Depth (ft)	= 0.17
Q (cfs)	= 0.610
Area (sqft)	= 0.45
Velocity (ft/s)	= 1.36
Wetted Perim (ft)	= 6.57
Crit Depth, Yc (ft)	= 0.17
Spread Width (ft)	= 6.40
EGL (ft)	= 0.20



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Sub-basin 30

Gutter

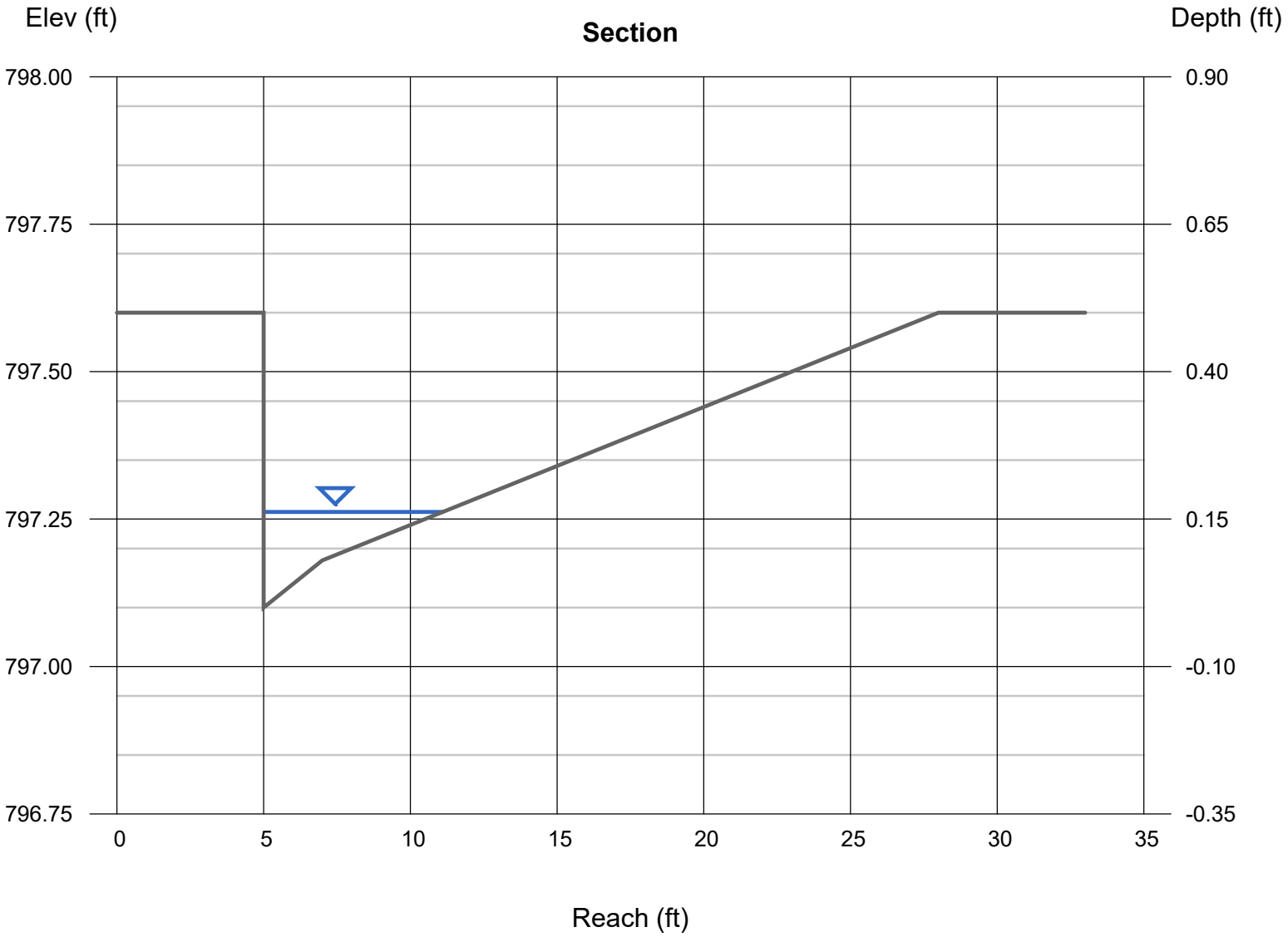
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 797.10
Slope (%)	= 0.75
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.72

Highlighted

Depth (ft)	= 0.16
Q (cfs)	= 0.720
Area (sqft)	= 0.41
Velocity (ft/s)	= 1.75
Wetted Perim (ft)	= 6.26
Crit Depth, Yc (ft)	= 0.18
Spread Width (ft)	= 6.10
EGL (ft)	= 0.21



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Sep 23 2021

Sub-basin 31

Gutter

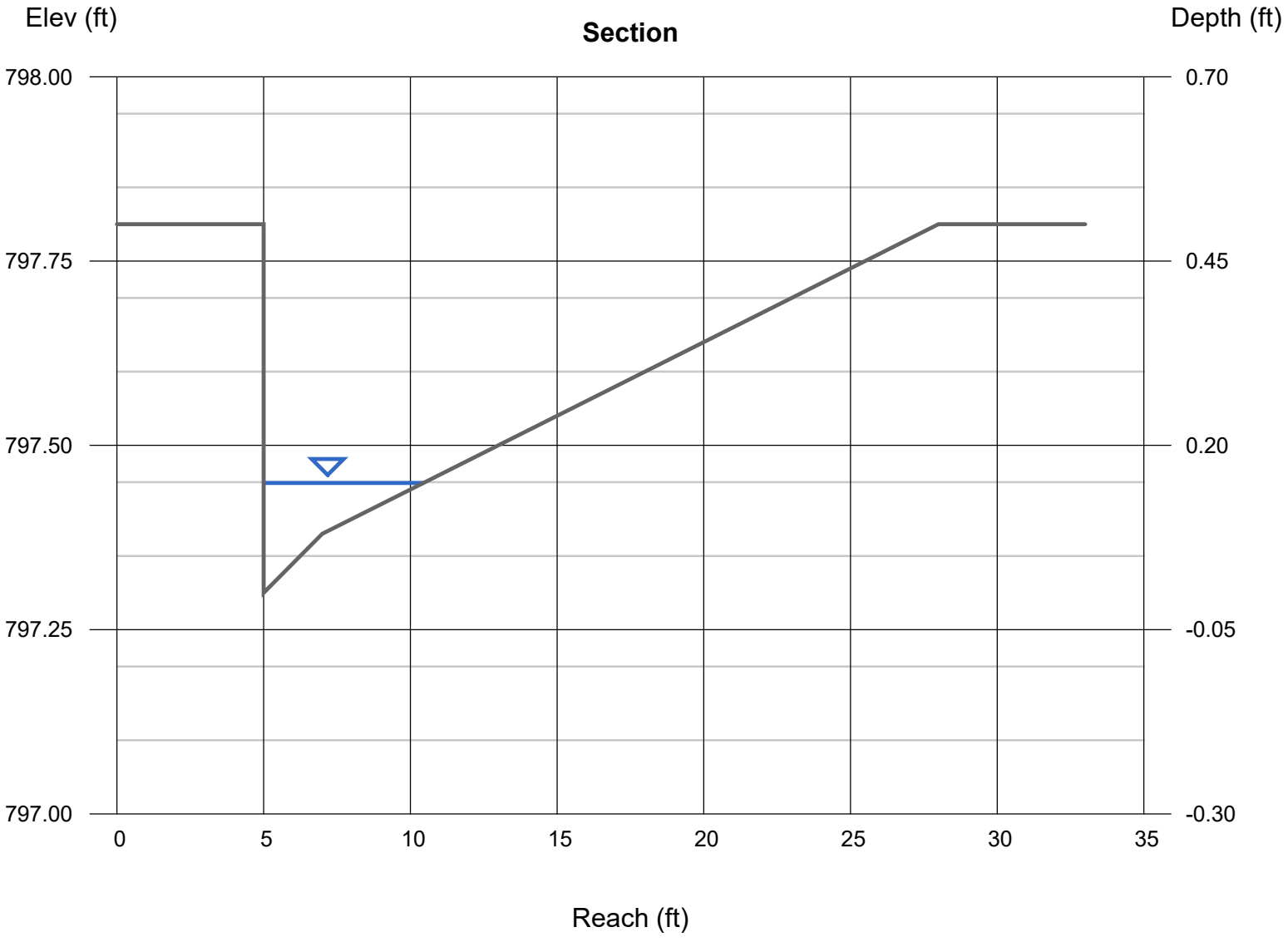
Cross Sl, Sx (ft/ft)	= 0.020
Cross Sl, Sw (ft/ft)	= 0.040
Gutter Width (ft)	= 2.00
Invert Elev (ft)	= 797.30
Slope (%)	= 0.66
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.52

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 0.520
Area (sqft)	= 0.34
Velocity (ft/s)	= 1.54
Wetted Perim (ft)	= 5.60
Crit Depth, Yc (ft)	= 0.16
Spread Width (ft)	= 5.45
EGL (ft)	= 0.19



Appendix I – NRCS Web Soil Survey

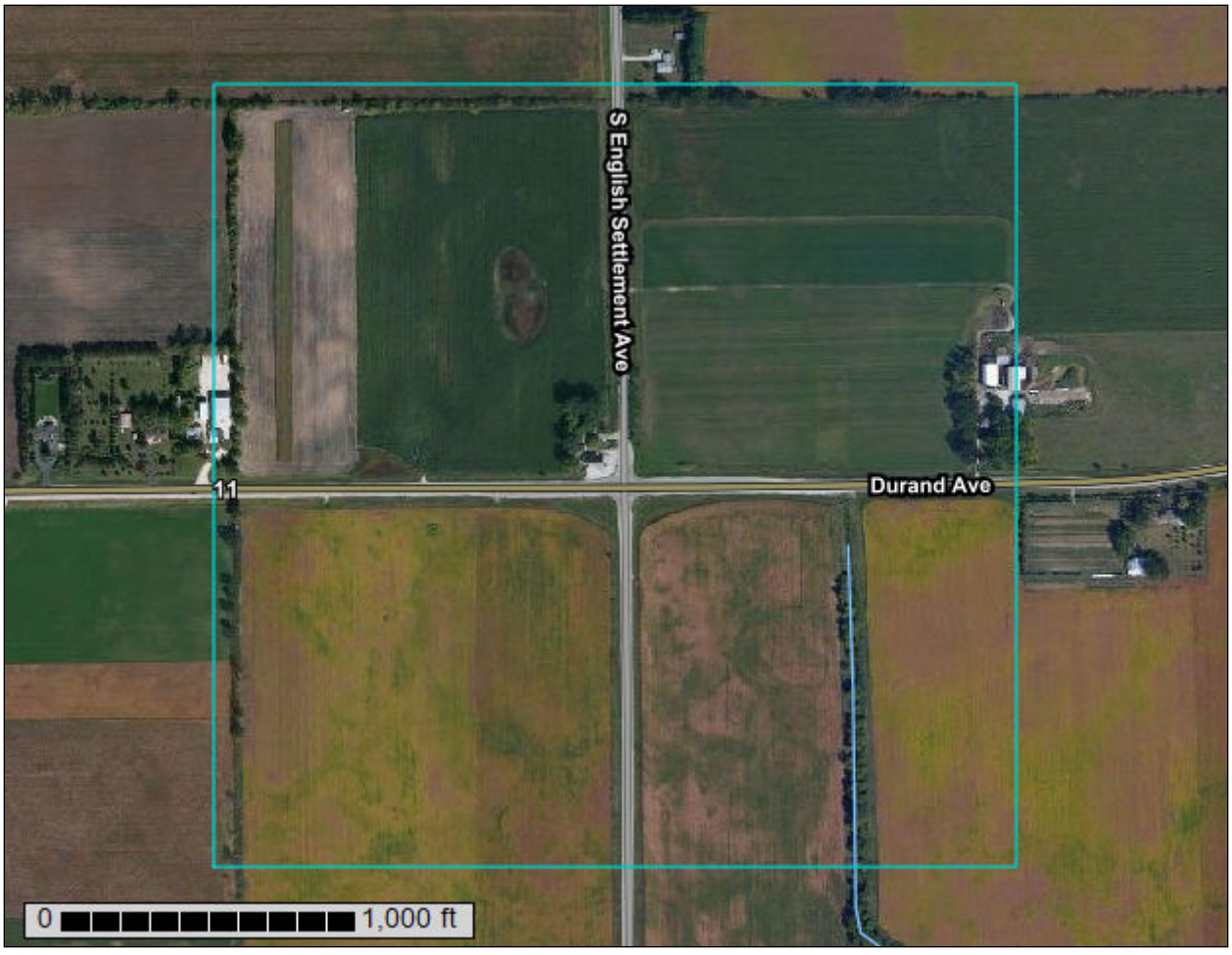
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Kenosha and Racine Counties, Wisconsin



September 2, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

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.

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

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

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

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

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

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

Soil Survey Area: Kenosha and Racine Counties, Wisconsin
Survey Area Data: Version 17, Jun 8, 2020

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

Date(s) aerial images were photographed: Apr 29, 2011—Mar 28, 2012

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AtA	Ashkum silty clay loam, 0 to 2 percent slopes	22.3	13.3%
AzB	Aztalan loam, 2 to 6 percent slopes	23.5	14.0%
BcA	Beecher silt loam, 1 to 3 percent slopes	5.6	3.4%
EtB	Elliott silty clay loam, 2 to 6 percent slopes	8.6	5.1%
FoB	Fox loam, 2 to 6 percent slopes	5.7	3.4%
HeB2	Hebron loam, 2 to 6 percent slopes, eroded	5.8	3.4%
MeB	Markham silt loam, 2 to 6 percent slopes	30.7	18.3%
MgA	Martinton silt loam, 1 to 3 percent slopes	8.3	5.0%
Mzc	Montgomery silty clay	30.5	18.2%
Na	Navan silt loam	24.5	14.6%
Pa	Palms muck, 0 to 2 percent slopes	1.5	0.9%
VaB	Varna silt loam, 2 to 6 percent slopes	0.6	0.4%
Totals for Area of Interest		**167.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called

noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can

be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Kenosha and Racine Counties, Wisconsin

AtA—Ashkum silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2ssrw
Elevation: 520 to 930 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 160 to 190 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Ashkum, drained, and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ashkum, Drained

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey colluvium over till

Typical profile

Ap - 0 to 12 inches: silty clay loam
Bg1 - 12 to 29 inches: silty clay
2Bg2 - 29 to 54 inches: silty clay loam
2Cg - 54 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Minor Components

Peotone, drained
Percent of map unit: 5 percent
Landform: Depressions on ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Orthents, clayey
Percent of map unit: 2 percent
Landform: Lake plains, ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Urban land
Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

AzB—Aztalan loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2wspk
Elevation: 570 to 980 feet
Mean annual precipitation: 31 to 37 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 124 to 193 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Aztalan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aztalan

Setting
Landform: Glacial lakes (relict)
Landform position (three-dimensional): Talf

Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy outwash over stratified silty and clayey lacustrine deposits

Typical profile

Ap - 0 to 10 inches: loam
Bt - 10 to 27 inches: loam
2C - 27 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Forage suitability group: High AWC, high water table (G095BY007WI)
Other vegetative classification: High AWC, high water table (G095BY007WI)
Hydric soil rating: No

Minor Components

Navan

Percent of map unit: 6 percent
Landform: Ground moraines, depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Colwood

Percent of map unit: 4 percent
Landform: Lakebeds (relict)
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: High AWC, high water table (G095BY007WI)
Hydric soil rating: Yes

BcA—Beecher silt loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: g76j
Elevation: 680 to 1,020 feet
Mean annual precipitation: 29 to 35 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Beecher and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beecher

Setting

Landform: Moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess over calcareous, silty or loamy till

Typical profile

Ap - 0 to 9 inches: silt loam
A2 - 9 to 12 inches: silt loam
B1t,2B2t-B3t - 12 to 28 inches: silty clay
2C - 28 to 60 inches: silty clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 30 percent
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R110XY010IL - Moist Glacial Drift Upland Savanna
Forage suitability group: High AWC, high water table (G095BY007WI)

Other vegetative classification: High AWC, high water table (G095BY007WI)
Hydric soil rating: No

Minor Components

Ashkum
Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Hydric soil rating: Yes

EtB—Elliott silty clay loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: g779
Elevation: 680 to 1,020 feet
Mean annual precipitation: 29 to 35 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Elliott and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elliott

Setting
Landform: Till plains
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess over calcareous silty till

Typical profile
Ap - 0 to 10 inches: silty clay loam
B1,2B2t,2B3t - 10 to 30 inches: silty clay
2C1,2C2 - 30 to 60 inches: silty clay loam

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Rare
Calcium carbonate, maximum content: 40 percent

Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie
Forage suitability group: Mod AWC, high water table (G095BY004WI)
Other vegetative classification: Mod AWC, high water table (G095BY004WI)
Hydric soil rating: No

Minor Components

Ashkum

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

FoB—Fox loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2szgj
Elevation: 740 to 1,140 feet
Mean annual precipitation: 31 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 124 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Fox and similar soils: 93 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fox

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 7 inches: loam
Bt1 - 7 to 22 inches: clay loam
2Bt2 - 22 to 36 inches: gravelly loam
2C - 36 to 79 inches: stratified sand to gravel

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: 20 to 26 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: Mod AWC, adequately drained (G095BY005WI)
Other vegetative classification: Mod AWC, adequately drained (G095BY005WI)
Hydric soil rating: No

Minor Components

Casco

Percent of map unit: 4 percent
Landform: Outwash plains
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Fox

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

HeB2—Hebron loam, 2 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: g77w
Elevation: 700 to 1,000 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 130 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Hebron and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hebron

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy outwash over stratified, calcareous silty and clayey lacustrine deposits

Typical profile

Ap,A2 - 0 to 11 inches: loam
B1,B21t,B22t - 11 to 24 inches: clay loam
2B23t - 24 to 28 inches: silty clay loam
2C - 28 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F110XY011IL - Dry Glacial Drift Upland Forest
Forage suitability group: Mod AWC, adequately drained (G095BY005WI)
Other vegetative classification: Mod AWC, adequately drained (G095BY005WI)
Hydric soil rating: No

MeB—Markham silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2ytpv
Elevation: 620 to 900 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Markham and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Markham

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over silty clay loam till

Typical profile

Ap - 0 to 11 inches: silt loam
2Bt1 - 11 to 21 inches: silty clay loam
2Bt2 - 21 to 31 inches: silty clay loam
2Cd - 31 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 55 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R110XY010IL - Moist Glacial Drift Upland Savanna
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 6 percent
Landform: End moraines, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Pewamo

Percent of map unit: 4 percent

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

MgA—Martinton silt loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: g78d
Elevation: 700 to 1,000 feet
Mean annual precipitation: 29 to 40 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 150 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Martinton and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Martinton

Setting

Landform: Drainageways on lake plains, flats on lake plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous silty and clayey lacustrine deposits

Typical profile

Ap,A3 - 0 to 12 inches: silt loam
B1t, B21t-B3 - 12 to 34 inches: silty clay loam
C - 34 to 60 inches: stratified sandy loam to silty clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 30 percent
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie
Forage suitability group: High AWC, high water table (G095BY007WI)
Other vegetative classification: High AWC, high water table (G095BY007WI)
Hydric soil rating: No

Minor Components

Montgomery

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Mzc—Montgomery silty clay

Map Unit Setting

National map unit symbol: g78t
Elevation: 340 to 800 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Montgomery and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Montgomery

Setting

Landform: Depressions on lake plains, drainageways on lake plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous silty and clayey lacustrine deposits

Typical profile

Ap,A1,A3g - 0 to 16 inches: silty clay
B21-22g,B3g - 16 to 36 inches: silty clay loam
Cg - 36 to 60 inches: stratified silty clay loam to clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: NoneRareFrequentOccasional
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 35 percent
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F110XY026IL - Lacustrine Swamp Forest
Forage suitability group: Frequently flooded, organics (G095BY010WI)
Other vegetative classification: Frequently flooded, organics (G095BY010WI)
Hydric soil rating: Yes

Na—Navan silt loam

Map Unit Setting
National map unit symbol: g797
Elevation: 600 to 1,200 feet
Mean annual precipitation: 32 to 35 inches
Mean annual air temperature: 37 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Navan and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Navan

Setting
Landform: Drainageways on lake plains, depressions on lake plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy outwash over stratified, calcareous silty and clayey lacustrine deposits

Typical profile
Ap - 0 to 10 inches: silt loam
A1,B1g-31tg - 10 to 35 inches: clay loam
2B32g,2Cg - 35 to 60 inches: silty clay

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: NoneRareFrequentOccasional
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F110XY026IL - Lacustrine Swamp Forest
Forage suitability group: Frequently flooded, organics (G095BY010WI)
Other vegetative classification: Frequently flooded, organics (G095BY010WI)
Hydric soil rating: Yes

Pa—Palms muck, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2szdc
Elevation: 780 to 1,240 feet
Mean annual precipitation: 31 to 35 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 124 to 178 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Palms, muck, and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Palms, Muck

Setting
Landform: Interdrumlins
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over loamy drift

Typical profile
Oap - 0 to 13 inches: muck
Oa - 13 to 30 inches: muck
2Cg - 30 to 79 inches: silty clay loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 1.98 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 15.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Houghton, muck
Percent of map unit: 8 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Adrian
Percent of map unit: 5 percent
Landform: Interdrumlins
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

VaB—Varna silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2yrr0
Elevation: 660 to 820 feet
Mean annual precipitation: 33 to 37 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Varna and similar soils: 96 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varna

Setting

Landform: End moraines, ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over silty clay loam or clay loam till

Typical profile

Ap - 0 to 12 inches: silt loam
2Bt1 - 12 to 30 inches: silty clay loam
2Bt2 - 30 to 48 inches: silty clay loam
2Cd - 48 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 55 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 4 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

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Appendix J – Wisconsin DNR Surface Water Data Viewer Map

Surface Water Data Viewer Map

Legend

- Wetland Class Areas
- Wetland Class Points
  - Dammed pond
  - Excavated pond
  - Filled/drained wetland
  - Wetland too small to delineate
  - Filled excavated pond
- Filled Points
- Wetland Class Areas
- Filled Areas
- Wetland Identifications and Confirmations
- Index to EN_Image_Basemap_Leaf_Off

0.1 0 0.03 0.1 Miles

1:1,980

NAD_1983_HARN_Wisconsin_TM

Notes

Appendix K – FEMA Floodplain Map

National Flood Hazard Layer FIRMette

FEMA

88°11'38"W 42°41'15"N

88°11'W 42°40'49"N

Feet 1:6,000

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

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 / 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
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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 9/21/2021 at 9:44 AM 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.

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