DRAINAGE MASTERPLAN

Certified Technology Park – Core Area

Bloomington, Indiana

Prepared for:

City of Bloomington
Department of Economic & Sustainable Development

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Executive Summary and Masterplanning Overview

General:

This Drainage Masterplan is intended to establish the drainage infrastructure that must be built to support the future development and street reconstruction within the City's Certified Technology Park (CTP). The City has directed that this Drainage Masterplan for the CTP focuses on what is referred to as its "Core Area". The Core Area is approximately 16-acres that are roughly bordered by Morton Street on the east, 11th Street to the north, Rogers Street on the west, and 10th Street to the south. The Core Area actually extends west of Rogers Street to include the parcels sitting just west of Rogers Street. To the south, the area actually extends along the south side of 10th Street into what is now a parking lot.

That is the City's designation of the Core Area, but stormwater movement is based on topography and watershed limits, not on street layouts, so the masterplanning for the Core Area's drainage has to be extended to the natural edges of the areas that drain to, and through, the CTP. In this case the ground is sloping to the south, and areas north of 11th Street flow into the CTP. The resulting area of study for drainage in the Core Area of the CTP is actually about 23 acres.

In addition to recognizing water that comes into the CTP area from the outside, the Drainage Masterplan recognizes that water leaves the area at multiple locations. Water does move southward from the area and eventually joins Clear Creek. But in this upper portion of the Clear Creek watershed, water departs the CTP Core Area from existing storm culverts in four locations: in Morton Street, in the parking area west of the Showers Building, and along each side of Rogers Street near the B-Line Trail. For the purpose of this report, the drainage outfall west of the Showers Building is called "Madison Street" because it is along the alignment of where Madison Street would be if it is extended to the area. These outflows eventually merge at lower points in the overall system, but for the purpose of planning for the Core Area, all are recognized as important outfalls.

Under existing conditions, drainage in the Core Area flows to these four locations, with areas west of and along Rogers Street flowing south to the B-Line trail corridor; areas south of 10th Street flowing to the "Madison Street" sewer; and areas between Morton and Rogers, including much of the area between 10 and 11th Streets, and even the areas north of 11th, flowing to the storm sewer in Morton Street. The Morton Street sewer is the largest of these by far.

Stormwater Management Requirements

The City, through its municipal utility, manages stormwater as a utility service. The City of Bloomington Utilities (CBU) provides the regulation and oversight for changes to the stormwater system in conjunction with developing properties and is thus the jurisdictional authority that sets requirements for stormwater planning in the CTP. CBU sets requirements for stormwater for both the quantity of water and for the quality of that water.

CBU sets the requirements for allowable stormwater outflow rates based on statistical rainfall events, and it is typical to establish goals which actually lower the outflow rate once a development project is completed. The limit that CBU applies to new developments is that the post-development flow rate for a 10-year rainfall event must not exceed the existing flow rate for a 2-year rainfall event, and that a post development flow rate for the 100-year rainfall event must not exceed the existing flow rate for a 100-year rainfall event. These are conservative requirements, but fairly typical for Indiana municipalities. The restriction of the outflow rate is accomplished by a combination of limiting the impervious surface present, and by providing for the temporary detention of stormwater. Detention limits the outflows to

rates that the downstream system can handle. Many types of features can provide some degree of detention ranging from roadway stormwater planters to storage within pipes, to larger traditional detention basins or tanks. Thus, stormwater detention must be considered on a scale ranging from a single site to the overall CTP.

Establishing stormwater detention on a by-site basis can be challenging and expensive, in addition to reducing the area and thus value of developable property. For this reason, **this masterplan includes a detailed review of stormwater management on a watershed level, whereby the requirements for both stormwater quantity and quality may be managed by a single larger facility to reduce the overall cost and avoid the challenges of managing stormwater on individual sites.**

Taken to its logical extent, the stormwater in virtually the entire CTP core area which lies north of 10th Street can be directed and managed in a single watershed facility. Future decisions for the City will include whether to take this watershed-level approach, or to apply stormwater management for each site. A watershed-level facility offers options that vary from an open detention pond, a closed (buried) storage facility, or a multi-use dry basin that only holds water during significant rain events, but quickly empties out and can be used most of the time for other, perhaps recreational uses.

The small portion of the Core Area south of 10th Street flows to the south, and is expected to continue to do so. CBU has agreed that this area need not be detained in part because of the impracticality of doing so, but also because the overall CTP Drainage Masterplan is incorporating areas north of 11th Street which are outside the CTP limits and are thus included as compensatory area.

The total detention volume required to meet CBU's requirements for the areas north of 10th Street has been determined to be 1.044 acre-feet, 45500cf of storage volume below elevation 787.00 with an overtopping elevation of 789.00 or higher. This significant amount of water becomes the basis for reviewing the City's options in the area.

The Masterplan also discusses the issue of stormwater quality, which can similarly be considered on a by-site or watershed level, with similar issues relating to total cost and impacts to developable space. Stormwater quality features, whether in the form of more natural solutions like a bio-swale or using a manufactured structural unit, require routine maintenance to function properly.

This Masterplan recommends the City take a watershed approach to development in the CTP Core Area to maximize the value and use of the land. This is compatible with the inclusion of sustainable stormwater practices. CBU also expressed a strong preference for this approach to limit the number of stormwater management facilities in the area.

Recommendations for each portion of the CTP Core Area, and especially each street corridor are presented. The focus on streets is important because the streets will hold the primary storm sewer network (pipes), and connect to the sites in the CTP. The City maintains perpetual access to the streets and the storm sewers within its Right of Way or through permanent easements.

The area north of 10th Street and west of the alley (west of Morton), receives special emphasis because it is the logical site for addressing broader watershed needs. This location is also the expected site of the future Central Green, and so the combination of stormwater management needs and the City's goals for an environmentally-friendly pedestrian area and sustainable greenspace must be closely coordinated to share this focal area within the CTP.

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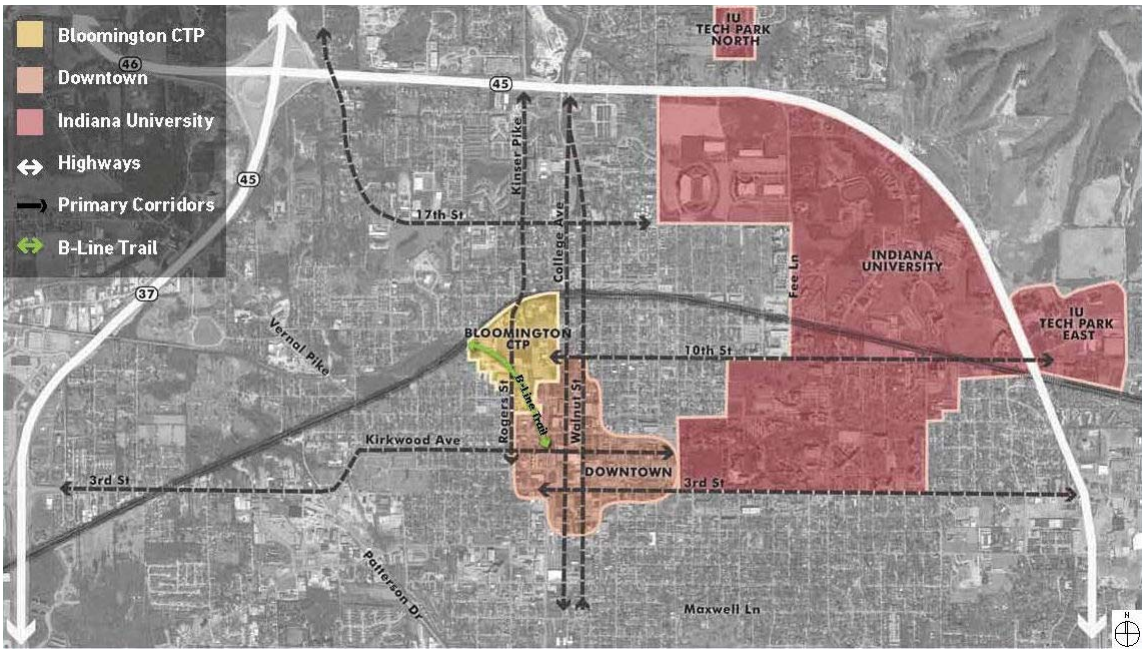
I. Masterplanning Background

A. Purpose of Masterplan and Location of the Certified Technology Park

This Drainage Masterplan is intended to establish the drainage infrastructure that must be built to support the future development and street reconstruction within what is known as the Core Area of the City's Certified Technology Park (CTP).

The CTP is located immediately northwest of the City's downtown area. It is within easy walking distance of downtown and the City and County government offices at the Showers Center on North Morton Street. Its location within the City is shown on the following exhibit:



CTP Location within the City

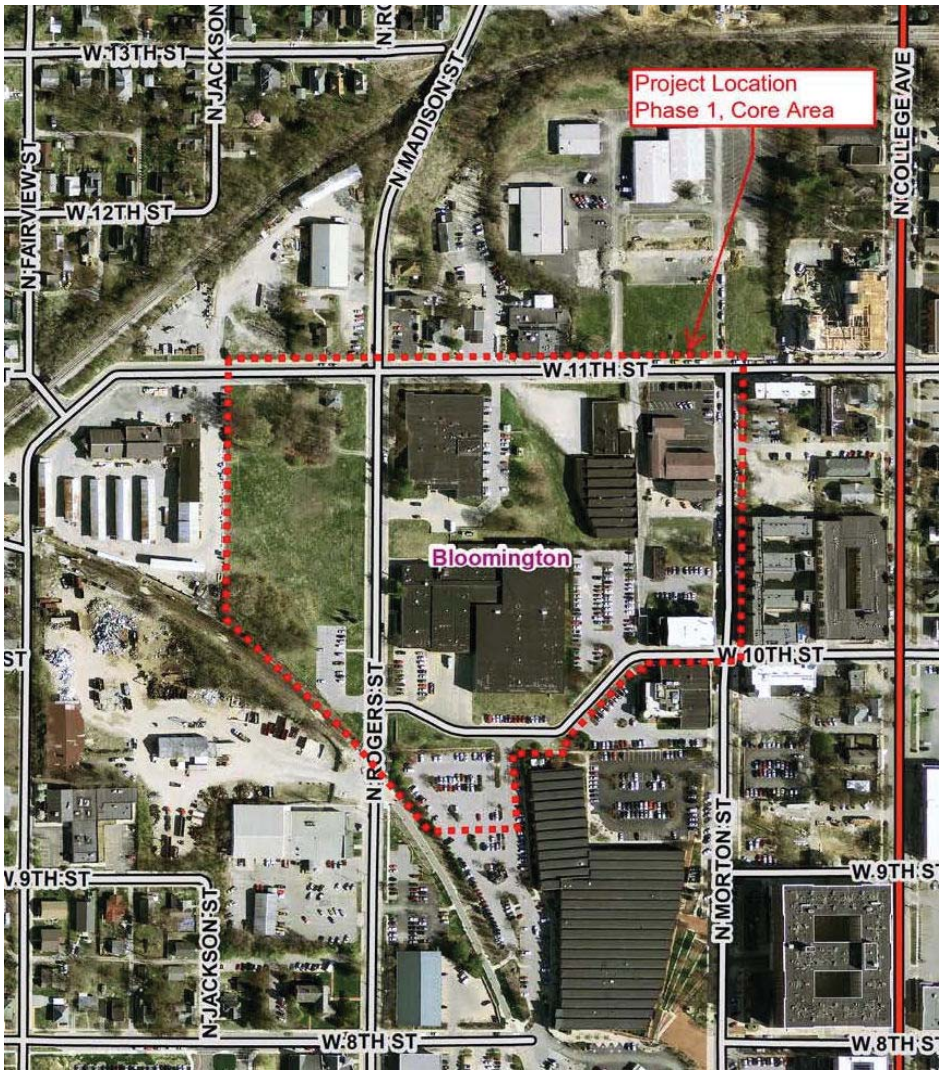
The area within the overall CTP is approximately 65 acres, but the City currently owns only about 12 acres that are located primarily in the east-central portion of the overall CTP. For planning purposes, and to help focus initial development efforts, the City has designated a Core Area within the CTP which includes the areas that the City currently owns.

The Core Area is the area in which the first infrastructure improvements and development are expected to occur. At the City's direction, this Drainage Masterplan addresses the drainage needs within the Core Area only.

The Core Area is approximately 16-acres that are roughly bordered by Morton Street on the east, 11th Street to the north, Rogers Street on the west, and 10th Street to the south. The Core Area actually extends west of Rogers Street to include the parcels sitting just west of Rogers Street and north of the existing B-Line Trail. To the south, the area actually extends into areas along the south side of 10th Street that are currently surface parking.

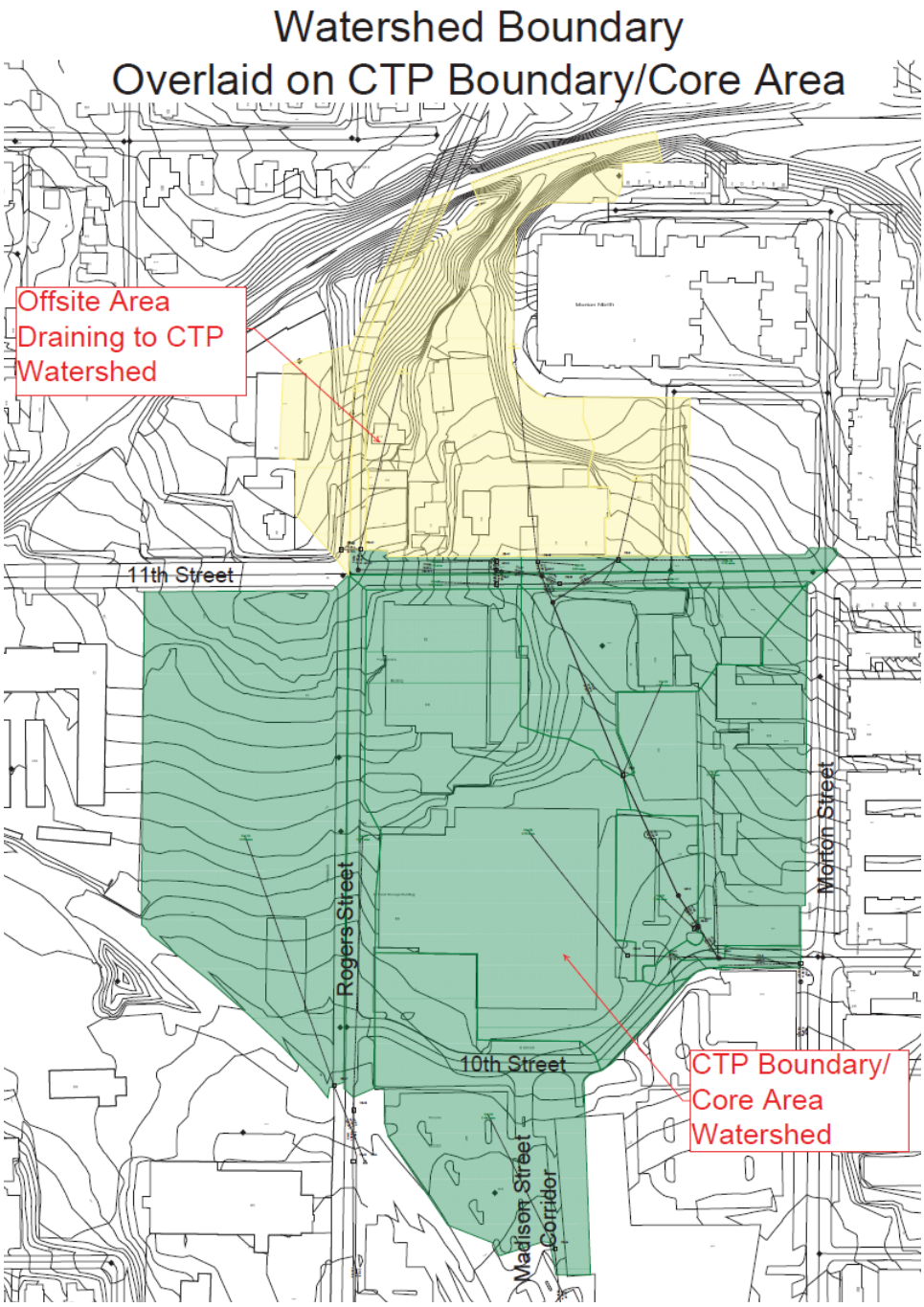
The Core Area of the CTP is shown on the following exhibit:

Core Area of the CTP



B. CTP Watershed

The City has designed the Core Area, but stormwater movement is based on topography and watershed limits, not on street layouts, so the masterplanning for the Core Area's drainage has to be extended to the natural edges of the areas that drain to, and through, the CTP. In this case the ground is sloping to the south, and areas north of 11th Street flow into the CTP. The resulting area of study for drainage in the Core Area of the CTP is actually about 23 acres.



C. Existing Storm Infrastructure and Sub-Watersheds

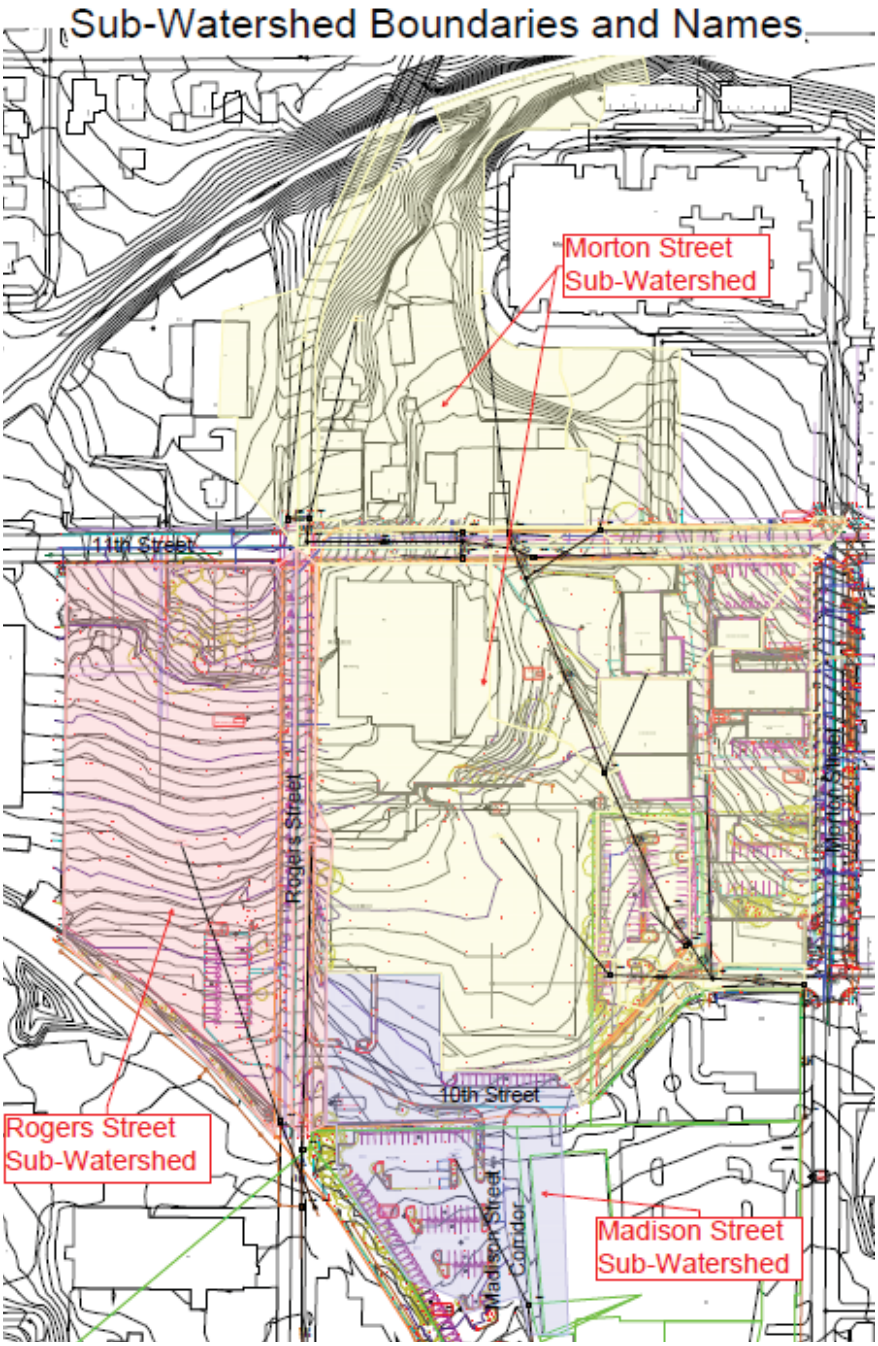
In addition to recognizing water that comes into the CTP area from the outside, the Drainage Masterplan recognizes that water leaves the area at multiple locations. Water does move southward from the entire area and eventually merges on its way to Clear Creek. But in this upper portion of the Clear Creek watershed, water departs the CTP Core Area from existing storm culverts in four locations:

- Morton Street,
- in the parking area west of the Showers Building,
- along the east and west sides of Rogers Street near the B-Line Trail.

For the purpose of this report, the drainage outfall south of 10th Street west of the Showers Building is called "Madison Street" because it is along the alignment of where Madison Street would be if it is extended to the area. These outflows eventually merge at lower points in the overall system, but for the purpose of planning for the Core Area, all are recognized as important outfalls.

Under existing conditions, drainage in the Core Area flows to these four locations, with areas west of and along Rogers Street flowing south to the B-Line trail corridor to one of the two outfalls along Rogers. Areas south of 10th Street flow to the "Madison Street" sewer. Areas between Morton and Rogers, including much of the area between 10 and 11th Streets, and even the areas north of 11th, flow to the storm sewer in Morton Street.

These areas were examined separately since they have offer options for releasing water from the Core Area and these sub-watershed names are used in this report.



D. Procedure for Masterplan Development

1. Approach Strategy

The approach to this Masterplan started with a thorough review of the existing condition. Available mapping was obtained from City GIS and other sources. The City, under a separate professional services contract, prepared a detailed topographic survey of the Core Area which includes the existing storm infrastructure.

The drainage planner met with CBU twice in the preparation of the Draft of this plan, and then a 3rd time in soliciting comments for the draft. The first meeting was held to establish study goals, to solicit CBU's fundamental stormwater requirements relating to rainfall and runoff computation procedures, detention requirements, and stormwater quality requirements.

Using the existing system mapping from the survey and also CBU's requirements, a model of the stormwater conditions was assembled in StormCAD. This model was then calibrated and refined to represent the flow conditions in the area, and checked with CBU to establish their satisfaction with the existing condition model.

The second meeting with CBU involved a discussion of the preliminary results, identification of key locations or pipe segments which may be at or over capacity, and a preliminary discussion of how the proposed (future buildout) of the CTP should be modeled. This included setting underlying assumptions of rainfall event frequency/intensity, impervious area percentages for the watersheds, and clarification of CBU requirements for the future condition. Various strategies were discussed including the application of a watershed approach, which CBU strongly prefers.

From this meeting, the drainage planner developed the model of stormwater under the proposed condition and determined the requirements for future piping, detention, and stormwater quality features. Presenting these analyses and the resulting recommendations is the purpose of this Drainage Masterplan.

2. Maximization of Developable Land Area

While it is the City's decision on how best to address the requirements for stormwater management in the CTP Core Area, it was identified very early that one of the City's key concerns is that the land it currently owns in the Core Area is intended to be sold to developers. It is desirable that the maximum land area be made available for development, which includes the effective implementation of stormwater management measures. Measures which take the least total space should be considered, and this by its very nature leads the study to include a detailed review of various ways to address stormwater management needs.

3 Stormwater Management on a Watershed Level versus by Parcel

CBU sets the requirements for allowable stormwater outflow rates based on statistical rainfall events, and it is typical to establish goals which actually lower the outflow rate once a development project is completed. The requirements that CBU applies to new developments is that the post-development flow rate for a 10-year rainfall event must not exceed the existing flow rate for a 2-year rainfall event, along with a post development flow rate for the 100-year rainfall event must not exceed the existing flow rate for a 100-year rainfall event. This is a conservative requirement, but fairly typical for Indiana municipalities. The restriction of the outflow rate is accomplished by a combination of limiting the impervious surface present, and by providing for the temporary detention of stormwater. This detention limits the outflows to rates that the downstream system can handle. Many types of features can provide some degree of detention ranging from roadway stormwater planters to storage within pipes, to larger traditional detention basins or tanks. Thus, stormwater detention must be considered on a range of possible approaches from a single site to the overall CTP.

Establishing stormwater detention on a by-site basis can be challenging and expensive, in addition to reducing the area and thus value of developable property. For this reason, **this masterplan includes a detailed review of stormwater management on a watershed level, whereby the requirements for both stormwater quantity and quality may be managed by a single larger facility to reduce the overall cost and avoid the challenges of managing stormwater on individual sites.**

Taken to its logical extent, the stormwater in virtually the entire CTP core area which lies north of 10th Street can be directed and managed in a single watershed facility. Future decisions for the City will include whether to take this watershed-level approach, or to apply stormwater management for each site. Additionally, a watershed-level facility offers options that vary from an open detention pond, a closed (buried) storage facility, or a multi-use dry basin that only stores water during significant rain events, but quickly empties out and can be used most of the time for other, perhaps recreational uses.

4. Importance of 10th Street

Based on the natural topography of the area, 10th Street sits at the lowest elevation across the width of the Core Area, and is the natural collection corridor for drainage coming from the north. Stormwater collection comes to this corridor, and stormwater management facilities need to be located near it to take advantage of this natural topography.

In this case, the lowest elevations along 10th Street are between Morton Street and the (possible) extension of Madison Street. This is the same location as the City's proposed Central Green, a small urban greenspace where a stormwater facility may serve a complementary purpose and need for the area.

The small area south of 10th Street currently flows south and is expected to continue to do so. Bringing this water north is not practical, and CBU has acknowledged that this area should continue to drain south to the Madison Street sewer. *CBU has agreed to allow this area to be excluded from requirements for stormwater management because the Masterplan is incorporating areas north of 11th Street in compensation. Essentially, these drain to the same destination eventually, so an improvement in another part of the same watershed allows for this small area to be excluded.*

E. Modeling Used

The modeling of the existing and proposed conditions was performed by using the "Modified Rational Method" developed and implemented in CivilStorm software by Bentley Systems. The Rational Method is traditionally a peak flow method used for storm sewer sizing. It predicts peak flows during different time durations of rainfall. This process develops a hydrograph to model the predicted runoff, measured in terms of a flow rate. The designer can adjust the time durations to determine the maximum flows through the system.

Modeling software chosen for this study was approved by CBU in advance because it is anticipated that the model will be given to CBU at the completion of work to become part of its system inventory data. CBU does not currently have a standard modeling software

so this one was selected as being compatible to the most common modeling platforms in use today.

F. Primary Stakeholders

1. City of Bloomington – Department of Economic & Sustainable development

The Department of Economic & Sustainable Development, as the City's leader in the development of the CTP, is the Department which initiated the development of this Masterplan. It is intended to fit within the broader framework of its masterplanning of the development of the CTP.

2. City of Bloomington Utilities

CBU is the jurisdictional authority for stormwater in the CTP area. CBU, on behalf of the City, is recognized as the owner for present and future stormwater infrastructure except for that portion which is on a specific site and only serving that site's needs. In the event that a site does include its own detention or quality measures, such facilities must still be reviewed, inspected and approved by CBU if they are to be connected to the City's system. Watershed infrastructure, such as a storm sewers, street inlets and detention basin serving multiple upslope areas will be owned, managed and maintained by CBU on behalf of the City.

3. Future Developers

Even if the City adopts a watershed level approach to managing storm3water in the CTP, future developers will still need to implement appropriate infrastructure to support the Drainage Masterplan. Each site must still manage its stormwater to the point where it is connected to the City's stormwater system. Depending on a site's location and its connectability to the larger system, infrastructure needs may vary widely. Each will need detailed review against this Masterplan to ensure that each respective site's runoff is being managed in accordance with CBU's requirements.

4. Design Engineers

This Masterplan sets the requirements that future designers are to use in providing stormwater infrastructure in the CTP's Core Area. Requirements are set for each primary system area, whether this be a street corridor, the future Central Green, or the larger facilities that are to provide for large portions of the CTP.

Additionally, this Masterplan addresses the City's intent to develop the CTP in phases, starting with 10th Street and the alley west of Morton Street, and the requirements are set to be able to occur in a compatible sequence. Fortunately the City's broader goals for the development of the CTP involve building 10th Street first. Because it is at the lowest point in the CTP watershed, the facilities in 10th Street are vital to the future development of the upslope areas.

II. Local and Regulatory Requirements

A. General Requirements

The City of Bloomington Utilities has provided specific criteria for this project. CBU's primary goal is to ensure the CTP area's storm infrastructure does not create an adverse impact on downstream portions of its infrastructure, some parts of which may or may not have the available capacity to accept added flow demands. The criteria were set forth to make it easier to implement and enforce for future developments.

This Masterplan addresses permanent infrastructure in the CTP, but does not account for the management of stormwater during construction efforts which frequently fall under the requirements of IDEM's Rule 5 Erosion Control permit. These requirements will need to be addressed by future developers and/or design engineers.

B. City of Bloomington Utilities Requirements

1. Hydrologic Criteria

Drainage Areas: Actual drainage areas to existing structures are to be used for the existing condition. Proposed storm sewer mainlines with structures can be placed to capture assumed proposed drainage areas.

Time of Concentration: All drainage areas will be required to have a time of concentration of 5 minutes to any structure.

Curve Number: The existing curve number for the area can be implemented on a "whole site" basis, therefore the curve number calculated for the existing condition was 0.69. The proposed curve number shall implement the commercial use runoff coefficient of 0.85 (for Manning's N) over the whole site. Built in green space can be used to offset parcels with higher impervious areas elsewhere on the site.

Rainfall Data: NOAA Atlas 14 rainfall data for the 2, 10, and 100 year storm events shall be used for the design.

2. Hydraulic Criteria

Maximum Runoff: Post-development flow rate for a 10-year rainfall event must not exceed the existing flow rate for a 2-year rainfall event, along with a post development flow rate for the 100-year rainfall event must not exceed the existing flow rate for a 100-year rainfall event.

Detention: Water storage/detention in the system will need to be designed in order to reduce the proposed runoff and comply with the Maximum Runoff criteria.

Outlets: There are 4 outlets (Rogers East side of Road, Rogers West side of road, Morton, and Madison) from the site. The drainage outlets along Rogers and Morton have adequate capacity, and any flow south of 10th Street shall be directed to these outlets if possible. The drainage area to the south of 10th Street can continue to be directed to the "Madison Street" outlet if they cannot be easily directed away from this outlet.

III Sub-Watershed Analyses

A. Morton Street Storm System

1 Existing Condition Summary

The existing drainage system outletting to Morton Street is collected by a network of drainage structures that converge at the intersection of Morton Street at 10th Street. The watershed draining to this outlet encompasses the majority of the drainage from the CTP Core. The existing piping includes an existing box culvert sized 32”x32” at 11th Street to 4’x4’ at 10th Street that runs through the heart of the CTP, through what is proposed to be the Central Green. It collects offsite drainage to the north of 11th Street including more than five acres north of 11th Street.

The box structure’s condition is not known at this time, and it may or may not need to be replaced, along with other storm sewer and structures in the watershed. According to CBU, the storm sewer works well in this area to drain the runoff during large storm events. There is no concern about this structure’s capacity. Note: A spot inspection of the 32”x32” box culvert at 11th Street by CBU showed that the concrete box was in relatively good condition, but the camera was not able to travel through the structure due to blockage.

This same box culvert extends along 10th from the alley to Morton Street. The survey shows a 4’x4’ box culvert near 10th and Morton. These findings are reflected in the existing storm analysis.

Storm sewers within Morton Street were recently installed as part of projects on Morton. These pipes are not anticipated to be disturbed, and parcels bordering Morton are expected to continue draining to Morton Street where feasible by elevations.

2. Proposed Infrastructure Needs

The proposed drainage system for the watershed will need to be updated for future development needs. The box culvert could be continued to be used if it were found to be in good condition, but it travels through the middle of the proposed Central Green. It is highly likely that this box culvert will be in conflict with other desired uses in the area including landscaping, new buildings, etc., so it will most likely need to be replaced as part of redevelopment of this area.

The concrete box culvert is in unknown condition, and will require a full internal inspection to verify its condition to determine if keeping a section of it to the north of the detention location to 11th Street is reasonable. If it is in good condition, it offers capable capacity. It is recommended that the culvert be removed in the area of detention, as it will no longer be necessary. Downstream of the detention area to the connection at 10th Street and Morton, it is recommended that the culvert be replaced as it likely will not be compatible with the future 10th Street design. The new pipe will also ensure that it should not need as much maintenance as an old culvert within the 10th Street limits. Hydraulic calculations show that a 36” pipe laid at similar slopes can provide enough capacity.

An additional concern for this box culvert is that is shares a route with existing sanitary sewer that needs to be upgraded. It would be preferred to lay the sanitary at a lower depth

than the storm to allow for connections from either side, including under the storm pipe. The existing concrete box is near the top of bedrock and raising the storm would be the most likely way to accommodate the sanitary sewer.

Storm sewers that connect to this concrete box culvert, or its replacement, need to be designed and installed according to the future needs of the development. These site plans do not yet exist for evaluation, so our focus is on the trunk line that currently serves the area.

It is recommended that a storm sewer be installed along the future 10th Street alignment from Rogers Street to Morton Street in order to collect all the drainage to the north of this corridor.

Detention is required for the area, and the volume needed is much greater than the 10th Street corridor itself can support. Connecting a trunk line across 10th Street, in conjunction with a larger stormwater feature adjacent to 10th Street, would provide the opportunity to manage stormwater detention and quality on a broader and more economical scale. This is discussed further with detention needs.

B. Rogers Street Storm System

1. Existing Condition Summary

The Rogers Street storm system has two outlets that eventually reconnect at the same downstream storm sewer. The storm sewer that drains this area is not large, presumably because the area outside the roadway has not yet been developed. Essentially, the area drains from north to south, and then is collected by two inlets and a culvert at the south end of this watershed.

The parcels west of Rogers Street drain from north to south and are collected in a drainage swale on the north side of the B-Line Trail. The drainage swale flows to a culvert along the B-Line Trail. Similarly, the west side of Rogers Street and the sidewalk drain from north to south and are collected in a single inlet structure just north of B-Line Trail. The structure flows to storm sewer along the B-Line Trail.

The east side of Rogers Street and the sidewalk drain from north to south and are collected by a single inlet that drains south along Rogers Street in a 15 inch storm line. The 15 inch storm sewer then connects to a 36 in storm sewer downstream.

According to CBU, the storm sewer works well in this area to drain the runoff during large storm events, and the 36 inch storm sewer has the capacity to carry more drainage if needed. But even though the 36 inch storm sewer has the capacity, <u>there is a portion of the storm sewer network further downstream that has some capacity concerns</u>. Per CBU, it is probable that there is a portion of this storm sewer downstream that does not have adequate slope resulting in a “pinch point” of flow. This downstream area would require more detailed analysis and likely a size upgrade if additional flows are added from the CTP.

2. Proposed Infrastructure Needs

Like all areas north of 10th Street, the drainage from this area needs to be detained to reduce the runoff rate in the proposed condition, and to treat for stormwater quality. Due to the detention and water quality needed, it is proposed that the runoff for the area to the north of 10th Street be directed eastward to the proposed storm sewer and stormwater management facilities along 10th Street. This would maximize the area available for development.

The redirection of the drainage will allow for the development of the property just north of the B-Line Trail and just west of the end of a redesigned 10th Street. It will also help redirect any flow away from Rogers Street which may or may not help the "pinch point" drainage problem downstream that was noted above.

If the City prefers to locate the stormwater management for this area in this area, it will be necessary to provide for stormwater quality improvement and also approximately 9000 cubic feet of temporary detention. The natural topography would place this feature alongside the B-Line trail, which may or may not be in sync with the City's preferred use for this prime location alongside the trail. It is for this reason that the recommendation is made to send this water eastward for management in a bigger feature.

C. Madison Street Storm System

1. Existing Condition Summary

For the purpose of this report, the drainage outfall south of 10th Street west of the Showers Building is called "Madison Street" because it is along the alignment where Madison Street would be if it extended to the area. The existing drainage structures in this area capture the runoff from the parking lot and a portion of existing 10th Street. The outflow eventually merges with the Morton Street and Rogers Street storm sewer networks to the south of the project.

The existing structures were designed to carry the existing flow of the parking lot and a portion of 10th Street. According to CBU, the storm design in this area functions as designed, but it is recommended that if possible, drainage flowing to this area be redirected to Morton Street or Rogers Street storm sewer.

By agreement with CBU, the drainage area to the south of the 10th Street corridor will drain as direct runoff and will not require stormwater detention. The direct runoff will be from a much smaller area than the existing drainage area resulting in less flow to the existing structures. Offsite area to the north of 11th Street will act as compensatory area that will be detained and treated.

2. Proposed Infrastructure Needs

The drainage area to the south of 10th Street is planned to continue to drain to these structures as direct runoff. No provision for stormwater management is required.

This is helpful, but does not relieve CBU's concern that flow not be increased by a future projects due to their downstream pipe size concerns. The 15 inch and 18 inch storm sewer

to the south of the CTP area do not have the capacity to drain a fully developed area with a CN value of 0.85 as required by CBU.

If the area south of 10th Street is developed, it is recommended that additional impervious area be redirected away from the existing storm sewer in this area, or the existing storm sewer needs to be upsized. The existing structures are expected to remain in place until a future redesign of this area requires that they be modified.

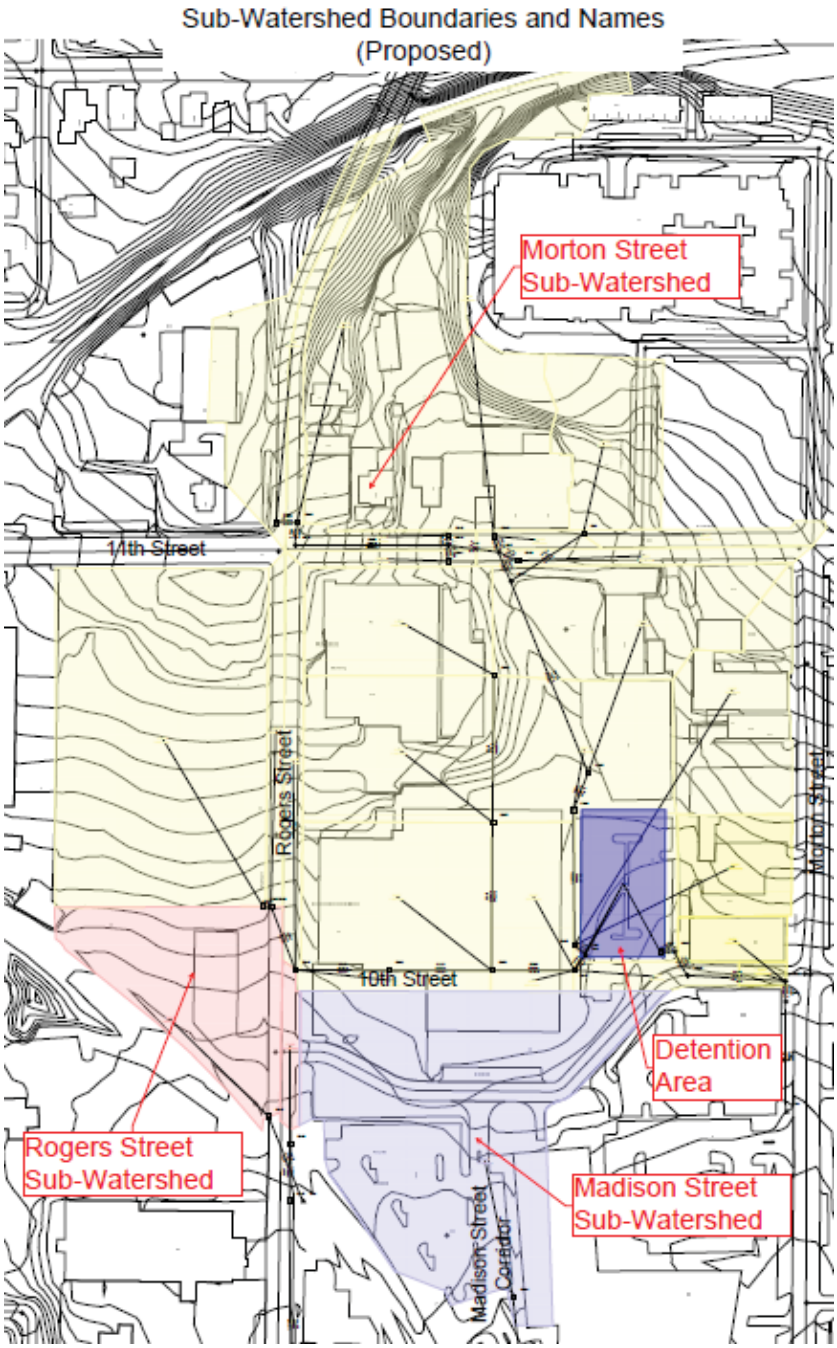
IV Drainage Masterplan

A. Detention Needs

Detention is required in order to reduce the fully developed 10-year storm runoff to the 2-year existing storm runoff. The total storage required to meet CBU's requirements for the areas north of 10th Street has been determined to be 1.044 acre-feet, 45500cf of storage volume below elevation 787.00 with an overtopping elevation of 789.00 or higher. The 2 feet of freeboard will be adequate for the adjacent buildings. (Assumes open detention with 3:1 or flatter side slopes)

The restriction of the outflow rate is accomplished by a combination of limiting the impervious surface present, and by providing for the temporary detention of stormwater. This detention limits the outflows to rates that the downstream system can handle. Many types of features can provide some degree of detention ranging from roadway stormwater planters to storage within pipes, to larger traditional detention basins or tanks.

The small portion of the Core Area south of 10th Street flows to the south, and is expected to continue to do so. CBU has agreed that this area need not be detained in part because of the impracticality of doing so, but also because the overall CTP Drainage Masterplan is incorporating areas north of 11th Street which are outside the CTP limits and are thus included as compensatory area.



1. Watershed Approach versus By Site Approach

Establishing stormwater detention on a by-site basis can be challenging and expensive, in addition to reducing the area and thus value of developable property. For this reason, this masterplan includes a detailed review of stormwater management on a watershed level, whereby the requirements for both stormwater quantity and quality may be managed by a single larger facility to reduce the overall cost and avoid the challenges of managing stormwater on individual sites.

CBU strongly prefers a watershed approach to limit the number of facilities that require routing inspection and maintenance. The stormwater in virtually the entire CTP core area which lies north of 10th Street, along with additional offsite drainage to the north of 11th Street, can be directed and managed in a single watershed facility. Future decisions for the City will include whether to keep this a single detention or a double detention approach. The initial plan is to design any infrastructure to facilitate drainage to a single detention location adjacent to 10th Street.

2. Options for Construction

A watershed-level facility offers options that vary from an open detention pond, a closed (buried) storage facility, or a multi-use dry basin that only stores water during significant rain events, but quickly empties out and can be used most of the time for other, perhaps recreational uses.

A wet pond in this area is possible, but the water conveyed through the area is not sufficient to maintain a wet pond on its own. In other words, the pond would need to be built deep enough to hold what is currently groundwater, or it would need an outside water supply to remain wet. Rock excavation would be necessary to obtain the depth needed, and would be very expensive to build (depth of rock was verified by a geotechnical investigation). Supplying the pond with water goes against the City's expressed goals for a sustainable solution, so this option is not recommended.

The closed (buried) storage facility might be a good option if open green space or a parking lot is wanted in this area. Trees would not be permissible over the facility. This option allows for additional stormwater quality that can be built in, hidden from the public, but with increased public safety compared to open ponds. This option would result in the largest footprint needed at about 0.5 to possibly 0.7 acres, depending on the structure type chosen (about the same size or slightly larger than the existing parking lot in this location). The size of this facility is significant, and would require a choice by the City for how available land is to be used.

A multi-use dry basin that would only store runoff during significant rain events, but quickly empties out could be another good option for the area. This can be done by providing a drainage swale around or through a slightly elevated bottom where most small rainfall runoff will drain along these swales. The slightly elevated area would only become inundated during heavy rainfall and would drain quickly after a rainfall event. This area could allow for landscaping or open area that would not be damaged by the occasional flooding. Such basins have been used in other areas as recreational space as they are available over 90% of the time. This option requires less excavation and less square footage than other options, approximately 19600 sf area minimum, using 789.00 as a top rim elevation extending down at 3:1 slopes.

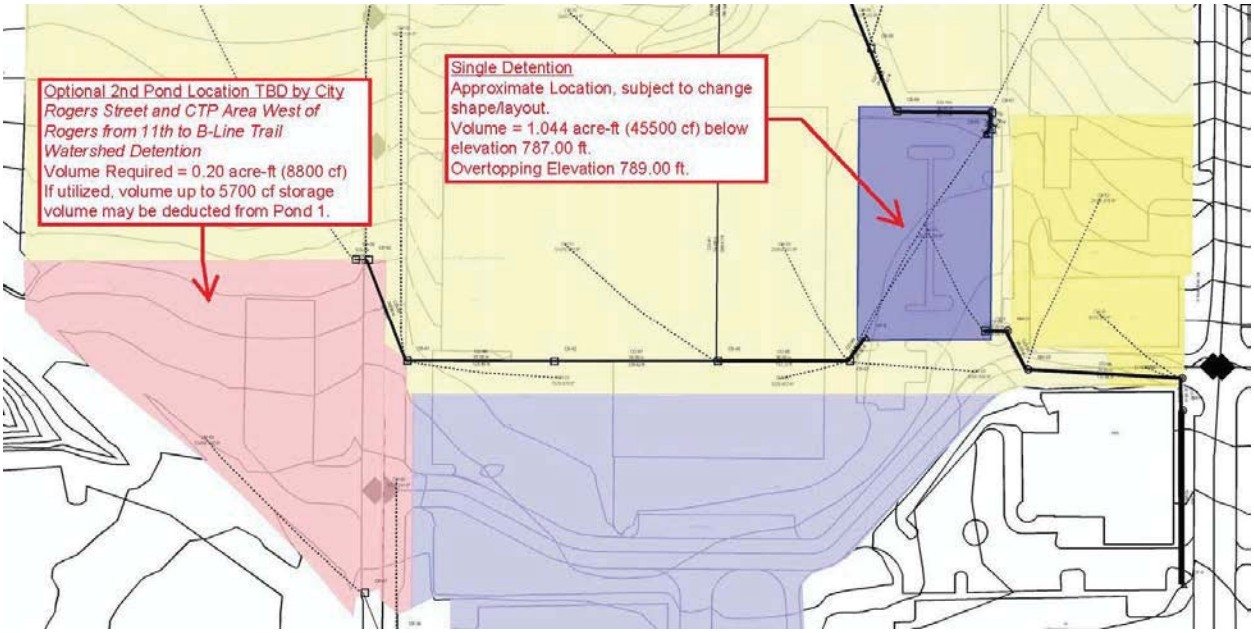
Topographically speaking, the most favorable location of this detention is immediately north of 10th Street where its outfall could connect to the Morton Street storm sewer outlet at 10th/Morton. The area of the above options can be manipulated to take on various shapes and forms, possibly to adapt to a landscaping design, as long as the volume is obtained. This location is within the conceptual footprint of the City's Central Green, at its southeastern corner.

3. Recommendations for Detention

This Masterplan recommends the City take a watershed approach to stormwater management in the CTP Core Area. In the long run, this is the most economical approach and will maximize the value and use of the upslope land. It also supports the City's interests in sustainable infrastructure solutions which can be incorporated as part of the overall solution.

CBU also expressed a strong preference for this approach to limit the number of stormwater management facilities in the area. The best options believed for this site are the closed (buried) storage facility or the multi-use dry basin that can serve as both detention and green space in this urban setting.

Rain gardens can also be used throughout the development to collect runoff from smaller areas and help offset a small portion of the required storage. These are anticipated to be part of the City's plan for reconstructed roadway corridors. Final calculations will be needed as some smaller scale improvements are designed and can offer small deductions from the primary detention needs. The areas and volumes of these will need to be known to determine the amount that they can contribute to the overall plan.



B. Water Quality

1. Requirements for Total Suspended Solids (TSS) Removal per CBU

Per CBU requirements, all new site improvements must include facilities designed to remove a large percentage of total suspended solids (80%) in the runoff generated by the "first flush" storm event. One inch of rainfall over the disturbed area will be required to be treated for all BMP's except for manufactured stormwater quality units, which are required to treat a ½ inch of rainfall over the disturbed area. CBU requires the manufactured units meet the "max treatable flow" values published by the City of Indianapolis.

Calculations for the stormwater quality needs are provided in the Appendix.

2. Watershed versus By Site Approach

Stormwater quality, like detention, can be considered on a by-site or watershed level, with similar issues relating to total cost and impacts to developable space.

3. Options for Construction

The stormwater quality features that require the least amount of space and are the most cost effective, especially for multi-site watershed areas, are manufactured structural units. These structural units, such as "AquaSwirl" and other brands of prefabricated unit, are typically placed just upstream of detention systems to protect them from silting in. This is advantageous because these units are more easily maintained with standard municipal cleaning equipment than it is to re-excavate a detention basin that has silted in.

Rain gardens, infiltration trenches, and bioswales are very good at collecting and treating runoff from smaller areas, such as single parcels and roadway drainage. These items could be implemented on a site by site basis, or used along the roadways to contribute to achieving suspended solids removal goals. Or, they can be used to improve the storm water quality over and above the 80% TSS removal required. Rain gardens are more difficult to maintain than a single structural unit, but can serve as landscaping and as a visible environmentally-friendly measure.

Similar to the detention review, the stormwater goals for the overall CTP cannot be fully achieved with stormwater planters if these are used within the traditional roadway corridors. A more significant feature must be provided to address the much larger areas that are not in roadways.

4. Recommendations for Water Quality

CBU expressed a strong preference for structural units to limit the number of stormwater management facilities in the area, and understands the sustainability goals that are part of the project.

This Masterplan recommends the City take a watershed approach to development in the CTP Core Area with structural BMP's to maximize the value and use of the land, and to incorporate these in conjunction with its interests in maximizing the use of sustainable infrastructure solutions. Some combination that includes a structural unit to address the primary area flow is needed, but a hybrid system that uses both structural and non-structural measures is suggested.

At a minimum, newly constructed streets with full streetscaping should include stormwater planters as part of their overall theme. The addition of these features, beyond providing a landscaping and beautification effect, can help the City achieve a stormwater quality improvement even higher than the required 80% removal.

C. Infrastructure Needs throughout the CTP

1. Storm Trunk Lines

Within the CTP limits, storm sewers in Morton, Rogers, and 11th Streets are of adequate size to address their current and anticipated future needs. Replacement of these pipes may be needed in conjunction with future roadway improvements, but these corridors are not expected to be built in the near future, and certainly not part of Phase 1 improvements.

A new storm sewer along a realigned 10th Street is required to address key issues through the Core Area. First, 10th Street will be a fully new street and will need its own stormwater facilities. It is also anticipated that 10th Street will provide vital conveyance for waters coming from north of 10th, potentially spanning the entire width of the Core Area. 10th Street may convey waters from Rogers Street up to 11th, and along Madison Street (if it is built) to 11th Street. 10th Street will provide the eastward drainage that eventually joins the Morton Street sewer. Coming through the Central Green Corridor, storm drainage from the center part of the Core Area and from areas north of 11th that are in the watershed must be conveyed in that portion of 10th between the alley and Morton.

It is anticipated that the primary stormwater management facility will be located on the north side of 10th near the alley. Pipes to and from the basin or other measure will be required.

The reconstructed Alley will require a storm pipe to catch inlets along that corridor, to pick up adjacent properties, and to convey this water toward 10th. This water will be directed to the stormwater management facility before becoming part of the 10th Street system.

Calculations for pipe flows and proposed elevations/slopes are provided in the Appendix.

2. Inlet Spacing

Inlet spacing is primarily a function of roadway layout. In this case, the inlets must be coordinated with not only the roadway layout but the layout of storm planters and other green infrastructure. Inlets are also typically provided just upstream of pedestrian crosswalks, to intercept off-roadway flow sources, such as downspouts, or to drain trapped areas like parking spaces. The detailed development of an inlet layout must be prepared by the roadway designer during that process.

3. Use of Rain Gardens / Stormwater Planters

Stormwater Planters are expected to be implemented along those streets which receive a full “streetscape treatment”, especially 10th Street but also Madison Street, if it is built. The bordering roadways of the Core Area (Rogers and 11th) may receive stormwater planters as part of a treatment, depending on the City’s later decisions for the character of those roadways, since they are expected to also remain as important collectors for this portion of downtown with heavier traffic. Morton Street was recently built and it appears unlikely that it would be retrofitted for stormwater planters.

4. Pipe Materials

The pipe material shall conform to CBU standards and should be smooth interior pipe such as RCP or HDPE in order to increase the flow capacity. Other selections should be modified due to proximity to water mains (which requires pressure rated pipe), or conditions of shallow installations (where we select higher strength RCP and ductile iron pipes).

D. Coordination with the Utility Masterplan

It is anticipated that all utilities in the CTP Core Area, with the possible exception of some lines present in Rogers Street or 11th Street, will eventually be replaced as part of the CTP's development. This reconstruction of all water, sanitary sewer, natural gas, electric and telecommunication infrastructure will demand a high level of design control to fit these facilities into a limited roadway corridor. The stormwater facilities, notably inlets, manholes and stormwater piping, have a high demand for space and these must also be tightly controlled.

Generally speaking, the greatest level of coordination must occur between the storm and sanitary systems because each should be implemented as gravity systems only. Permanent pumping of either system is not desirable from either an expense or sustainability standpoint. Future designers must coordinate these two systems closely to accomplish the goals of both Masterplans.

V Next Steps

A. Phase 1 Construction Requirements

1. Coordination with Landscaping/Streetscaping

It is recognized that the City has established goals to include sustainability within its stormwater planning of the CTP's streets. Whether called rain gardens, stormwater planters, bioswales or one of the other terms frequently used, these features can provide both a stormwater quality and stormwater quantity benefit for the waters that drain off the pavements. In a practical sense, stormwater planters provide a more significant stormwater quality benefit because they catch the water nearest the street and thus the primary source of potential pollutants. They allow infiltration closest to the point of the original rainfall. These planters are fairly effective at meeting the requirements for the removal of suspended solids and other contamination so long as the flow is not excessive.

Stormwater planters can provide some stormwater quantity (detention) also, but the limited area and volume available within a street corridor generally cannot support a larger area's need for detention. Such is the case with the CTP area. Stormwater planters can partially address needs within the roadway corridor in which they are positioned, but large off-site sources have demands that cannot be successfully managed by bringing the water to roadway planters.

The Masterplan is compatible with this issue by supporting the inclusion of stormwater planters in new roadway and streetscape designs. These measures may be implemented to the extent they can fit within the respective areas and the Masterplan provides the primary piping to serve to outflow of these areas.

The sizing of these planters and the setting of inverts and grades is a function of final roadway (streetscape) design.

2. Partial or Full Completion of CTP Stormwater Detention

We understand that the City intends to make the design and development of the Central Green area an activity that is led by a future developer. This can be handled in this manner, but it is important to recognize that the City has a fundamental interest in the need for this area to provide for necessary stormwater management for the Core Area.

It will be necessary to construct at least a portion of the stormwater management facilities in the Central Green area as part of the Phase 1 construction activities. Essentially, the area must provide for the reconstructed corridors of 10th Street and the alley right away. The stormwater management feature could be expanded in the future as part of a larger design, but it's worth noting this may be a more expensive approach in the long run than implementing the needed measures up front.

3. 10th Street Reconstruction Needs

The 10th Street reconstruction will need a mainline pipe running from Rogers Street to the Morton Street outlet location. Assuming all runoff north of 10th Street, including the area west of Rogers Street, a 30 inch pipe at 0.5% slope minimum will have the capacity to carry the drainage from Rogers Street to Madison Street. The pipe will then need upsized to 36 inches at 0.5% slope from Madison Street to the detention system. From the detention outlet to Morton Street, a 36 inch pipe at existing slopes will be adequate to carry the maximum flow out of the pond to the 4'x4' box culvert under Morton Street.

The layout as stated above assumes much of the drainage to the west of the Madison Street Corridor to Rogers Street will flow into 10th Street storm main at the 36" junction point. Ground naturally drains in this are towards this location.

Structures should be placed at Rogers Street in order to connect inlets capturing street runoff and future storm networks that may be installed during future development.

A structure should also be placed at the future connection to Madison Street where the 10th Street mainline will change in size. It is recommended that this structure provide a stub or short run north to a temporary structure outside of the 10th Street reconstruction limits to simplify this possible future connection. The Madison connection pipe has been sized to be 24 inches to carry the future development along this corridor whether Madison Street is built or not.

Stormwater planters or inlets can be connected to the mainline that will be implemented during future design.

Structure top of casting or gutter flow line elevations upstream of the detention pond, mainly along the 10th Street corridor shall have an absolute minimum elevation of 787.40 feet (just above the 10 and 100 year HGL) with a recommended minimum elevation of 789.00 feet (downstream pond overtopping elevation) if possible.

The existing concrete box culvert in 10th Street should be replaced. Future replacement of this section of pipe under a reconstructed 10th Street would be difficult and expensive.

A 36 inch circular pipe at existing slopes will have the capacity to carry the flow and then reconnect to the box in Morton Street. Where the 36 inch pipe connects to the box, a special structure will be needed to make this connection.

4. Alley Reconstruction Needs

Storm sewer along the alleyway is recommended to be kept to a minimum as this area will have many other utilities in this location. A structure in this location may be placed in order to capture runoff from the areas to the north that drain to this location, along with a structure providing stormwater quality treatment for the storm mainline prior to draining into the detention. The detention system could be moved westward slightly if needed to provide additional space for the many utilities along the alleyway. Coordination with the City of Bloomington is recommended during the final design placement of these structures to make sure anything placed here will not only work with the utilities, but also the future detention with landscaping design.

Having the detention system adjacent to the alleyway gives an easy location to service the detention system and possibly any stormwater quality features in this location.

5. Parking Area South of 10th

Per CBU's request, it is desirable to redirect some portion of this area directly to Morton Street if found to be feasible. Some additional survey is needed to verify this because the area is outside the limits of the survey that was prepared for the Masterplanning. However, elevation data appears to support that a portion of the area can be so directed.

This would alleviate the concern that the pipes downstream of this area are too small to accommodate an increase in impervious area. The rerouting of the drainage is the only concern in this area. Per the earlier discussion, CBU has already waived any requirement to address stormwater management in this area.

B. Future Steps

1. In-Building of CTP Sites

This masterplan is intended to provide for the stormwater trunk (primary lines), and for the stormwater management requirements (quantity and quality). As individual building sites are developed, each will need to connect to the City's system as appropriate, and subject to review and approval by CBU. We have recommended that stormwater management be provided on a watershed level, which is also CBU's preferred approach, but we recognize that the City may prefer to address these on a site-level in some areas. If so, then the respective site plans will needs to address these requirements. This will also be subject to review and approval by CBU.

The overall CTP site detention is designed to allow the overall site with a maximum C value of 0.85 including roadways, sidewalks, rooftops, and all other impervious areas. Any development with a greater C value must be submitted for approval showing offsetting greenspace within the CTP area to lower the C value to 0.85 or lower.

2. Completion of CTP Stormwater Detention

If the stormwater management facility is not fully completed in Phase 1, it will need to be completed in conjunction with upslope improvements because with each development a greater portion of the anticipated facility will be needed.

3. Madison Street Extension

At the time of this Masterplan, it is not known whether Madison Street will ever be built. This decision is subject to future developer planning. Because of this uncertainty, Madison Street is not considered an appropriate pathway for any through conveyance of upslope areas. When it is built, it should only need to provide for its own drainage and be compatible with bordering development. This preserves the City's flexibility by making the broader recommendations independent of the future of Madison Street.

It is worth noting that it will be necessary during Phase 1 to size the 10th Street pipe with the assumption that Madison WILL be built, and a manhole should be provided at the edge of 10th Street construction to simplify this possible future connection.

4. Rogers Street Improvements

The City has expressed a long-term interest in converting Rogers Street to a more pedestrian friendly multi-modal roadway, but it is also recognized that it will continue to serve as an important collector street that conveys trucks and more vehicular traffic around the CTP. It may be reconstructed, or partial reconstructed in the future. If and when this happens, it is anticipated that the existing stormwater piping and inlets would be obsolete for a new roadway section. At the time of that design, new stormwater infrastructure will be needed, but this should not need to include provisions for stormwater management since this will have already been addressed for the area.

5. 11th Street Improvements

The City has expressed a long-term interest in converting 11th Street to a more pedestrian friendly multi-modal roadway, but it is also recognized that it will continue to serve as an important collector street that conveys trucks and more vehicular traffic around the CTP. It may be reconstructed, or partial reconstructed in the future. If and when this happen, it is anticipated that the existing stormwater piping and inlets would be obsolete for a new roadway section. At the time of that design, new stormwater infrastructure will be needed, but this should not need to include provisions for stormwater management since this will have already been addressed for the area.

Appendices

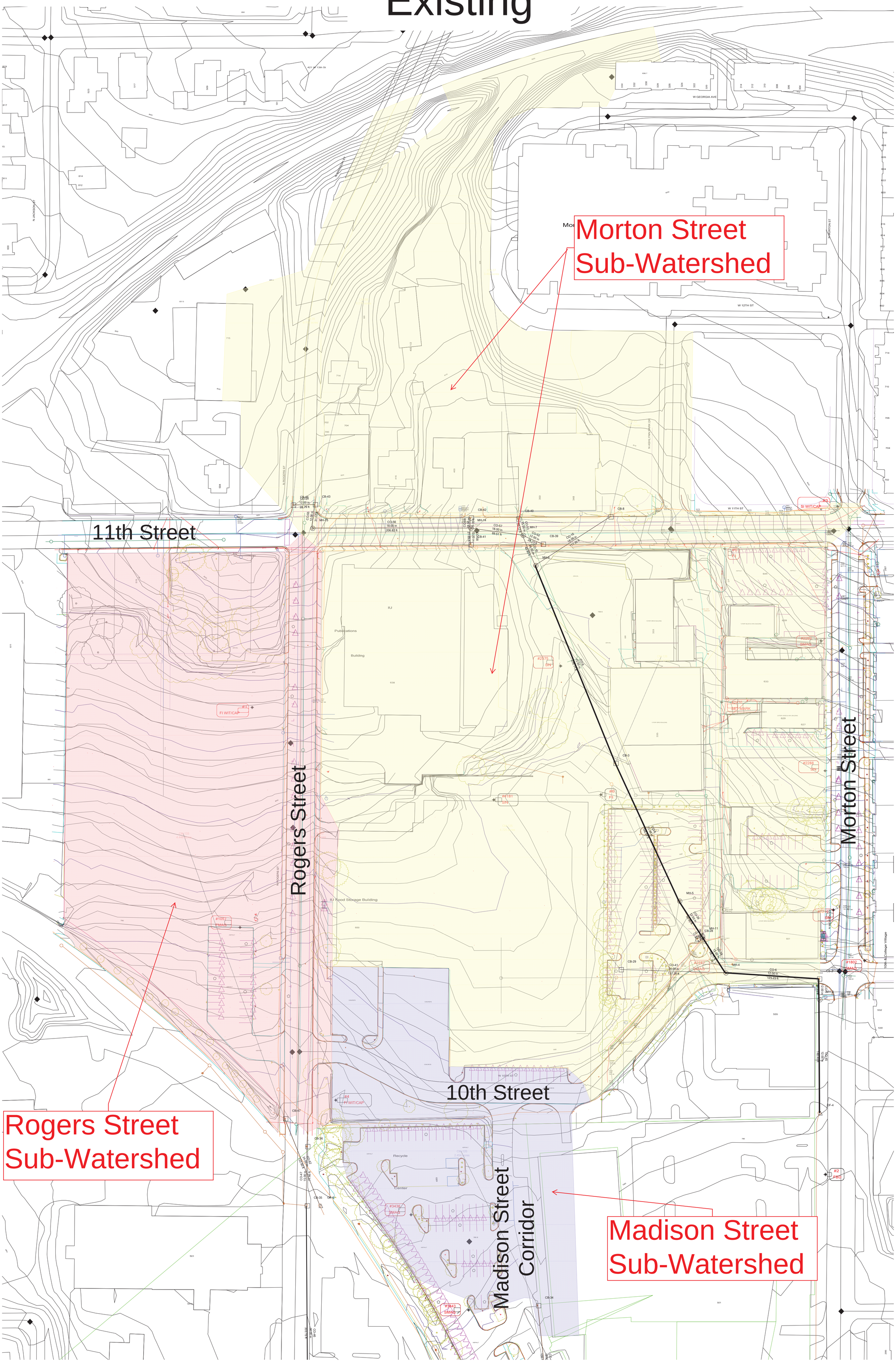
Time of Concentration Calculations
(Existing and Proposed)

Time of Concentration Calculations

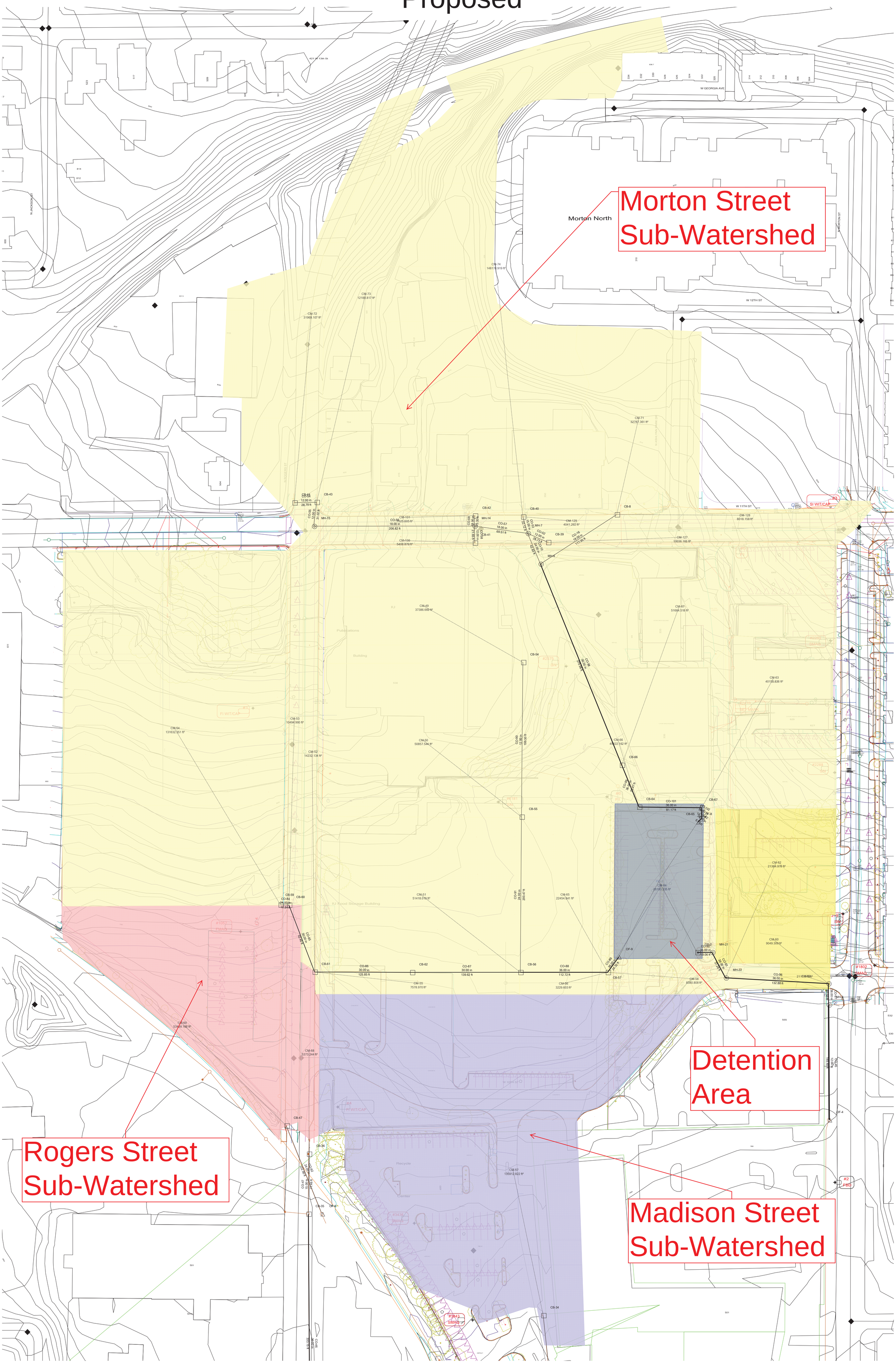
Times of Concentrations were given as 5 minutes to each structure per CBU requirement.

Hydraulic Exhibits with Overall Drainage Area (Existing and Proposed)

Existing


Morton Street
Sub-Watershed
11th Street
Rogers Street
Morton Street
10th Street
Madison Street
Corridor
Rogers Street
Sub-Watershed
Madison Street
Sub-Watershed
W GEORGIA AVE
W 12TH ST
W 11TH ST
N JACKSON ST
N ROGERS ST
N ASHLYNN PARK DR
IU
Publications
Building
IU Food Storage Building
Recycle
Center

Proposed


Morton Street
Sub-Watershed
Detention
Area
Rogers Street
Sub-Watershed
Madison Street
Sub-Watershed
Morton North
W GEORGIA AVE
W 12TH ST
W 11TH ST
N JACKSON ST
N MORTON ST
N ROGERS ST
N ASHLYNN AVE
IU Publications Building
IU Food Storage Building
Recycle Center

C-Value and Greenspace Required Calculations

C-Value and Greenspace Required Calculations

(to compute existing and proposed C-values, along with computing the required Greenspace for the proposed future development)

Existing

	Area or %	C	C x A
Pavement	11.4	0.9	10.26
Grass	6.2	0.3	1.86
			0
Total:	17.6		12.12
		Use C:	0.69

Proposed (per CBU 0.85, percent req'd computed below)

	Area or %	C	C x A
Pavement	91	0.9	81.9
Grass	9	0.3	2.7
			0
Total:	100		84.6
		Use C:	0.85

The above proposed shows that a minimum of 9% of the area will be required to be greenspace in the area.

Greenspace req'd = 1.584 acres

Calculations using CivilStorm Software

Project: 113-Bloomington CTP
Location: Bloomington, Indiana
Prepared by: MJT
Date: 11/14/2014

Summary of Results

Summary of Existing (with additional Offsite Area to the North)						
	Storm Duration for highest flow rates	**Rogers Street (West Side)**	**Rogers Street (East Side)**	**Madison Street**	**Morton Street**	**Total**
	(Max. for Overall Area input)	Max. Q Node (CO-62)	Max. Q Node (CO-47)	Max. Q Node (CO-44)	Max. Q Node (CO-45)	**Core Area** Max. Q
Storm Event	(minutes)	(cfs)	(cfs)	(cfs)	(cfs)	
2 - Year	7	15.48	2.3	8.55	49.04	**75.37**
10 - Year	5	22.42	3.34	12.02	77.41	**115.19**
100 - Year	5	31.1	4.64	13.76	109	**158.5**

Summary of Proposed (with additional Offsite Area to the North)						
	Storm Duration for highest flow rates	**Rogers Street (West Side)**	**Rogers Street (East Side)**	**Madison Street**	**Morton Street**	**Total**
	(To Produce Maximum Outflow from System)	Max. Q Node (CO-62)	Max. Q Node (CO-47)	Max. Q Node (CO-44)	Max. Q Node (CO-45)	**Core Area** Max. Q
Storm Event	(minutes)	(cfs)	(cfs)	(cfs)	(cfs)	
2 - Year	8	5.02	0.5	12.75	34.47	**52.74**
10 - Year	7	7.15	0.72	18.16	39.84	**65.87**
100 - Year	20	6.19	0.62	15.72	71.83	**94.36**

Compare Results (with additional Offsite Area to the North)				
Storm Event	Existing	Proposed	Target	Is Prop. <= Target Goal
2 - Year	**75.37**	52.74		
10 - Year	115.19	**65.87**	**10YR Prop <= 2YR Exist**	**YES**
100 - Year	**158.5**	**94.36**	**100YR Prop <= 100YR Exist**	**YES**

Summary of Proposed (Morton Street Outlet plus Morton North Development)				
Summary of Maximum Outflow to Morton Street by inserting the hydrographs of the peak flows obtained by previous site calculations by others. These calculations were run to check the capacity of the system, but were not used to size the detention of the system.				
	Morton North Maximum Outflow	**Maximum Flow Existing**	**Morton North Maximum Outflow**	**Maximum Flow Proposed**
		Node (CO-45)		Node (CO-45)
Storm Event	(cfs)	(cfs)	(cfs)	(cfs)
2 - Year	0.07	**52.37**	0.07	**34.51**
10 - Year	4.61	**84.06**	4.61	**39.85**
100 - Year	10.86	**116.48**	10.86	**76.97**

Calculations

2 – Year Existing

Catchment Table - 2 Year Existing							
Label	Outflow Element	Area (Unified) (acres)	Runoff Method	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Maximum) (ft^3/s)	Notes
CM-120	152: CB-34	106899.946	Modified Rational	0.69	5	8.54	Existing - Madison St. Outfall
CM-121	73: CB-2	6937.229	Modified Rational	0.69	5	0.55	Existing - Morton St Outfall
CM-122	142: CB-28	25877.415	Modified Rational	0.69	5	2.07	Existing - Morton St Outfall
CM-123	74: MH-4	94800.244	Modified Rational	0.69	5	7.57	Existing - Morton St Outfall
CM-125	144: CB-29	205818.922	Modified Rational	0.69	5	16.44	Existing - Morton St Outfall
CM-126	76: CB-3	67975.164	Modified Rational	0.69	5	5.43	Existing - Morton St Outfall
CM-127	172: CB-39	10036.166	Modified Rational	0.69	5	0.8	Ex/Pr 11th St
CM-128	84: CB-8	8018.158	Modified Rational	0.69	5	0.64	Ex/Pr 11th St
CM-129	173: CB-40	4041.292	Modified Rational	0.69	5	0.32	Ex/Pr 11th St
CM-130	174: CB-41	5408.879	Modified Rational	0.69	5	0.43	Ex/Pr 11th St
CM-131	175: CB-42	7525.605	Modified Rational	0.69	5	0.6	Ex/Pr 11th St
CM-132	160: CB-36	28775.485	Modified Rational	0.69	5	2.3	Existing - East side of Rogers
CM-133	238: CB-47	193646.739	Modified Rational	0.69	5	15.46	Existing - West side of Rogers and Area West of Rogers
CM-37	173: CB-40	148209.346	Modified Rational	0.69	5	11.84	Existing - Offsite flowing through system - Area North of 11th
CM-38	176: CB-43	11983.974	Modified Rational	0.69	5	0.96	Existing - Offsite flowing through system - East side of Rogers Street North of 11th
CM-39	177: CB-44	31900.936	Modified Rational	0.69	5	2.55	Existing - Offsite flowing through system - West side of Rogers Street North of 11th
CM-41	84: CB-8	143312.4	None			(N/A)	Existing - Morton North Development - Offsite flowing through system
CM-42	84: CB-8	33087.162	Modified Rational	0.69	5	2.64	Existing - Offsite north of 11th flowing through system
CM-44	84: CB-8	140263.2	Modified Rational	0.69		(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-46	103: CB-11	119380.804	Modified Rational	0.69	5	(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-48		444312	Modified Rational	0.69	5	(N/A)	Offsite South of Site Rogers Street
CM-49	271: CB-54	37386.669	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-50	272: CB-55	50857.544	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-51	274: CB-56	51418.019	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-52	285: CB-61	14232.134	Modified Rational	0.85	5	(N/A)	Proposed - East Side Rogers St. flowing to Morton St. Outlet
CM-53	283: CB-60	10494.99	Modified Rational	0.85	5	(N/A)	Proposed - Rogers St. West side flowing to Morton St. Outlet
CM-54	281: CB-59	131632.351	Modified Rational	0.85	5	(N/A)	Proposed - West of Rogers St. flowing to Morton St. Outlet
CM-55	285: CB-61	7578.97	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-57	152: CB-34	135912.822	Modified Rational	0.85	5	(N/A)	Proposed - Area south of 10th St. to Madison St. Outfall
CM-58	276: CB-57	8380.808	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-62	364: MH-22	21364.978	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-63	410: CB-67	40150.836	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-64	276: CB-57	28193.335	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-65	276: CB-57	22454.841	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-66	335: CB-64	45822.162	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-67	371: CB-66	51664.518	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-68	160: CB-36	5373.244	Modified Rational	0.85	5	(N/A)	Proposed - East side Rogers St. to Rogers St. outlet - no detention
CM-69	238: CB-47	53499.168	Modified Rational	0.85	5	(N/A)	Proposed - Rogers St. Outlet - No detention
CM-71	84: CB-8	32787.361	Modified Rational	0.85	5	(N/A)	Proposed - Offsite north of 11th flowing to Morton St. Outlet
CM-72	177: CB-44	31969.107	Modified Rational	0.85	5	(N/A)	Proposed - Offsite West side of Rogers north of 11th flowing to Morton St. Outlet
CM-73	176: CB-43	12188.817	Modified Rational	0.85	5	(N/A)	Proposed - Offsite East side of Rogers north of 11th flowing to Morton St. Outlet
CM-74	173: CB-40	148178.919	Modified Rational	0.85	5	(N/A)	Proposed - Offsite Area North of 11th flowing to Morton St. Outlet
CM-56	276: CB-57	3229.603	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-60	368: MH-23	9049.309	Modified Rational	0.85	5	(N/A)	
CM-59	368: MH-23	2111.07	Modified Rational	0.85	5	(N/A)	

DOT Report - 2yr Existing													
Label	-Node- Upstream / Downstream	-Ground- Upstream / Downstream (ft)	-Invert- Upstream / Downstream (ft)	Diameter (in)	Manning's n	Length (Unified) (ft)	Slope (Calculated) (%)	Flow (Maximum) (ft^3/s)	Section Discharge Capacity (ft^3/s)	Velocity (Maximum Calculated) (ft/s)	-X- Upstream / Downstream (ft)	-Y- Upstream / Downstream (ft)	Hydraulic Grade (Maximum) (ft)
CO-5	73: CB-2 72: MH-3	786.59 786	780.59 780.2	12	0.013	27	1.444	50.12	0 219.8	5.55	3107868.58 3107868.66	1429442.02 1429414.7	782.78
CO-6	74: MH-4 73: CB-2	786.89 786.59	782.01 780.59	12	0.013	123	1.154	49.42	0 66.87	8.59	3107745.61 3107868.58	1429450.02 1429442.02	783.47
CO-8	76: CB-3 75: MH-5	793.54 789	787.63 783.09	12	0.013	199	2.281	26.28	0 94	11.22	3107601.84 3107685.27	1429724.54 1429543.96	786.24
CO-9	77: MH-6 76: CB-3	800.99 793.54	793.51 787.63	12	0.013	280	2.1	20.77	0 90.19	10.16	3107496.69 3107601.84	1429983.74 1429724.54	791.93
CO-10	78: MH-7 77: MH-6	803.34 800.99	796.6 793.51	24	0.013	43	7.186	17.51	0 60.64	16.7	3107480.24 3107496.69	1430023.28 1429983.74	795.79
CO-16	84: CB-8 77: MH-6	804.58 800.99	799.39 793.51	18	0.013	117	5.026	3.28	0 23.55	9.32	3107595.21 3107496.69	1430047.51 1429983.74	796.83
CO-20	103: CB-11 72: MH-3	785.61 786	781.36 780.2	30	0.013	20	5.8	(N/A)	(N/A) 98.78	(N/A)	3107888.52 3107868.66	1429414.81 1429414.7	(N/A)
CO-38	139: MH-11 74: MH-4	787.52 786.89	782.56 782.01	12	0.013	57	0.965	28.43	0 61.13	5.92	3107715.17 3107745.61	1429497.86 1429450.02	784.08
CO-39	75: MH-5 139: MH-11	789 787.52	783.09 782.56	12	0.013	55	0.964	26.4	0 61.09	7.38	3107685.27 3107715.17	1429543.96 1429497.86	784.16
CO-40	142: CB-28 139: MH-11	787.52 787.52	784.44 782.56	12	0.013	7	3.429	2.07	0 6.6	7.47	3107709.27 3107715.17	1429494.48 1429497.86	784.7
CO-41	144: CB-29 74: MH-4	790 786.89	786 782.01	24	0.013	137	2.912	16.46	0 38.6	11.78	3107608.39 3107745.61	1429454.21 1429450.02	784.92
CO-43	151: CB-33 150: OF-3	775 772	771 768.4	18	0.013	203	1.281	8.55	0 11.89	7.3	3107515.23 3107541.74	1428875.45 1428674.62	770.64
CO-44	152: CB-34 151: CB-33	779 775	775 771	15	0.013	139	2.878	8.55	0 10.96	9.83	3107500.29 3107515.23	1429014.12 1428875.45	773.83
CO-45	72: MH-3 155: OF-4	786 784	780.2 779.8	12	0.013	148	0.27	49.04	0 95.08	6.71	3107868.66 3107869.46	1429414.7 1429266.21	782.62
CO-46	157: CB-35 163: OF-5	781.24 775.3	771.79 771	36	0.013	333	0.237	2.26	0 32.49	2.65	3107197.22 3107199.54	1429144.98 1428811.84	771.93
CO-47	160: CB-36 157: CB-35	783.5 781.24	778.3 771.79	15	0.013	77	8.455	2.3	0 18.78	10.3	3107197.87 3107197.22	1429222.44 1429144.98	775.34
CO-52	172: CB-39 78: MH-7	802.79 803.34	800.57 796.6	12	0.013	29	13.69	0.8	0 13.18	5.34	3107506.52 3107480.24	1430011.67 1430023.28	798.75
CO-53	173: CB-40 78: MH-7	803.47 803.34	798.57 796.6	15	0.013	22	8.955	12.16	0 19.33	16.62	3107474.29 3107480.24	1430044.58 1430023.28	798.3
CO-54	177: CB-44 176: CB-43	819.89 819.67	817.69 814.12	12	0.013	29	12.31	2.55	0 12.5	12.4	3107179.22 3107208.01	1430062.84 1430063.31	816.21
CO-55	176: CB-43 179: MH-15	819.67 818.91	814.12 814.36	12	0.013	31	0.032	3.5	0 0.64	4.51	3107208.01 3107204.54	1430063.31 1430032.48	815.33
CO-56	179: MH-15 178: MH-14	818.91 804.19	814.36 800.19	18	0.013	207	6.845	3.51	0 27.48	10.84	3107204.54 3107411.36	1430032.48 1430032.62	807.64

CO-57	178: MH-14 78: MH-7	804.19 803.34	800.19 796.6	18	0.013	70	5.129	4.54	0 23.79	10.35	3107411.36 3107480.24	1430032.62 1430023.28	798.84
CO-58	174: CB-41 178: MH-14	803.52 804.19	801.42 800.19	12	0.013	22	5.591	0.43	0 8.42	3.44	3107411.89 3107411.36	1430010.98 1430032.62	800.96
CO-59	175: CB-42 178: MH-14	804.03 804.19	800.51 800.19	18	0.013	13	2.462	0.6	0 16.48	2.42	3107412.12 3107411.36	1430045.95 1430032.62	800.65
CO-62	238: CB-47 240: OF-6	783.88 781.9	780.48 777.45	24	0.013	123	2.463	15.48	0 35.5	10.9	3107168.9 3107215.02	1429258.86 1429144.95	779.89
CO-82	337: CB-65 339: OF-8	0 0	0 0	12	0.013	6	0	(N/A)	(N/A) 0	(N/A)	3107704.41 3107700.07	1429655.11 1429650.77	(N/A)
CO-84	281: CB-59 283: CB-60	0 0	0 0	12	0.013	11	0	(N/A)	(N/A) 0	(N/A)	3107161.34 3107172.17	1429543.86 1429543.58	(N/A)
CO-85	283: CB-60 285: CB-61	0 0	0 0	12	0.013	92	0	(N/A)	(N/A) 0	(N/A)	3107172.17 3107205.23	1429543.58 1429457.24	(N/A)
CO-86	285: CB-61 287: CB-62	0 0	0 0	12	0.013	126	0	(N/A)	(N/A) 0	(N/A)	3107205.23 3107331.08	1429457.24 1429456.72	(N/A)
CO-87	287: CB-62 274: CB-56	0 0	0 0	12	0.013	140	0	(N/A)	(N/A) 0	(N/A)	3107331.08 3107470.7	1429456.72 1429456.88	(N/A)
CO-88	274: CB-56 276: CB-57	0 0	0 0	12	0.013	113	0	(N/A)	(N/A) 0	(N/A)	3107470.7 3107583.42	1429456.88 1429456.88	(N/A)
CO-89	276: CB-57 347: OF-9	0 0	0 0	12	0.013	24	0	(N/A)	(N/A) 0	(N/A)	3107583.42 3107597.75	1429456.88 1429476.53	(N/A)
CO-90	271: CB-54 272: CB-55	0 0	0 0	12	0.013	200	0	(N/A)	(N/A) 0	(N/A)	3107474.32 3107472.53	1429856.84 1429657.35	(N/A)
CO-91	272: CB-55 274: CB-56	0 0	0 0	12	0.013	200	0	(N/A)	(N/A) 0	(N/A)	3107472.53 3107470.7	1429657.35 1429456.88	(N/A)
CO-92	249: OS-2 362: MH-21	787.52 0	 0	12	0.013	19	0	(N/A)	(N/A) 0	(N/A)	3107699.11 3107718.17	1429482.53 1429482.61	(N/A)
CO-93	362: MH-21 364: MH-22	0 0	0 0	12	0.013	37	0	(N/A)	(N/A) 0	(N/A)	3107718.17 3107735.62	1429482.61 1429449.69	(N/A)
CO-96	364: MH-22 368: MH-23	0 0	0 0	12	0.013	133	0	(N/A)	(N/A) 0	(N/A)	3107735.62 3107868.29	1429449.69 1429442.2	(N/A)
CO-97	368: MH-23 72: MH-3	0 786	0 780.2	12	0.013	28	-2786.429	(N/A)	(N/A) 188.06	(N/A)	3107868.29 3107868.66	1429442.2 1429414.7	(N/A)
CO-98	77: MH-6 371: CB-66	800.99 0	793.51 0	12	0.013	280	283.396	(N/A)	(N/A) 59.97	(N/A)	3107496.69 3107601.68	1429983.74 1429724.19	(N/A)
CO-99	371: CB-66 335: CB-64	0 0	0 0	12	0.013	58	0	(N/A)	(N/A) 0	(N/A)	3107601.68 3107623.91	1429724.19 1429670.11	(N/A)
CO-101	335: CB-64 410: CB-67	0 0	0 0	12	0.013	81	0	(N/A)	(N/A) 0	(N/A)	3107623.91 3107705.07	1429670.11 1429669.24	(N/A)
CO-102	410: CB-67 337: CB-65	0 0	0 0	12	0.013	14	0	(N/A)	(N/A) 0	(N/A)	3107705.07 3107704.41	1429669.24 1429655.11	(N/A)

Calculations

10 – Year Existing

Catchment Table - 10 Year Existing							
Label	Outflow Element	Area (Unified) (acres)	Runoff Method	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Maximum) (ft^3/s)	Notes
CM-120	152: CB-34	106899.946	Modified Rational	0.69	5	12.72	Existing - Madison St. Outfall
CM-121	73: CB-2	6937.229	Modified Rational	0.69	5	0.83	Existing - Morton St Outfall
CM-122	142: CB-28	25877.415	Modified Rational	0.69	5	3.08	Existing - Morton St Outfall
CM-123	74: MH-4	94800.244	Modified Rational	0.69	5	11.28	Existing - Morton St Outfall
CM-125	144: CB-29	205818.922	Modified Rational	0.69	5	24.49	Existing - Morton St Outfall
CM-126	76: CB-3	67975.164	Modified Rational	0.69	5	8.09	Existing - Morton St Outfall
CM-127	172: CB-39	10036.166	Modified Rational	0.69	5	1.19	Ex/Pr 11th St
CM-128	84: CB-8	8018.158	Modified Rational	0.69	5	0.95	Ex/Pr 11th St
CM-129	173: CB-40	4041.292	Modified Rational	0.69	5	0.48	Ex/Pr 11th St
CM-130	174: CB-41	5408.879	Modified Rational	0.69	5	0.64	Ex/Pr 11th St
CM-131	175: CB-42	7525.605	Modified Rational	0.69	5	0.9	Ex/Pr 11th St
CM-132	160: CB-36	28775.485	Modified Rational	0.69	5	3.42	Existing - East side of Rogers
CM-133	238: CB-47	193646.739	Modified Rational	0.69	5	23.04	Existing - West side of Rogers and Area West of Rogers
CM-37	173: CB-40	148209.346	Modified Rational	0.69	5	17.64	Existing - Offsite flowing through system - Area North of 11th
CM-38	176: CB-43	11983.974	Modified Rational	0.69	5	1.43	Existing - Offsite flowing through system - East side of Rogers Street North of 11th
CM-39	177: CB-44	31900.936	Modified Rational	0.69	5	3.8	Existing - Offsite flowing through system - West side of Rogers Street North of 11th
CM-41	84: CB-8	143312.4	None			(N/A)	Existing - Morton North Development - Offsite flowing through system
CM-42	84: CB-8	33087.162	Modified Rational	0.69	5	3.94	Existing - Offsite north of 11th flowing through system
CM-44	84: CB-8	140263.2	Modified Rational	0.69		(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-46	103: CB-11	119380.804	Modified Rational	0.69	5	(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-48		444312	Modified Rational	0.69	5	(N/A)	Offsite South of Site Rogers Street
CM-49	271: CB-54	37386.669	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-50	272: CB-55	50857.544	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-51	274: CB-56	51418.019	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-52	285: CB-61	14232.134	Modified Rational	0.85	5	(N/A)	Proposed - East Side Rogers St. flowing to Morton St. Outlet
CM-53	283: CB-60	10494.99	Modified Rational	0.85	5	(N/A)	Proposed - Rogers St. West side flowing to Morton St. Outlet
CM-54	281: CB-59	131632.351	Modified Rational	0.85	5	(N/A)	Proposed - West of Rogers St. flowing to Morton St. Outlet
CM-55	285: CB-61	7578.97	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-57	152: CB-34	135912.822	Modified Rational	0.85	5	(N/A)	Proposed - Area south of 10th St. to Madison St. Outfall
CM-58	276: CB-57	8380.808	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-62	364: MH-22	21364.978	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-63	410: CB-67	40150.836	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-64	276: CB-57	28193.335	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-65	276: CB-57	22454.841	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-66	335: CB-64	45822.162	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-67	371: CB-66	51664.518	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-68	160: CB-36	5373.244	Modified Rational	0.85	5	(N/A)	Proposed - East side Rogers St. to Rogers St. outlet - no detention
CM-69	238: CB-47	53499.168	Modified Rational	0.85	5	(N/A)	Proposed - Rogers St. Outlet - No detention
CM-71	84: CB-8	32787.361	Modified Rational	0.85	5	(N/A)	Proposed - Offsite north of 11th flowing to Morton St. Outlet
CM-72	177: CB-44	31969.107	Modified Rational	0.85	5	(N/A)	Proposed - Offsite West side of Rogers north of 11th flowing to Morton St. Outlet
CM-73	176: CB-43	12188.817	Modified Rational	0.85	5	(N/A)	Proposed - Offsite East side of Rogers north of 11th flowing to Morton St. Outlet
CM-74	173: CB-40	148178.919	Modified Rational	0.85	5	(N/A)	Proposed - Offsite Area North of 11th flowing to Morton St. Outlet
CM-56	276: CB-57	3229.603	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-60	368: MH-23	9049.309	Modified Rational	0.85	5	(N/A)	
CM-59	368: MH-23	2111.07	Modified Rational	0.85	5	(N/A)	

DOT Report - 10yr Existing													
Label	-Node- Upstream / Downstream	-Ground- Upstream / Downstream (ft)	-Invert- Upstream / Downstream (ft)	Diameter (in)	Manning's n	Length (Unified) (ft)	Slope (Calculated) (%)	Flow (Maximum) (ft^3/s)	Section Discharge Capacity (ft^3/s)	Velocity (Maximum Calculated) (ft/s)	-X- Upstream / Downstream (ft)	-Y- Upstream / Downstream (ft)	Hydraulic Grade (Maximum) (ft)
CO-5	73: CB-2 72: MH-3	786.59 786	780.59 780.2	12	0.013	27	1.444	65.31	0 219.8	7.88	3107868.58 3107868.66	1429442.02 1429414.7	783.28
CO-6	74: MH-4 73: CB-2	786.89 786.59	782.01 780.59	12	0.013	123	1.154	64.08	0 66.87	8.99	3107745.61 3107868.58	1429450.02 1429442.02	785.13
CO-8	76: CB-3 75: MH-5	793.54 789	787.63 783.09	12	0.013	199	2.281	35.28	0 94	12.11	3107601.84 3107685.27	1429724.54 1429543.96	786.45
CO-9	77: MH-6 76: CB-3	800.99 793.54	793.51 787.63	12	0.013	280	2.1	29.01	0 90.19	11.23	3107496.69 3107601.84	1429983.74 1429724.54	792.13
CO-10	78: MH-7 77: MH-6	803.34 800.99	796.6 793.51	24	0.013	43	7.186	24.88	0 60.64	18.37	3107480.24 3107496.69	1430023.28 1429983.74	795.95
CO-16	84: CB-8 77: MH-6	804.58 800.99	799.39 793.51	18	0.013	117	5.026	4.89	0 23.55	10.45	3107595.21 3107496.69	1430047.51 1429983.74	796.92
CO-20	103: CB-11 72: MH-3	785.61 786	781.36 780.2	30	0.013	20	5.8	(N/A)	(N/A) 98.78	(N/A)	3107888.52 3107868.66	1429414.81 1429414.7	(N/A)
CO-38	139: MH-11 74: MH-4	787.52 786.89	782.56 782.01	12	0.013	57	0.965	43.99	0 61.13	6.17	3107715.17 3107745.61	1429497.86 1429450.02	786.14
CO-39	75: MH-5 139: MH-11	789 787.52	783.09 782.56	12	0.013	55	0.964	41.42	0 61.09	5.81	3107685.27 3107715.17	1429543.96 1429497.86	786.22
CO-40	142: CB-28 139: MH-11	787.52 787.52	784.44 782.56	12	0.013	7	3.429	3.08	0 6.6	3.92	3107709.27 3107715.17	1429494.48 1429497.86	786.18
CO-41	144: CB-29 74: MH-4	790 786.89	786 782.01	24	0.013	137	2.912	23.82	0 38.6	8.8	3107608.39 3107745.61	1429454.21 1429450.02	786.14
CO-43	151: CB-33 150: OF-3	775 772	771 768.4	18	0.013	203	1.281	11.57	0 11.89	7.6	3107515.23 3107541.74	1428875.45 1428674.62	770.91
CO-44	152: CB-34 151: CB-33	779 775	775 771	15	0.013	139	2.878	12.02	0 10.96	10.01	3107500.29 3107515.23	1429014.12 1428875.45	774.18
CO-45	72: MH-3 155: OF-4	786 784	780.2 779.8	12	0.013	148	0.27	77.41	0 95.08	8.48	3107868.66 3107869.46	1429414.7 1429266.21	782.86
CO-46	157: CB-35 163: OF-5	781.24 775.3	771.79 771	36	0.013	333	0.237	3.06	0 32.49	2.9	3107197.22 3107199.54	1429144.98 1428811.84	772.01
CO-47	160: CB-36 157: CB-35	783.5 781.24	778.3 771.79	15	0.013	77	8.455	3.34	0 18.78	11.53	3107197.87 3107197.22	1429222.44 1429144.98	775.4
CO-52	172: CB-39 78: MH-7	802.79 803.34	800.57 796.6	12	0.013	29	13.69	1.19	0 13.18	7.49	3107506.52 3107480.24	1430011.67 1430023.28	798.79
CO-53	173: CB-40 78: MH-7	803.47 803.34	798.57 796.6	15	0.013	22	8.955	18.12	0 19.33	17.85	3107474.29 3107480.24	1430044.58 1430023.28	798.55
CO-54	177: CB-44 176: CB-43	819.89 819.67	817.69 814.12	12	0.013	29	12.31	3.72	0 12.5	13.91	3107179.22 3107208.01	1430062.84 1430063.31	816.28
CO-55	176: CB-43 179: MH-15	819.67 818.91	814.12 814.36	12	0.013	31	0.032	5.1	0 0.64	6.5	3107208.01 3107204.54	1430063.31 1430032.48	815.68
CO-56	179: MH-15 178: MH-14	818.91 804.19	814.36 800.19	18	0.013	207	6.845	5.01	0 27.48	11.91	3107204.54 3107411.36	1430032.48 1430032.62	807.71

CO-57	178: MH-14 78: MH-7	804.19 803.34	800.19 796.6	18	0.013	70	5.129	6.32	0 23.79	11.43	3107411.36 3107480.24	1430032.62 1430023.28	798.92
CO-58	174: CB-41 178: MH-14	803.52 804.19	801.42 800.19	12	0.013	22	5.591	0.64	0 8.42	4.66	3107411.89 3107411.36	1430010.98 1430032.62	800.99
CO-59	175: CB-42 178: MH-14	804.03 804.19	800.51 800.19	18	0.013	13	2.462	0.88	0 16.48	2.43	3107412.12 3107411.36	1430045.95 1430032.62	800.74
CO-62	238: CB-47 240: OF-6	783.88 781.9	780.48 777.45	24	0.013	123	2.463	22.42	0 35.5	11.97	3107168.9 3107215.02	1429258.86 1429144.95	780.12
CO-82	337: CB-65 339: OF-8	0 0	0 0	12	0.013	6	0	(N/A)	(N/A) 0	(N/A)	3107704.41 3107700.07	1429655.11 1429650.77	(N/A)
CO-84	281: CB-59 283: CB-60	0 0	0 0	12	0.013	11	0	(N/A)	(N/A) 0	(N/A)	3107161.34 3107172.17	1429543.86 1429543.58	(N/A)
CO-85	283: CB-60 285: CB-61	0 0	0 0	12	0.013	92	0	(N/A)	(N/A) 0	(N/A)	3107172.17 3107205.23	1429543.58 1429457.24	(N/A)
CO-86	285: CB-61 287: CB-62	0 0	0 0	12	0.013	126	0	(N/A)	(N/A) 0	(N/A)	3107205.23 3107331.08	1429457.24 1429456.72	(N/A)
CO-87	287: CB-62 274: CB-56	0 0	0 0	12	0.013	140	0	(N/A)	(N/A) 0	(N/A)	3107331.08 3107470.7	1429456.72 1429456.88	(N/A)
CO-88	274: CB-56 276: CB-57	0 0	0 0	12	0.013	113	0	(N/A)	(N/A) 0	(N/A)	3107470.7 3107583.42	1429456.88 1429456.88	(N/A)
CO-89	276: CB-57 347: OF-9	0 0	0 0	12	0.013	24	0	(N/A)	(N/A) 0	(N/A)	3107583.42 3107597.75	1429456.88 1429476.53	(N/A)
CO-90	271: CB-54 272: CB-55	0 0	0 0	12	0.013	200	0	(N/A)	(N/A) 0	(N/A)	3107474.32 3107472.53	1429856.84 1429657.35	(N/A)
CO-91	272: CB-55 274: CB-56	0 0	0 0	12	0.013	200	0	(N/A)	(N/A) 0	(N/A)	3107472.53 3107470.7	1429657.35 1429456.88	(N/A)
CO-92	249: OS-2 362: MH-21	787.52 0	 0	12	0.013	19	0	(N/A)	(N/A) 0	(N/A)	3107699.11 3107718.17	1429482.53 1429482.61	(N/A)
CO-93	362: MH-21 364: MH-22	0 0	0 0	12	0.013	37	0	(N/A)	(N/A) 0	(N/A)	3107718.17 3107735.62	1429482.61 1429449.69	(N/A)
CO-96	364: MH-22 368: MH-23	0 0	0 0	12	0.013	133	0	(N/A)	(N/A) 0	(N/A)	3107735.62 3107868.29	1429449.69 1429442.2	(N/A)
CO-97	368: MH-23 72: MH-3	0 786	0 780.2	12	0.013	28	-2786.429	(N/A)	(N/A) 188.06	(N/A)	3107868.29 3107868.66	1429442.2 1429414.7	(N/A)
CO-98	77: MH-6 371: CB-66	800.99 0	793.51 0	12	0.013	280	283.396	(N/A)	(N/A) 59.97	(N/A)	3107496.69 3107601.68	1429983.74 1429724.19	(N/A)
CO-99	371: CB-66 335: CB-64	0 0	0 0	12	0.013	58	0	(N/A)	(N/A) 0	(N/A)	3107601.68 3107623.91	1429724.19 1429670.11	(N/A)
CO-101	335: CB-64 410: CB-67	0 0	0 0	12	0.013	81	0	(N/A)	(N/A) 0	(N/A)	3107623.91 3107705.07	1429670.11 1429669.24	(N/A)
CO-102	410: CB-67 337: CB-65	0 0	0 0	12	0.013	14	0	(N/A)	(N/A) 0	(N/A)	3107705.07 3107704.41	1429669.24 1429655.11	(N/A)

Calculations

100 – Year Existing

Catchment Table - 100 Year Existing							
Label	Outflow Element	Area (Unified) (acres)	Runoff Method	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Maximum) (ft^3/s)	Notes
CM-120	152: CB-34	106899.946	Modified Rational	0.69	5	17.76	Existing - Madison St. Outfall
CM-121	73: CB-2	6937.229	Modified Rational	0.69	5	1.15	Existing - Morton St Outfall
CM-122	142: CB-28	25877.415	Modified Rational	0.69	5	4.3	Existing - Morton St Outfall
CM-123	74: MH-4	94800.244	Modified Rational	0.69	5	15.75	Existing - Morton St Outfall
CM-125	144: CB-29	205818.922	Modified Rational	0.69	5	34.19	Existing - Morton St Outfall
CM-126	76: CB-3	67975.164	Modified Rational	0.69	5	11.29	Existing - Morton St Outfall
CM-127	172: CB-39	10036.166	Modified Rational	0.69	5	1.67	Ex/Pr 11th St
CM-128	84: CB-8	8018.158	Modified Rational	0.69	5	1.33	Ex/Pr 11th St
CM-129	173: CB-40	4041.292	Modified Rational	0.69	5	0.67	Ex/Pr 11th St
CM-130	174: CB-41	5408.879	Modified Rational	0.69	5	0.9	Ex/Pr 11th St
CM-131	175: CB-42	7525.605	Modified Rational	0.69	5	1.25	Ex/Pr 11th St
CM-132	160: CB-36	28775.485	Modified Rational	0.69	5	4.78	Existing - East side of Rogers
CM-133	238: CB-47	193646.739	Modified Rational	0.69	5	32.17	Existing - West side of Rogers and Area West of Rogers
CM-37	173: CB-40	148209.346	Modified Rational	0.69	5	24.62	Existing - Offsite flowing through system - Area North of 11th
CM-38	176: CB-43	11983.974	Modified Rational	0.69	5	1.99	Existing - Offsite flowing through system - East side of Rogers Street North of 11th
CM-39	177: CB-44	31900.936	Modified Rational	0.69	5	5.3	Existing - Offsite flowing through system - West side of Rogers Street North of 11th
CM-41	84: CB-8	143312.4	None			(N/A)	Existing - Morton North Development - Offsite flowing through system
CM-42	84: CB-8	33087.162	Modified Rational	0.69	5	5.5	Existing - Offsite north of 11th flowing through system
CM-44	84: CB-8	140263.2	Modified Rational	0.69		(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-46	103: CB-11	119380.804	Modified Rational	0.69	5	(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-48		444312	Modified Rational	0.69	5	(N/A)	Offsite South of Site Rogers Street
CM-49	271: CB-54	37386.669	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-50	272: CB-55	50857.544	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-51	274: CB-56	51418.019	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-52	285: CB-61	14232.134	Modified Rational	0.85	5	(N/A)	Proposed - East Side Rogers St. flowing to Morton St. Outlet
CM-53	283: CB-60	10494.99	Modified Rational	0.85	5	(N/A)	Proposed - Rogers St. West side flowing to Morton St. Outlet
CM-54	281: CB-59	131632.351	Modified Rational	0.85	5	(N/A)	Proposed - West of Rogers St. flowing to Morton St. Outlet
CM-55	285: CB-61	7578.97	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-57	152: CB-34	135912.822	Modified Rational	0.85	5	(N/A)	Proposed - Area south of 10th St. to Madison St. Outfall
CM-58	276: CB-57	8380.808	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-62	364: MH-22	21364.978	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-63	410: CB-67	40150.836	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-64	276: CB-57	28193.335	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-65	276: CB-57	22454.841	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-66	335: CB-64	45822.162	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-67	371: CB-66	51664.518	Modified Rational	0.85	5	(N/A)	Proposed - Morton St. Outlet
CM-68	160: CB-36	5373.244	Modified Rational	0.85	5	(N/A)	Proposed - East side Rogers St. to Rogers St. outlet - no detention
CM-69	238: CB-47	53499.168	Modified Rational	0.85	5	(N/A)	Proposed - Rogers St. Outlet - No detention
CM-71	84: CB-8	32787.361	Modified Rational	0.85	5	(N/A)	Proposed - Offsite north of 11th flowing to Morton St. Outlet
CM-72	177: CB-44	31969.107	Modified Rational	0.85	5	(N/A)	Proposed - Offsite West side of Rogers north of 11th flowing to Morton St. Outlet
CM-73	176: CB-43	12188.817	Modified Rational	0.85	5	(N/A)	Proposed - Offsite East side of Rogers north of 11th flowing to Morton St. Outlet
CM-74	173: CB-40	148178.919	Modified Rational	0.85	5	(N/A)	Proposed - Offsite Area North of 11th flowing to Morton St. Outlet
CM-56	276: CB-57	3229.603	Modified Rational	0.85	5	(N/A)	Proposed - 10th St. to Morton St. Outlet
CM-60	368: MH-23	9049.309	Modified Rational	0.85	5	(N/A)	
CM-59	368: MH-23	2111.07	Modified Rational	0.85	5	(N/A)	

DOT Report - 100yr Existing													
Label	-Node- Upstream / Downstream	-Ground- Upstream / Downstream (ft)	-Invert- Upstream / Downstream (ft)	Diameter (in)	Manning's n	Length (Unified) (ft)	Slope (Calculated) (%)	Flow (Maximum) (ft^3/s)	Section Discharge Capacity (ft^3/s)	Velocity (Maximum Calculated) (ft/s)	-X- Upstream / Downstream (ft)	-Y- Upstream / Downstream (ft)	Hydraulic Grade (Maximum) (ft)
CO-5	73: CB-2 72: MH-3	786.59 786	780.59 780.2	12	0.013	27	1.444	110.37	0 219.8	9.07	3107868.58 3107868.66	1429442.02 1429414.7	783.44
CO-6	74: MH-4 73: CB-2	786.89 786.59	782.01 780.59	12	0.013	123	1.154	110.23	0 66.87	15.46	3107745.61 3107868.58	1429450.02 1429442.02	784.46
CO-8	76: CB-3 75: MH-5	793.54 789	787.63 783.09	12	0.013	199	2.281	52.62	0 94	13.58	3107601.84 3107685.27	1429724.54 1429543.96	786.81
CO-9	77: MH-6 76: CB-3	800.99 793.54	793.51 787.63	12	0.013	280	2.1	42.67	0 90.19	12.44	3107496.69 3107601.84	1429983.74 1429724.54	792.44
CO-10	78: MH-7 77: MH-6	803.34 800.99	796.6 793.51	24	0.013	43	7.186	35.97	0 60.64	20.14	3107480.24 3107496.69	1430023.28 1429983.74	796.16
CO-16	84: CB-8 77: MH-6	804.58 800.99	799.39 793.51	18	0.013	117	5.026	6.83	0 23.55	11.56	3107595.21 3107496.69	1430047.51 1429983.74	797
CO-20	103: CB-11 72: MH-3	785.61 786	781.36 780.2	30	0.013	20	5.8	(N/A)	(N/A) 98.78	(N/A)	3107888.52 3107868.66	1429414.81 1429414.7	(N/A)
CO-38	139: MH-11 74: MH-4	787.52 786.89	782.56 782.01	12	0.013	57	0.965	62.87	0 61.13	8.82	3107715.17 3107745.61	1429497.86 1429450.02	785.79
CO-39	75: MH-5 139: MH-11	789 787.52	783.09 782.56	12	0.013	55	0.964	58.01	0 61.09	8.14	3107685.27 3107715.17	1429543.96 1429497.86	785.87
CO-40	142: CB-28 139: MH-11	787.52 787.52	784.44 782.56	12	0.013	7	3.429	4.3	0 6.6	5.47	3107709.27 3107715.17	1429494.48 1429497.86	785.84
CO-41	144: CB-29 74: MH-4	790 786.89	786 782.01	24	0.013	137	2.912	33.03	0 38.6	11.97	3107608.39 3107745.61	1429454.21 1429450.02	785.79
CO-43	151: CB-33 150: OF-3	775 772	771 768.4	18	0.013	203	1.281	13.73	0 11.89	7.77	3107515.23 3107541.74	1428875.45 1428674.62	771.44
CO-44	152: CB-34 151: CB-33	779 775	775 771	15	0.013	139	2.878	13.76	0 10.96	11.21	3107500.29 3107515.23	1429014.12 1428875.45	776.11
CO-45	72: MH-3 155: OF-4	786 784	780.2 779.8	12	0.013	148	0.27	109	0 95.08	9.42	3107868.66 3107869.46	1429414.7 1429266.21	782.97
CO-46	157: CB-35 163: OF-5	781.24 775.3	771.79 771	36	0.013	333	0.237	4.37	0 32.49	3.28	3107197.22 3107199.54	1429144.98 1428811.84	772.13
CO-47	160: CB-36 157: CB-35	783.5 781.24	778.3 771.79	15	0.013	77	8.455	4.64	0 18.78	12.73	3107197.87 3107197.22	1429222.44 1429144.98	775.47
CO-52	172: CB-39 78: MH-7	802.79 803.34	800.57 796.6	12	0.013	29	13.69	1.67	0 13.18	10.04	3107506.52 3107480.24	1430011.67 1430023.28	798.83
CO-53	173: CB-40 78: MH-7	803.47 803.34	798.57 796.6	15	0.013	22	8.955	25.29	0 19.33	20.61	3107474.29 3107480.24	1430044.58 1430023.28	798.85
CO-54	177: CB-44 176: CB-43	819.89 819.67	817.69 814.12	12	0.013	29	12.31	5.15	0 12.5	8.15	3107179.22 3107208.01	1430062.84 1430063.31	816.66
CO-55	176: CB-43 179: MH-15	819.67 818.91	814.12 814.36	12	0.013	31	0.032	7.06	0 0.64	8.99	3107208.01 3107204.54	1430063.31 1430032.48	815.97
CO-56	179: MH-15 178: MH-14	818.91 804.19	814.36 800.19	18	0.013	207	6.845	6.95	0 27.48	13.15	3107204.54 3107411.36	1430032.48 1430032.62	807.78

CO-57	178: MH-14 78: MH-7	804.19 803.34	800.19 796.6	18	0.013	70	5.129	8.9	0 23.79	12.52	3107411.36 3107480.24	1430032.62 1430023.28	799.03
CO-58	174: CB-41 178: MH-14	803.52 804.19	801.42 800.19	12	0.013	22	5.591	0.9	0 8.42	6.1	3107411.89 3107411.36	1430010.98 1430032.62	801.03
CO-59	175: CB-42 178: MH-14	804.03 804.19	800.51 800.19	18	0.013	13	2.462	1.21	0 16.48	2.41	3107412.12 3107411.36	1430045.95 1430032.62	800.84
CO-62	238: CB-47 240: OF-6	783.88 781.9	780.48 777.45	24	0.013	123	2.463	31.1	0 35.5	12.79	3107168.9 3107215.02	1429258.86 1429144.95	780.41
CO-82	337: CB-65 339: OF-8	0 0	0 0	12	0.013	6	0	(N/A)	(N/A) 0	(N/A)	3107704.41 3107700.07	1429655.11 1429650.77	(N/A)
CO-84	281: CB-59 283: CB-60	0 0	0 0	12	0.013	11	0	(N/A)	(N/A) 0	(N/A)	3107161.34 3107172.17	1429543.86 1429543.58	(N/A)
CO-85	283: CB-60 285: CB-61	0 0	0 0	12	0.013	92	0	(N/A)	(N/A) 0	(N/A)	3107172.17 3107205.23	1429543.58 1429457.24	(N/A)
CO-86	285: CB-61 287: CB-62	0 0	0 0	12	0.013	126	0	(N/A)	(N/A) 0	(N/A)	3107205.23 3107331.08	1429457.24 1429456.72	(N/A)
CO-87	287: CB-62 274: CB-56	0 0	0 0	12	0.013	140	0	(N/A)	(N/A) 0	(N/A)	3107331.08 3107470.7	1429456.72 1429456.88	(N/A)
CO-88	274: CB-56 276: CB-57	0 0	0 0	12	0.013	113	0	(N/A)	(N/A) 0	(N/A)	3107470.7 3107583.42	1429456.88 1429456.88	(N/A)
CO-89	276: CB-57 347: OF-9	0 0	0 0	12	0.013	24	0	(N/A)	(N/A) 0	(N/A)	3107583.42 3107597.75	1429456.88 1429476.53	(N/A)
CO-90	271: CB-54 272: CB-55	0 0	0 0	12	0.013	200	0	(N/A)	(N/A) 0	(N/A)	3107474.32 3107472.53	1429856.84 1429657.35	(N/A)
CO-91	272: CB-55 274: CB-56	0 0	0 0	12	0.013	200	0	(N/A)	(N/A) 0	(N/A)	3107472.53 3107470.7	1429657.35 1429456.88	(N/A)
CO-92	249: OS-2 362: MH-21	787.52 0	 0	12	0.013	19	0	(N/A)	(N/A) 0	(N/A)	3107699.11 3107718.17	1429482.53 1429482.61	(N/A)
CO-93	362: MH-21 364: MH-22	0 0	0 0	12	0.013	37	0	(N/A)	(N/A) 0	(N/A)	3107718.17 3107735.62	1429482.61 1429449.69	(N/A)
CO-96	364: MH-22 368: MH-23	0 0	0 0	12	0.013	133	0	(N/A)	(N/A) 0	(N/A)	3107735.62 3107868.29	1429449.69 1429442.2	(N/A)
CO-97	368: MH-23 72: MH-3	0 786	0 780.2	12	0.013	28	-2786.429	(N/A)	(N/A) 188.06	(N/A)	3107868.29 3107868.66	1429442.2 1429414.7	(N/A)
CO-98	77: MH-6 371: CB-66	800.99 0	793.51 0	12	0.013	280	283.396	(N/A)	(N/A) 59.97	(N/A)	3107496.69 3107601.68	1429983.74 1429724.19	(N/A)
CO-99	371: CB-66 335: CB-64	0 0	0 0	12	0.013	58	0	(N/A)	(N/A) 0	(N/A)	3107601.68 3107623.91	1429724.19 1429670.11	(N/A)
CO-101	335: CB-64 410: CB-67	0 0	0 0	12	0.013	81	0	(N/A)	(N/A) 0	(N/A)	3107623.91 3107705.07	1429670.11 1429669.24	(N/A)
CO-102	410: CB-67 337: CB-65	0 0	0 0	12	0.013	14	0	(N/A)	(N/A) 0	(N/A)	3107705.07 3107704.41	1429669.24 1429655.11	(N/A)

Calculations

2 – Year Proposed

Catchment Table - 2 Year Proposed							
Label	Outflow Element	Area (Unified) (acres)	Runoff Method	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Maximum) (ft^3/s)	Notes
CM-120	152: CB-34	106899.946	Modified Rational	0.69	5	(N/A)	Existing - Madison St. Outfall
CM-121	73: CB-2	6937.229	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-122	142: CB-28	25877.415	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-123	74: MH-4	94800.244	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-125	144: CB-29	205818.922	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-126	76: CB-3	67975.164	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-127	172: CB-39	10036.166	Modified Rational	0.69	5	0.76	Ex/Pr 11th St
CM-128	84: CB-8	8018.158	Modified Rational	0.69	5	0.61	Ex/Pr 11th St
CM-129	173: CB-40	4041.292	Modified Rational	0.69	5	0.31	Ex/Pr 11th St
CM-130	174: CB-41	5408.879	Modified Rational	0.69	5	0.41	Ex/Pr 11th St
CM-131	175: CB-42	7525.605	Modified Rational	0.69	5	0.57	Ex/Pr 11th St
CM-132	160: CB-36	28775.485	Modified Rational	0.69	5	(N/A)	Existing - East side of Rogers
CM-133	238: CB-47	193646.739	Modified Rational	0.69	5	(N/A)	Existing - West side of Rogers and Area West of Rogers
CM-37	173: CB-40	148209.346	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - Area North of 11th
CM-38	176: CB-43	11983.974	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - East side of Rogers Street North of 11th
CM-39	177: CB-44	31900.936	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - West side of Rogers Street North of 11th
CM-41	84: CB-8	143312.4	None			(N/A)	Existing - Morton North Development - Offsite flowing through system
CM-42	84: CB-8	33087.162	Modified Rational	0.69	5	(N/A)	Existing - Offsite north of 11th flowing through system
CM-44	84: CB-8	140263.2	Modified Rational	0.69		(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-46	103: CB-11	119380.804	Modified Rational	0.69	5	(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-48		444312	Modified Rational	0.69	5	(N/A)	Offsite South of Site Rogers Street
CM-49	271: CB-54	37386.669	Modified Rational	0.85	5	3.5	Proposed - Morton St. Outlet
CM-50	272: CB-55	50857.544	Modified Rational	0.85	5	4.76	Proposed - Morton St. Outlet
CM-51	274: CB-56	51418.019	Modified Rational	0.85	5	4.82	Proposed - Morton St. Outlet
CM-52	285: CB-61	14232.134	Modified Rational	0.85	5	1.33	Proposed - East Side Rogers St. flowing to Morton St. Outlet
CM-53	283: CB-60	10494.99	Modified Rational	0.85	5	0.98	Proposed - Rogers St. West side flowing to Morton St. Outlet
CM-54	281: CB-59	131632.351	Modified Rational	0.85	5	12.33	Proposed - West of Rogers St. flowing to Morton St. Outlet
CM-55	285: CB-61	7578.97	Modified Rational	0.85	5	0.71	Proposed - 10th St. to Morton St. Outlet
CM-57	152: CB-34	135912.822	Modified Rational	0.85	5	12.73	Proposed - Area south of 10th St. to Madison St. Outfall
CM-58	276: CB-57	8380.808	Modified Rational	0.85	5	0.78	Proposed - 10th St. to Morton St. Outlet
CM-62	364: MH-22	21364.978	Modified Rational	0.85	5	2	Proposed - Morton St. Outlet
CM-63	410: CB-67	40150.836	Modified Rational	0.85	5	3.76	Proposed - Morton St. Outlet
CM-64	276: CB-57	28193.335	Modified Rational	0.85	5	2.64	Proposed - Morton St. Outlet
CM-65	276: CB-57	22454.841	Modified Rational	0.85	5	2.1	Proposed - Morton St. Outlet
CM-66	335: CB-64	45822.162	Modified Rational	0.85	5	4.29	Proposed - Morton St. Outlet
CM-67	371: CB-66	51664.518	Modified Rational	0.85	5	4.84	Proposed - Morton St. Outlet
CM-68	160: CB-36	5373.244	Modified Rational	0.85	5	0.5	Proposed - East side Rogers St. to Rogers St. outlet - no detention
CM-69	238: CB-47	53499.168	Modified Rational	0.85	5	5.01	Proposed - Rogers St. Outlet - No detention
CM-71	84: CB-8	32787.361	Modified Rational	0.85	5	3.07	Proposed - Offsite north of 11th flowing to Morton St. Outlet
CM-72	177: CB-44	31969.107	Modified Rational	0.85	5	2.99	Proposed - Offsite West side of Rogers north of 11th flowing to Morton St. Outlet
CM-73	176: CB-43	12188.817	Modified Rational	0.85	5	1.14	Proposed - Offsite East side of Rogers north of 11th flowing to Morton St. Outlet
CM-74	173: CB-40	148178.919	Modified Rational	0.85	5	13.88	Proposed - Offsite Area North of 11th flowing to Morton St. Outlet
CM-56	276: CB-57	3229.603	Modified Rational	0.85	5	0.3	Proposed - 10th St. to Morton St. Outlet
CM-60	368: MH-23	9049.309	Modified Rational	0.85	5	0.85	
CM-59	368: MH-23	2111.07	Modified Rational	0.85	5	0.2	

DOT Report - 2yr Proposed													
Label	-Node- Upstream / Downstream	-Ground- Upstream / Downstream (ft)	-Invert- Upstream / Downstream (ft)	Diameter (in)	Manning's n	Length (Unified) (ft)	Slope (Calculated) (%)	Flow (Maximum) (ft^3/s)	Section Discharge Capacity (ft^3/s)	Velocity (Maximum Calculated) (ft/s)	-X- Upstream / Downstream (ft)	-Y- Upstream / Downstream (ft)	Hydraulic Grade (Maximum) (ft)
CO-5	73: CB-2 72: MH-3	786.59 786	780.59 780.2	12	0.013	27	1.444	(N/A)	(N/A) 219.8	(N/A)	3107868.58 3107868.66	1429442.02 1429414.7	(N/A)
CO-6	74: MH-4 73: CB-2	786.89 786.59	782.01 780.59	12	0.013	123	1.154	(N/A)	(N/A) 66.87	(N/A)	3107745.61 3107868.58	1429450.02 1429442.02	(N/A)
CO-8	76: CB-3 75: MH-5	793.54 789	787.63 783.09	12	0.013	199	2.281	(N/A)	(N/A) 94	(N/A)	3107601.84 3107685.27	1429724.54 1429543.96	(N/A)
CO-9	77: MH-6 76: CB-3	800.99 793.54	793.51 787.63	12	0.013	280	2.1	(N/A)	(N/A) 90.19	(N/A)	3107496.69 3107601.84	1429983.74 1429724.54	(N/A)
CO-10	78: MH-7 77: MH-6	803.34 800.99	796.6 793.51	24	0.013	43	7.186	20.1	0 60.64	17.65	3107480.24 3107496.69	1430023.28 1429983.74	795.86
CO-16	84: CB-8 77: MH-6	804.58 800.99	799.39 793.51	18	0.013	117	5.026	3.68	0 23.55	9.62	3107595.21 3107496.69	1430047.51 1429983.74	796.85
CO-20	103: CB-11 72: MH-3	785.61 786	781.36 780.2	30	0.013	20	5.8	(N/A)	(N/A) 98.78	(N/A)	3107888.52 3107868.66	1429414.81 1429414.7	(N/A)
CO-38	139: MH-11 74: MH-4	787.52 786.89	782.56 782.01	12	0.013	57	0.965	(N/A)	(N/A) 61.13	(N/A)	3107715.17 3107745.61	1429497.86 1429450.02	(N/A)
CO-39	75: MH-5 139: MH-11	789 787.52	783.09 782.56	12	0.013	55	0.964	(N/A)	(N/A) 61.09	(N/A)	3107685.27 3107715.17	1429543.96 1429497.86	(N/A)
CO-40	142: CB-28 139: MH-11	787.52 787.52	784.44 782.56	12	0.013	7	3.429	(N/A)	(N/A) 6.6	(N/A)	3107709.27 3107715.17	1429494.48 1429497.86	(N/A)
CO-41	144: CB-29 74: MH-4	790 786.89	786 782.01	24	0.013	137	2.912	(N/A)	(N/A) 38.6	(N/A)	3107608.39 3107745.61	1429454.21 1429450.02	(N/A)
CO-43	151: CB-33 150: OF-3	775 772	771 768.4	21	0.013	203	1.281	12.76	0 17.93	8.09	3107515.23 3107541.74	1428875.45 1428674.62	770.79
CO-44	152: CB-34 151: CB-33	779 775	775 771	18	0.013	139	2.878	12.75	0 17.82	10.92	3107500.29 3107515.23	1429014.12 1428875.45	773.94
CO-45	72: MH-3 155: OF-4	786 784	780.2 779.8	12	0.013	148	0.27	34.47	0 95.08	6.13	3107868.66 3107869.46	1429414.7 1429266.21	781.41
CO-46	157: CB-35 163: OF-5	781.24 775.3	771.79 771	36	0.013	333	0.237	0.5	0 32.49	1.61	3107197.22 3107199.54	1429144.98 1428811.84	771.66
CO-47	160: CB-36 157: CB-35	783.5 781.24	778.3 771.79	15	0.013	77	8.455	0.5	0 18.78	3.75	3107197.87 3107197.22	1429222.44 1429144.98	775.19
CO-52	172: CB-39 78: MH-7	802.79 803.34	800.57 796.6	12	0.013	29	13.69	0.76	0 13.18	5.13	3107506.52 3107480.24	1430011.67 1430023.28	798.75
CO-53	173: CB-40 78: MH-7	803.47 803.34	798.57 796.6	15	0.013	22	8.955	14.19	0 19.33	17.23	3107474.29 3107480.24	1430044.58 1430023.28	798.38
CO-54	177: CB-44 176: CB-43	819.89 819.67	817.69 814.12	12	0.013	29	12.31	3	0 12.5	13.03	3107179.22 3107208.01	1430062.84 1430063.31	816.24
CO-55	176: CB-43 179: MH-15	819.67 818.91	814.12 814.36	12	0.013	31	0.032	4.14	0 0.64	5.26	3107208.01 3107204.54	1430063.31 1430032.48	815.51
CO-56	179: MH-15 178: MH-14	818.91 804.19	814.36 800.19	18	0.013	207	6.845	4.14	0 27.48	11.24	3107204.54 3107411.36	1430032.48 1430032.62	807.67

CO-57	178: MH-14 78: MH-7	804.19 803.34	800.19 796.6	18	0.013	70	5.129	5.12	0 23.79	10.77	3107411.36 3107480.24	1430032.62 1430023.28	798.87
CO-58	174: CB-41 178: MH-14	803.52 804.19	801.42 800.19	12	0.013	22	5.591	0.41	0 8.42	3.32	3107411.89 3107411.36	1430010.98 1430032.62	800.96
CO-59	175: CB-42 178: MH-14	804.03 804.19	800.51 800.19	18	0.013	13	2.462	0.57	0 16.48	2.01	3107412.12 3107411.36	1430045.95 1430032.62	800.68
CO-62	238: CB-47 240: OF-6	783.88 781.9	780.48 777.45	24	0.013	123	2.463	5.02	0 35.5	7.95	3107168.9 3107215.02	1429258.86 1429144.95	779.47
CO-82	337: CB-65 339: OF-8	792 789	783.2 782.6	36	0.013	6	10	35.87	0 210.91	6.88	3107704.41 3107700.07	1429655.11 1429650.77	785.39
CO-84	281: CB-59 283: CB-60	789 789	785.55 785.45	24	0.013	11	0.909	12.33	0 21.57	6.85	3107161.34 3107172.17	1429543.86 1429543.58	786.62
CO-85	283: CB-60 285: CB-61	789 789	785.45 784.89	30	0.013	92	0.609	13.31	0 32	6.21	3107172.17 3107205.23	1429543.58 1429457.24	786.29
CO-86	285: CB-61 287: CB-62	789 789	784.89 784.16	30	0.013	126	0.579	15.33	0 31.22	6.34	3107205.23 3107331.08	1429457.24 1429456.72	785.76
CO-87	287: CB-62 274: CB-56	789 789	784.16 783.46	30	0.013	140	0.5	15.29	0 29	5.29	3107331.08 3107470.7	1429456.72 1429456.88	785.52
CO-88	274: CB-56 276: CB-57	789 789	783.46 782.9	36	0.013	113	0.496	28.3	0 46.95	6.02	3107470.7 3107583.42	1429456.88 1429456.88	785.46
CO-89	276: CB-57 347: OF-9	789 789	782.9 782.6	36	0.013	24	1.25	34.02	0 74.57	6	3107583.42 3107597.75	1429456.88 1429476.53	785.4
CO-90	271: CB-54 272: CB-55	804 794	799 789	12	0.013	200	5	3.51	0 7.97	9.86	3107474.32 3107472.53	1429856.84 1429657.35	794.47
CO-91	272: CB-55 274: CB-56	794 789	789 783.46	24	0.013	200	2.77	8.29	0 37.65	9.47	3107472.53 3107470.7	1429657.35 1429456.88	786.87
CO-92	249: OS-2 362: MH-21	789 787.52	 781.9	36	0.013	19	3.158	34.25	0 118.52	12.63	3107699.11 3107718.17	1429482.53 1429482.61	783.42
CO-93	362: MH-21 364: MH-22	787.52 786.89	781.9 781.5	36	0.013	37	1.081	34.22	0 69.35	9.76	3107718.17 3107735.62	1429482.61 1429449.69	783.19
CO-96	364: MH-22 368: MH-23	786.89 786.59	781.5 780.5	36	0.013	133	0.752	34.39	0 57.83	8.57	3107735.62 3107868.29	1429449.69 1429442.2	782.66
CO-97	368: MH-23 72: MH-3	786.59 786	780.5 780.2	36	0.013	28	1.071	34.47	0 69.04	9.93	3107868.29 3107868.66	1429442.2 1429414.7	781.83
CO-98	77: MH-6 371: CB-66	800.99 793.54	793.51 787.63	36	0.013	280	2.1	24.15	0 96.65	11.59	3107496.69 3107601.68	1429983.74 1429724.19	792.17
CO-99	371: CB-66 335: CB-64	793.54 792	787.63 786.13	36	0.013	58	2.586	28.42	0 107.26	12.91	3107601.68 3107623.91	1429724.19 1429670.11	787.96
CO-101	335: CB-64 410: CB-67	792 792	786.13 784.3	36	0.013	81	2.261	33.2	0 100.28	12.96	3107623.91 3107705.07	1429670.11 1429669.24	786.42
CO-102	410: CB-67 337: CB-65	792 792	784.3 783.2	36	0.013	14	7.848	35.76	0 186.84	12.12	3107705.07 3107704.41	1429669.24 1429655.11	785.47

Calculations

10 – Year Proposed

Catchment Table - 10 Year Proposed							
Label	Outflow Element	Area (Unified) (acres)	Runoff Method	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Maximum) (ft^3/s)	Notes
CM-120	152: CB-34	106899.946	Modified Rational	0.69	5	(N/A)	Existing - Madison St. Outfall
CM-121	73: CB-2	6937.229	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-122	142: CB-28	25877.415	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-123	74: MH-4	94800.244	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-125	144: CB-29	205818.922	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-126	76: CB-3	67975.164	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-127	172: CB-39	10036.166	Modified Rational	0.69	5	1.09	Ex/Pr 11th St
CM-128	84: CB-8	8018.158	Modified Rational	0.69	5	0.87	Ex/Pr 11th St
CM-129	173: CB-40	4041.292	Modified Rational	0.69	5	0.44	Ex/Pr 11th St
CM-130	174: CB-41	5408.879	Modified Rational	0.69	5	0.58	Ex/Pr 11th St
CM-131	175: CB-42	7525.605	Modified Rational	0.69	5	0.81	Ex/Pr 11th St
CM-132	160: CB-36	28775.485	Modified Rational	0.69	5	(N/A)	Existing - East side of Rogers
CM-133	238: CB-47	193646.739	Modified Rational	0.69	5	(N/A)	Existing - West side of Rogers and Area West of Rogers
CM-37	173: CB-40	148209.346	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - Area North of 11th
CM-38	176: CB-43	11983.974	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - East side of Rogers Street North of 11th
CM-39	177: CB-44	31900.936	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - West side of Rogers Street North of 11th
CM-41	84: CB-8	143312.4	None			(N/A)	Existing - Morton North Development - Offsite flowing through system
CM-42	84: CB-8	33087.162	Modified Rational	0.69	5	(N/A)	Existing - Offsite north of 11th flowing through system
CM-44	84: CB-8	140263.2	Modified Rational	0.69		(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-46	103: CB-11	119380.804	Modified Rational	0.69	5	(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-48		444312	Modified Rational	0.69	5	(N/A)	Offsite South of Site Rogers Street
CM-49	271: CB-54	37386.669	Modified Rational	0.85	5	4.98	Proposed - Morton St. Outlet
CM-50	272: CB-55	50857.544	Modified Rational	0.85	5	6.77	Proposed - Morton St. Outlet
CM-51	274: CB-56	51418.019	Modified Rational	0.85	5	6.85	Proposed - Morton St. Outlet
CM-52	285: CB-61	14232.134	Modified Rational	0.85	5	1.9	Proposed - East Side Rogers St. flowing to Morton St. Outlet
CM-53	283: CB-60	10494.99	Modified Rational	0.85	5	1.4	Proposed - Rogers St. West side flowing to Morton St. Outlet
CM-54	281: CB-59	131632.351	Modified Rational	0.85	5	17.53	Proposed - West of Rogers St. flowing to Morton St. Outlet
CM-55	285: CB-61	7578.97	Modified Rational	0.85	5	1.01	Proposed - 10th St. to Morton St. Outlet
CM-57	152: CB-34	135912.822	Modified Rational	0.85	5	18.1	Proposed - Area south of 10th St. to Madison St. Outfall
CM-58	276: CB-57	8380.808	Modified Rational	0.85	5	1.12	Proposed - 10th St. to Morton St. Outlet
CM-62	364: MH-22	21364.978	Modified Rational	0.85	5	2.85	Proposed - Morton St. Outlet
CM-63	410: CB-67	40150.836	Modified Rational	0.85	5	5.35	Proposed - Morton St. Outlet
CM-64	276: CB-57	28193.335	Modified Rational	0.85	5	3.76	Proposed - Morton St. Outlet
CM-65	276: CB-57	22454.841	Modified Rational	0.85	5	2.99	Proposed - Morton St. Outlet
CM-66	335: CB-64	45822.162	Modified Rational	0.85	5	6.1	Proposed - Morton St. Outlet
CM-67	371: CB-66	51664.518	Modified Rational	0.85	5	6.88	Proposed - Morton St. Outlet
CM-68	160: CB-36	5373.244	Modified Rational	0.85	5	0.72	Proposed - East side Rogers St. to Rogers St. outlet - no detention
CM-69	238: CB-47	53499.168	Modified Rational	0.85	5	7.13	Proposed - Rogers St. Outlet - No detention
CM-71	84: CB-8	32787.361	Modified Rational	0.85	5	4.37	Proposed - Offsite north of 11th flowing to Morton St. Outlet
CM-72	177: CB-44	31969.107	Modified Rational	0.85	5	4.26	Proposed - Offsite West side of Rogers north of 11th flowing to Morton St. Outlet
CM-73	176: CB-43	12188.817	Modified Rational	0.85	5	1.62	Proposed - Offsite East side of Rogers north of 11th flowing to Morton St. Outlet
CM-74	173: CB-40	148178.919	Modified Rational	0.85	5	19.74	Proposed - Offsite Area North of 11th flowing to Morton St. Outlet
CM-56	276: CB-57	3229.603	Modified Rational	0.85	5	0.43	Proposed - 10th St. to Morton St. Outlet
CM-60	368: MH-23	9049.309	Modified Rational	0.85	5	1.21	
CM-59	368: MH-23	2111.07	Modified Rational	0.85	5	0.28	

DOT Report - 10yr Proposed													
Label	-Node- Upstream / Downstream	-Ground- Upstream / Downstream (ft)	-Invert- Upstream / Downstream (ft)	Diameter (in)	Manning's n	Length (Unified) (ft)	Slope (Calculated) (%)	Flow (Maximum) (ft³/s)	Section Discharge Capacity (ft³/s)	Velocity (Maximum Calculated) (ft/s)	-X- Upstream / Downstream (ft)	-Y- Upstream / Downstream (ft)	Hydraulic Grade (Maximum) (ft)
CO-5	73: CB-2 72: MH-3	786.59 786	780.59 780.2	12	0.013	27	1.444	(N/A)	(N/A) 219.8	(N/A)	3107868.58 3107868.66	1429442.02 1429414.7	(N/A)
CO-6	74: MH-4 73: CB-2	786.89 786.59	782.01 780.59	12	0.013	123	1.154	(N/A)	(N/A) 66.87	(N/A)	3107745.61 3107868.58	1429450.02 1429442.02	(N/A)
CO-8	76: CB-3 75: MH-5	793.54 789	787.63 783.09	12	0.013	199	2.281	(N/A)	(N/A) 94	(N/A)	3107601.84 3107685.27	1429724.54 1429543.96	(N/A)
CO-9	77: MH-6 76: CB-3	800.99 793.54	793.51 787.63	12	0.013	280	2.1	(N/A)	(N/A) 90.19	(N/A)	3107496.69 3107601.84	1429983.74 1429724.54	(N/A)
CO-10	78: MH-7 77: MH-6	803.34 800.99	796.6 793.51	24	0.013	43	7.186	28.62	0 60.64	19.03	3107480.24 3107496.69	1430023.28 1429983.74	796.02
CO-16	84: CB-8 77: MH-6	804.58 800.99	799.39 793.51	18	0.013	117	5.026	5.23	0 23.55	10.67	3107595.21 3107496.69	1430047.51 1429983.74	796.93
CO-20	103: CB-11 72: MH-3	785.61 786	781.36 780.2	30	0.013	20	5.8	(N/A)	(N/A) 98.78	(N/A)	3107888.52 3107868.66	1429414.81 1429414.7	(N/A)
CO-38	139: MH-11 74: MH-4	787.52 786.89	782.56 782.01	12	0.013	57	0.965	(N/A)	(N/A) 61.13	(N/A)	3107715.17 3107745.61	1429497.86 1429450.02	(N/A)
CO-39	75: MH-5 139: MH-11	789 787.52	783.09 782.56	12	0.013	55	0.964	(N/A)	(N/A) 61.09	(N/A)	3107685.27 3107715.17	1429543.96 1429497.86	(N/A)
CO-40	142: CB-28 139: MH-11	787.52 787.52	784.44 782.56	12	0.013	7	3.429	(N/A)	(N/A) 6.6	(N/A)	3107709.27 3107715.17	1429494.48 1429497.86	(N/A)
CO-41	144: CB-29 74: MH-4	790 786.89	786 782.01	24	0.013	137	2.912	(N/A)	(N/A) 38.6	(N/A)	3107608.39 3107745.61	1429454.21 1429450.02	(N/A)
CO-43	151: CB-33 150: OF-3	775 772	771 768.4	21	0.013	203	1.281	18.11	0 17.93	8.52	3107515.23 3107541.74	1428875.45 1428674.62	771.15
CO-44	152: CB-34 151: CB-33	779 775	775 771	18	0.013	139	2.878	18.16	0 17.82	11.45	3107500.29 3107515.23	1429014.12 1428875.45	774.26
CO-45	72: MH-3 155: OF-4	786 784	780.2 779.8	12	0.013	148	0.27	39.84	0 95.08	6.45	3107868.66 3107869.46	1429414.7 1429266.21	781.54
CO-46	157: CB-35 163: OF-5	781.24 775.3	771.79 771	36	0.013	333	0.237	0.7	0 32.49	1.83	3107197.22 3107199.54	1429144.98 1428811.84	771.71
CO-47	160: CB-36 157: CB-35	783.5 781.24	778.3 771.79	15	0.013	77	8.455	0.72	0 18.78	4.93	3107197.87 3107197.22	1429222.44 1429144.98	775.21
CO-52	172: CB-39 78: MH-7	802.79 803.34	800.57 796.6	12	0.013	29	13.69	1.09	0 13.18	6.9	3107506.52 3107480.24	1430011.67 1430023.28	798.78
CO-53	173: CB-40 78: MH-7	803.47 803.34	798.57 796.6	15	0.013	22	8.955	20.18	0 19.33	18.35	3107474.29 3107480.24	1430044.58 1430023.28	798.63
CO-54	177: CB-44 176: CB-43	819.89 819.67	817.69 814.12	12	0.013	29	12.31	4.26	0 12.5	14.47	3107179.22 3107208.01	1430062.84 1430063.31	816.31
CO-55	176: CB-43 179: MH-15	819.67 818.91	814.12 814.36	12	0.013	31	0.032	5.89	0 0.64	7.49	3107208.01 3107204.54	1430063.31 1430032.48	815.78
CO-56	179: MH-15 178: MH-14	818.91 804.19	814.36 800.19	18	0.013	207	6.845	5.91	0 27.48	12.49	3107204.54 3107411.36	1430032.48 1430032.62	807.75

CO-57	178: MH-14 78: MH-7	804.19 803.34	800.19 796.6	18	0.013	70	5.129	7.29	0 23.79	11.9	3107411.36 3107480.24	1430032.62 1430023.28	798.96
CO-58	174: CB-41 178: MH-14	803.52 804.19	801.42 800.19	12	0.013	22	5.591	0.58	0 8.42	4.32	3107411.89 3107411.36	1430010.98 1430032.62	800.98
CO-59	175: CB-42 178: MH-14	804.03 804.19	800.51 800.19	18	0.013	13	2.462	0.81	0 16.48	1.96	3107412.12 3107411.36	1430045.95 1430032.62	800.78
CO-62	238: CB-47 240: OF-6	783.88 781.9	780.48 777.45	24	0.013	123	2.463	7.15	0 35.5	8.79	3107168.9 3107215.02	1429258.86 1429144.95	779.58
CO-82	337: CB-65 339: OF-8	792 789	783.2 782.6	36	0.013	6	10	42.92	0 210.91	7.07	3107704.41 3107700.07	1429655.11 1429650.77	785.72
CO-84	281: CB-59 283: CB-60	789 789	785.55 785.45	24	0.013	11	0.909	17.54	0 21.57	7.54	3107161.34 3107172.17	1429543.86 1429543.58	786.89
CO-85	283: CB-60 285: CB-61	789 789	785.45 784.89	30	0.013	92	0.609	18.97	0 32	6.83	3107172.17 3107205.23	1429543.58 1429457.24	786.55
CO-86	285: CB-61 287: CB-62	789 789	784.89 784.16	30	0.013	126	0.579	21.83	0 31.22	7	3107205.23 3107331.08	1429457.24 1429456.72	786.06
CO-87	287: CB-62 274: CB-56	789 789	784.16 783.46	30	0.013	140	0.5	21.72	0 29	5.59	3107331.08 3107470.7	1429456.72 1429456.88	785.87
CO-88	274: CB-56 276: CB-57	789 789	783.46 782.9	36	0.013	113	0.496	40.21	0 46.95	7.67	3107470.7 3107583.42	1429456.88 1429456.88	785.82
CO-89	276: CB-57 347: OF-9	789 789	782.9 782.6	36	0.013	24	1.25	48.22	0 74.57	8.22	3107583.42 3107597.75	1429456.88 1429476.53	785.74
CO-90	271: CB-54 272: CB-55	804 794	799 789	12	0.013	200	5	5	0 7.97	10.78	3107474.32 3107472.53	1429856.84 1429657.35	794.57
CO-91	272: CB-55 274: CB-56	794 789	789 783.46	24	0.013	200	2.77	11.79	0 37.65	10.64	3107472.53 3107470.7	1429657.35 1429456.88	787
CO-92	249: OS-2 362: MH-21	789 787.52	 781.9	36	0.013	19	3.158	39.3	0 118.52	12.67	3107699.11 3107718.17	1429482.53 1429482.61	783.56
CO-93	362: MH-21 364: MH-22	787.52 786.89	781.9 781.5	36	0.013	37	1.081	39.33	0 69.35	9.9	3107718.17 3107735.62	1429482.61 1429449.69	783.35
CO-96	364: MH-22 368: MH-23	786.89 786.59	781.5 780.5	36	0.013	133	0.752	39.57	0 57.83	8.87	3107735.62 3107868.29	1429449.69 1429442.2	782.81
CO-97	368: MH-23 72: MH-3	786.59 786	780.5 780.2	36	0.013	28	1.071	39.86	0 69.04	10.28	3107868.29 3107868.66	1429442.2 1429414.7	781.96
CO-98	77: MH-6 371: CB-66	800.99 793.54	793.51 787.63	36	0.013	280	2.1	34.04	0 96.65	12.48	3107496.69 3107601.68	1429983.74 1429724.19	792.39
CO-99	371: CB-66 335: CB-64	793.54 792	787.63 786.13	36	0.013	58	2.586	40.03	0 107.26	14	3107601.68 3107623.91	1429724.19 1429670.11	788.31
CO-101	335: CB-64 410: CB-67	792 792	786.13 784.3	36	0.013	81	2.261	41.65	0 100.28	11.27	3107623.91 3107705.07	1429670.11 1429669.24	786.92
CO-102	410: CB-67 337: CB-65	792 792	784.3 783.2	36	0.013	14	7.848	43.17	0 186.84	10.97	3107705.07 3107704.41	1429669.24 1429655.11	785.8

Calculations

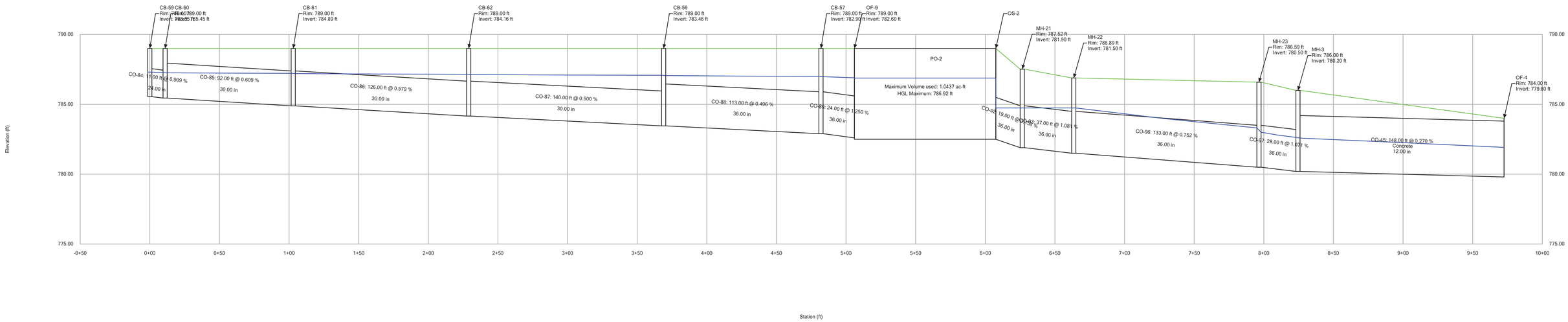
100 – Year Proposed

Catchment Table - 100 Year Proposed							
Label	Outflow Element	Area (Unified) (acres)	Runoff Method	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Maximum) (ft^3/s)	Notes
CM-120	152: CB-34	106899.946	Modified Rational	0.69	5	(N/A)	Existing - Madison St. Outfall
CM-121	73: CB-2	6937.229	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-122	142: CB-28	25877.415	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-123	74: MH-4	94800.244	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-125	144: CB-29	205818.922	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-126	76: CB-3	67975.164	Modified Rational	0.69	5	(N/A)	Existing - Morton St Outfall
CM-127	172: CB-39	10036.166	Modified Rational	0.69	5	0.94	Ex/Pr 11th St
CM-128	84: CB-8	8018.158	Modified Rational	0.69	5	0.75	Ex/Pr 11th St
CM-129	173: CB-40	4041.292	Modified Rational	0.69	5	0.38	Ex/Pr 11th St
CM-130	174: CB-41	5408.879	Modified Rational	0.69	5	0.51	Ex/Pr 11th St
CM-131	175: CB-42	7525.605	Modified Rational	0.69	5	0.71	Ex/Pr 11th St
CM-132	160: CB-36	28775.485	Modified Rational	0.69	5	(N/A)	Existing - East side of Rogers
CM-133	238: CB-47	193646.739	Modified Rational	0.69	5	(N/A)	Existing - West side of Rogers and Area West of Rogers
CM-37	173: CB-40	148209.346	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - Area North of 11th
CM-38	176: CB-43	11983.974	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - East side of Rogers Street North of 11th
CM-39	177: CB-44	31900.936	Modified Rational	0.69	5	(N/A)	Existing - Offsite flowing through system - West side of Rogers Street North of 11th
CM-41	84: CB-8	143312.4	None			(N/A)	Existing - Morton North Development - Offsite flowing through system
CM-42	84: CB-8	33087.162	Modified Rational	0.69	5	(N/A)	Existing - Offsite north of 11th flowing through system
CM-44	84: CB-8	140263.2	Modified Rational	0.69		(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-46	103: CB-11	119380.804	Modified Rational	0.69	5	(N/A)	Offsite Area east of project and Morton Street not flowing through Core System Analysis
CM-48		444312	Modified Rational	0.69	5	(N/A)	Offsite South of Site Rogers Street
CM-49	271: CB-54	37386.669	Modified Rational	0.85	5	4.33	Proposed - Morton St. Outlet
CM-50	272: CB-55	50857.544	Modified Rational	0.85	5	5.88	Proposed - Morton St. Outlet
CM-51	274: CB-56	51418.019	Modified Rational	0.85	5	5.95	Proposed - Morton St. Outlet
CM-52	285: CB-61	14232.134	Modified Rational	0.85	5	1.65	Proposed - East Side Rogers St. flowing to Morton St. Outlet
CM-53	283: CB-60	10494.99	Modified Rational	0.85	5	1.21	Proposed - Rogers St. West side flowing to Morton St. Outlet
CM-54	281: CB-59	131632.351	Modified Rational	0.85	5	15.23	Proposed - West of Rogers St. flowing to Morton St. Outlet
CM-55	285: CB-61	7578.97	Modified Rational	0.85	5	0.88	Proposed - 10th St. to Morton St. Outlet
CM-57	152: CB-34	135912.822	Modified Rational	0.85	5	15.72	Proposed - Area south of 10th St. to Madison St. Outfall
CM-58	276: CB-57	8380.808	Modified Rational	0.85	5	0.97	Proposed - 10th St. to Morton St. Outlet
CM-62	364: MH-22	21364.978	Modified Rational	0.85	5	2.47	Proposed - Morton St. Outlet
CM-63	410: CB-67	40150.836	Modified Rational	0.85	5	4.65	Proposed - Morton St. Outlet
CM-64	276: CB-57	28193.335	Modified Rational	0.85	5	3.26	Proposed - Morton St. Outlet
CM-65	276: CB-57	22454.841	Modified Rational	0.85	5	2.6	Proposed - Morton St. Outlet
CM-66	335: CB-64	45822.162	Modified Rational	0.85	5	5.3	Proposed - Morton St. Outlet
CM-67	371: CB-66	51664.518	Modified Rational	0.85	5	5.98	Proposed - Morton St. Outlet
CM-68	160: CB-36	5373.244	Modified Rational	0.85	5	0.62	Proposed - East side Rogers St. to Rogers St. outlet - no detention
CM-69	238: CB-47	53499.168	Modified Rational	0.85	5	6.19	Proposed - Rogers St. Outlet - No detention
CM-71	84: CB-8	32787.361	Modified Rational	0.85	5	3.79	Proposed - Offsite north of 11th flowing to Morton St. Outlet
CM-72	177: CB-44	31969.107	Modified Rational	0.85	5	3.7	Proposed - Offsite West side of Rogers north of 11th flowing to Morton St. Outlet
CM-73	176: CB-43	12188.817	Modified Rational	0.85	5	1.41	Proposed - Offsite East side of Rogers north of 11th flowing to Morton St. Outlet
CM-74	173: CB-40	148178.919	Modified Rational	0.85	5	17.14	Proposed - Offsite Area North of 11th flowing to Morton St. Outlet
CM-56	276: CB-57	3229.603	Modified Rational	0.85	5	0.37	Proposed - 10th St. to Morton St. Outlet
CM-60	368: MH-23	9049.309	Modified Rational	0.85	5	1.05	
CM-59	368: MH-23	2111.07	Modified Rational	0.85	5	0.24	

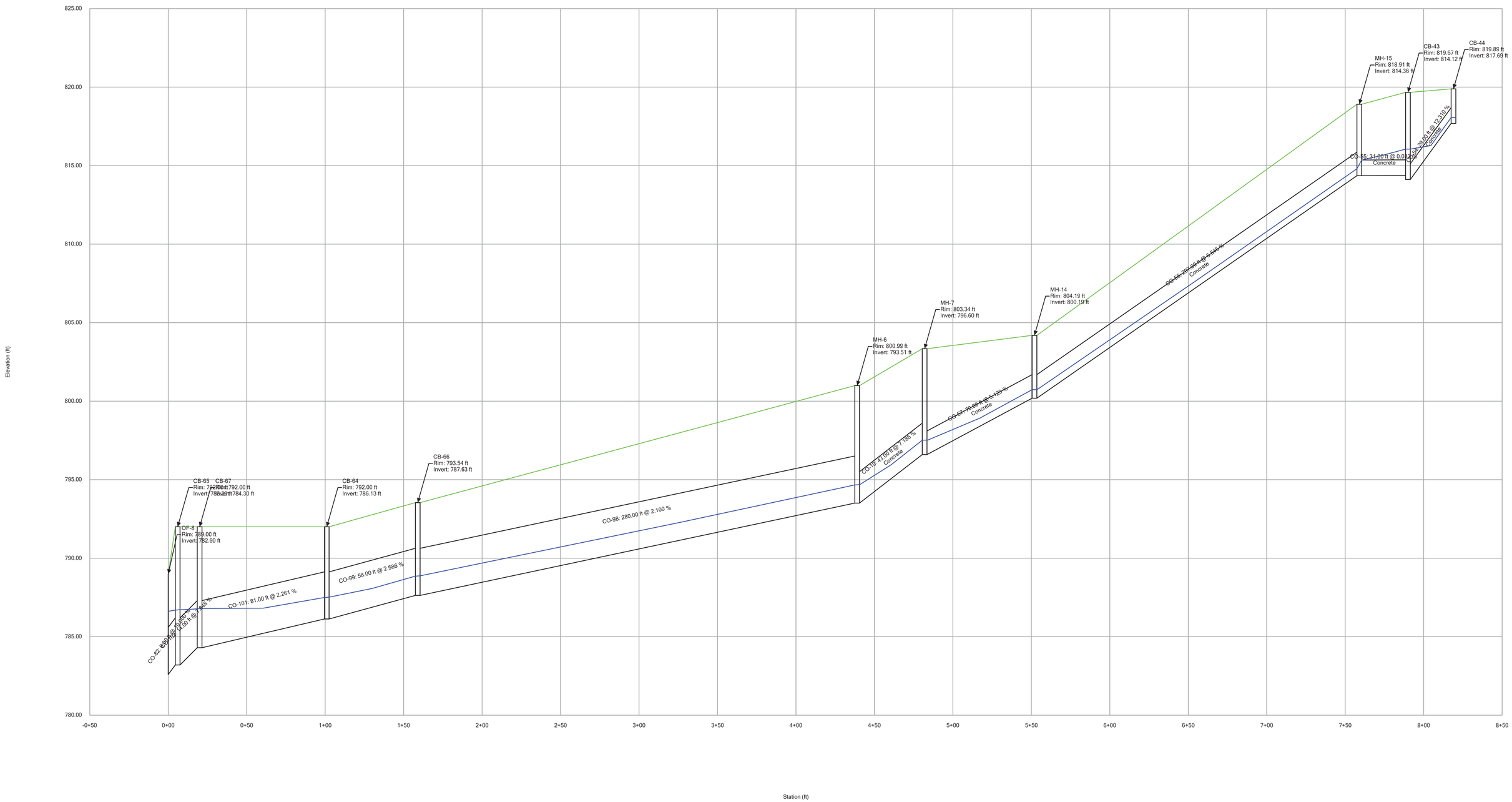
DOT Report - 100yr Proposed													
Label	-Node- Upstream / Downstream	-Ground- Upstream / Downstream (ft)	-Invert- Upstream / Downstream (ft)	Diameter (in)	Manning's n	Length (Unified) (ft)	Slope (Calculated) (%)	Flow (Maximum) (ft^3/s)	Section Discharge Capacity (ft^3/s)	Velocity (Maximum Calculated) (ft/s)	-X- Upstream / Downstream (ft)	-Y- Upstream / Downstream (ft)	Hydraulic Grade (Maximum) (ft)
CO-5	73: CB-2 72: MH-3	786.59 786	780.59 780.2	12	0.013	27	1.444	(N/A)	(N/A) 219.8	(N/A)	3107868.58 3107868.66	1429442.02 1429414.7	(N/A)
CO-6	74: MH-4 73: CB-2	786.89 786.59	782.01 780.59	12	0.013	123	1.154	(N/A)	(N/A) 66.87	(N/A)	3107745.61 3107868.58	1429450.02 1429442.02	(N/A)
CO-8	76: CB-3 75: MH-5	793.54 789	787.63 783.09	12	0.013	199	2.281	(N/A)	(N/A) 94	(N/A)	3107601.84 3107685.27	1429724.54 1429543.96	(N/A)
CO-9	77: MH-6 76: CB-3	800.99 793.54	793.51 787.63	12	0.013	280	2.1	(N/A)	(N/A) 90.19	(N/A)	3107496.69 3107601.84	1429983.74 1429724.54	(N/A)
CO-10	78: MH-7 77: MH-6	803.34 800.99	796.6 793.51	24	0.013	43	7.186	24.79	0 60.64	18.34	3107480.24 3107496.69	1430023.28 1429983.74	795.95
CO-16	84: CB-8 77: MH-6	804.58 800.99	799.39 793.51	18	0.013	117	5.026	4.55	0 23.55	10.23	3107595.21 3107496.69	1430047.51 1429983.74	796.9
CO-20	103: CB-11 72: MH-3	785.61 786	781.36 780.2	30	0.013	20	5.8	(N/A)	(N/A) 98.78	(N/A)	3107888.52 3107868.66	1429414.81 1429414.7	(N/A)
CO-38	139: MH-11 74: MH-4	787.52 786.89	782.56 782.01	12	0.013	57	0.965	(N/A)	(N/A) 61.13	(N/A)	3107715.17 3107745.61	1429497.86 1429450.02	(N/A)
CO-39	75: MH-5 139: MH-11	789 787.52	783.09 782.56	12	0.013	55	0.964	(N/A)	(N/A) 61.09	(N/A)	3107685.27 3107715.17	1429543.96 1429497.86	(N/A)
CO-40	142: CB-28 139: MH-11	787.52 787.52	784.44 782.56	12	0.013	7	3.429	(N/A)	(N/A) 6.6	(N/A)	3107709.27 3107715.17	1429494.48 1429497.86	(N/A)
CO-41	144: CB-29 74: MH-4	790 786.89	786 782.01	24	0.013	137	2.912	(N/A)	(N/A) 38.6	(N/A)	3107608.39 3107745.61	1429454.21 1429450.02	(N/A)
CO-43	151: CB-33 150: OF-3	775 772	771 768.4	21	0.013	203	1.281	15.72	0 17.93	8.4	3107515.23 3107541.74	1428875.45 1428674.62	770.97
CO-44	152: CB-34 151: CB-33	779 775	775 771	18	0.013	139	2.878	15.72	0 17.82	11.34	3107500.29 3107515.23	1429014.12 1428875.45	774.1
CO-45	72: MH-3 155: OF-4	786 784	780.2 779.8	12	0.013	148	0.27	71.83	0 95.08	7.82	3107868.66 3107869.46	1429414.7 1429266.21	782.3
CO-46	157: CB-35 163: OF-5	781.24 775.3	771.79 771	36	0.013	333	0.237	0.66	0 32.49	1.83	3107197.22 3107199.54	1429144.98 1428811.84	771.69
CO-47	160: CB-36 157: CB-35	783.5 781.24	778.3 771.79	15	0.013	77	8.455	0.62	0 18.78	4.4	3107197.87 3107197.22	1429222.44 1429144.98	775.2
CO-52	172: CB-39 78: MH-7	802.79 803.34	800.57 796.6	12	0.013	29	13.69	0.94	0 13.18	6.12	3107506.52 3107480.24	1430011.67 1430023.28	798.77
CO-53	173: CB-40 78: MH-7	803.47 803.34	798.57 796.6	15	0.013	22	8.955	17.52	0 19.33	17.73	3107474.29 3107480.24	1430044.58 1430023.28	798.52
CO-54	177: CB-44 176: CB-43	819.89 819.67	817.69 814.12	12	0.013	29	12.31	3.7	0 12.5	13.89	3107179.22 3107208.01	1430062.84 1430063.31	816.28
CO-55	176: CB-43 179: MH-15	819.67 818.91	814.12 814.36	12	0.013	31	0.032	5.11	0 0.64	6.5	3107208.01 3107204.54	1430063.31 1430032.48	815.68
CO-56	179: MH-15 178: MH-14	818.91 804.19	814.36 800.19	18	0.013	207	6.845	5.11	0 27.48	11.83	3107204.54 3107411.36	1430032.48 1430032.62	807.71

CO-57	178: MH-14	804.19	800.19	18	0.013	70	5.129	6.32	0	11.38	3107411.36	1430032.62	798.92
	78: MH-7	803.34	796.6						23.79		3107480.24	1430023.28	
CO-58	174: CB-41	803.52	801.42	12	0.013	22	5.591	0.51	0	3.88	3107411.89	1430010.98	800.97
	178: MH-14	804.19	800.19						8.42		3107411.36	1430032.62	
CO-59	175: CB-42	804.03	800.51	18	0.013	13	2.462	0.71	0	1.97	3107412.12	1430045.95	800.73
	178: MH-14	804.19	800.19						16.48		3107411.36	1430032.62	
CO-62	238: CB-47	783.88	780.48	24	0.013	123	2.463	6.19	0	8.45	3107168.9	1429258.86	779.53
	240: OF-6	781.9	777.45						35.5		3107215.02	1429144.95	
CO-82	337: CB-65	792	783.2	36	0.013	6	10	46.32	0	8.36	3107704.41	1429655.11	786.96
	339: OF-8	789	782.6						210.91		3107700.07	1429650.77	
CO-84	281: CB-59	789	785.55	24	0.013	11	0.909	15.23	0	7.26	3107161.34	1429543.86	787.28
	283: CB-60	789	785.45						21.57		3107172.17	1429543.58	
CO-85	283: CB-60	789	785.45	30	0.013	92	0.609	16.44	0	6.55	3107172.17	1429543.58	787.24
	285: CB-61	789	784.89						32		3107205.23	1429457.24	
CO-86	285: CB-61	789	784.89	30	0.013	126	0.579	18.97	0	6.67	3107205.23	1429457.24	787.19
	287: CB-62	789	784.16						31.22		3107331.08	1429456.72	
CO-87	287: CB-62	789	784.16	30	0.013	140	0.5	18.97	0	5.33	3107331.08	1429456.72	787.13
	274: CB-56	789	783.46						29		3107470.7	1429456.88	
CO-88	274: CB-56	789	783.46	36	0.013	113	0.496	35.13	0	6.17	3107470.7	1429456.88	787.06
	276: CB-57	789	782.9						46.95		3107583.42	1429456.88	
CO-89	276: CB-57	789	782.9	36	0.013	24	1.25	42.33	0	6.5	3107583.42	1429456.88	786.98
	347: OF-9	789	782.6						74.57		3107597.75	1429476.53	
CO-90	271: CB-54	804	799	12	0.013	200	5	4.33	0	10.31	3107474.32	1429856.84	794.53
	272: CB-55	794	789						7.97		3107472.53	1429657.35	
CO-91	272: CB-55	794	789	24	0.013	200	2.77	10.21	0	10.17	3107472.53	1429657.35	787.11
	274: CB-56	789	783.46						37.65		3107470.7	1429456.88	
CO-92	249: OS-2	789		36	0.013	19	3.158	72.35	0	11.33	3107699.11	1429482.53	784.97
	362: MH-21	787.52	781.9						118.52		3107718.17	1429482.61	
CO-93	362: MH-21	787.52	781.9	36	0.013	37	1.081	70.45	0	9.97	3107718.17	1429482.61	784.97
	364: MH-22	786.89	781.5						69.35		3107735.62	1429449.69	
CO-96	364: MH-22	786.89	781.5	36	0.013	133	0.752	72.09	0	10.2	3107735.62	1429449.69	784.14
	368: MH-23	786.59	780.5						57.83		3107868.29	1429442.2	
CO-97	368: MH-23	786.59	780.5	36	0.013	28	1.071	72.98	0	11.58	3107868.29	1429442.2	782.85
	72: MH-3	786	780.2						69.04		3107868.66	1429414.7	
CO-98	77: MH-6	800.99	793.51	36	0.013	280	2.1	29.41	0	11.98	3107496.69	1429983.74	792.33
	371: CB-66	793.54	787.63						96.65		3107601.68	1429724.19	
CO-99	371: CB-66	793.54	787.63	36	0.013	58	2.586	36.86	0	13.27	3107601.68	1429724.19	788.13
	335: CB-64	792	786.13						107.26		3107623.91	1429670.11	
CO-101	335: CB-64	792	786.13	36	0.013	81	2.261	40.65	0	13.43	3107623.91	1429670.11	787.12
	410: CB-67	792	784.3						100.28		3107705.07	1429669.24	
CO-102	410: CB-67	792	784.3	36	0.013	14	7.848	45.48	0	13.75	3107705.07	1429669.24	787.04
	337: CB-65	792	783.2						186.84		3107704.41	1429655.11	

Profile Report
Engineering Profile - Rogers to Morton Outfall (CTPMasterplan11-14-2014.stsw)



Profile Report
Engineering Profile - 11th/Rogers to Pond (CTPMasterplan11-14-2014.stsw)



Intensity Duration Frequency Values Used in Hydraulic Calculations From NOAA Atlas 14, Bloomington, Indiana

NOAA Atlas 14, Volume 2, Version 3
Location name: Bloomington, Indiana, US*
Latitude: 39.1774°, Longitude: -86.5261°
Elevation: 809 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.61 (4.16–5.12)	5.48 (4.96–6.10)	6.59 (5.93–7.32)	7.46 (6.68–8.28)	8.60 (7.66–9.58)	9.52 (8.40–10.6)	10.4 (9.11–11.6)	11.4 (9.83–12.8)	12.6 (10.8–14.3)	13.6 (11.4–15.5)
10-min	3.58 (3.23–3.98)	4.28 (3.86–4.76)	5.12 (4.61–5.69)	5.76 (5.16–6.40)	6.58 (5.85–7.32)	7.21 (6.37–8.03)	7.84 (6.86–8.76)	8.47 (7.33–9.52)	9.30 (7.91–10.5)	9.91 (8.31–11.3)
15-min	2.92 (2.64–3.25)	3.49 (3.15–3.88)	4.19 (3.77–4.66)	4.72 (4.23–5.24)	5.42 (4.82–6.03)	5.95 (5.26–6.63)	6.49 (5.68–7.25)	7.03 (6.08–7.89)	7.74 (6.58–8.75)	8.26 (6.92–9.42)
30-min	1.93 (1.75–2.15)	2.34 (2.11–2.60)	2.87 (2.58–3.19)	3.28 (2.94–3.64)	3.83 (3.40–4.26)	4.25 (3.76–4.74)	4.69 (4.10–5.24)	5.13 (4.44–5.76)	5.73 (4.87–6.48)	6.19 (5.19–7.06)
60-min	1.18 (1.07–1.31)	1.43 (1.29–1.59)	1.80 (1.62–2.00)	2.09 (1.87–2.32)	2.48 (2.21–2.76)	2.80 (2.47–3.12)	3.13 (2.74–3.50)	3.48 (3.01–3.91)	3.96 (3.37–4.48)	4.35 (3.64–4.96)
2-hr	0.690 (0.622–0.772)	0.836 (0.754–0.935)	1.05 (0.948–1.18)	1.23 (1.10–1.37)	1.48 (1.32–1.65)	1.69 (1.49–1.89)	1.92 (1.66–2.14)	2.15 (1.84–2.41)	2.49 (2.09–2.82)	2.77 (2.29–3.15)
3-hr	0.491 (0.443–0.553)	0.595 (0.536–0.670)	0.753 (0.676–0.847)	0.882 (0.787–0.990)	1.07 (0.941–1.20)	1.22 (1.07–1.37)	1.39 (1.20–1.57)	1.57 (1.33–1.77)	1.83 (1.52–2.08)	2.05 (1.66–2.34)
6-hr	0.297 (0.267–0.338)	0.360 (0.323–0.409)	0.456 (0.407–0.518)	0.535 (0.476–0.607)	0.650 (0.571–0.737)	0.747 (0.650–0.847)	0.853 (0.731–0.969)	0.968 (0.816–1.10)	1.14 (0.935–1.30)	1.28 (1.03–1.47)
12-hr	0.175 (0.157–0.199)	0.211 (0.190–0.240)	0.264 (0.236–0.299)	0.307 (0.274–0.348)	0.368 (0.326–0.416)	0.419 (0.368–0.474)	0.474 (0.410–0.536)	0.531 (0.454–0.603)	0.614 (0.515–0.702)	0.682 (0.562–0.783)
24-hr	0.106 (0.099–0.115)	0.128 (0.119–0.138)	0.159 (0.148–0.172)	0.185 (0.172–0.199)	0.221 (0.204–0.239)	0.252 (0.231–0.271)	0.284 (0.258–0.306)	0.318 (0.287–0.344)	0.366 (0.327–0.398)	0.407 (0.359–0.444)
2-day	0.063 (0.059–0.067)	0.075 (0.070–0.081)	0.093 (0.087–0.100)	0.108 (0.100–0.115)	0.128 (0.119–0.137)	0.145 (0.133–0.155)	0.162 (0.149–0.174)	0.181 (0.164–0.195)	0.207 (0.186–0.225)	0.228 (0.203–0.249)
3-day	0.045 (0.042–0.048)	0.054 (0.051–0.058)	0.066 (0.062–0.071)	0.077 (0.072–0.082)	0.091 (0.085–0.097)	0.103 (0.095–0.110)	0.115 (0.106–0.123)	0.128 (0.117–0.138)	0.147 (0.133–0.158)	0.162 (0.145–0.176)
4-day	0.036 (0.034–0.038)	0.043 (0.041–0.046)	0.053 (0.050–0.056)	0.061 (0.057–0.065)	0.072 (0.068–0.077)	0.082 (0.076–0.087)	0.092 (0.085–0.098)	0.102 (0.094–0.109)	0.117 (0.106–0.125)	0.129 (0.116–0.139)
7-day	0.024 (0.023–0.026)	0.029 (0.027–0.031)	0.035 (0.033–0.037)	0.040 (0.038–0.043)	0.047 (0.044–0.050)	0.053 (0.050–0.056)	0.059 (0.055–0.062)	0.065 (0.060–0.069)	0.073 (0.067–0.078)	0.080 (0.073–0.086)
10-day	0.019 (0.018–0.020)	0.023 (0.022–0.024)	0.028 (0.026–0.029)	0.032 (0.030–0.034)	0.037 (0.035–0.039)	0.042 (0.039–0.044)	0.046 (0.043–0.049)	0.050 (0.047–0.054)	0.057 (0.052–0.061)	0.062 (0.056–0.066)
20-day	0.013 (0.013–0.014)	0.016 (0.015–0.017)	0.019 (0.018–0.020)	0.021 (0.020–0.022)	0.024 (0.023–0.025)	0.027 (0.025–0.028)	0.029 (0.027–0.031)	0.031 (0.029–0.033)	0.035 (0.032–0.037)	0.037 (0.034–0.039)
30-day	0.011 (0.010–0.011)	0.013 (0.012–0.014)	0.015 (0.014–0.016)	0.017 (0.016–0.018)	0.019 (0.018–0.020)	0.021 (0.020–0.022)	0.023 (0.021–0.024)	0.025 (0.023–0.026)	0.027 (0.025–0.028)	0.029 (0.026–0.030)
45-day	0.009 (0.009–0.010)	0.011 (0.010–0.011)	0.013 (0.012–0.013)	0.014 (0.013–0.015)	0.016 (0.015–0.016)	0.017 (0.016–0.018)	0.018 (0.017–0.019)	0.020 (0.018–0.021)	0.021 (0.020–0.022)	0.022 (0.021–0.024)
60-day	0.008 (0.008–0.009)	0.010 (0.009–0.010)	0.011 (0.011–0.012)	0.012 (0.012–0.013)	0.014 (0.013–0.014)	0.015 (0.014–0.016)	0.016 (0.015–0.017)	0.017 (0.016–0.018)	0.018 (0.017–0.019)	0.019 (0.018–0.020)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Stormwater Detention Outlet Structure Calculations

Composite Outlet Structures Detailed Report: Control Structure

Element Details			
Label	Control Structure	Notes	

Headwater Range			
Headwater Type	User Defined Headwater	Increment (Headwater)	0.50 ft
Minimum (Headwater)	782.50 ft	Maximum (Headwater)	787.60 ft
Spot Elevation (ft)			

Tailwater Setup			
Tailwater Type	Interconnected Ponds	Increment (Tailwater)	0.70 ft
Minimum (Tailwater)	781.90 ft	Maximum (Tailwater)	789.60 ft
Spot Elevation (ft)			

Tailwater Tolerances			
Maximum Iterations	30	Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft	Flow Tolerance (Minimum)	0.001 ft^3/s
Headwater Tolerance (Maximum)	0.50 ft	Flow Tolerance (Maximum)	10.000 ft^3/s
Tailwater Tolerance (Minimum)	0.01 ft		

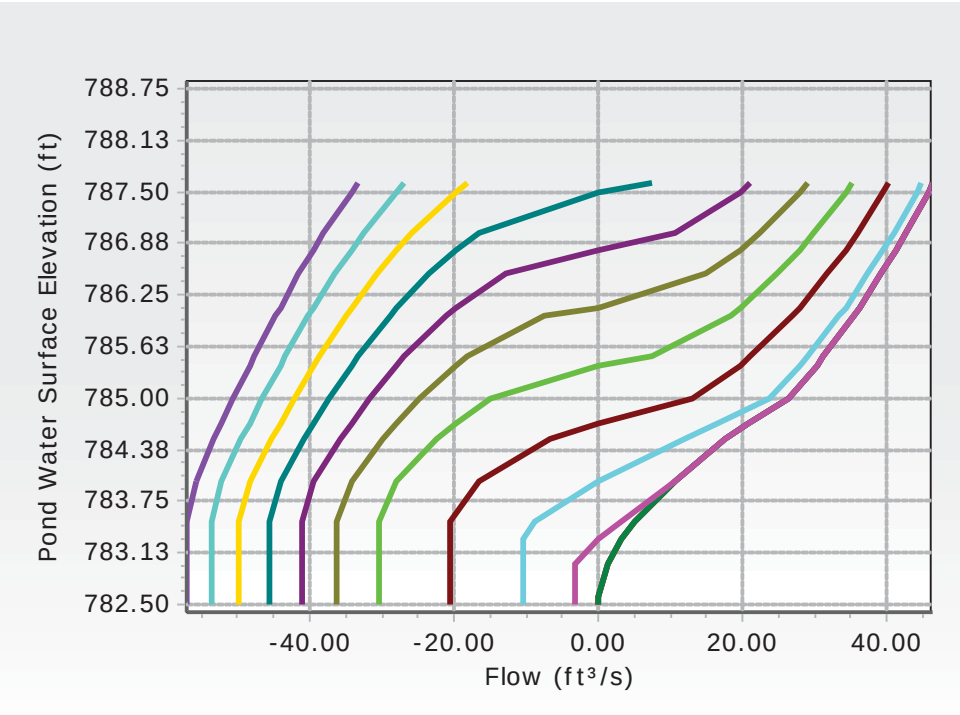
Outlet Structure			
Outlet Structure Type	Orifice	Orifice Coefficient	0.600
Flow Direction	Forward and Reverse Flow	Elevation	782.50 ft
Number of Openings	1		

Outlet Structure (IDs and Direction)			
Outlet ID	Orifice - 1	Notes	
Downstream ID	Tailwater		

Outlet Structure (Advanced)			
Elevation (On)	770.00 ft	Elevation (Off)	800.00 ft

Outlet Structure (Orifice)			
Orifice Type	Circular Orifice	Orifice Diameter	30.00 in

Composite Outlet Structures Detailed Report: Control Structure



RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	0.00	781.90
782.60	0.05	781.90
783.00	1.31	781.90
783.30	3.25	781.90
783.50	4.98	781.90
784.00	10.55	781.90
784.50	17.59	781.90
784.70	20.69	781.90
785.00	26.41	781.90
785.40	30.35	781.90
785.50	31.25	781.90
786.00	35.44	781.90
786.10	36.22	781.90
786.50	39.18	781.90
786.80	41.26	781.90
787.00	42.59	781.90
787.50	45.75	781.90
787.60	46.36	781.90

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Convergence Error (ft)	Computation Messages
0.00	Upstream HW & DNstream TW < Inv.El
0.00	CRIT.DEPTH CONTROL Vh= .025ft Dcr= .076ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .128ft Dcr= .372ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .209ft Dcr= .591ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .265ft Dcr= .736ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.086ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .581ft Dcr= 1.420ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .656ft Dcr= 1.545ft CRIT.DEPTH Hev= .00ft
0.00	H =1.25
0.00	H =1.65
0.00	H =1.75
0.00	H =2.25
0.00	H =2.35
0.00	H =2.75
0.00	H =3.05
0.00	H =3.25
0.00	H =3.75
0.00	H =3.85

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	782.50
782.60	0.05	782.50
783.00	1.31	782.50
783.30	3.25	782.50
783.50	4.98	782.50
784.00	10.55	782.50
784.50	17.59	782.50
784.70	20.69	782.50

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
785.00	26.41	782.50
785.40	30.35	782.50
785.50	31.25	782.50
786.00	35.44	782.50
786.10	36.22	782.50
786.50	39.18	782.50
786.80	41.26	782.50
787.00	42.59	782.50
787.50	45.75	782.50
787.60	46.36	782.50

Convergence Error (ft)	Computation Messages
0.00	Upstream HW & DNstream TW < Inv.El
0.00	CRIT.DEPTH CONTROL Vh= .025ft Dcr= .076ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .128ft Dcr= .372ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .209ft Dcr= .591ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .265ft Dcr= .736ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.086ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .581ft Dcr= 1.420ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .656ft Dcr= 1.545ft CRIT.DEPTH Hev= .00ft
0.00	H =1.25
0.00	H =1.65
0.00	H =1.75
0.00	H =2.25
0.00	H =2.35
0.00	H =2.75
0.00	H =3.05
0.00	H =3.25
0.00	H =3.75
0.00	H =3.85

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-0.05	782.60
782.60	0.00	782.60
783.00	1.31	782.60
783.30	3.25	782.60
783.50	4.98	782.60
784.00	10.55	782.60
784.50	17.59	782.60
784.70	20.69	782.60
785.00	26.41	782.60
785.40	30.35	782.60
785.50	31.25	782.60
786.00	35.44	782.60
786.10	36.22	782.60
786.50	39.18	782.60
786.80	41.26	782.60
787.00	42.59	782.60
787.50	45.75	782.60
787.60	46.36	782.60

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .025ft Dcr= .074ft REVERSE Hev= .00ft
0.00	HW = TW elev
0.00	CRIT.DEPTH CONTROL Vh= .128ft Dcr= .372ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .209ft Dcr= .591ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .265ft Dcr= .736ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.086ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .581ft Dcr= 1.420ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .656ft Dcr= 1.545ft CRIT.DEPTH Hev= .00ft
0.00	H =1.25
0.00	H =1.65
0.00	H =1.75
0.00	H =2.25
0.00	H =2.35
0.00	H =2.75
0.00	H =3.05

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Convergence Error (ft)	Computation Messages
0.00	H =3.25
0.00	H =3.75
0.00	H =3.85

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-3.25	783.30
782.60	-3.25	783.30
783.00	-3.25	783.30
783.30	0.00	783.30
783.50	3.11	783.30
784.00	10.55	783.30
784.50	17.59	783.30
784.70	20.69	783.30
785.00	26.41	783.30
785.40	30.35	783.30
785.50	31.25	783.30
786.00	35.44	783.30
786.10	36.22	783.30
786.50	39.18	783.30
786.80	41.26	783.30
787.00	42.59	783.30
787.50	45.75	783.30
787.60	46.36	783.30

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .209ft Dcr= .591ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .209ft Dcr= .591ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .209ft Dcr= .591ft REVERSE Hev= .00ft
0.00	HW = TW elev
0.00	BACKWATER CONTROL.. Vh= .199ft hwDi= .800ft Lbw= .0ft Hev= .00ft

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.086ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .581ft Dcr= 1.420ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .656ft Dcr= 1.545ft CRIT.DEPTH Hev= .00ft
0.00	H =1.25
0.00	H =1.65
0.00	H =1.75
0.00	H =2.25
0.00	H =2.35
0.00	H =2.75
0.00	H =3.05
0.00	H =3.25
0.00	H =3.75
0.00	H =3.85

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-10.56	784.00
782.60	-10.56	784.00
783.00	-10.56	784.00
783.30	-10.56	784.00
783.50	-8.80	784.00
784.00	0.00	784.00
784.50	11.81	784.00
784.70	16.54	784.00
785.00	23.63	784.00
785.40	27.95	784.00
785.50	28.94	784.00
786.00	33.41	784.00
786.10	34.24	784.00
786.50	37.36	784.00
786.80	39.53	784.00
787.00	40.92	784.00
787.50	44.20	784.00

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
787.60	44.83	784.00

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.087ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.087ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.087ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.087ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .413ft Dcr= 1.087ft REVERSE Hev= .00ft
0.00	HW = TW elev
0.00	BACKWATER CONTROL.. Vh= .500ft hwDi= 1.500ft Lbw= .0ft Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .656ft Dcr= 1.545ft CRIT.DEPTH Hev= .00ft
0.00	H =1.00
0.00	H =1.40
0.00	H =1.50
0.00	H =2.00
0.00	H =2.10
0.00	H =2.50
0.00	H =2.80
0.00	H =3.00
0.00	H =3.50
0.00	H =3.60

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-20.67	784.70
782.60	-20.67	784.70
783.00	-20.67	784.70
783.30	-20.67	784.70
783.50	-20.67	784.70

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
784.00	-16.54	784.70
784.50	-6.68	784.70
784.70	0.00	784.70
785.00	12.94	784.70
785.40	19.77	784.70
785.50	21.13	784.70
786.00	26.94	784.70
786.10	27.95	784.70
786.50	31.70	784.70
786.80	34.24	784.70
787.00	35.83	784.70
787.50	39.53	784.70
787.60	40.23	784.70

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .655ft Dcr= 1.544ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .655ft Dcr= 1.544ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .655ft Dcr= 1.544ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .655ft Dcr= 1.544ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .655ft Dcr= 1.544ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .655ft Dcr= 1.544ft REVERSE Hev= .00ft
0.00	REVERSE BACKWATER.. Vh= .199ft twDi= 2.000ft Lbw= .0ft Hev= .00ft
0.00	HW = TW elev
0.00	H =.30
0.00	H =.70
0.00	H =.80
0.00	H =1.30
0.00	H =1.40
0.00	H =1.80
0.00	H =2.10
0.00	H =2.30
0.00	H =2.80
0.00	H =2.90

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-30.35	785.40
782.60	-30.35	785.40
783.00	-30.35	785.40
783.30	-30.35	785.40
783.50	-30.35	785.40
784.00	-27.95	785.40
784.50	-22.41	785.40
784.70	-19.77	785.40
785.00	-14.94	785.40
785.40	0.00	785.40
785.50	7.47	785.40
786.00	18.30	785.40
786.10	19.77	785.40
786.50	24.78	785.40
786.80	27.95	785.40
787.00	29.88	785.40
787.50	34.24	785.40
787.60	35.04	785.40

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =1.65
0.00	REVERSE: H =1.65
0.00	REVERSE: H =1.65
0.00	REVERSE: H =1.65
0.00	REVERSE: H =1.65
0.00	REVERSE: H =1.40
0.00	REVERSE: H =.90
0.00	REVERSE: H =.70
0.00	REVERSE: H =.40
0.00	H =.00
0.00	H =.10
0.00	H =.60
0.00	H =.70
0.00	H =1.10
0.00	H =1.40
0.00	H =1.60
0.00	H =2.10
0.00	H =2.20

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-36.22	786.10
782.60	-36.22	786.10
783.00	-36.22	786.10
783.30	-36.22	786.10
783.50	-36.22	786.10
784.00	-34.24	786.10
784.50	-29.88	786.10
784.70	-27.95	786.10
785.00	-24.78	786.10
785.40	-19.77	786.10
785.50	-18.30	786.10
786.00	-7.47	786.10
786.10	0.00	786.10
786.50	14.94	786.10
786.80	19.77	786.10
787.00	22.41	786.10
787.50	27.95	786.10
787.60	28.94	786.10

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =2.35
0.00	REVERSE: H =2.35
0.00	REVERSE: H =2.35
0.00	REVERSE: H =2.35
0.00	REVERSE: H =2.35
0.00	REVERSE: H =2.10
0.00	REVERSE: H =1.60
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.10
0.00	REVERSE: H =.70
0.00	REVERSE: H =.60
0.00	REVERSE: H =.10
0.00	H =.00
0.00	H =.40
0.00	H =.70
0.00	H =.90
0.00	H =1.40
0.00	H =1.50

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-41.26	786.80
782.60	-41.26	786.80
783.00	-41.26	786.80
783.30	-41.26	786.80
783.50	-41.26	786.80
784.00	-39.53	786.80
784.50	-35.83	786.80
784.70	-34.24	786.80
785.00	-31.70	786.80
785.40	-27.95	786.80
785.50	-26.94	786.80
786.00	-21.13	786.80
786.10	-19.77	786.80
786.50	-12.94	786.80
786.80	0.00	786.80
787.00	10.57	786.80
787.50	19.77	786.80
787.60	21.13	786.80

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =3.05
0.00	REVERSE: H =3.05
0.00	REVERSE: H =3.05
0.00	REVERSE: H =3.05
0.00	REVERSE: H =3.05
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.30
0.00	REVERSE: H =2.10
0.00	REVERSE: H =1.80
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.30
0.00	REVERSE: H =.80
0.00	REVERSE: H =.70
0.00	REVERSE: H =.30
0.00	H =.00
0.00	H =.20
0.00	H =.70
0.00	H =.80

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-45.75	787.50
782.60	-45.75	787.50
783.00	-45.75	787.50
783.30	-45.75	787.50
783.50	-45.75	787.50
784.00	-44.20	787.50
784.50	-40.92	787.50
784.70	-39.53	787.50
785.00	-37.36	787.50
785.40	-34.24	787.50
785.50	-33.41	787.50
786.00	-28.94	787.50
786.10	-27.95	787.50
786.50	-23.63	787.50
786.80	-19.77	787.50
787.00	-16.71	787.50
787.50	0.00	787.50
787.60	7.47	787.50

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =3.75
0.00	REVERSE: H =3.75
0.00	REVERSE: H =3.75
0.00	REVERSE: H =3.75
0.00	REVERSE: H =3.75
0.00	REVERSE: H =3.50
0.00	REVERSE: H =3.00
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.50
0.00	REVERSE: H =2.10
0.00	REVERSE: H =2.00
0.00	REVERSE: H =1.50
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.00
0.00	REVERSE: H =.70
0.00	REVERSE: H =.50
0.00	H =.00
0.00	H =.10

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-49.84	788.20
782.60	-49.84	788.20
783.00	-49.84	788.20
783.30	-49.84	788.20
783.50	-49.84	788.20
784.00	-48.42	788.20
784.50	-45.45	788.20
784.70	-44.20	788.20
785.00	-42.26	788.20
785.40	-39.53	788.20
785.50	-38.82	788.20
786.00	-35.04	788.20
786.10	-34.24	788.20
786.50	-30.80	788.20
786.80	-27.95	788.20
787.00	-25.88	788.20
787.50	-19.77	788.20
787.60	-18.30	788.20

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =4.45
0.00	REVERSE: H =4.45
0.00	REVERSE: H =4.45
0.00	REVERSE: H =4.45
0.00	REVERSE: H =4.45
0.00	REVERSE: H =4.20
0.00	REVERSE: H =3.70
0.00	REVERSE: H =3.50
0.00	REVERSE: H =3.20
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.70
0.00	REVERSE: H =2.20
0.00	REVERSE: H =2.10
0.00	REVERSE: H =1.70
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.20
0.00	REVERSE: H =.70
0.00	REVERSE: H =.60

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-53.62	788.90
782.60	-53.62	788.90
783.00	-53.62	788.90
783.30	-53.62	788.90
783.50	-53.62	788.90
784.00	-52.30	788.90
784.50	-49.56	788.90
784.70	-48.42	788.90
785.00	-46.66	788.90
785.40	-44.20	788.90
785.50	-43.56	788.90
786.00	-40.23	788.90
786.10	-39.53	788.90
786.50	-36.60	788.90
786.80	-34.24	788.90
787.00	-32.57	788.90
787.50	-27.95	788.90
787.60	-26.94	788.90

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =5.15
0.00	REVERSE: H =5.15
0.00	REVERSE: H =5.15
0.00	REVERSE: H =5.15
0.00	REVERSE: H =5.15
0.00	REVERSE: H =4.90
0.00	REVERSE: H =4.40
0.00	REVERSE: H =4.20
0.00	REVERSE: H =3.90
0.00	REVERSE: H =3.50
0.00	REVERSE: H =3.40
0.00	REVERSE: H =2.90
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.40
0.00	REVERSE: H =2.10
0.00	REVERSE: H =1.90
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.30

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	-57.14	789.60
782.60	-57.14	789.60
783.00	-57.14	789.60
783.30	-57.14	789.60
783.50	-57.14	789.60
784.00	-55.91	789.60
784.50	-53.35	789.60
784.70	-52.30	789.60
785.00	-50.67	789.60
785.40	-48.42	789.60
785.50	-47.84	789.60
786.00	-44.83	789.60
786.10	-44.20	789.60
786.50	-41.60	789.60
786.80	-39.53	789.60
787.00	-38.10	789.60
787.50	-34.24	789.60
787.60	-33.41	789.60

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =5.85
0.00	REVERSE: H =5.85
0.00	REVERSE: H =5.85
0.00	REVERSE: H =5.85
0.00	REVERSE: H =5.85
0.00	REVERSE: H =5.60
0.00	REVERSE: H =5.10
0.00	REVERSE: H =4.90
0.00	REVERSE: H =4.60
0.00	REVERSE: H =4.20
0.00	REVERSE: H =4.10
0.00	REVERSE: H =3.60
0.00	REVERSE: H =3.50
0.00	REVERSE: H =3.10
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.60
0.00	REVERSE: H =2.10
0.00	REVERSE: H =2.00

Outlet Structure

Outlet Structure Type	Weir	Weir Coefficient	3.00 ft^(1/2)/s

Composite Outlet Structures Detailed Report: Control Structure

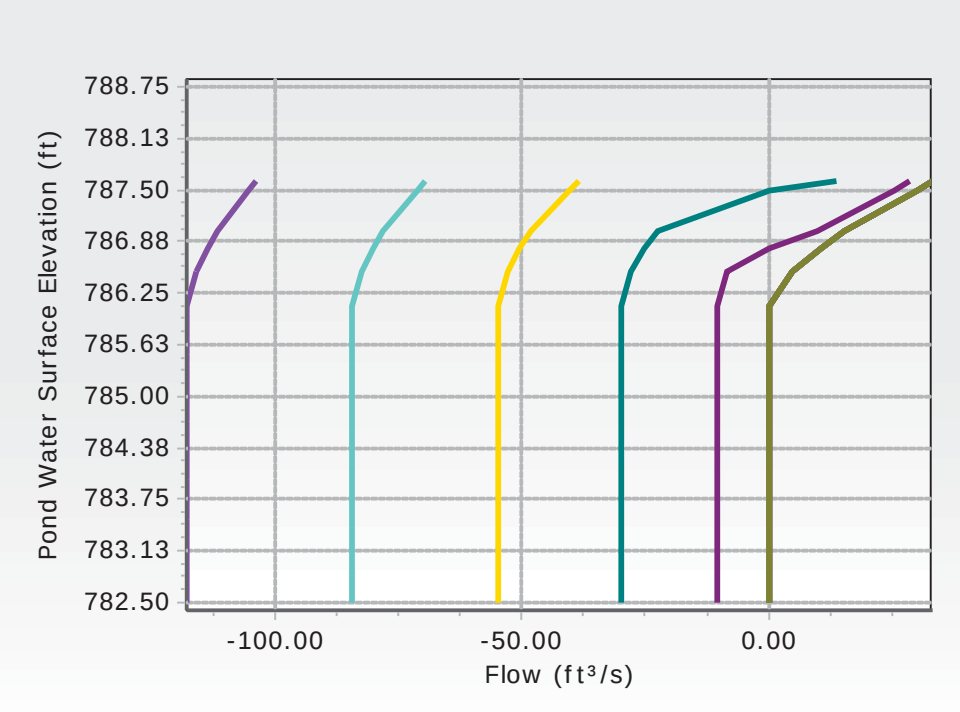
Outlet Structure			
Flow Direction	Forward and Reverse Flow	Rectangular Weir	Suppressed
Weir Type	Rectangular Weir	Weir Length	6.00 ft
Elevation	786.10 ft		

Outlet Structure (IDs and Direction)			
Outlet ID	Weir - 1	Notes	
Downstream ID	Tailwater		

Outlet Structure (Advanced)			
Elevation (On)	0.00 ft	Elevation (Off)	0.00 ft

Outlet Structure (Weir)	
Vary Coefficient with Depth	False

Outlet Structure (Weir, Advanced)	
User Defined Table	False



Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	781.90
782.60	0.00	781.90
783.00	0.00	781.90
783.30	0.00	781.90
783.50	0.00	781.90
784.00	0.00	781.90
784.50	0.00	781.90
784.70	0.00	781.90
785.00	0.00	781.90
785.40	0.00	781.90
785.50	0.00	781.90
786.00	0.00	781.90
786.10	0.00	781.90
786.50	4.55	781.90
786.80	10.54	781.90
787.00	15.37	781.90
787.50	29.82	781.90
787.60	33.07	781.90

Convergence Error (ft)	Computation Messages
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	782.50
782.60	0.00	782.50
783.00	0.00	782.50
783.30	0.00	782.50
783.50	0.00	782.50
784.00	0.00	782.50
784.50	0.00	782.50
784.70	0.00	782.50
785.00	0.00	782.50
785.40	0.00	782.50
785.50	0.00	782.50
786.00	0.00	782.50
786.10	0.00	782.50
786.50	4.55	782.50
786.80	10.54	782.50
787.00	15.37	782.50
787.50	29.82	782.50
787.60	33.07	782.50

Convergence Error (ft)	Computation Messages
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	782.60
782.60	0.00	782.60
783.00	0.00	782.60
783.30	0.00	782.60
783.50	0.00	782.60
784.00	0.00	782.60
784.50	0.00	782.60
784.70	0.00	782.60
785.00	0.00	782.60
785.40	0.00	782.60
785.50	0.00	782.60
786.00	0.00	782.60
786.10	0.00	782.60
786.50	4.55	782.60
786.80	10.54	782.60
787.00	15.37	782.60
787.50	29.82	782.60
787.60	33.07	782.60

Convergence Error (ft)	Computation Messages
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	783.30
782.60	0.00	783.30
783.00	0.00	783.30
783.30	0.00	783.30
783.50	0.00	783.30
784.00	0.00	783.30
784.50	0.00	783.30
784.70	0.00	783.30
785.00	0.00	783.30
785.40	0.00	783.30
785.50	0.00	783.30
786.00	0.00	783.30
786.10	0.00	783.30
786.50	4.55	783.30
786.80	10.54	783.30
787.00	15.37	783.30
787.50	29.82	783.30
787.60	33.07	783.30

Convergence Error (ft)	Computation Messages
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	784.00
782.60	0.00	784.00
783.00	0.00	784.00
783.30	0.00	784.00
783.50	0.00	784.00
784.00	0.00	784.00
784.50	0.00	784.00
784.70	0.00	784.00
785.00	0.00	784.00
785.40	0.00	784.00
785.50	0.00	784.00
786.00	0.00	784.00
786.10	0.00	784.00
786.50	4.55	784.00
786.80	10.54	784.00
787.00	15.37	784.00
787.50	29.82	784.00
787.60	33.07	784.00

Convergence Error (ft)	Computation Messages
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	784.70
782.60	0.00	784.70
783.00	0.00	784.70
783.30	0.00	784.70
783.50	0.00	784.70
784.00	0.00	784.70
784.50	0.00	784.70
784.70	0.00	784.70
785.00	0.00	784.70
785.40	0.00	784.70
785.50	0.00	784.70
786.00	0.00	784.70
786.10	0.00	784.70
786.50	4.55	784.70
786.80	10.54	784.70
787.00	15.37	784.70
787.50	29.82	784.70
787.60	33.07	784.70

Convergence Error (ft)	Computation Messages
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	785.40
782.60	0.00	785.40
783.00	0.00	785.40
783.30	0.00	785.40
783.50	0.00	785.40
784.00	0.00	785.40
784.50	0.00	785.40
784.70	0.00	785.40
785.00	0.00	785.40
785.40	0.00	785.40
785.50	0.00	785.40
786.00	0.00	785.40
786.10	0.00	785.40
786.50	4.55	785.40
786.80	10.54	785.40
787.00	15.37	785.40
787.50	29.82	785.40
787.60	33.07	785.40

Convergence Error (ft)	Computation Messages
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	HW & TW below Inv.El.=786.100
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	786.10
782.60	0.00	786.10
783.00	0.00	786.10
783.30	0.00	786.10
783.50	0.00	786.10
784.00	0.00	786.10
784.50	0.00	786.10
784.70	0.00	786.10
785.00	0.00	786.10
785.40	0.00	786.10
785.50	0.00	786.10
786.00	0.00	786.10
786.10	0.00	786.10
786.50	4.55	786.10
786.80	10.54	786.10
787.00	15.37	786.10
787.50	29.82	786.10
787.60	33.07	786.10

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	REVERSE: H=.00; Htw=.00; Qfree=.00;
0.00	H=.00; Htw=.00; Qfree=.00;
0.00	H=.40; Htw=.00; Qfree=4.55;
0.00	H=.70; Htw=.00; Qfree=10.54;
0.00	H=.90; Htw=.00; Qfree=15.37;
0.00	H=1.40; Htw=.00; Qfree=29.82;
0.00	H=1.50; Htw=.00; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-10.54	786.80
782.60	-10.54	786.80
783.00	-10.54	786.80
783.30	-10.54	786.80
783.50	-10.54	786.80
784.00	-10.54	786.80
784.50	-10.54	786.80
784.70	-10.54	786.80
785.00	-10.54	786.80
785.40	-10.54	786.80
785.50	-10.54	786.80
786.00	-10.54	786.80
786.10	-10.54	786.80
786.50	-8.48	786.80
786.80	0.00	786.80
787.00	9.84	786.80
787.50	25.21	786.80
787.60	28.52	786.80

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.00; Htw=.70; Qfree=-10.54;
0.00	REVERSE: H=.40; Htw=.70; Qfree=-10.54;
0.00	H=.70; Htw=.70; Qfree=10.54;
0.00	H=.90; Htw=.70; Qfree=15.37;
0.00	H=1.40; Htw=.70; Qfree=29.82;
0.00	H=1.50; Htw=.70; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-29.82	787.50
782.60	-29.82	787.50
783.00	-29.82	787.50
783.30	-29.82	787.50
783.50	-29.82	787.50
784.00	-29.82	787.50
784.50	-29.82	787.50
784.70	-29.82	787.50
785.00	-29.82	787.50
785.40	-29.82	787.50
785.50	-29.82	787.50
786.00	-29.82	787.50
786.10	-29.82	787.50
786.50	-27.97	787.50
786.80	-25.21	787.50
787.00	-22.56	787.50
787.50	0.00	787.50
787.60	13.54	787.50

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.00; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.40; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.70; Htw=1.40; Qfree=-29.82;
0.00	REVERSE: H=.90; Htw=1.40; Qfree=-29.82;
0.00	H=1.40; Htw=1.40; Qfree=29.82;
0.00	H=1.50; Htw=1.40; Qfree=33.07;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-54.78	788.20
782.60	-54.78	788.20
783.00	-54.78	788.20
783.30	-54.78	788.20
783.50	-54.78	788.20
784.00	-54.78	788.20
784.50	-54.78	788.20
784.70	-54.78	788.20
785.00	-54.78	788.20
785.40	-54.78	788.20
785.50	-54.78	788.20
786.00	-54.78	788.20
786.10	-54.78	788.20
786.50	-52.98	788.20
786.80	-50.45	788.20
787.00	-48.26	788.20
787.50	-40.47	788.20
787.60	-38.36	788.20

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.00; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.40; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.70; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=.90; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=1.40; Htw=2.10; Qfree=-54.78;
0.00	REVERSE: H=1.50; Htw=2.10; Qfree=-54.78;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-84.34	788.90
782.60	-84.34	788.90
783.00	-84.34	788.90
783.30	-84.34	788.90
783.50	-84.34	788.90
784.00	-84.34	788.90
784.50	-84.34	788.90
784.70	-84.34	788.90
785.00	-84.34	788.90
785.40	-84.34	788.90
785.50	-84.34	788.90
786.00	-84.34	788.90
786.10	-84.34	788.90
786.50	-82.55	788.90
786.80	-80.11	788.90
787.00	-78.05	788.90
787.50	-71.30	788.90
787.60	-69.63	788.90

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.00; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.40; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.70; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=.90; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=1.40; Htw=2.80; Qfree=-84.34;
0.00	REVERSE: H=1.50; Htw=2.80; Qfree=-84.34;

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-117.86	789.60
782.60	-117.86	789.60
783.00	-117.86	789.60
783.30	-117.86	789.60
783.50	-117.86	789.60
784.00	-117.86	789.60
784.50	-117.86	789.60
784.70	-117.86	789.60
785.00	-117.86	789.60
785.40	-117.86	789.60
785.50	-117.86	789.60
786.00	-117.86	789.60
786.10	-117.86	789.60
786.50	-116.09	789.60
786.80	-113.69	789.60
787.00	-111.69	789.60
787.50	-105.34	789.60
787.60	-103.83	789.60

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.00; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.40; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.70; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=.90; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=1.40; Htw=3.50; Qfree=-117.86;
0.00	REVERSE: H=1.50; Htw=3.50; Qfree=-117.86;

Outlet Structure

Outlet Structure Type	Orifice	Orifice Coefficient	0.600

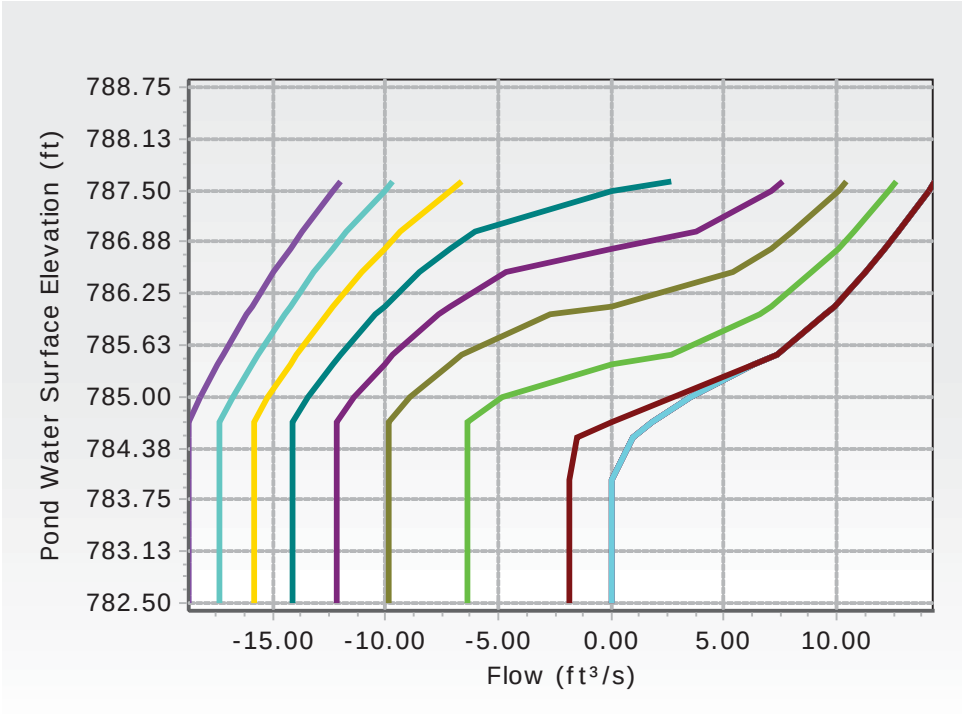
Composite Outlet Structures Detailed Report: Control Structure

Outlet Structure			
Flow Direction	Forward and Reverse Flow	Elevation	784.00 ft
Number of Openings	1		

Outlet Structure (IDs and Direction)			
Outlet ID	Orifice - 2	Notes	
Downstream ID	Tailwater		

Outlet Structure (Advanced)			
Elevation (On)	0.00 ft	Elevation (Off)	0.00 ft

Outlet Structure (Orifice)			
Orifice Type	Circular Orifice	Orifice Diameter	18.00 in



RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	0.00	781.90

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.60	0.00	781.90
783.00	0.00	781.90
783.30	0.00	781.90
783.50	0.00	781.90
784.00	0.00	781.90
784.50	0.98	781.90
784.70	1.86	781.90
785.00	3.55	781.90
785.40	6.36	781.90
785.50	7.37	781.90
786.00	9.51	781.90
786.10	9.88	781.90
786.50	11.25	781.90
786.80	12.18	781.90
787.00	12.76	781.90
787.50	14.10	781.90
787.60	14.36	781.90

Convergence Error (ft)	Computation Messages
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	Upstream HW & DNstream TW < Inv.El
0.00	CRIT.DEPTH CONTROL Vh= .130ft Dcr= .369ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .188ft Dcr= .513ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .279ft Dcr= .720ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .975ft CRIT.DEPTH Hev= .00ft
0.00	H =.75
0.00	H =1.25
0.00	H =1.35
0.00	H =1.75
0.00	H =2.05
0.00	H =2.25
0.00	H =2.75
0.00	H =2.85

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	782.50
782.60	0.00	782.50
783.00	0.00	782.50
783.30	0.00	782.50
783.50	0.00	782.50
784.00	0.00	782.50
784.50	0.98	782.50
784.70	1.86	782.50
785.00	3.55	782.50
785.40	6.36	782.50
785.50	7.37	782.50
786.00	9.51	782.50
786.10	9.88	782.50
786.50	11.25	782.50
786.80	12.18	782.50
787.00	12.76	782.50
787.50	14.10	782.50
787.60	14.36	782.50

Convergence Error (ft)	Computation Messages
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	Upstream HW & DNstream TW < Inv.El
0.00	CRIT.DEPTH CONTROL Vh= .130ft Dcr= .369ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .188ft Dcr= .513ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .279ft Dcr= .720ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .975ft CRIT.DEPTH Hev= .00ft
0.00	H =.75
0.00	H =1.25
0.00	H =1.35
0.00	H =1.75
0.00	H =2.05
0.00	H =2.25
0.00	H =2.75
0.00	H =2.85

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	782.60
782.60	0.00	782.60
783.00	0.00	782.60
783.30	0.00	782.60
783.50	0.00	782.60
784.00	0.00	782.60
784.50	0.98	782.60
784.70	1.86	782.60
785.00	3.55	782.60
785.40	6.36	782.60
785.50	7.37	782.60
786.00	9.51	782.60
786.10	9.88	782.60
786.50	11.25	782.60
786.80	12.18	782.60
787.00	12.76	782.60
787.50	14.10	782.60
787.60	14.36	782.60

Convergence Error (ft)	Computation Messages
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	Upstream HW & DNstream TW < Inv.El
0.00	CRIT.DEPTH CONTROL Vh= .130ft Dcr= .369ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .188ft Dcr= .513ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .279ft Dcr= .720ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .975ft CRIT.DEPTH Hev= .00ft
0.00	H =.75
0.00	H =1.25
0.00	H =1.35
0.00	H =1.75
0.00	H =2.05
0.00	H =2.25
0.00	H =2.75
0.00	H =2.85

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	783.30
782.60	0.00	783.30
783.00	0.00	783.30
783.30	0.00	783.30
783.50	0.00	783.30
784.00	0.00	783.30
784.50	0.98	783.30
784.70	1.86	783.30
785.00	3.55	783.30
785.40	6.36	783.30
785.50	7.37	783.30
786.00	9.51	783.30
786.10	9.88	783.30
786.50	11.25	783.30
786.80	12.18	783.30
787.00	12.76	783.30
787.50	14.10	783.30
787.60	14.36	783.30

Convergence Error (ft)	Computation Messages
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	HW & TW below invert
0.00	Upstream HW & DNstream TW < Inv.El
0.00	CRIT.DEPTH CONTROL Vh= .130ft Dcr= .369ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .188ft Dcr= .513ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .279ft Dcr= .720ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .975ft CRIT.DEPTH Hev= .00ft
0.00	H =.75
0.00	H =1.25
0.00	H =1.35
0.00	H =1.75
0.00	H =2.05
0.00	H =2.25
0.00	H =2.75
0.00	H =2.85

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	0.00	784.00
782.60	0.00	784.00
783.00	0.00	784.00
783.30	0.00	784.00
783.50	0.00	784.00
784.00	0.00	784.00
784.50	0.98	784.00
784.70	1.86	784.00
785.00	3.55	784.00
785.40	6.36	784.00
785.50	7.37	784.00
786.00	9.51	784.00
786.10	9.88	784.00
786.50	11.25	784.00
786.80	12.18	784.00
787.00	12.76	784.00
787.50	14.10	784.00
787.60	14.36	784.00

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .000ft Dcr= .006ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .000ft Dcr= .006ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .000ft Dcr= .006ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .000ft Dcr= .006ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .000ft Dcr= .006ft REVERSE Hev= .00ft
0.00	Upstream HW & DNstream TW < Inv.El
0.00	CRIT.DEPTH CONTROL Vh= .130ft Dcr= .369ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .188ft Dcr= .513ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .279ft Dcr= .720ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .975ft CRIT.DEPTH Hev= .00ft
0.00	H =.75
0.00	H =1.25
0.00	H =1.35
0.00	H =1.75

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Convergence Error (ft)	Computation Messages
0.00	H =2.05
0.00	H =2.25
0.00	H =2.75
0.00	H =2.85

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-1.85	784.70
782.60	-1.85	784.70
783.00	-1.85	784.70
783.30	-1.85	784.70
783.50	-1.85	784.70
784.00	-1.85	784.70
784.50	-1.47	784.70
784.70	0.00	784.70
785.00	2.76	784.70
785.40	6.36	784.70
785.50	7.37	784.70
786.00	9.51	784.70
786.10	9.88	784.70
786.50	11.25	784.70
786.80	12.18	784.70
787.00	12.76	784.70
787.50	14.10	784.70
787.60	14.36	784.70

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .187ft Dcr= .512ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .187ft Dcr= .512ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .187ft Dcr= .512ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .187ft Dcr= .512ft REVERSE Hev= .00ft

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .187ft Dcr= .512ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .187ft Dcr= .512ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .187ft Dcr= .512ft REVERSE Hev= .00ft
0.00	HW = TW elev
0.00	CRIT.DEPTH CONTROL Vh= .279ft Dcr= .720ft CRIT.DEPTH Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .975ft CRIT.DEPTH Hev= .00ft
0.00	H =.75
0.00	H =1.25
0.00	H =1.35
0.00	H =1.75
0.00	H =2.05
0.00	H =2.25
0.00	H =2.75
0.00	H =2.85

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-6.37	785.40
782.60	-6.37	785.40
783.00	-6.37	785.40
783.30	-6.37	785.40
783.50	-6.37	785.40
784.00	-6.37	785.40
784.50	-6.37	785.40
784.70	-6.37	785.40
785.00	-4.81	785.40
785.40	0.00	785.40
785.50	2.69	785.40
786.00	6.59	785.40
786.10	7.12	785.40
786.50	8.92	785.40

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
786.80	10.06	785.40
787.00	10.76	785.40
787.50	12.33	785.40
787.60	12.62	785.40

Convergence Error (ft)	Computation Messages
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	CRIT.DEPTH CONTROL Vh= .425ft Dcr= .976ft REVERSE Hev= .00ft
0.00	REVERSE BACKWATER.. Vh= .399ft twDi= 1.000ft Lbw= .0ft Hev= .00ft
0.00	HW = TW elev
0.00	H =.10
0.00	H =.60
0.00	H =.70
0.00	H =1.10
0.00	H =1.40
0.00	H =1.60
0.00	H =2.10
0.00	H =2.20

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-9.88	786.10

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.60	-9.88	786.10
783.00	-9.88	786.10
783.30	-9.88	786.10
783.50	-9.88	786.10
784.00	-9.88	786.10
784.50	-9.88	786.10
784.70	-9.88	786.10
785.00	-8.92	786.10
785.40	-7.12	786.10
785.50	-6.59	786.10
786.00	-2.69	786.10
786.10	0.00	786.10
786.50	5.38	786.10
786.80	7.12	786.10
787.00	8.07	786.10
787.50	10.06	786.10
787.60	10.42	786.10

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.35
0.00	REVERSE: H =1.10
0.00	REVERSE: H =.70
0.00	REVERSE: H =.60
0.00	REVERSE: H =.10
0.00	H =.00
0.00	H =.40
0.00	H =.70
0.00	H =.90
0.00	H =1.40
0.00	H =1.50

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-12.18	786.80
782.60	-12.18	786.80
783.00	-12.18	786.80
783.30	-12.18	786.80
783.50	-12.18	786.80
784.00	-12.18	786.80
784.50	-12.18	786.80
784.70	-12.18	786.80
785.00	-11.41	786.80
785.40	-10.06	786.80
785.50	-9.70	786.80
786.00	-7.61	786.80
786.10	-7.12	786.80
786.50	-4.66	786.80
786.80	0.00	786.80
787.00	3.80	786.80
787.50	7.12	786.80
787.60	7.61	786.80

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =2.05
0.00	REVERSE: H =2.05
0.00	REVERSE: H =2.05
0.00	REVERSE: H =2.05
0.00	REVERSE: H =2.05
0.00	REVERSE: H =2.05
0.00	REVERSE: H =2.05
0.00	REVERSE: H =2.05
0.00	REVERSE: H =1.80
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.30
0.00	REVERSE: H =.80
0.00	REVERSE: H =.70
0.00	REVERSE: H =.30
0.00	H =.00
0.00	H =.20
0.00	H =.70
0.00	H =.80

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-14.10	787.50
782.60	-14.10	787.50
783.00	-14.10	787.50
783.30	-14.10	787.50
783.50	-14.10	787.50
784.00	-14.10	787.50
784.50	-14.10	787.50
784.70	-14.10	787.50
785.00	-13.45	787.50
785.40	-12.33	787.50
785.50	-12.03	787.50
786.00	-10.42	787.50
786.10	-10.06	787.50
786.50	-8.51	787.50
786.80	-7.12	787.50
787.00	-6.01	787.50
787.50	0.00	787.50
787.60	2.69	787.50

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.75
0.00	REVERSE: H =2.50
0.00	REVERSE: H =2.10
0.00	REVERSE: H =2.00
0.00	REVERSE: H =1.50
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.00
0.00	REVERSE: H =.70
0.00	REVERSE: H =.50
0.00	H =.00
0.00	H =.10

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-15.80	788.20
782.60	-15.80	788.20
783.00	-15.80	788.20
783.30	-15.80	788.20
783.50	-15.80	788.20
784.00	-15.80	788.20
784.50	-15.80	788.20
784.70	-15.80	788.20
785.00	-15.21	788.20
785.40	-14.23	788.20
785.50	-13.98	788.20
786.00	-12.62	788.20
786.10	-12.33	788.20
786.50	-11.09	788.20
786.80	-10.06	788.20
787.00	-9.32	788.20
787.50	-7.12	788.20
787.60	-6.59	788.20

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.45
0.00	REVERSE: H =3.20
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.70
0.00	REVERSE: H =2.20
0.00	REVERSE: H =2.10
0.00	REVERSE: H =1.70
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.20
0.00	REVERSE: H =.70
0.00	REVERSE: H =.60

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-17.33	788.90
782.60	-17.33	788.90
783.00	-17.33	788.90
783.30	-17.33	788.90
783.50	-17.33	788.90
784.00	-17.33	788.90
784.50	-17.33	788.90
784.70	-17.33	788.90
785.00	-16.80	788.90
785.40	-15.91	788.90
785.50	-15.68	788.90
786.00	-14.48	788.90
786.10	-14.23	788.90
786.50	-13.18	788.90
786.80	-12.33	788.90
787.00	-11.72	788.90
787.50	-10.06	788.90
787.60	-9.70	788.90

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =4.15
0.00	REVERSE: H =4.15
0.00	REVERSE: H =4.15
0.00	REVERSE: H =4.15
0.00	REVERSE: H =4.15
0.00	REVERSE: H =4.15
0.00	REVERSE: H =4.15
0.00	REVERSE: H =4.15
0.00	REVERSE: H =3.90
0.00	REVERSE: H =3.50
0.00	REVERSE: H =3.40
0.00	REVERSE: H =2.90
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.40
0.00	REVERSE: H =2.10
0.00	REVERSE: H =1.90
0.00	REVERSE: H =1.40
0.00	REVERSE: H =1.30

Composite Outlet Structures Detailed Report: Control Structure

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-18.73	789.60
782.60	-18.73	789.60
783.00	-18.73	789.60
783.30	-18.73	789.60
783.50	-18.73	789.60
784.00	-18.73	789.60
784.50	-18.73	789.60
784.70	-18.73	789.60
785.00	-18.24	789.60
785.40	-17.43	789.60
785.50	-17.22	789.60
786.00	-16.14	789.60
786.10	-15.91	789.60
786.50	-14.98	789.60
786.80	-14.23	789.60
787.00	-13.71	789.60
787.50	-12.33	789.60
787.60	-12.03	789.60

Convergence Error (ft)	Computation Messages
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.85
0.00	REVERSE: H =4.60
0.00	REVERSE: H =4.20
0.00	REVERSE: H =4.10
0.00	REVERSE: H =3.60
0.00	REVERSE: H =3.50
0.00	REVERSE: H =3.10
0.00	REVERSE: H =2.80
0.00	REVERSE: H =2.60
0.00	REVERSE: H =2.10
0.00	REVERSE: H =2.00

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 781.90 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	0.00	781.90
782.60	0.05	781.90
783.00	1.31	781.90
783.30	3.25	781.90
783.50	4.98	781.90
784.00	10.55	781.90
784.50	18.57	781.90
784.70	22.54	781.90
785.00	29.97	781.90
785.40	36.71	781.90
785.50	38.62	781.90
786.00	44.95	781.90
786.10	46.10	781.90
786.50	54.98	781.90
786.80	63.98	781.90
787.00	70.72	781.90
787.50	89.67	781.90
787.60	93.78	781.90

Convergence Error (ft)	Contributing Structures
0.00	None Contributing
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 782.50 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	0.00	782.50
782.60	0.05	782.50
783.00	1.31	782.50
783.30	3.25	782.50

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 782.50 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
783.50	4.98	782.50
784.00	10.55	782.50
784.50	18.57	782.50
784.70	22.54	782.50
785.00	29.97	782.50
785.40	36.71	782.50
785.50	38.62	782.50
786.00	44.95	782.50
786.10	46.10	782.50
786.50	54.98	782.50
786.80	63.98	782.50
787.00	70.72	782.50
787.50	89.67	782.50
787.60	93.78	782.50

Convergence Error (ft)	Contributing Structures
0.00	None Contributing
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 782.60 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	-0.05	782.60
782.60	0.00	782.60
783.00	1.31	782.60
783.30	3.25	782.60
783.50	4.98	782.60
784.00	10.55	782.60
784.50	18.57	782.60
784.70	22.54	782.60

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 782.60 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
785.00	29.97	782.60
785.40	36.71	782.60
785.50	38.62	782.60
786.00	44.95	782.60
786.10	46.10	782.60
786.50	54.98	782.60
786.80	63.98	782.60
787.00	70.72	782.60
787.50	89.67	782.60
787.60	93.78	782.60

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 783.30 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	-3.25	783.30
782.60	-3.25	783.30
783.00	-3.25	783.30
783.30	0.00	783.30
783.50	3.11	783.30
784.00	10.55	783.30
784.50	18.57	783.30
784.70	22.54	783.30
785.00	29.97	783.30
785.40	36.71	783.30
785.50	38.62	783.30
786.00	44.95	783.30

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 783.30 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
786.10	46.10	783.30
786.50	54.98	783.30
786.80	63.98	783.30
787.00	70.72	783.30
787.50	89.67	783.30
787.60	93.78	783.30

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 784.00 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	-10.56	784.00
782.60	-10.56	784.00
783.00	-10.56	784.00
783.30	-10.56	784.00
783.50	-8.80	784.00
784.00	0.00	784.00
784.50	12.79	784.00
784.70	18.39	784.00
785.00	27.18	784.00
785.40	34.31	784.00
785.50	36.30	784.00
786.00	42.92	784.00
786.10	44.12	784.00
786.50	53.16	784.00
786.80	62.25	784.00
787.00	69.05	784.00

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 784.00 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
787.50	88.12	784.00
787.60	92.25	784.00

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 784.70 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	-22.52	784.70
782.60	-22.52	784.70
783.00	-22.52	784.70
783.30	-22.52	784.70
783.50	-22.52	784.70
784.00	-18.39	784.70
784.50	-8.16	784.70
784.70	0.00	784.70
785.00	15.70	784.70
785.40	26.13	784.70
785.50	28.50	784.70
786.00	36.45	784.70
786.10	37.84	784.70
786.50	47.50	784.70
786.80	56.96	784.70
787.00	63.96	784.70
787.50	83.46	784.70
787.60	87.66	784.70

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 784.70 ft (Control Structure)

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 785.40 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-36.71	785.40
782.60	-36.71	785.40
783.00	-36.71	785.40
783.30	-36.71	785.40
783.50	-36.71	785.40
784.00	-34.32	785.40
784.50	-28.78	785.40
784.70	-26.13	785.40
785.00	-19.75	785.40
785.40	0.00	785.40
785.50	10.16	785.40
786.00	24.89	785.40
786.10	26.88	785.40
786.50	38.25	785.40
786.80	48.56	785.40
787.00	56.01	785.40
787.50	76.38	785.40
787.60	80.73	785.40

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 785.40 ft (Control Structure)

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 786.10 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-46.10	786.10
782.60	-46.10	786.10
783.00	-46.10	786.10
783.30	-46.10	786.10
783.50	-46.10	786.10
784.00	-44.12	786.10
784.50	-39.77	786.10
784.70	-37.84	786.10
785.00	-33.70	786.10
785.40	-26.88	786.10
785.50	-24.89	786.10
786.00	-10.16	786.10
786.10	0.00	786.10
786.50	24.88	786.10
786.80	37.42	786.10
787.00	45.85	786.10
787.50	67.84	786.10
787.60	72.42	786.10

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 786.10 ft (Control Structure)

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 786.80 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-63.98	786.80
782.60	-63.98	786.80
783.00	-63.98	786.80
783.30	-63.98	786.80
783.50	-63.98	786.80
784.00	-62.25	786.80
784.50	-58.55	786.80
784.70	-56.96	786.80
785.00	-53.65	786.80
785.40	-48.56	786.80
785.50	-47.18	786.80
786.00	-39.28	786.80
786.10	-37.42	786.80
786.50	-26.08	786.80
786.80	0.00	786.80
787.00	24.21	786.80
787.50	52.09	786.80
787.60	57.26	786.80

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 786.80 ft (Control Structure)

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 787.50 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-89.67	787.50
782.60	-89.67	787.50
783.00	-89.67	787.50
783.30	-89.67	787.50
783.50	-89.67	787.50
784.00	-88.12	787.50
784.50	-84.84	787.50
784.70	-83.46	787.50
785.00	-80.62	787.50
785.40	-76.38	787.50
785.50	-75.26	787.50
786.00	-69.17	787.50
786.10	-67.84	787.50
786.50	-60.11	787.50
786.80	-52.09	787.50
787.00	-45.28	787.50
787.50	0.00	787.50
787.60	23.70	787.50

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 787.50 ft (Control Structure)

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 788.20 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
782.50	-120.41	788.20
782.60	-120.41	788.20
783.00	-120.41	788.20
783.30	-120.41	788.20
783.50	-120.41	788.20
784.00	-118.99	788.20
784.50	-116.02	788.20
784.70	-114.78	788.20
785.00	-112.26	788.20
785.40	-108.54	788.20
785.50	-107.57	788.20
786.00	-102.44	788.20
786.10	-101.34	788.20
786.50	-94.87	788.20
786.80	-88.47	788.20
787.00	-83.45	788.20
787.50	-67.36	788.20
787.60	-63.25	788.20

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
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0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 788.90 ft (Control Structure)

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 788.90 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	-155.28	788.90
782.60	-155.28	788.90
783.00	-155.28	788.90
783.30	-155.28	788.90
783.50	-155.28	788.90
784.00	-153.96	788.90
784.50	-151.22	788.90
784.70	-150.08	788.90
785.00	-147.79	788.90
785.40	-144.45	788.90
785.50	-143.58	788.90
786.00	-139.05	788.90
786.10	-138.10	788.90
786.50	-132.33	788.90
786.80	-126.67	788.90
787.00	-122.34	788.90
787.50	-109.31	788.90
787.60	-106.26	788.90

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Rating Table
TW Elev. = 789.60 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
782.50	-193.74	789.60
782.60	-193.74	789.60
783.00	-193.74	789.60
783.30	-193.74	789.60

Composite Outlet Structures Detailed Report: Control Structure

Composite Rating Table
TW Elev. = 789.60 ft (Control Structure)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
783.50	-193.74	789.60
784.00	-192.50	789.60
784.50	-189.95	789.60
784.70	-188.89	789.60
785.00	-186.78	789.60
785.40	-183.71	789.60
785.50	-182.92	789.60
786.00	-178.83	789.60
786.10	-177.97	789.60
786.50	-172.66	789.60
786.80	-167.45	789.60
787.00	-163.50	789.60
787.50	-151.91	789.60
787.60	-149.27	789.60

Convergence Error (ft)	Contributing Structures
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
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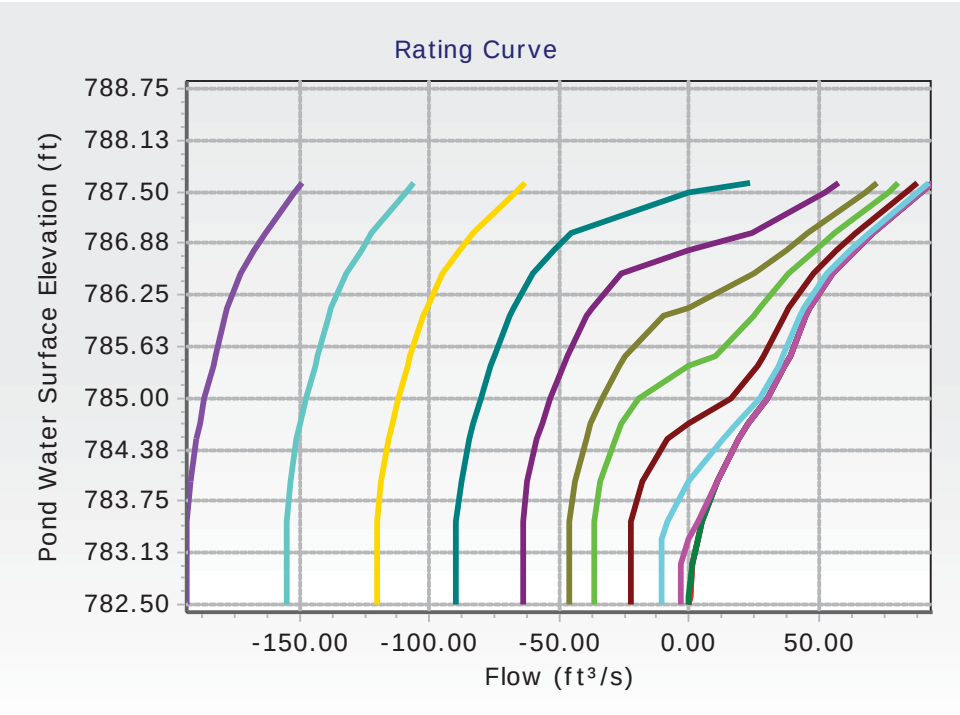
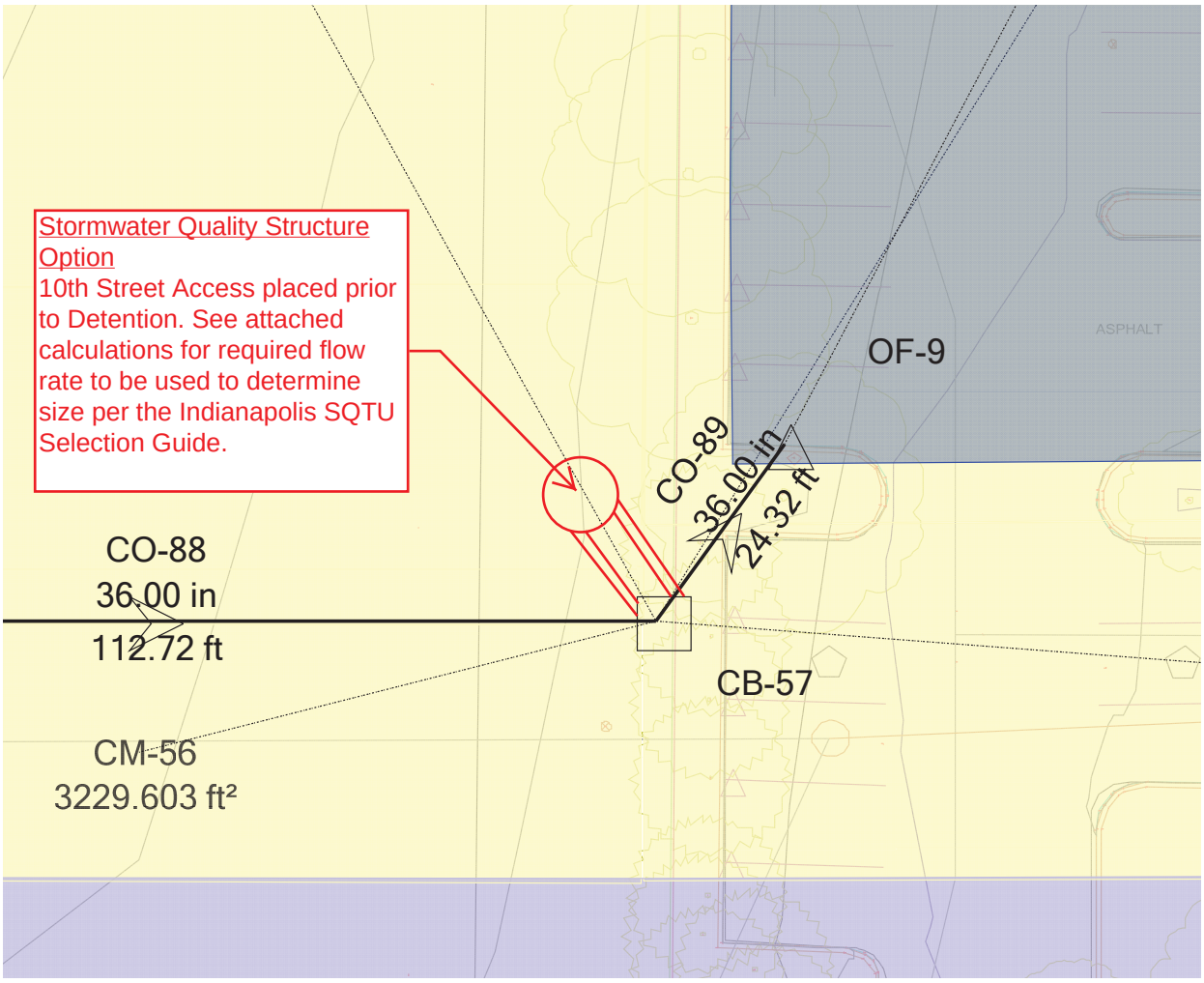
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1
0.00	Orifice - 1 + Orifice - 2 + Weir - 1

Composite Outlet Structures Detailed Report: Control Structure

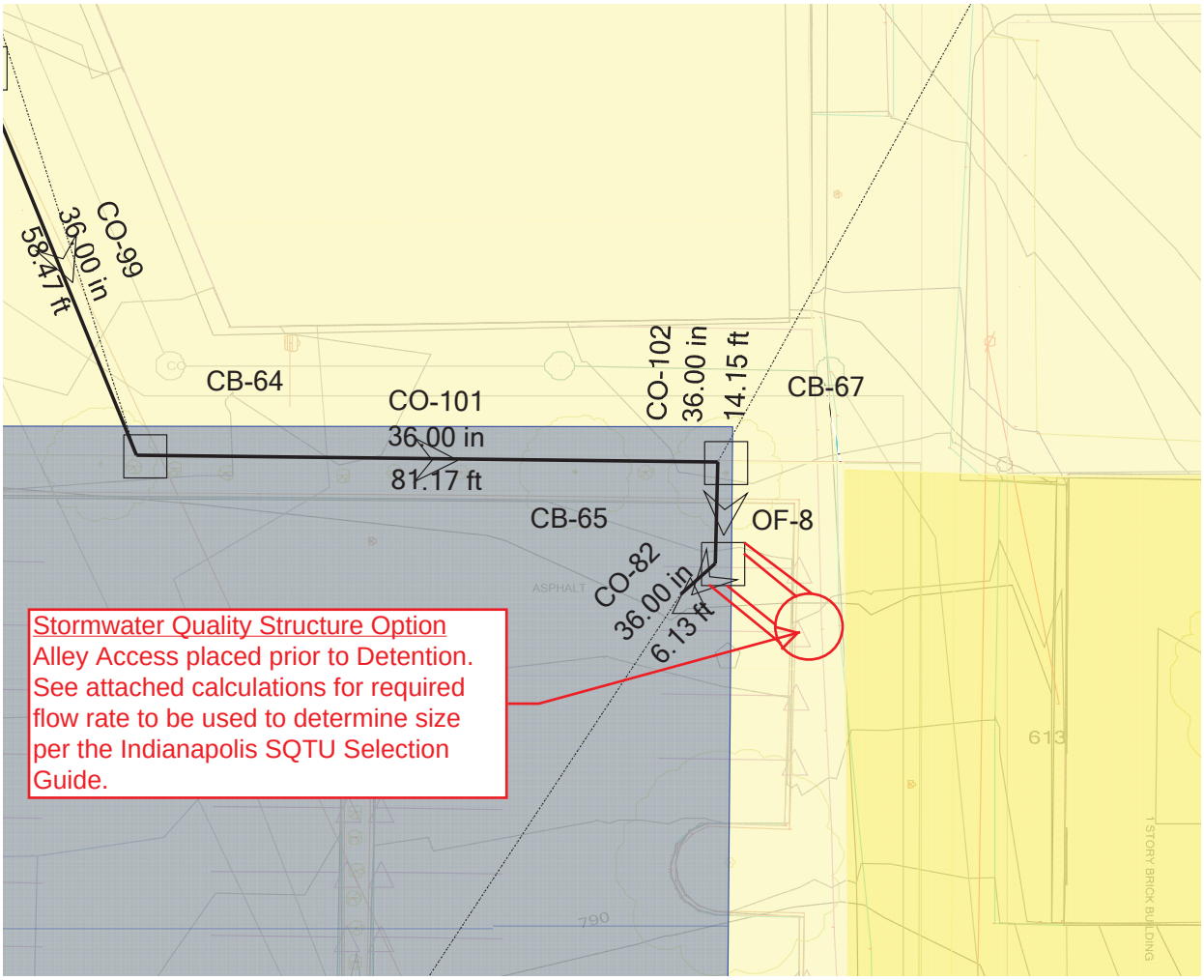


Stormwater Quality Calculations

Scenario: Proposed - 100 Yr with Pond



Scenario: Proposed - 100 Yr with Pond



DOT Report - Proposed Water Quality Calculations													
Label	-Node- Upstream / Downstream	-Ground- Upstream / Downstream (ft)	-Invert- Upstream / Downstream (ft)	Diameter (in)	Manning's n	Length (Unified) (ft)	Slope (Calculated) (%)	Flow (Maximum) (ft^3/s)	Section Discharge Capacity (ft^3/s)	Velocity (Maximum Calculated) (ft/s)	-X- Upstream / Downstream (ft)	-Y- Upstream / Downstream (ft)	Hydraulic Grade (Maximum) (ft)
CO-5	73: CB-2 72: MH-3	786.59 786	780.59 780.2	12	0.013	27	1.444	(N/A)	(N/A) 219.8	(N/A)	3107868.58 3107868.66	1429442.02 1429414.7	(N/A)
CO-6	74: MH-4 73: CB-2	786.89 786.59	782.01 780.59	12	0.013	123	1.154	(N/A)	(N/A) 66.87	(N/A)	3107745.61 3107868.58	1429450.02 1429442.02	(N/A)
CO-8	76: CB-3 75: MH-5	793.54 789	787.63 783.09	12	0.013	199	2.281	(N/A)	(N/A) 94	(N/A)	3107601.84 3107685.27	1429724.54 1429543.96	(N/A)
CO-9	77: MH-6 76: CB-3	800.99 793.54	793.51 787.63	12	0.013	280	2.1	(N/A)	(N/A) 90.19	(N/A)	3107496.69 3107601.84	1429983.74 1429724.54	(N/A)
CO-10	78: MH-7 77: MH-6	803.34 800.99	796.6 793.51	24	0.013	43	7.186	2.11	0 60.64	8.97	3107480.24 3107496.69	1430023.28 1429983.74	795.31
CO-16	84: CB-8 77: MH-6	804.58 800.99	799.39 793.51	18	0.013	117	5.026	0.39	0 23.55	3.12	3107595.21 3107496.69	1430047.51 1429983.74	796.59
CO-20	103: CB-11 72: MH-3	785.61 786	781.36 780.2	30	0.013	20	5.8	(N/A)	(N/A) 98.78	(N/A)	3107888.52 3107868.66	1429414.81 1429414.7	(N/A)
CO-38	139: MH-11 74: MH-4	787.52 786.89	782.56 782.01	12	0.013	57	0.965	(N/A)	(N/A) 61.13	(N/A)	3107715.17 3107745.61	1429497.86 1429450.02	(N/A)
CO-39	75: MH-5 139: MH-11	789 787.52	783.09 782.56	12	0.013	55	0.964	(N/A)	(N/A) 61.09	(N/A)	3107685.27 3107715.17	1429543.96 1429497.86	(N/A)
CO-40	142: CB-28 139: MH-11	787.52 787.52	784.44 782.56	12	0.013	7	3.429	(N/A)	(N/A) 6.6	(N/A)	3107709.27 3107715.17	1429494.48 1429497.86	(N/A)
CO-41	144: CB-29 74: MH-4	790 786.89	786 782.01	24	0.013	137	2.912	(N/A)	(N/A) 38.6	(N/A)	3107608.39 3107745.61	1429454.21 1429450.02	(N/A)
CO-43	151: CB-33 150: OF-3	775 772	771 768.4	21	0.013	203	1.281	1.34	0 17.93	4.32	3107515.23 3107541.74	1428875.45 1428674.62	770.03
CO-44	152: CB-34 151: CB-33	779 775	775 771	18	0.013	139	2.878	1.34	0 17.82	5.92	3107500.29 3107515.23	1429014.12 1428875.45	773.28
CO-45	72: MH-3 155: OF-4	786 784	780.2 779.8	12	0.013	148	0.27	4.46	0 95.08	2.85	3107868.66 3107869.46	1429414.7 1429266.21	780.39
CO-46	157: CB-35 163: OF-5	781.24 775.3	771.79 771	36	0.013	333	0.237	0.05	0 32.49	0.58	3107197.22 3107199.54	1429144.98 1428811.84	771.51
CO-47	160: CB-36 157: CB-35	783.5 781.24	778.3 771.79	15	0.013	77	8.455	0.05	0 18.78	1.07	3107197.87 3107197.22	1429222.44 1429144.98	775.11
CO-52	172: CB-39 78: MH-7	802.79 803.34	800.57 796.6	12	0.013	29	13.69	0.08	0 13.18	1.22	3107506.52 3107480.24	1430011.67 1430023.28	798.65
CO-53	173: CB-40 78: MH-7	803.47 803.34	798.57 796.6	15	0.013	22	8.955	1.49	0 19.33	9.12	3107474.29 3107480.24	1430044.58 1430023.28	797.82
CO-54	177: CB-44 176: CB-43	819.89 819.67	817.69 814.12	12	0.013	29	12.31	0.31	0 12.5	2.65	3107179.22 3107208.01	1430062.84 1430063.31	816.02
CO-55	176: CB-43 179: MH-15	819.67 818.91	814.12 814.36	12	0.013	31	0.032	0.43	0 0.64	1.84	3107208.01 3107204.54	1430063.31 1430032.48	814.71
CO-56	179: MH-15 178: MH-14	818.91 804.19	814.36 800.19	18	0.013	207	6.845	0.43	0 27.48	3.35	3107204.54 3107411.36	1430032.48 1430032.62	807.41

CO-57	178: MH-14 78: MH-7	804.19 803.34	800.19 796.6	18	0.013	70	5.129	0.54	0 23.79	4.01	3107411.36 3107480.24	1430032.62 1430023.28	798.56
CO-58	174: CB-41 178: MH-14	803.52 804.19	801.42 800.19	12	0.013	22	5.591	0.04	0 8.42	1.01	3107411.89 3107411.36	1430010.98 1430032.62	800.86
CO-59	175: CB-42 178: MH-14	804.03 804.19	800.51 800.19	18	0.013	13	2.462	0.06	0 16.48	1.21	3107412.12 3107411.36	1430045.95 1430032.62	800.43
CO-62	238: CB-47 240: OF-6	783.88 781.9	780.48 777.45	24	0.013	123	2.463	0.53	0 35.5	3.94	3107168.9 3107215.02	1429258.86 1429144.95	779.14
CO-82	337: CB-65 339: OF-8	792 789	783.2 782.6	36	0.013	6	10	**3.85**	0 210.91	3.7	3107704.41 3107700.07	1429655.11 1429650.77	783.74
CO-84	281: CB-59 283: CB-60	789 789	785.55 785.45	24	0.013	11	0.909	1.3	0 21.57	3.78	3107161.34 3107172.17	1429543.86 1429543.58	785.83
CO-85	283: CB-60 285: CB-61	789 789	785.45 784.89	30	0.013	92	0.609	1.4	0 32	3.2	3107172.17 3107205.23	1429543.58 1429457.24	785.53
CO-86	285: CB-61 287: CB-62	789 789	784.89 784.16	30	0.013	126	0.579	1.61	0 31.22	3.3	3107205.23 3107331.08	1429457.24 1429456.72	784.92
CO-87	287: CB-62 274: CB-56	789 789	784.16 783.46	30	0.013	140	0.5	1.61	0 29	3.13	3107331.08 3107470.7	1429456.72 1429456.88	784.21
CO-88	274: CB-56 276: CB-57	789 789	783.46 782.9	36	0.013	113	0.496	2.99	0 46.95	3.66	3107470.7 3107583.42	1429456.88 1429456.88	783.76
CO-89	276: CB-57 347: OF-9	789 789	782.9 782.6	36	0.013	24	1.25	**3.6**	0 74.57	2.31	3107583.42 3107597.75	1429456.88 1429476.53	783.75
CO-90	271: CB-54 272: CB-55	804 794	799 789	12	0.013	200	5	0.37	0 7.97	3.09	3107474.32 3107472.53	1429856.84 1429657.35	794.15
CO-91	272: CB-55 274: CB-56	794 789	789 783.46	24	0.013	200	2.77	0.87	0 37.65	4.74	3107472.53 3107470.7	1429657.35 1429456.88	786.45
CO-92	249: OS-2 362: MH-21	789 787.52	 781.9	36	0.013	19	3.158	4.4	0 118.52	7.92	3107699.11 3107718.17	1429482.53 1429482.61	782.61
CO-93	362: MH-21 364: MH-22	787.52 786.89	781.9 781.5	36	0.013	37	1.081	4.38	0 69.35	5.46	3107718.17 3107735.62	1429482.61 1429449.69	782.21
CO-96	364: MH-22 368: MH-23	786.89 786.59	781.5 780.5	36	0.013	133	0.752	4.44	0 57.83	4.8	3107735.62 3107868.29	1429449.69 1429442.2	781.57
CO-97	368: MH-23 72: MH-3	786.59 786	780.5 780.2	36	0.013	28	1.071	4.46	0 69.04	5.53	3107868.29 3107868.66	1429442.2 1429414.7	780.86
CO-98	77: MH-6 371: CB-66	800.99 793.54	793.51 787.63	36	0.013	280	2.1	2.5	0 96.65	5.77	3107496.69 3107601.68	1429983.74 1429724.19	791.49
CO-99	371: CB-66 335: CB-64	793.54 792	787.63 786.13	36	0.013	58	2.586	3.01	0 107.26	6.55	3107601.68 3107623.91	1429724.19 1429670.11	787.23
CO-101	335: CB-64 410: CB-67	792 792	786.13 784.3	36	0.013	81	2.261	3.46	0 100.28	6.57	3107623.91 3107705.07	1429670.11 1429669.24	785.6
CO-102	410: CB-67 337: CB-65	792 792	784.3 783.2	36	0.013	14	7.848	3.85	0 186.84	10.29	3107705.07 3107704.41	1429669.24 1429655.11	784.05