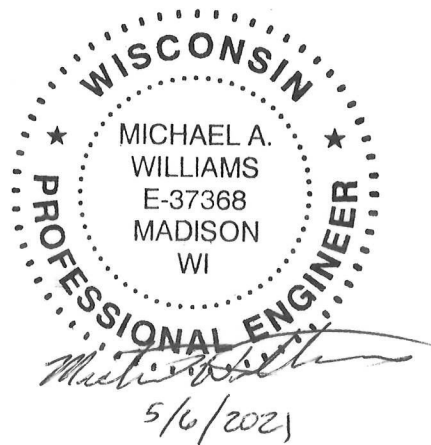


Report for City of Fitchburg, Wisconsin

Regional Stormwater Management Study for the Sub-Zero/Stoner Prairie Area



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QUESTIONS AND ANSWERS

The Sub-Zero Kettle is a naturally low-lying area that was formed by the glacial movement, also known as a “glacial kettle.” The kettle was re-shaped in 2016 via a wetland scrape by consultants on behalf of Sub-Zero Group, Inc., the owner of the kettle at the time. As called for in the Nine Springs Neighborhood Plan, the elevation associated with the volume of runoff from back-to-back 100-year storm events was identified as the flood protection elevation. The intention was that the kettle would provide the neighborhood with flood protection from back-to-back 100-year storm events. However, as the kettle fills with waters (as it has done in the last few years), the flood protection is reduced. Kettles do not have a gravity outfall, and under normal rainfall conditions, the only way for water to leave a kettle is through evaporation, evapotranspiration and infiltration. Since the wetland scrape in 2016, the kettle has continued to gradually fill with water due to a variety of factors including abnormally high rainfall in 2017, 2018, and 2019, upstream developments generating more stormwater runoff, lack of infiltration, and a high groundwater condition. In summer 2020, the kettle had approximately 5 feet of standing water in it, which is equal to approximately 26.5 million gallons (MG). This standing water takes up approximately 42 percent of the flood storage volume required to store the 100-year back-to-back storm events and drowns out the wetland vegetation and habitat.

The purpose of this report is to summarize the hydrologic and hydraulic analyses that have been performed to evaluate the Sub-Zero Kettle and the kettle south of Lacy Road, known as Closed Depression 5 (CD5), high-water elevations (HWELs) and to analyze potential drainage improvements that will allow the kettles to safely drain down after a storm event to provide flood protection to adjacent lands.

This report provides new recommendations for pumping based on the City of Fitchburg’s (City’s) desire to provide 100-year back-to-back flood protection within the neighborhood’s flood protection elevation. In addition, Natural Resources Conservation Service (NRCS) storm events have changed since the flood protection elevation was set in 2013. This additional rainfall will make an impact on the kettle’s ability to continue to meet the 100-year back-to-back design storm requirement.

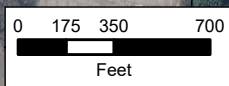
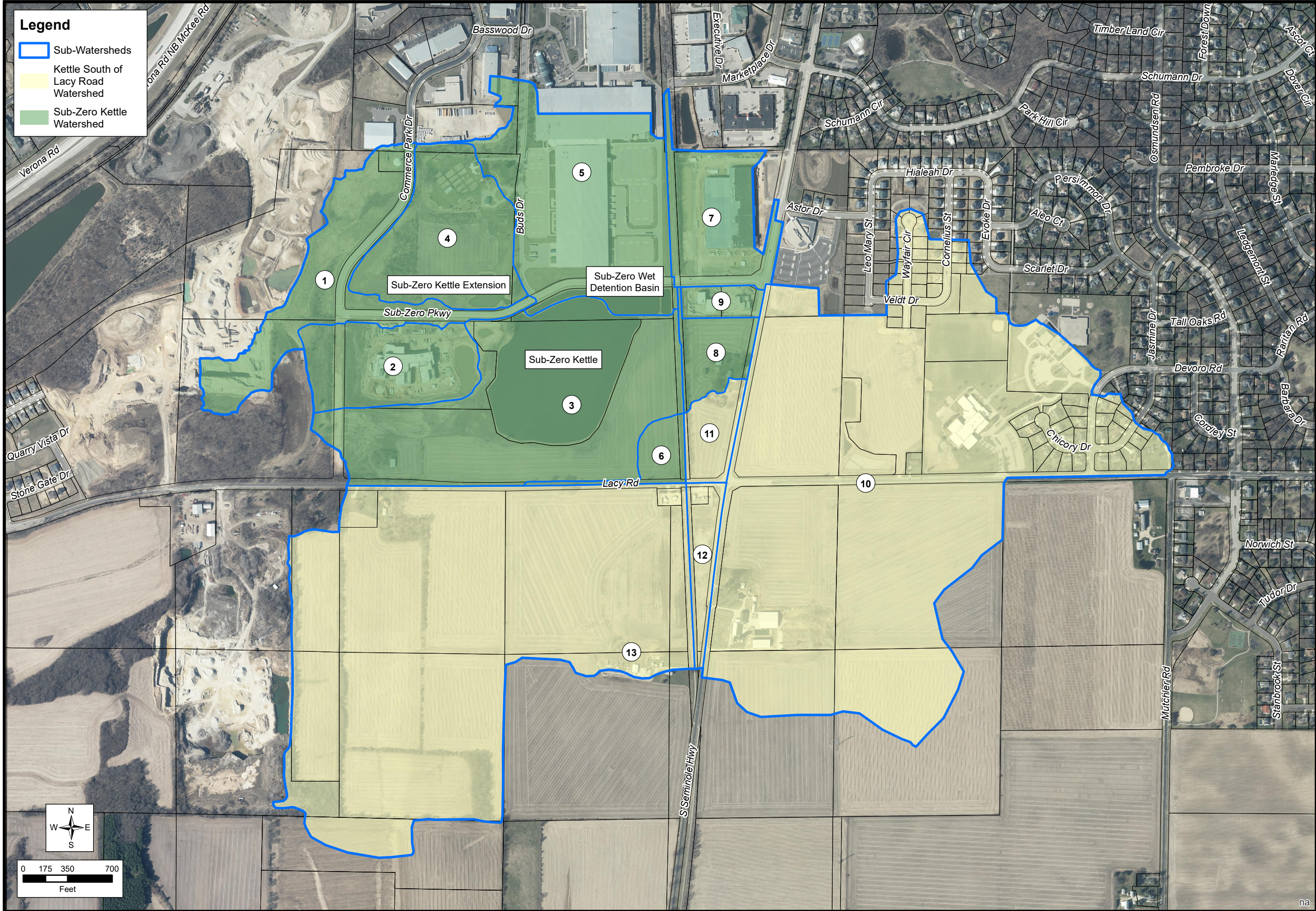
PROJECT BACKGROUND

A. Location and Kettle History

The existing topography of the 220-acre Sub-Zero Kettle and the 349-acre kettle south of Lacy Road watershed drainage area can be seen in Figure 1. The Sub-Zero Kettle is located south of Sub-Zero Parkway, north of Lacy Road, and west of the Badger State Trail. The site where the kettle sits today has always been a topographically depressed area that historically was pumped to allow for crop production (based on discussions with long-time City residents). The construction of Sub-Zero Parkway required the use of hauled-in fill material. In order to offset the volume of fill added to the kettle and meet regulatory stormwater management requirements, material from the Sub-Zero Kettle was removed as part of a wetland scrape project in 2016. The kettle located south of Lacy Road appears to drain down in a timely fashion as compared to the Sub-Zero Kettle. As development occurs, additional stormwater runoff will be directed to this kettle and it may change the dynamics of this kettle.

Legend

- Sub-Watersheds
- Kettle South of Lacy Road Watershed
- Sub-Zero Kettle Watershed



WATERSHED MAP

**REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
CITY OF FITCHBURG
DANE COUNTY, WISCONSIN**



**FIGURE 1
1275.050**

B. Past Project Reports

1. North Stoner Prairie Neighborhood Plan

The *North Stoner Prairie Neighborhood Plan*, written by SAA Design Group, Inc., Teska Associates, Inc., and Montgomery Associates Resource Solutions was first published in November 2013 and amended August 22, 2017. The purpose of this plan was to illustrate how the North Stoner Prairie Neighborhood should develop in a manner consistent with the City of Fitchburg Comprehensive Plan. The plan is available online at the link below:

<https://www.fitchburgwi.gov/468/North-Stoner-Prairie-Neighborhood-Plan>

The area included in the *North Stoner Prairie Neighborhood Plan* is shown in Figure 2 below, which was excerpted from the plan.



Figure 2 North Stoner Prairie Neighborhood Plan

Recommendations from the North Stoner Prairie Neighborhood plan include:

- Require runoff volume control practice that achieve 100 percent of the predevelopment infiltration volume for all developed areas on the average annual rainfall series.
- Encourage other volume controls techniques that harvest and reuse runoff. Relying solely on infiltration will be challenging because of the proximity of the groundwater table and underlying soils.
- Establish a flood protection elevation at the Sub-Zero Kettle at elevation 1,022.6 feet for back-to-back 100-year design storms.
- Develop an emergency pumping plan and install infrastructure needed to mitigate flooding of the Sub-Zero Kettle. Pump stormwater runoff north to Dunn’s Marsh using existing City infrastructure.

C. Development within Kettles—Lessons Learned from Other Neighborhoods

Kettles are naturally low-lying areas where water can accumulate and either slowly infiltrate, evaporate, or evapotranspire over time. Kettles naturally fluctuate between drier and wetter in correspondence with drier or wetter weather conditions. Depending on underlying soil characteristics and groundwater level conditions, kettles can store runoff for longer periods than desired, as is the case at the Sub-Zero Kettle. If the kettle is being used as a means of stormwater retention and stored water does not have a way to positively drain, conveyance solutions need to be provided to lower the water level and maintain available storage. If water levels stage up and cannot get out, there will be an increased chance for the kettle to overtop and potentially flood surrounding property and infrastructure. For the Sub-Zero Kettle, the natural overflow route is to the south over Badger State Trail and over Lacy Road. The locations of these overflow routes along with approximate elevations of overtopping are included in Figure 3.

Higher risks of flooding in enclosed water bodies is not just a problem for the Sub-Zero Kettle. Other kettles throughout the state appear to be experiencing similar issues because of higher-than-average rainfall, increased land development, and high groundwater elevations. One example of how Dane County is working to resolve an issue of this type is Crystal Lake and Fish Lake located on the northern edge of Dane County between the Village of Prairie Du Sac and the City of Lodi. Over the last 12 years, these lakes have continued to fill up, causing Dane County to close several adjacent roadways. Elevated lake levels have also flooded out several neighboring homes resulting in significant property damage. In August 2020, Dane County approved an approximately \$6 million plan to drain these lakes by gravity by installing more than 2.5 miles of storm sewer that outlets to the Wisconsin River. While the design of this pipeline is still ongoing, this plan approval has set a precedent in Dane County for the drainage of enclosed water bodies.

D. Enclosed Kettle Design Requirements

As discussed in the stormwater performance standards laid out in the *North Stoner Prairie Neighborhood Plan*, the Sub-Zero Kettle needs to have a flood protection elevation equivalent to the standing water level that would result from back-to-back 100-year storm events. The plan identified this elevation as 1,022.8 feet. Because this kettle is filling with water, it is no longer providing protection from the back-to-back 100-year storm events in the space under 1,022.8 feet as originally intended. The current overflow elevation of the Sub-Zero Kettle is near elevation 1,024 feet and is located along the bike path just north of Lacy Road. According to available aerial imagery (dating back to 1937), it does not appear the kettle has ever overflowed. On October 15, 2019, the water surface elevation of the kettle was observed at elevation 1,019.9 feet. In order meet the 100-year back-to-back storage volume requirements, the kettle would need to be drained from elevation 1,019.9 feet to 1,015.0 feet restoring approximately 80 acre-feet (ac-ft) of flood storage volume.

E. 2016 Wetland Scrape Project

The Wetland Scrape Project, conducted by Sub-Zero, Inc. in 2016, was required to offset fill areas within the watershed and to meet regulatory requirements. The goal of this project was to offset 15 ac-ft of lost storage volume within the depression that was filled by the new Sub-Zero Parkway. The wetland scrape lowered ground elevations between 2 and 5 feet within the kettle, and some fill was placed along the

outside edge to create a steeper side slope to the depression. A Wisconsin Department of Natural Resources (WDNR) waterway and wetland general permit was issued for the project.

The wetland scrape reshaped the wetland but maintained the storage volume. Therefore, after the wetland scrape, the elevation associated with the 100-year back-to-back flood events remained at elevation 1,022.8 feet. The stormwater maintenance agreement for this kettle states that Sub-Zero Group, Inc. (the owner of the kettle at the time) would be responsible for pumping the kettle if it reached an elevation of 1,022.8 feet until it was lowered to an elevation of 1,021.8 feet

WATERSHED DESCRIPTION

A. Topography and Drainage Patterns

The existing topography of the 220-acre Sub-Zero Kettle watershed and the 349-acre CD5 watershed can be seen in Figure 1. In general, surface water drains from the surrounding parcels to the kettle. As each parcel within the watershed has been developed, they have had to meet City, Dane County, and State of Wisconsin stormwater requirements. The stormwater best management practices (BMPs) installed for each development require 80 percent of total suspended solids (TSS) associated with impervious surfaces to be removed before ultimately draining to the Sub-Zero Kettle. As the watershed for the kettle south of Lacy Road develops, it will also be built with its own BMPs to meet City standards. This is an important aspect to this project because the intention is to infiltrate the stormwater while mitigating the chance for pollutants to get into the groundwater.

The overland flow route out of the Sub-Zero Kettle is located to the southeast near the intersection of Lacy Road and Badger State Trail. The overland flow route for the kettle south of Lacy Road is across a private access driveway to the south. These overland flow routes should be protected during future construction to allow for drainage during storm events larger than what is discussed in this report providing for a greater level of flood resiliency. Figure 3 shows the overland flow locations and elevations from the kettles and low areas.

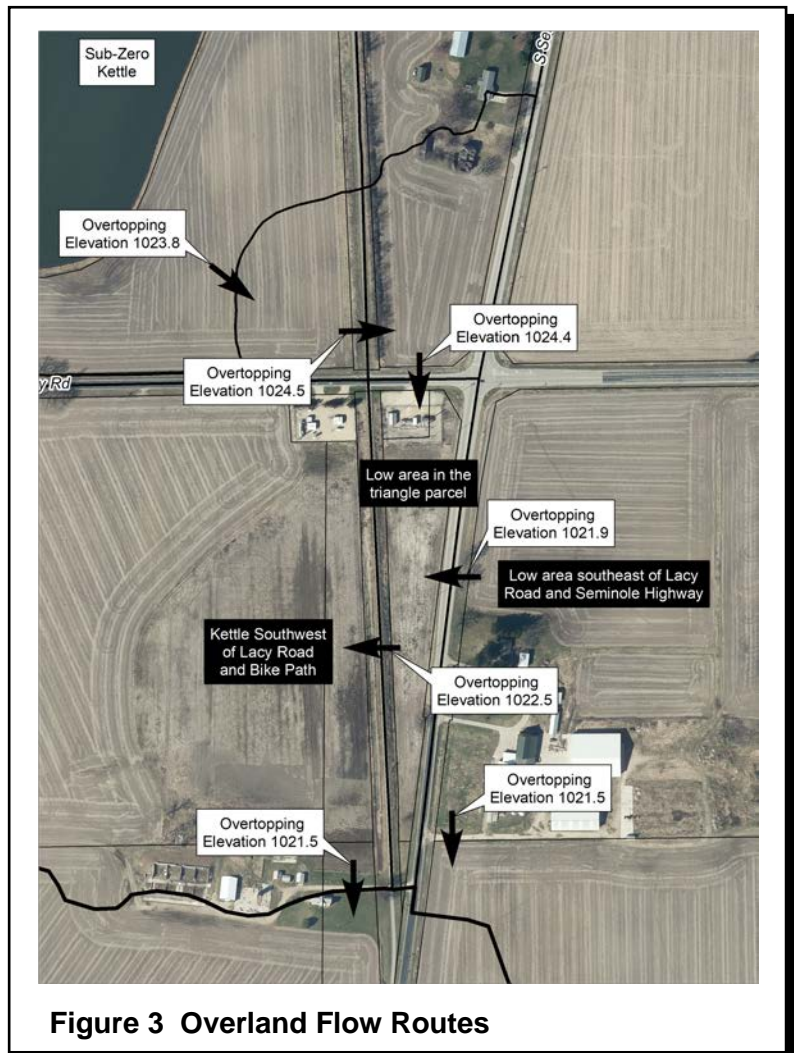


Figure 3 Overland Flow Routes

B. Land Use Development Plan

Land use is another factor that affects the amount of stormwater runoff that will be produced by a storm event. Urbanization and development reduce the ability of the ground to absorb stormwater, typically causing peak discharges and runoff volumes to increase. The time from the beginning of the storm event to the occurrence of the peak runoff may also be significantly shortened.

Current and ultimate land use in the watershed is shown in Figures 4 and 5, respectively. Current land use was delineated based on existing aerial photography and the ultimate land use is based on the City’s zoning map. This investigation indicates that the watershed is currently approximately one-half built out except for lands to the west and south of the kettles. The City’s Stormwater Ordinance (Chapter 30) in conjunction with Wisconsin Administrative Code (WAC) NR 151 and Dane County regulates future development. Ultimate land use will increase future stormwater volumes because of the increase in impervious area. The City has an infiltration requirement of 90 percent of the average annual predevelopment infiltration volume. This does not offset the increased runoff volume from developments being directed toward the kettle. Other factors including legislature at the state level have reduced the City’s ability to hold developers to higher standards.
















C. Soils

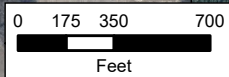
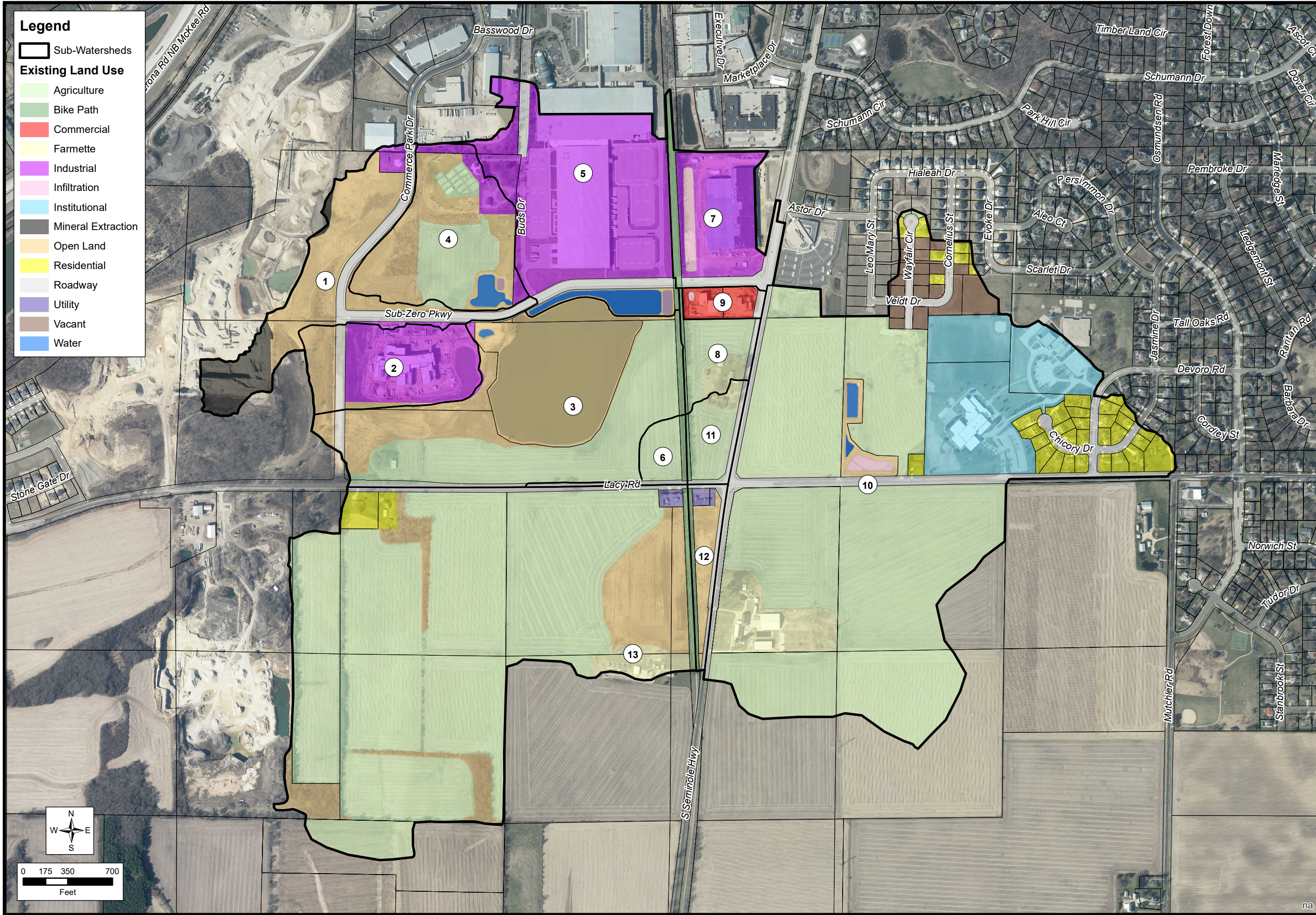
The amount of stormwater runoff produced by a storm event is impacted by the types of soil underlying the watershed. Soils having a high percentage of sand and gravel will absorb a higher percentage of stormwater runoff than will soils having high clay content. This means the sandy soil generally produces less runoff than clay soil. The NRCS classifies soil types in categories known as Hydrologic Soil Groups (HSG). HSG A soils consist of sandy soils having high infiltration rates and low runoff potential. HSG B soils have moderately fine to moderately coarse textures and moderate runoff potentials. HSG C soils are typically sandy clay loam soils having moderately fine to fine textures and a low infiltration capacity. Examples of HSG D soils are clays, soils with a permanent high-water table, and shallow soils over nearly impervious material. HSG D soils have a very low infiltration capacity and have a high runoff potential.

HSG	Area (acres)
B	426.0
B/D	39.6
C	101.2
D	1.7
Total	568.5

Table 1 Summary of HSG

HSGs in the Sub-Zero Kettle watershed are identified in Table 1 and Figure 6. These soils are classified by the NRCS as mainly HSG B.

- Legend**
-  Sub-Watersheds
 - Existing Land Use**
 -  Agriculture
 -  Bike Path
 -  Commercial
 -  Farmette
 -  Industrial
 -  Infiltration
 -  Institutional
 -  Mineral Extraction
 -  Open Land
 -  Residential
 -  Roadway
 -  Utility
 -  Vacant
 -  Water



CURRENT CONDITIONS LAND USE

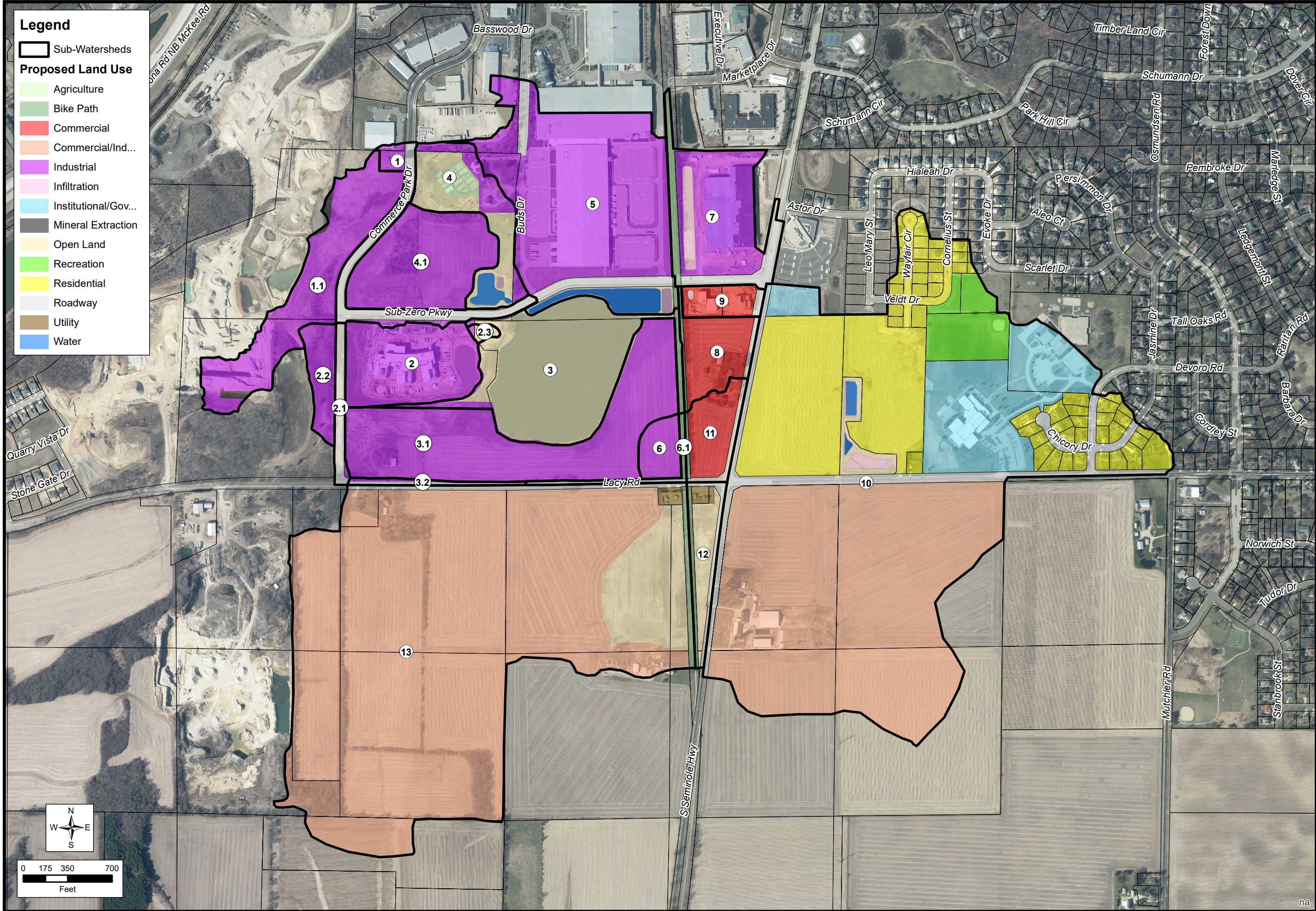
REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



FIGURE 4
1275.050

Legend

- Sub-Watersheds
- Proposed Land Use**
- Agriculture
- Bike Path
- Commercial
- Commercial/Ind...
- Industrial
- Infiltration
- Institutional/Gov...
- Mineral Extraction
- Open Land
- Recreation
- Residential
- Roadway
- Utility
- Water









ULTIMATE CONDITIONS LAND USE

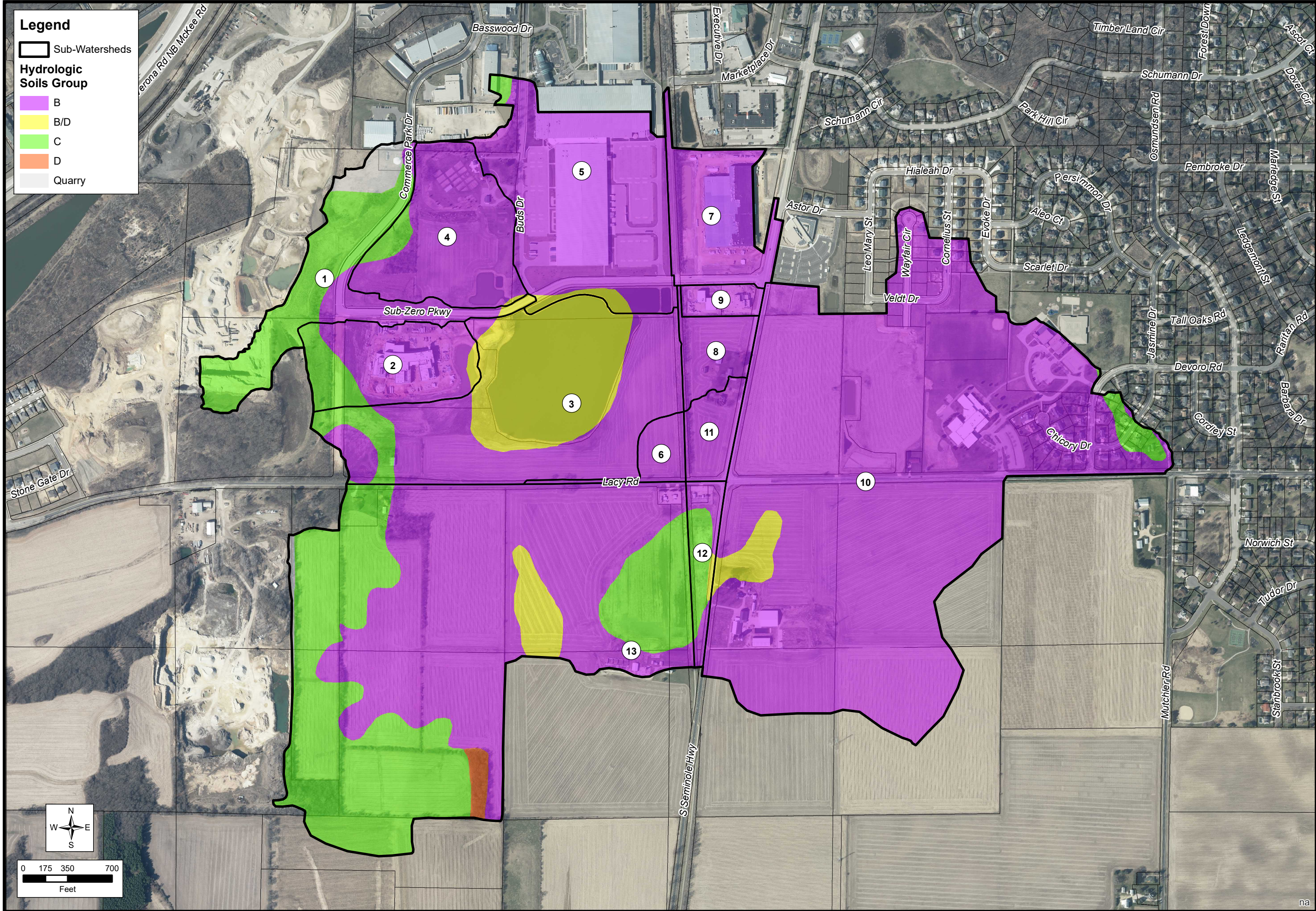
REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



FIGURE 5
1275.050

Legend

-  Sub-Watersheds
- Hydrologic Soils Group**
-  B
-  B/D
-  C
-  D
-  Quarry



SOILS MAP
REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



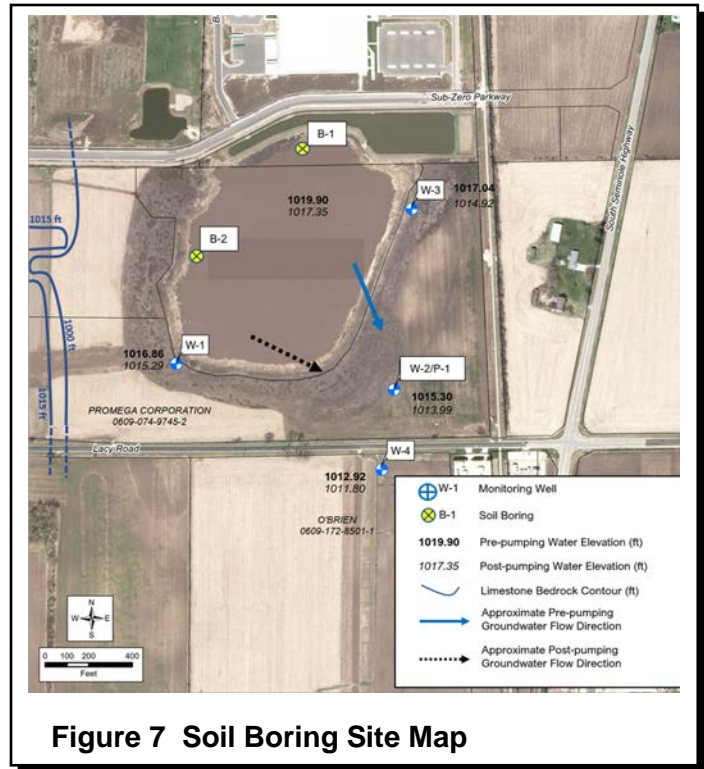
FIGURE 6
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D. Soil Borings Evaluation

In August 2020, five soil borings were drilled around the basin by CGC, Inc. (CGC), and monitoring wells W-1 through W-4 and piezometer P-1 were installed in the borings (see Figure 7). In October 2020, two additional soil borings were drilled adjacent to the basin to further evaluate soil conditions (B-1 and B-2). The October 16, 2020, report by CGC discusses all seven borings and is included in Appendix A; it provides a map showing the soil boring and well location, soil boring logs, and well construction forms.

The seven soil borings were logged by CGC to evaluate soils at the basin and to the southeast, including well W-4 located south of Lacy Road. As summarized in the October 2020 CGC report, the soil stratigraphy generally consists of:

1. 10 inches of topsoil.
2. 10 inches to 3 feet of native silty clay loam and clay loam.
3. 3 to 17 feet of coarser-grained strata, including, gravelly sand, sand, loamy sand, fine sand, loamy fine sand, and fine sandy loam.
4. 17 to 26 feet of silt loam and silty clay loam.



The borings logs for B-1 and B-2 show 10 inches of muck and 10 inches to 3 feet of clay, which is limiting the infiltration of stormwater runoff to the groundwater table. It is not apparent if this clay layer is present in the bottom of the Sub-Zero Kettle or if it was removed during wetland scrape project in 2016. Additional field investigation is recommended to verify the extents of the clay layer. Removal of this clay layer may help to increase infiltration to the groundwater table; however, as the water table rises or groundwater mounding reaches the bottom of the kettle, the infiltration capacity will be greatly reduced.

At the well W-2 and piezometer P-1 located southeast of the basin, a zone of fine to medium grained sand was recorded from an approximate depth of 5 to 22 feet (elevation 1,018.4 to 1,001.4 feet). This thicker sand layer along with lower groundwater elevations to the south and east make the area around well W-2 and piezometer P-1 an ideal location for an infiltration basin as long as the design shows at least 5 feet of vertical separation between the groundwater table and the infiltration basin bottom elevation.

Well W-2 was constructed with a screen interval in this sand layer, extending from near the ground surface to a depth of approximately 20 feet (elevation 1,003.4 feet). Piezometer P-1 was constructed with a screen interval at 35 to 45 feet (approximate elevation 988 to 978 feet), separated from well W-2 by a

4-foot-thick clay layer at a depth of 22 to 26 feet (elevation 1,001.4 to 997.4 feet).

E. Groundwater Evaluation

The wells were installed in August 2020 and pumping of water from the kettle was initiated by the City on September 3, 2020. A temporary pumping station was set up at the Sub-Zero Kettle and pumped flows were directed to the north through temporary piping to the Business Park A wet pond. Pumping was conducted in accordance with a Temporary Pumping Plan, which was approved by Common Council and Wisconsin Department of Natural Resources (WDNR) (available in Appendix B). Temporary easements were obtained from Promega, Sub Zero, and the O'briens for this work. A Wisconsin Department of Transportation (WisDOT) right-of-way permit was granted giving the City access to lay down pipe along the Badger State Trail. Pumping continued until October 2, 2020, with the pump operating for a total of approximately 364 hours at an approximate rate of 850 gallons per minute (gpm). Water levels in the kettle and at each well were recorded by the City on August 31, 2020, before the start of pumping, and approximately every week after pumping began until October 19, 2020. Findings are included in Appendix A.

The kettle water level dropped 2.23 feet from August 31 to October 2, 2020. The kettle water level continued to drop after pumping ceased and the decline was recorded at 2.55 feet on October 19, 2020. Similarly, the water elevations in each well dropped from August 31 to October 2, 2020 after the start of water pumping from the kettle, with declines of 1.02, 0.83, 1.5, 0.75, and 0.72 feet at wells W-1 through W-4 and P-1, respectively. Like the kettle, after pumping stopped, the water levels in the wells continued to decline. The total declines from August 31 to October 19, 2020, were 1.5, 1.31, 2.12, 1.12, and 1.04 feet at wells W-1 through W-4 and piezometer P-1, respectively. Table 2 summarizes the dates of pumping and recorded water levels. A technical memorandum summarizing the groundwater conditions around the Sub-Zero Kettle is also included in Appendix A. The WDNR-approved temporary pumping plan is included in Appendix B.

Conclusions that can be drawn from the basin pumping are as follow:

1. The water elevation in the basin remained higher than the water elevations recorded at wells W-1 through W-4, indicating groundwater was not being drawn into the pond as a result of pumping.
2. Wells W-1 through W-4 showed a consistent southeastern groundwater flow direction before, during, and after pumping.
3. Well nest W-2 and piezometer P-1 showed a consistent downward vertical groundwater gradient before, during, and after pumping.
4. It appears the water levels at wells W-1 and W-3 dropped more than the levels at wells W-2 and W-4 because wells W-1 and W-3 were adjacent to the basin. The nearby wells appear to have been more quickly influenced by the basin level and the water table mounding that is occurring at the basin. Moving farther away and downgradient from the basin, the water level drops recorded at wells W-2 and W-4 were less than at wells W-1 and W-3.

5. The water level drop at well W-3 may have been greater than at well W-1 because well W-3 appears to be more upgradient.

6. After pumping stopped, the basin water level declined another 14 percent. The continued declines at the wells were 54, 58, 41, 49, and 44 percent at wells W-1 through W-4 and piezometer P-1, respectively. This appears to show the delayed effects of reduced groundwater mounding at the basin after the basin level was dropped.

Table 2 Kettle and Groundwater Elevations

Groundwater Elevation (feet)											
Well	August 31, 2020	Pump Start September 3, 2020	September 10, 2020	September 17, 2020	September 25, 2020	October 2, 2020	Pump Stop October 2, 2020	Water Level Decline August 31 to October 2, 2020	October 8, 2020	October 19, 2020	Water Level Decline August 31 to October 19, 2020
W-1	1,016.86		1,016.44	1,016.47	1,016.22	1,015.84		1.02	1,015.61	1,015.29	1.57
W-2	1,015.30		1,015.00	1,014.85	1,014.69	1,014.47		0.83	1,014.27	1,013.99	1.31
P-1	1,007.62		1,007.18	1,007.22	1,007.22	1,006.90		0.72	1,006.71	1,006.58	1.04
W-3	1,017.04		1,016.59	1,016.44	1,015.98	1,015.54		1.50	1,015.32	1,014.92	2.12
W-4	1,012.92		1,012.61	1,012.42	1,012.32	1,012.17		0.75	1,012.00	1,011.80	1.12
Horizontal Flow	South/Southeast		Southeast	Southeast	Southeast	Southeast			Southeast	Southeast	
W-2/P-1 Vertical Flow	Down		Down	Down	Down	Down			Down	Down	
Kettle Water Elevation (feet)											
Location	August 31, 2020	Pump Start September 3, 2020	September 10, 2020	September 17, 2020	September 25, 2020	October 2, 2020	Pump Stop October 2, 2020	Water Level Decline August 31 to October 2, 2020	October 8, 2020	October 19, 2020	Water Level Decline August 31 to October 19, 2020
Pond	1,019.9		1,019.2	1,018.7	1,017.7	1,017.67		2.23	1,017.4	1,017.35	2.55

Note: Rainfall recorded September 1, 6, 8, 9, 11, and 12, 2020.

F. Regulatory Discussions

In February 2020 and April 2020, meetings were held with multiple stakeholders to discuss regulatory considerations for the stormwater management of the Sub-Zero/Stoner Prairie watershed area. WDNR, Dane County, United States Army Corps of Engineers (USACE), the City, the Capital Area Regional Planning Commission (CARPC), and Strand Associates, Inc.[®] (Strand) were present. The meeting included discussion of project background, conceptual flood mitigation ideas, and design and construction schedule. Copies of the meeting minutes from both meetings are included in Appendix C.

The following list includes important discussion points from the meetings:

1. WDNR stated concern with draining the kettle to the south to Story Creek. Story Creek is considered a cold-water creek and the waters released to the creek could raise the temperature and stress the creek habitat.
2. WDNR stated that while trying to use infiltration seems reasonable, areas that are used for long-term infiltration will have a greater chance of clogging. Infiltration BMPs do need a dry-out period to remain viable. A “Plan B” will be needed in case the infiltration option is not working. A feasible Plan B could include the use of a pumping station to pump out the kettle to the Dunn’s Marsh watershed.
3. It was noted that, because drainage infrastructure was already in place to receive pumping to the north and considering potential environmental impacts of draining to the south, pumping to the north may be the best option for a Plan B if infiltration and water reuse measures fail or are insufficient.
4. WDNR will require water quality testing be performed to verify the amount of total suspended solids and phosphorous being sent to Dunn’s Marsh. The number of tests required will be dependent on how often and how long the pump is operated.

Additional correspondence with Allen Ramminger, the Dane County WDNR Wetland Specialist, provided the following information.

1. The Sub-Zero Kettle is delineated as a wetland by WDNR, and coordination and permitting will be required if disturbance does occur in the kettle.
2. WDNR did state that there is a wetland benefit to allowing the kettle to drain down. Allowing the water to sit for an extended period is not good for the vegetation and habitat.
3. WDNR is amenable with removing the topsoil and clay limiting layer in the bottom of the kettle to allow for infiltration. There is a concern regarding polluting the groundwater and one option discussed was to replace the material removed with an engineered soil and the use of blast furnace slag to remove phosphorus from the stormwater runoff.

Based on the discussion with the regulatory agencies, if the City does decide to move forward with the alternatives listed in this report, it is likely that the following list of permits would be required:

1. WDNR Notice of Intent
2. WDNR Chapter 30
3. City of Fitchburg Erosion Control Permit
4. USACE jurisdiction determination
5. CARPC approval

HYDROLOGIC AND HYDRAULIC MODELING

Strand has developed an XPSWMM computer model (model) of the current storage areas and Sub-Zero Kettle along with its interconnecting culverts. Hydrologic input parameters of the contributing watershed include subbasin drainage areas, runoff curve numbers (RCNs), times of concentration (Tc), and rainfall depths. RCNs were calculated by analyzing available soils mapping along with the current condition and ultimate condition land use in the study watershed. The hydrologic parameters are listed in Table 3. Hydraulic model input parameters included rim and invert elevations, pipe size, manning's "n" coefficients, length of pipe, slope, and storage volumes were incorporated into the model. The modeling input and outputs are included in Appendix D.

The current condition and ultimate condition models were set up to run the 1-, 2-, 10-, and 100-year, 24-hour duration storm events and the back-to-back 100-year, 24-hour duration storm event. Rainfall amounts as specified in the City Chapter 30 Ordinance, were used along with the NRCS Midwest and Southeast United States (MSE4) rainfall distribution. Table 4 summarizes the rainfall amounts used.

It should also be noted that the modeling was completed under the conservative assumption that all the upstream infiltration (either current or ultimate) is fully clogged and not functioning, producing the highest, most conservative volume of stormwater runoff.

Current Condition Hydrology				Ultimate Condition Hydrology			
Basin	Area (acres)	RCN	Tc (minutes)	Basin	Area (acres)	RCN	Tc (minutes)
1	28.60	79	22.5	1	7.38	85	10.0
2	19.40	84	20.3	1.1	19.36	91	20.0
3	63.35	76	15.5	2	14.77	88	20.3
4	26.93	72	24.3	2.1	2.48	85	10.0
5	46.70	88	17.3	2.2	4.26	91	20.0
6	4.75	76	18.7	2.3	0.57	80	10.0
7	18.65	86	12.7	3	27.51	79	10.0
8	7.66	75	26	3.1	32.48	88	15.5
9	3.61	91	19.3	3.2	1.29	85	10.0
10	184.60	78	50.3	4	12.13	74	20.0
11	6.52	76	19.2	4.1	16.65	88	20.0
12	6.28	76	15.1	5	46.70	88	17.3
13	151.46	78	37	6	3.34	88	18.7
Total	568.50			6.1	1.41	77	10.0
				7	18.65	86	12.7
				8	7.66	90	26.0
				9	3.61	91	19.3
				10	184.6	84	50.3
				11	6.52	89	19.2
				12	6.28	76	15.1
				13	151.46	91	37
				Total	569.14		

Table 3 Current and Ultimate Condition Hydrologic Parameters

Rainfall Interval	Rainfall Amount (inches)
1-Year	2.49
2-Year	2.84
10-Year	4.09
100-Year	6.6
100-Year Back-to-Back	13.2

Table 4 Rainfall Amounts (NRCS MSE4 24-Hour Duration Design Storms)

DATA COLLECTION

Existing storm sewer and culvert data was generated from multiple sources including field visits to the site, construction drawings, and geographical information system (GIS) storm sewer shapefiles provided to Strand by the City. Strand also used the Dane County light detection and ranging (LIDAR) topographic data to determine storage volumes in each of the storage areas within the watershed including the Sub-Zero Kettle, the extension of the Sub-Zero Kettle on the north side of Sub-Zero Parkway, and Sub-Zero wet detention basin as shown on Figure 1. This LIDAR data does not detail areas that are under water; therefore, these storage areas were supplemented using the provided construction drawings. The construction drawings used for this effort and the building structures first floor elevation (FFE) include:

1. Wolf South Building Addition 2016, 2866 Buds Drive (FFE–1,033.0 feet)
2. Promega 2019, 3075 Sub-Zero Parkway (FFE–1,035.0 feet)
3. Hop House Brewing 2019, 2975, and 2995 Sub-Zero Parkway (FFE–1,028.5 feet)
4. Sub-Zero Parkway 2018, Sub-Zero Parkway (Low Point Elevation–1,023.7 feet)
5. Sub-Zero Design Center 2019, 2900 Sub-Zero Parkway (FFE–1,030.0 feet)

A. Results

Table 5 summarizes the water elevations that the kettle would reach for various rain events given current and ultimate buildout of the Sub-Zero Kettle watershed. The results also show how the kettle reacts when a portion of the kettle is partially filled with water. Strand looked at starting elevations in the kettle of 1,015 (bottom of kettle), 1,016, 1,017, and 1,018 feet. The City has also surveyed portions of the Sub-Zero Parkway to determine the road elevations where storm sewer would provide a hydraulic connection from the kettle to Sub-Zero Parkway. After review of the Sub-Zero Parkway construction drawings, it appears that the maximum allowable HWEL in the Sub-Zero Kettle at the low point in Sub-Zero Parkway at elevation 1,023.7 feet. Elevation 1023.7 provides more than 4.5 feet of freeboard from the existing surrounding buildings. Based on the resultant HWELs in the kettle, it appears that the kettle should be almost dry (elevation 1,016 feet to 1,015 feet) to be able to store the 100-year back-to-back events without flooding Sub-Zero Parkway under both current and ultimate conditions.

Table 6 summarizes estimated HWELs in the kettle and low-lying areas located south of Lacy Road. These areas include lands located in the south east quadrant of Lacy Road and Seminole Highway, the triangle parcel between Seminole Highway and the Badger State Trail, as well as the area located within the southwest quadrant of Lacy Road and the Badger State Trail. Based on these modeling results, it appears that these low-lying areas south of Lacy Road do fill up with stormwater runoff during larger design storms. Once flood levels reach an elevation of approximately 1,021.5 feet, stormwater overflows across the driveways to the south. The utility parcels located just southwest of Lacy Road and Seminole Highway have a gravel pad elevation of approximately 1,023.00 feet, which is 0.3 feet higher than the 100-year back-to-back HWEL.

Table 5 HWEL in Sub-Zero Kettle Associated with Current and Ultimate Buildout of the Watershed

Current Conditions					Ultimate Conditions				
	Starting Elevation in Kettle 1,015 feet	Starting Elevation in Kettle 1,016 feet	Starting Elevation in Kettle 1,017 feet	Starting Elevation in Kettle 1,018 feet		Starting Elevation in Kettle 1,015 feet	Starting Elevation in Kettle 1,016 feet	Starting Elevation in Kettle 1,017 feet	Starting Elevation in Kettle 1,018 feet
Event	HWEL (feet)	HWEL (feet)	HWEL (feet)	HWEL (feet)	Event	HWEL (feet)	HWEL (feet)	HWEL (feet)	HWEL (feet)
1-Year	1,016.65	1,016.95	1,017.71	1,018.63	1-Year	1,017.07	1,017.32	1,017.97	1,018.79
2-Year	1,016.9	1,017.18	1,017.91	1,018.81	2-Year	1,017.32	1,017.55	1,018.18	1,018.99
10-Year	1,017.75	1,017.99	1,018.66	1,019.47	10-Year	1,018.15	1,018.37	1,018.95	1,019.66
100-Year	1,019.44	1,019.63	1,020.17	1,020.88	100-Year	1,019.83	1,020.01	1,020.52	1,021.12
100-Year Back-to-Back	1,023.43	1,023.57	1,023.88	1,024.24	100-Year Back-to-Back	1,023.55	1,023.68	1,024.23	1,024.53

Note: The low point in Sub Zero Parkway is approximately 1023.7 feet.

Table 6 HWEL in Kettle South of Lacy Road Current and Ultimate Buildout of the Watershed

Current Conditions				Ultimate Conditions			
	Kettle Southwest of Lacy Road and Badger State Trail	Low Area in Triangle Parcel South of Lacy Road	Low Area Southeast of Lacy Road and Seminole Highway		Kettle Southwest of Lacy Road and Badger State Trail	Low Area in Triangle Parcel South of Lacy Road	Low Area Southeast of Lacy Road and Seminole Highway
Event	HWEL (feet)	HWEL (feet)	HWEL (feet)	Event	HWEL (feet)	HWEL (feet)	HWEL (feet)
1-Year	1,018.23	1,018.76	1,019.74	1-Year	1,019.06	1,019.54	1,020.26
2-Year	1,018.62	1,019.23	1,020.1	2-Year	1,019.47	1,019.94	1,020.6
10-Year	1,019.89	1,020.49	1,021.17	10-Year	1,020.7	1,021.11	1,021.63
100-Year	1,021.44	1,022.08	1,022.09	100-Year	1,021.62	1,022.33	1,022.33
100-Year Back-to-Back	1,022.46	1,022.70	1,022.71	100-Year Back-to-Back	1,022.5	1,022.71	1,022.73

ALTERNATIVES ANALYSIS

An alternatives analysis was conducted to investigate various options to drain the Sub-Zero Kettle to meet the City's requirement of storing the back-to-back 100-year design storms. Specific design elements included pump rates, pump on and off regimes, receiving downstream storm sewer capacities, draw down times, infiltration rates, and potential groundwater mounding. As stated during the regulatory meetings, it is preferred to provide infiltration on-site to allow the stormwater to drain down in the local watershed to the maximum extent possible before conveying the stormwater elsewhere. This would also be in keeping with the spirit of the North Stoner Prairie Neighborhood Plan, which recommended volume control for 100 percent of the pre-development infiltration (stay-on) volume (which is not enforceable because of state statutes that limit the City to 90 percent). A complete stormwater plan for this watershed should include infiltration as well as contingency pumping for wetter years. A detailed opinion of probable construction cost (OPCC) is provided at the end of this section.

This analysis includes the following six alternatives. A complete stormwater approach for this watershed should include two components from the options listed below: an infiltration component (Alternative A1 or A2) and a drawdown component for the Sub-Zero Kettle (Alternative B1, B2, or B3). Installing a drawdown component for the CD5 Kettle (Alternative C1) is considered optional at this time because the kettle south of Lacy Road has not failed (i.e., it is still infiltrating). This option should be considered in the future if the kettle plugs and ceases to be infiltrative.

1. Alternative A1–Infiltration within the Footprint of the Sub-Zero Kettle
2. Alternative A2–A New Infiltration Basin Outside of the Sub-Zero Kettle
3. Alternative B1–Fixed Pumping Station
4. Alternative B2–Mobile Pumping Station
5. Alternative B3–Low-Flow Gravity Pipe to Seminole Village Pond
5. Alternative B4–Low-Flow Gravity Drainage to Story Creek (not considered feasible)
6. Alternative C1–Low-Flow Gravity Pipe from Kettle South of Lacy Road to Sub-Zero Kettle

A. Alternative A–Infiltration within the Sub-Zero Watershed

An option to relieve flooding within the drainage basin would be to encourage infiltration of stormwater on top of what is already required for new development per City Ordinance. Two options to accomplish this would be to either encourage infiltration in the existing Sub-Zero Kettle, or to construct a new infiltration basin to the southeast of the kettle located north of Lacy Road. Construction of infiltration basins to the south of Lacy Road were not considered because of existing wetlands and utilities in the areas that were most likely candidates. In addition, water would need to be pumped south, adding to the cost of potential facilities south of the road.




It is recommended that all infiltration options include the installation of monitoring wells to measure groundwater elevations and potential groundwater mounding depths for future regime modifications should the mounding depths get higher than calculated estimates. These monitoring wells could also help determine when maintenance of the infiltration features is required.

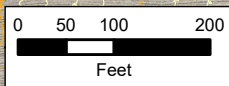
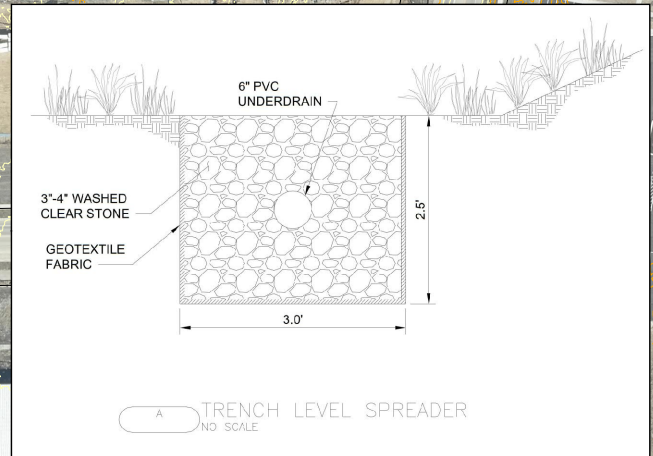
1. Alternative A1—Infiltration within the Footprint of the Sub-Zero Kettle

Establishing infiltration within the existing Sub-Zero Kettle would allow the City to draw down the kettle without having to expand the stormwater management footprint. After the temporary pumping in the of summer 2020 was completed, soil borings were collected around the perimeter of the kettle at an approximate elevation of 1,017.70 feet. Based on review of the two borings (B1 and B-2), there appears to be 10 inches of topsoil and muck at the surface that is underlain with 26 inches of clay loam. This approximately 3-foot layer of material could be removed from the bottom of the kettle and replaced with engineered soil to provide a level of treatment before infiltrating to the groundwater table. All areas disturbed in the bottom of the kettle will be reseeded to establish wetland vegetation. Establishing a link to the underlying sand and gravel layer will establish a higher infiltration rate in the areas where this practice is implemented. The infiltration rate of these underlying soils is approximately 3.6 inches per hour (in/hr) as stated in the soils report. When the groundwater level becomes elevated and gets close to the bottom of the infiltration area (as shown in the well logs), the infiltration rate drops significantly from an estimated 3.6 in/hr to almost 0 in/hr as stated in the Technical Standard 1002, Site Evaluation For Stormwater Infiltration created by WDNR. There is also the potential circumstance when the groundwater level is higher than the bottom of the infiltration basin, which takes up storage volume needed to retain the 100-year back-to-back storm event.

To collect stormwater runoff as it enters into the kettle, a narrow footprint was selected along the western edge of the existing kettle to use for infiltration. The proposed infiltration basin has a footprint of approximately 1.0 acres (5 percent of the kettle bottom footprint) and has a bottom elevation of 1,017 feet (approximately 2 feet higher than the bottom of the kettle). The infiltration basin will be separated from the kettle with a 2-foot-high berm at elevation 1,019 feet with spillways that would allow larger storm events to be conveyed to the kettle. It should be noted that the creation of the flat infiltration footprint does require excavation along the southern edge of the kettle. This excavation offsets the fill required to place the berm and will not cause a significant change to the overall storage volume in the kettle. The OPCC includes the use of a turf reinforcement mat to be placed along the top of berm and spillways to limit erosion when overtopping of the berm occurs in large storm events. Because the bottom of the infiltration basin is approximately 2 feet higher than the kettle bottom elevation, a pumping or low-flow gravity pipe alternative will need to be implemented to remove the remaining stormwater from the kettle.

An evaluation was completed to determine the infiltration capacity of the 1.0-acre infiltration footprint in the kettle. Based on these calculations the infiltration basin has the capability to hold the runoff volume from upstream areas for an approximately 1-year design storm within its footprint. Assuming a groundwater elevation of 1,015 feet (approximate elevation in the area after pumping occurred in 2020) the infiltration basin can only drain an approximately three-month event before the groundwater mounding elevation would intercept the bottom of the infiltration basin. The Hantush (1967) equation for groundwater mounding beneath an infiltration basin was used to estimate mounding depths. For this reason, it is assumed that 6-inch polyvinyl chloride (PVC) capped pipes will be needed along the separation berm to allow the infiltration footprint to be drawn down. A 1.0-acre infiltration area was used in the OPCC for this alternative.

- Legend**
-  Soil Boring
 -  Well Location
 -  Proposed Infiltration Basin



ALTERNATIVE A1
INFILTRATION WITHIN THE FOOTPRINT OF THE SUB-ZERO KETTLE
 REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
 CITY OF FITCHBURG
 DANE COUNTY, WISCONSIN



FIGURE 8
1275.050

There are several options to allow for stormwater runoff from the upstream watersheds to be spread uniformly over the bottom of the new infiltration basin. The option proposed in this report and used in the OPCC consists of 6-inch perforated underdrain pipes installed throughout the basin bottom that are surrounded by clean stone as shown in the detail on Figure 8. The clean stone and perforated pipes allow stormwater to disperse across the basin and will work as a stormwater spreading device to evenly distribute stormwater across the surface of the basin, minimizing erosion concerns and providing a uniform infiltration rate across the infiltration basin. Other options to distribute stormwater runoff uniformly could include laying perforated concrete pipe on the bottom of the infiltration basin.

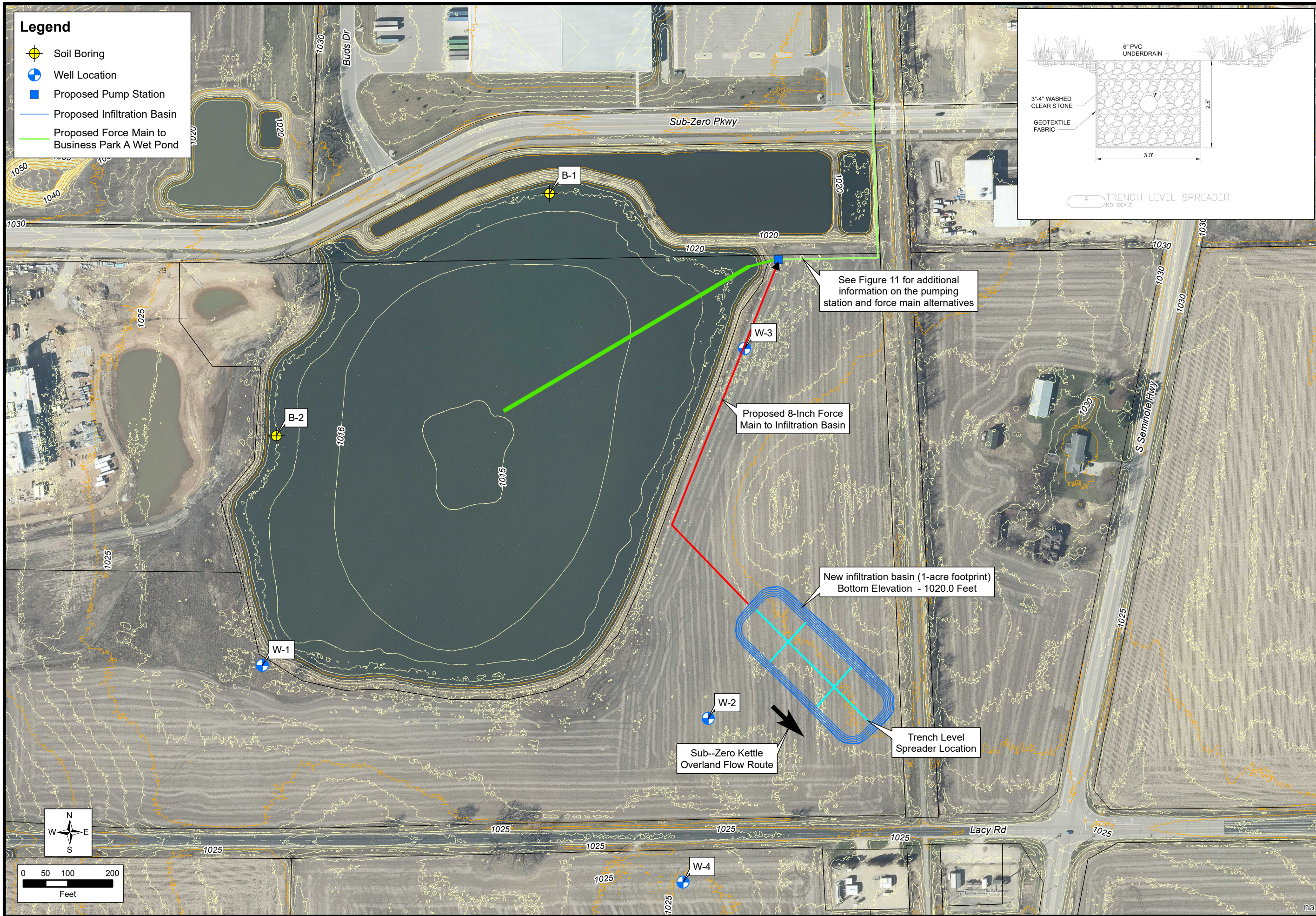
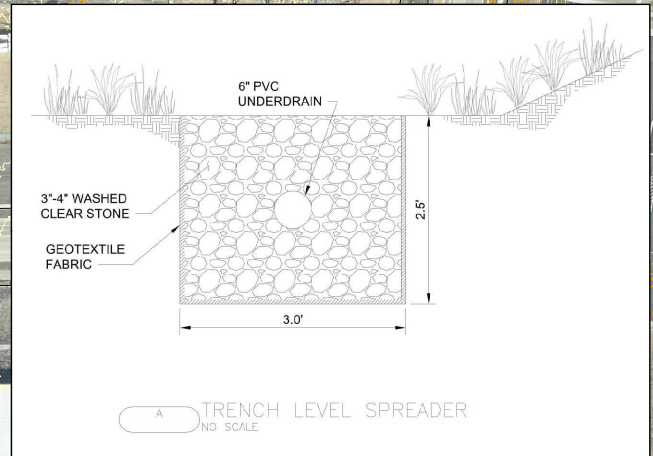
As with any infiltration device, maintenance of the system will be required as the infiltration rate decreases over time because of silt and sediment that accumulates on the bottom of the infiltration basin. One option for maintenance in this circumstance is to remove any accumulated sediment and deep till the bottom of the basin to loosen soils and increase the infiltration rate. If this is unsuccessful, the engineered soil may need to be removed and replaced.

Based on our analysis of groundwater mounding in this area, we believe that an infiltration basin in this area would be ineffective during years with high groundwater. Therefore, an infiltration basin within the kettle footprint is not recommended.

2. Alternative A2—A New Infiltration Basin Outside the Sub-Zero Kettle

This option would propose to install a new 1-acre rectangular infiltration basin in the northwest quadrant of the bike path and Lacy Road (see Figure 9). Placement of the basin, as shown on Figure 9, allows for the basin to be located on the downstream side of the groundwater gradient, limits the amount of excavation, and allows for the overland flow path from the kettle to the southeast to remain in place. The rectangular shape of the basin is recommended, and interior cells should be added during final design to control the flow across the basin and help with maintenance. Flow would be pumped from the Sub-Zero Kettle at a rate of 850 gpm to the infiltration basin. The cost for the pumping station is not included in the cost for this alternative. The pumping station (Alternatives B1 or B2) can be used to pump the water to Dunn's Marsh and to the infiltration basin. The OPCC for this alternative includes the 8-inch ductile iron pipe required to convey the stormwater from the pumping station to the new infiltration basin. The design of the basin includes a bottom surface at elevation 1,020, which is approximately 5 feet higher than the groundwater elevation in the monitoring well directly adjacent to the infiltration basin (see Figure 7). Based on the soil boring in this area, it appears that the sand and gravel layer is at elevation 1,017 feet, meaning the infiltration basin will need to be over-excavated to remove the native clay material between 1,017 and 1,020 feet. This excavated area will be backfilled with an engineered soil to allow for effective infiltration while providing a level of filtration to mitigate the chances of polluting the groundwater. The soils report has stated that the sand and gravel below elevation 1,017 feet has an infiltration rate of 3.6 in/hr and WDNR states that the engineered soil will also have an infiltration rate of 3.6 in/hr.

- Legend**
- Soil Boring
 - Well Location
 - Proposed Pump Station
 - Proposed Infiltration Basin
 - Proposed Force Main to Business Park A Wet Pond



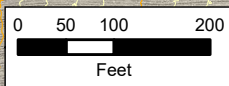
See Figure 11 for additional information on the pumping station and force main alternatives

Proposed 8-Inch Force Main to Infiltration Basin

New infiltration basin (1-acre footprint)
Bottom Elevation - 1020.0 Feet

Trench Level Spreader Location

Sub-Zero Kettle Overland Flow Route



ALTERNATIVE A2
NEW INFILTRATION BASIN OUTSIDE OF THE SUB-ZERO KETTLE
 REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
 CITY OF FITCHBURG
 DANE COUNTY, WISCONSIN

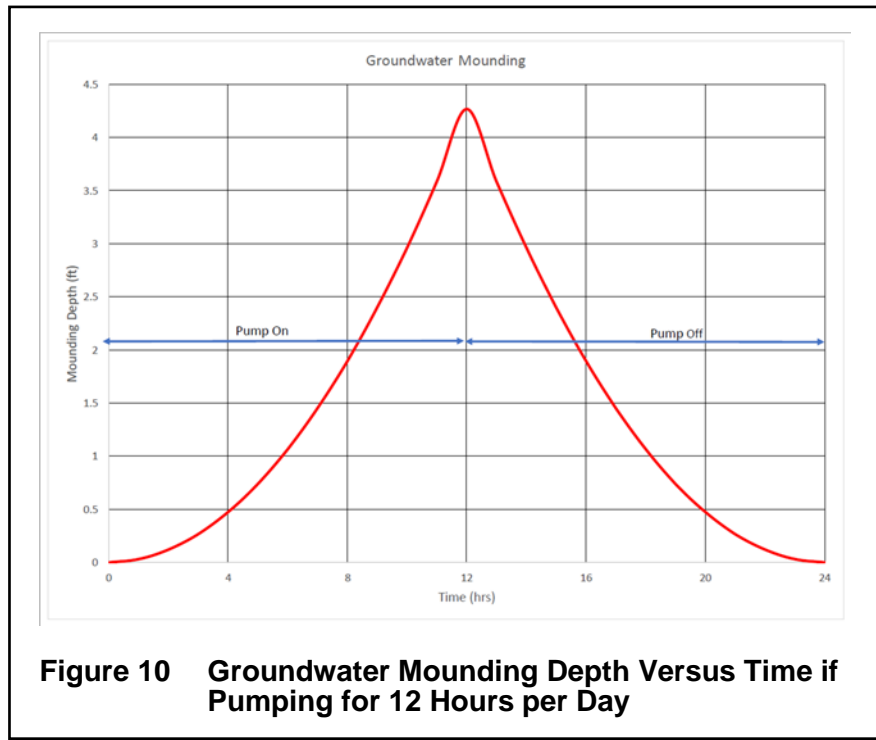


FIGURE 9
1275.050

	HWEL (feet)	Runoff Volume in Kettle (ac-ft)	Total Pump Time to Drain Kettle at 850 gpm (hours)	Days to Drain Kettle at 12 Hours per Day
Current Condition				
1-Year	1,016.65	15.1	97	8
2-Year	1,016.90	18.5	118	10
10-Year	1,017.75	34.0	218	18
100-Year	1,019.44	70.2	449	37
100-Year Back-to-Back	1,023.43	179.8	1,151	96
Ultimate Condition				
1-Year	1,017.07	21.4	137	11
2-Year	1,017.32	25.9	166	14
10-Year	1,018.15	41.7	267	22
100-Year	1,019.83	79.7	510	43
100-Year Back-to-Back	1,023.55	183.9	1,177	98

Table 7 Days to Drain Sub-Zero Kettle System Pumping 12 Hours per Day

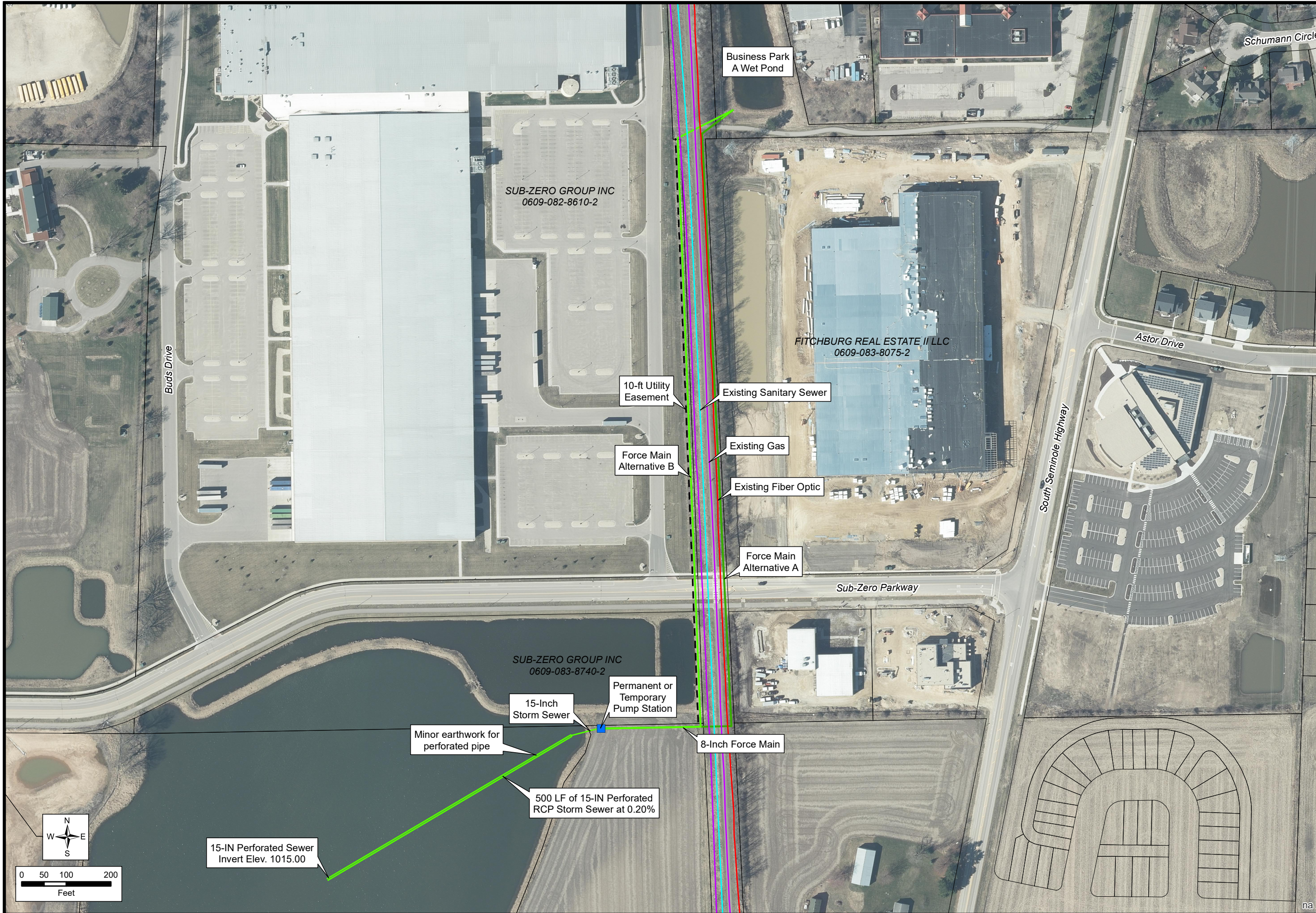
The potential for groundwater mounding was also investigated to estimate the depth of the mounding and the volume of water that could pump to the basin before the mounding depth was higher than the bottom of the basin. The Hantush (1967) equation for groundwater mounding beneath an infiltration basin was used to estimate mounding depths. After performing an iterative process, it appears that allowing pumping to occur in 12-hour increments limits the groundwater mounding depth to approximately 4.3 feet (elevation 1,019.3 feet, which is just below the bottom of the pond); see Figure 10. If it is also assumed that the decay rate of the mounding will occur at the same rate as it occurred, the mounding should be gone by the end of the next 12-hour period (Hantush 1967). It also appears that the influence on groundwater mounding extends approximately 20 feet outside the bottom edge of the infiltration basin. All groundwater mounding calculations are shown in Appendix E. Figure 10 shows how the groundwater mounding depths would change over a 24-hour period if pumping occurred in the first 12 hours. Table 7 also shows the number of days it would take to drain the Sub-Zero Kettle system pumping at 850 gpm for 12 hours per day. Under the time constraint of 12 hours, the pump on elevation should be set at 1,016 feet and turned off at elevation 1,015 feet with floats set in the pumping station wet well.



Review of the groundwater elevations in the monitoring wells does show a groundwater surface gradient to the south. This gradient should allow the infiltrated water to move away from the Sub-Zero Kettle, mitigating concerns that the water will cycle from the infiltration basin back to the Sub-Zero Kettle.

There are several options to allow for the stormwater runoff from the Sub-Zero Kettle to be spread uniformly over the bottom of the new infiltration basins. The option proposed in this report and used in the OPCC consist of 6-inch perforated underdrain pipes installed throughout the pond and surrounded by clean stone as shown in the detail on Figure 9. The clean stone and perforated pipes allow the stormwater to reach across the basin and will work as a stormwater spreading device to evenly distribute stormwater across the surface of the pond, minimizing erosion concerns and providing a uniform infiltration rate across the infiltration basin. Other options to distribute the stormwater runoff uniformly could include laying perforated concrete pipe on the bottom of the infiltration basin or using an irrigation system.

As with any infiltration device, maintenance of the system will be required as the infiltration rate decreases over time because of silt and sediment that accumulates on the bottom of the infiltration basin. One option for maintenance in this circumstance to is deep till the bottom of the basin to increase the infiltration rate. If this is unsuccessful, the engineered soil may need to be removed and replaced.



ALTERNATIVES B1 AND B2
FIXED AND MOBILE PUMPING STATION AND FORCE MAIN
 REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
 CITY OF FITCHBURG
 DANE COUNTY, WISCONSIN



FIGURE 11
1275.050

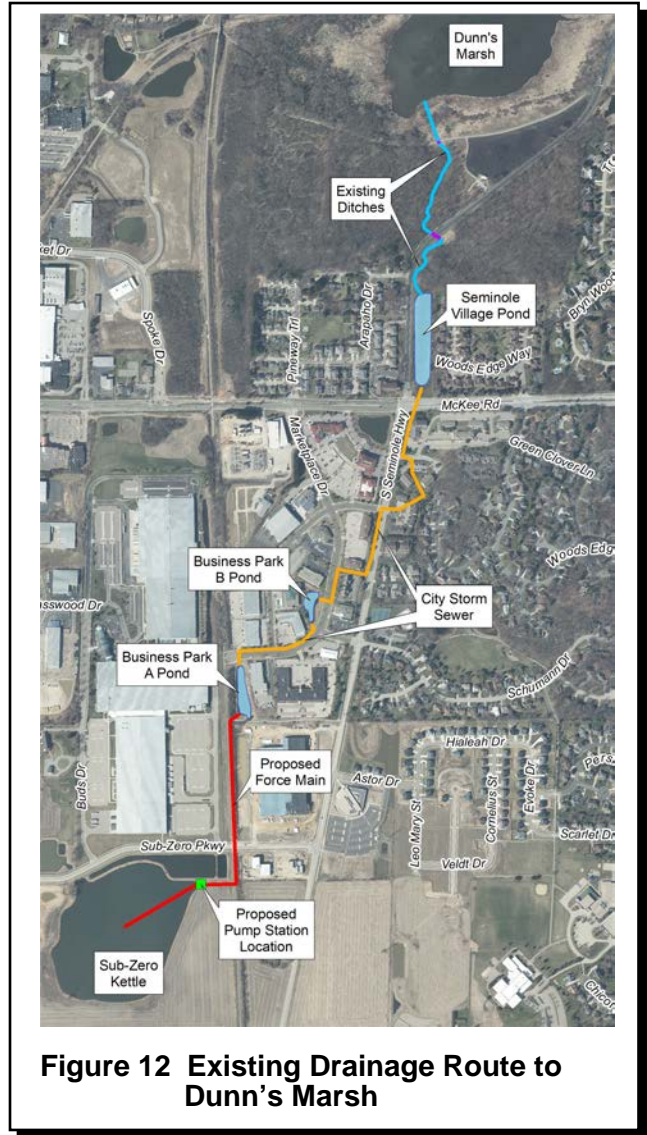
B. Alternative B—Options to Drain the Sub-Zero Kettle

1. Pumping Station Alternatives

As part of the pumping station alternative, it is proposed to install a permanent discharge force main from the kettle to the Business Park A Pond (see Figure 11), which is located approximately 1,700 feet north of the kettle. Pumped flow would then enter the existing storm sewer system, pass through the Business Park A Pond, Business Park B Pond, Seminole Village Pond, and ultimately outfall into Dunn’s Marsh (see Figure 12). Pumping operations to this downstream conveyance system should only occur after a storm event has occurred and the downstream system has had an opportunity to drain out to avoid potential capacity issues. A permanent pumping plan will need to be approved by WDNR. This alternative addresses options for the force main route and pumping station configurations. The proposed pumping station and force main route alternatives are displayed in Figure 11.

The force main will be included under both alternatives. In general, force mains are sized to maintain a minimum velocity of at least 2 feet per second (fps) to keep grit moving and prevent settling of sediment in the pipeline. Typical maximum velocities in force main design are usually less than 8 fps. Any flows higher than that result in greater head losses and may create excessive water hammer.

For this project, an 8-inch-diameter force main was chosen, which results in a velocity of 6.4 fps for a flow of 850 to 1,000 gpm. As a comparison, the velocity in a 6-inch-diameter pipe would be 11.3 fps.



There are two potential routes for the proposed force main, one on the east side of Badger State Trail, and the other on the west side of the trail. Both options would require an easement from WisDOT, who own and maintain this section of the Badger State Trail. The route along the east side of the trail has approximately 15 feet from the east edge of the trail to the property line. The current constraints for this route include a buried fiber line which runs approximately 7 to 9 feet parallel to the trail, and a thick tree and brush line also running parallel to the trail as show in Figure 13.



Figure 13 Badger State Trail Looking North

The route along the west side of the trail does not include ample space for force main installation within the WisDOT property because of an existing high-pressure gas main and sanitary sewer interceptor.

This alternative would propose to obtain a 10-foot permanent stormwater easement from Sub-Zero to install the new force main. Both force main routes are shown in Figure 11. Although this would incur costs to purchase additional easement, the route appears to have less obstructions to clear for installation. These force main routes could either be directly discharged to the wet pond or enter a new manhole before exiting and flow by gravity to Pond A. This would allow for a shorter force main.

The proposed pumping station would be installed to facilitate the conveyance of stormwater from the Sub-Zero Kettle to the Business Park A Pond. This pumping station can either be installed as a permanent structure to the area, or provisions can be included so that the City can use its existing portable trailered pump. This option would rely on staff availability to operate the pumps and could introduce human error. If the City decides to operate the pumps at 12-hour intervals, required staff might be prohibitive. The pumping location for either pumping setup is shown on Figure 11.

a. Alternative B1–Fixed Pumping Station

This alternative proposes to install a submersible pumping station adjacent to the Sub-Zero Kettle. The pumping station would consist of an 8-foot-diameter wet well and valve vault, two submersible pumps capable of pumping 850 to 1,000 gpm each, and outdoor electrical controls. The wet well would be connected to the Sub-Zero Kettle by a 15-inch perforated reinforced concrete pipe with exposed joints. Each section of the storm sewer system will be tied into the ground to limit the storm sewer from moving around during a storm event and the end piece will have an apron end wall and grate to limit the amount of vegetation and trash to get into the system. The OPCC also includes an allowance to run power to the proposed pumping station location.

The Fixed pumping station would be set up to automatically turn on at elevation 1,016 feet and draw the kettle down to an elevation of 1,015 feet. Under this pump on and pump off regime, the pump would run for approximately 37 hours to pump the kettle down to elevation 1,015 feet.

b. Alternative B2–Mobile Pumping Station

In summer 2020, the City had mobile pumping set up (see Figure 14) from the kettle to the Business Park A Wet Pond consisting of a 6-inch portable trailered pump with flexible hose to the outlet approximately 1,700 feet away. This alternative would still use the submersible station structure and force main listed in the Fixed pumping station setup, but would not include the submersible pumps, controls, and appurtenances. The City could then use its 6-inch portable trailered pump to convey stormwater from the pumping station wet well and connect to the force main via a quick connect hookup in the wet well. This setup would be able to convey approximately 850 to 1,000 gpm through an 8-inch force main at a velocity of 8.0 fps. The wet well would be connected to the Sub-Zero Kettle by a 15-inch perforated reinforced concrete pipe with exposed joints. Each section of the storm sewer system will be tied into the ground to stop the storm sewer from moving around during a storm event and the end piece will have an apron end wall and grate to limit the amount of vegetation and trash entering the system by a 15-inch-diameter storm sewer intake pipe. This alternative would also include the minor kettle grading, 15-inch perforated storm sewer, downstream force main, and wet well mentioned in Alternative B1.



Figure 14 6-Inch Mobile Trailered Pump

The purpose of this configuration would be that the City could reduce its initial costs to construct the pumping station but be able to install a fixed pumping station in the future, if desired, by adding submersible pumps and controls to the existing structure.

The mobile trailer pump would be manually run when the kettle elevation reaches 1,016 feet and pump until the water elevation reaches 1,015 feet. Similar to the fixed pumping station option, for this pump on and pump off regime the pump would run for approximately 37 hours to pump the kettle down to elevation 1,015 feet.

2. Low Flow Gravity Pipe Alternatives

An additional option to relieve flooding within the drainage basin would be to construct low-flow gravity storm sewer to drain the Sub-Zero Kettle. These low-flow storm sewer options are typically deeper storm sewers and have relatively flat slopes. While each of these options typically have significant construction costs, there is very little additional cost associated with operating them beyond the maintenance of traditional storm sewer systems.

a. Alternative B3—Low-Flow Gravity Pipe to Seminole Village Pond

This alternative includes the installation of 5,100 lineal feet (LF) of 15-inch storm sewer to extend from the low point in the Sub-Zero Kettle to the Seminole Village Pond located north east of Seminole Highway and CTH PD. The alignment of the storm sewer, as shown in Figure 15, will start at the Sub-Zero Kettle and run along the north side of Sub-Zero Parkway to the east to Seminole Highway. The storm sewer will then head north running down the western side of Seminole Highway where it will connect to the existing storm sewer system at Seminole Centre Court. This will allow stormwater runoff from the Sub-Zero Kettle to continue to drain across CTH PD to the Seminole Village Pond without having to disturb the newly reconstructed intersection of CTH PD and Seminole Highway.

The alignment of the storm sewer system was chosen to avoid potential conflicts with existing utilities in the corridor and to minimize traffic conflicts as much as possible. The west side of the Seminole Highway right-of-way appears to have approximately 30 to 40 feet between the right-of-way line and the back of curb. It is proposed to use this corridor as much as possible to avoid traffic conflicts. This will also reduce conflicts with the sanitary sewer, which runs down the middle of Seminole Highway, and the water main, which runs down the east side of Seminole Highway. However, there may be other private utilities located on the west side of the roadway requiring further investigation during design.

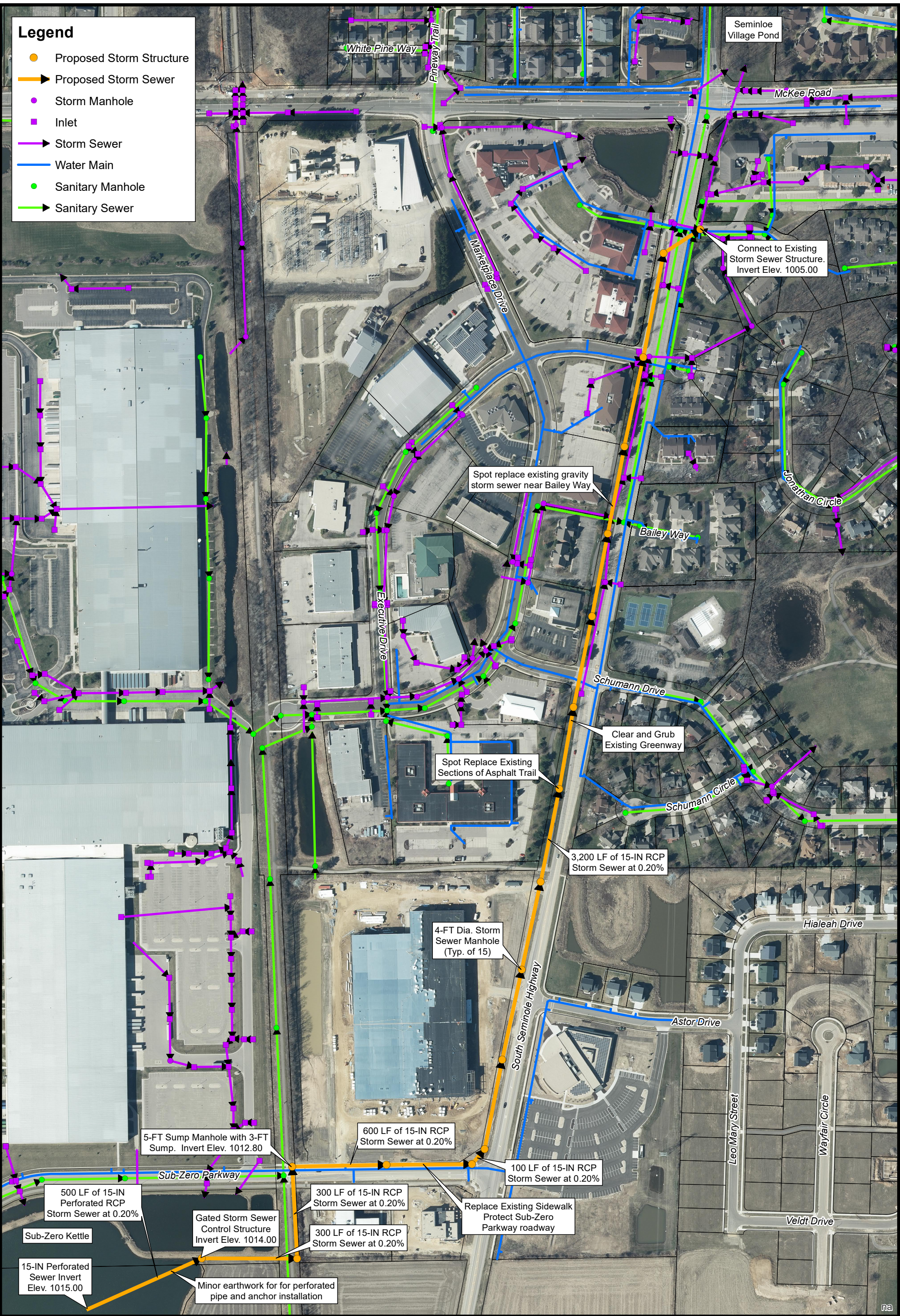
Because of the long stretch of storm sewer and the relatively flat grades in the corridor the storm sewer system will have a flat slope of approximately 0.2 percent. While this slope is flatter than a typical storm sewer system, if the storm sewer is flowing half full, it should have velocity greater than 2 fps, which will limit sediment from clogging the new storm sewer. A 5-foot-diameter manhole with a 3-foot sump is also proposed near the intersection of the Badger State Trail and Sub-Zero Parkway to collect sediment before being sent through the downstream system. The storm sewer system on average will be installed at a depth of 19 feet along the alignment with a maximum depth of 26 feet deep just south of the Schumann Drive and Seminole Highway intersection.

This storm sewer system will be setup to work in a similar fashion as the pumping station options. The stormwater from the Sub-Zero Kettle will not be released until the receiving downstream system has drained down. A gated control structure near the Sub-Zero Kettle can manually be operated to release flow at a similar rate as the pumping station alternatives. Mimicking the pumping station capacity for flows through the 15-inch pipe provides for kettle draw down times similar to what is listed in Table 7. WDNR will also

Path: S:\MAD1200-12991275\050\Drawings\GIS\Mapas\Report\Figures\Fig 15 Alternative B3 11x17.rxd
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Time: 9:49:41 AM

Legend

- Proposed Storm Structure
- Proposed Storm Sewer
- Storm Manhole
- Inlet
- Storm Sewer
- Water Main
- Sanitary Manhole
- Sanitary Sewer



STRAND ASSOCIATES
FIGURE 15
12/5.050

ALTERNATIVE B3
LOW-FLOW GRAVITY PIPE TO SEMINOLE VILLAGE POND
REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
CITY OF FITCHBURG
DANE COUNTY, WISCONSIN

require testing of stormwater flow that is being released through this system to verify the levels of TSS and phosphorus that are being routed to Dunn’s Marsh. The 15-inch storm sewer running along the bottom of the Sub-Zero Kettle will be perforated reinforced concrete pipe with exposed joints. Each section of the storm sewer system will be tied into the ground to limit the storm sewer from shifting during a storm event and the end piece will have an apron end wall and grate to limit the amount of vegetation and trash entering the system.

The OPCC developed for this alternative assumes that the storm sewer will be constructed as a standalone project requiring restoration of all surfaces disturbed by construction. While it is understood that there is the possibility that this could be included as part of a larger Seminole Highway reconstruction project, the timelines for the two projects may not align.

b. Alternative B4–Low-Flow Gravity Drainage to Story Creek

Another option considered for stormwater management was to drain the Sub-Zero Kettle to the south to Story Creek, which is downstream of Lake Harriet. The alignment of this storm sewer is shown in Figure 16. The 10,400-foot-long storm sewer would drain to an unnamed tributary to Story Creek which drains directly to Lake Harriet. Lake Harriet is an enclosed kettle with reports of high water and flooding under current conditions. Because of the already existing flooding problems at Lake Harriet, an outfall would need to be constructed to allow the water to continue to drain to Story Creek. Story Creek is listed as an Area of Special Natural Resource Interest and is designated as a trout stream by WDNR.

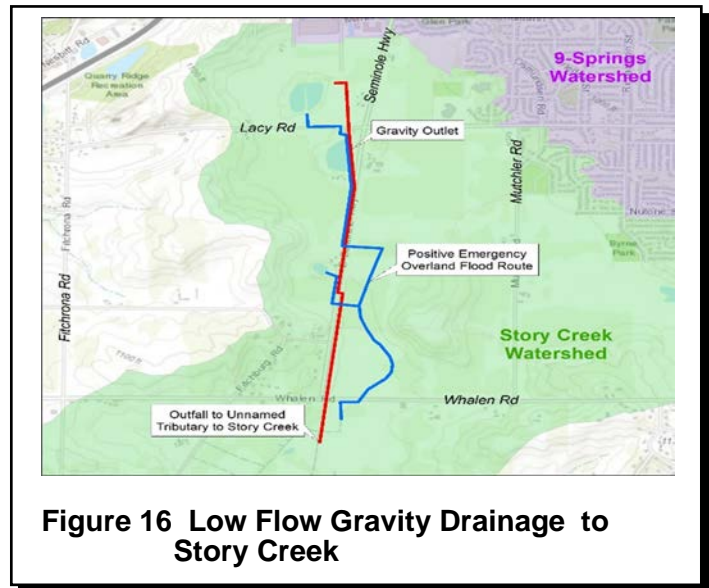


Figure 16 Low Flow Gravity Drainage to Story Creek

Because of trout being extremely sensitive to water temperature changes, the length of infrastructure required to be constructed to drain to the south, and the potential for additional flooding at Lake Harriet, this alternative does not appear to be feasible and was eliminated from further consideration. It was not included in the cost summaries or decision-making matrix.

C. Alternative C—Options to Drain the Kettle South of Lacy Road

An additional option to relieve flooding within the drainage basin would be to construct low-flow gravity storm sewer to drain the kettle located just southwest of the Lacy Road and Badger State Trail intersection.

1. Alternative C1—Low-Flow Gravity Pipe From Kettle South of Lacy Road to Sub-Zero Kettle

This alternative includes a concept to draw down the kettle located just southwest of the Lacy Road and Badger State Trail intersection. As shown in Figure 17 the alignment of the low-flow pipe connecting the southern kettle to the Sub-Zero Kettle runs along the west side of the Badger State Trail across Lacy Road and then on a north westerly route to the proposed Sub-Zero Kettle pumping station wet well.

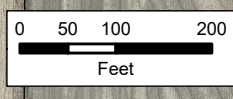
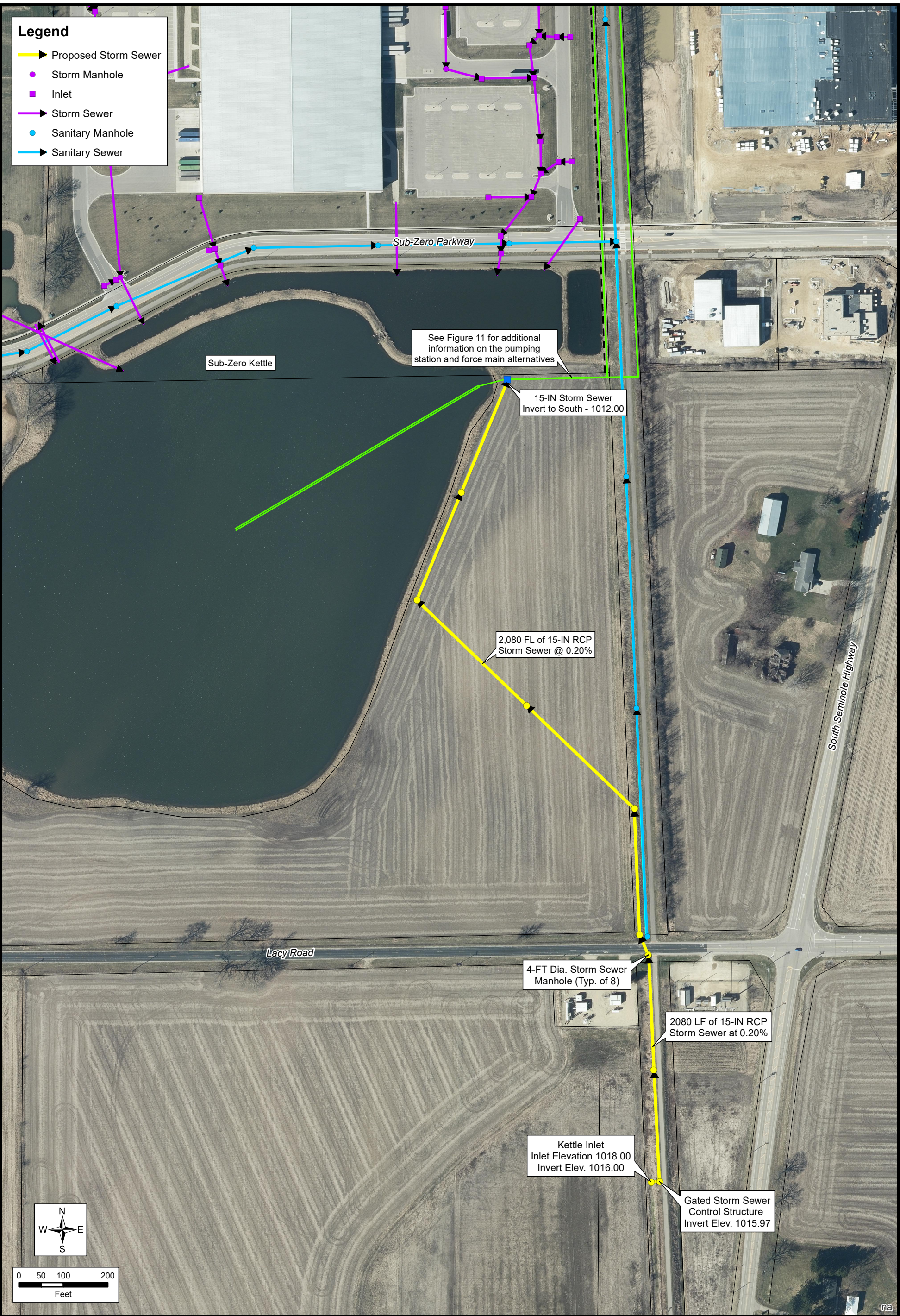
The 2,080 LF of 15-inch reinforced concrete pipe will be installed at a 0.2 percent grade. As stated previously, if the storm sewer is flowing half full the velocity will be greater than 2 fps, which should limit sediment from clogging the new storm sewer. The average depth of the proposed storm sewer is approximately 10 feet with a maximum depth of approximately 13 feet.

Stormwater from the southern Kettle should not be released to the Sub-Zero Kettle until after the Sub-Zero Kettle has fully drained down. A gated control structure near the inlet to the southern Kettle can be manually operated to release flow at a similar rate to the pumping station capacity. The inlet structure will consist of a grated inlet at elevation 1,018.00 feet. Additional controls could be placed in this inlet structure to allow for the kettle to be drawn down to a lower elevation if desired.

Modeling results show the 100-year and 100-year back-to-back design storms have an approximate HWELs of 1,022.21 feet and 1,022.70 feet, respectively, under current conditions and 1,022.39 feet and 1,022.71 feet, respectively, under ultimate conditions. These elevations are lower than the utility pad elevation (located south the intersection of Lacy Road and the Badger State Trail) of approximately 1,023.00 feet based on LIDAR data. Because of the overland flow routes to the south of the kettle having an overtopping elevation of 1,021.5 feet, this alternative will allow for the drainage of the remaining stormwater from elevation 1,021.5 feet to 1,018.00 feet. The available storage volume in this kettle between the elevations of 2,021.5 feet and 1,018.00 feet is approximately 82.1 ac-ft and will increase the pump run times in Alternatives A1 and A2 by 22 days. The additional pumping station operations costs were included in this alternative's operation and maintenance (O&M) cost.

Legend

- ▶ Proposed Storm Sewer
- Storm Manhole
- Inlet
- ▶ Storm Sewer
- Sanitary Manhole
- ▶ Sanitary Sewer



STRAND ASSOCIATES
 1275.050
 FIGURE 17

ALTERNATIVE C1
LOW FLOW GRAVITY PIPE FROM KETTLE SOUTH OF LACY ROAD TO SUB-ZERO KETTLE
 REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
 CITY OF FITCHBURG
 DANE COUNTY, WISCONSIN

OPCC

A summary of the alternatives discussed to potentially reduce flooding to the North Stoner Prairie Neighborhood Plan is listed in the following section, including a summary of their respective OPCC in Table 8. A complete stormwater approach for this watershed should include three components from the options listed below: an infiltration component (Alternative A1 or A2) and a drawdown component for the Sub Zero Kettle (Alternative B1, B2, or B3). At this time, a drawdown component for the CD5 Kettle (Alternative C1) is not considered necessary because the kettle south of Lacy Road has not failed (i.e., it continues to infiltrate).

1. Alternative A1–Infiltration within the Footprint of the Sub-Zero Kettle
2. Alternative A2–A New Infiltration Basin Outside of the Sub-Zero Kettle
3. Alternative B1–Fixed Pumping Station
4. Alternative B2–Mobile Pumping Station
5. Alternative B3–Low-Flow Gravity Pipe to Seminole Village Pond
6. Alternative C1–Low-Flow Gravity Pipe From Kettle South of Lacy Road to Sub-Zero Kettle

OPCC for the alternatives are based on 2020 costs. OPCC include 35 percent (on top of construction costs) for engineering and contingencies. Note that detailed cost opinion breakdowns for each project are included in Appendix F. It should be noted that the force main costs do not include provisions for clearing and grubbing cost for the eastern route or easement acquisition costs. Estimated construction cost for the alternatives considered earth excavation, restoration (per acre cost includes topsoil placement, seeding, and erosion mat), storm sewer piping, pump, force main, and other related items.

It would be noted that the proposed plan would include both an infiltration and pumping option.

	Alternative A1	Alternative A2	Alternative B1	Alternative B2	Alternative B3	Alternative C1
Total Construction Costs	\$562,900	\$627,300	\$634,600	\$420,800	\$1,695,000	\$481,150
Contingencies and Engineering (35%)	\$197,000	\$220,000	\$222,000	\$147,000	\$593,000	\$165,000
Total Capital Costs	\$759,900	\$847,300	\$856,600	\$567,800	\$2,288,000	\$649,150

Notes:
 As stated earlier, the final recommended alternative should contain pumping alternative in the case the infiltration alternatives fail.
 Alternatives A1, A2, and C2 do not include the cost for the pumping station as either Alternatives B1 or B2 could be used for this purpose.
 Land acquisition costs are not included in the totals listed above.

Table 8 Summary of OPCC

A 20-year O&M evaluation was completed for each alternative that incorporates the yearly estimates for O&M. The yearly costs in 2021 dollars were adjusted on a yearly basis over the 20-year analysis to account for a 3 percent annual inflation rate. The summary of these cost and the total 20-year cost are

shown in Table 9. The following assumptions were made regarding O&M for each alternative and a detailed breakdown of each are included in Appendix F.

1. Infiltration Alternatives (A1 and A2)
 - a. Yearly maintenance and mowing of vegetation.
 - b. Sediment removal and deep tilling of the infiltration basin every five years.
 - c. Removal and replacement of the top foot of engineered soil and reseed every ten years.
 - d. O&M costs for the pumping station at the Sub-Zero Kettle for Alternative A2.

2. Pumping Alternatives (B1 and B2)
 - a. Annual maintenance of pumps.
 - b. Labor cost for annual operations.
 - c. Alternative B2 included additional labor time for fueling pump and starting and stopping the pump during at appropriate set elevations.
 - d. Pump run times and fuel cost are based on average annual rainfall amounts (28.8 inches) converted to a runoff volume.
 - e. Electricity and fuel cost for annual operations.
 - f. Water quality testing as requested by WDNR.

3. Low-Flow Gravity Pipe Alternatives (B3, C1)
 - a. Annual O&M of gate and piping.
 - b. Fuel cost for pumping station operations at Sub-Zero Kettle for Alternative C1.
 - c. Water quality testing as requested by WDNR.

	Alternative A1	Alternative A2	Alternative B1	Alternative B2	Alternative B3	Alternative C1
Construction Cost	\$759,900	\$847,300	\$856,600	\$567,800	\$2,288,000	\$649,150
20-Year O&M Cost	\$459,050	\$728,400	\$483,500	\$817,900	\$226,100	\$163,250
20-Year Total Cost	\$1,218,950	\$1,575,700	\$1,340,100	\$1,385,700	\$2,514,100	\$900,300

Table 9 Summary of 20-Year Construction and O&M Cost

CONCLUSIONS AND RECOMMENDATIONS

Based on review of the modeling results for current and ultimate condition Sub-Zero Kettle HWELs, the kettle should be drawn down to elevation 1016 feet) to allow for the retention of the 100-year back-to-back design storms without flooding Sub Zero Parkway. The proposed plan for the Sub-Zero Kettle watershed should include a combination of both an infiltration and pumping option.

There is also a desire to provide a means to drain the kettle to the southeast of the Lacy Road and Badger State Trail intersection. Unlike the Sub Zero Kettle, significant amounts of standing water had not been observed in CD5 for long periods of time over the 2017 to 2020 time frame. This indicates that the kettle is still infiltrating as it has in the past. Therefore, providing an option to draw down the kettle south of Lacy Road is not considered needed at this time. In addition, this kettle does have an overland flow route to the south that is used during larger rainfall events which should continue to be maintained as part of future development.

The recommended alternatives and are listed in the following and the total cost for the recommended alternatives are summarized in Table 10.

1. Infiltration Alternatives

Alternative A2–A New Infiltration Basin Outside of the Sub-Zero Kettle is the recommended infiltration alternative. The proximity of the bottom of the infiltration basin compared to the groundwater elevations in that area reduce the concern of groundwater mounding, which likely would be as issue for Alternative A1.

2. Drainage to Dunn’s Marsh Alternatives

Alternative B1–Fixed Pumping Station is the recommended alternative to provide drainage to Dunn’s Marsh. While the fixed pumping station has a higher construction cost, the 20-year O&M cost for this alternative is less than the mobile pumping station (Alternative B2). While the low-flow gravity pipe to Dunn’s Marsh (Alternative B3) requires less O&M over a 20-year period, the initial construction cost is significantly higher than the pumping station alternatives because of the depth of the low-flow pipe, potential utility conflicts, and surface restorations.

3. Drainage of Kettle to the South of Lacy Road

As previously discussed, providing drainage for the kettle South of Lacy Road is not recommended at this time.

Recommend Alternative	Construction Cost
Alternative A2 (Infiltration Within the Footprint of the Sub-Zero Kettle)	\$847,300
Alternative B1 (Fixed Pumping Station)	\$856,600
Total Cost	\$1,703,900

Table 10 Total Cost of Recommended Alternatives

The decision matrix located in Table 11 summarizes the pros and cons for each alternative and also discusses their dependencies on other alternatives. Other factors including land acquisition, sustainability, overall effectiveness, resiliency, and cost are also listed.

Other non-structural recommendations should be considered moving forward in the planning and design of these watersheds including:

- Establish a new flood protection elevation at the Sub-Zero Kettle of 1,023.7 feet that takes into account the newer 100-year design storm (6.66 inches as opposed to 6.0 inches over 24 hours), and the initial pumping elevation of 1,016.0 feet.
- Ensure that the overflow route to the south of the Sub Zero Kettle is preserved.

This project was presented to the City of Fitchburg Committee of the Whole of February 24, 2021. The presentation and resulting question and answers from this event are shown in Appendix G.

Table 11 Decision Matrix

Alternative	Opportunity	Pros	Cons	Dependency on Other Alternatives	Time to Drain Kettle After 10-Year Design Storm Under Existing Condition Land Use.	Land Acquisition	Sustainability	Effectiveness	Resilience	Cost
A1	Infiltration within the footprint of the Sub-Zero Kettle	<ul style="list-style-type: none"> Contained within the existing stormwater management footprint. 	<ul style="list-style-type: none"> Proximity of groundwater elevation to bottom of the kettle lowers effective infiltration rate. During high groundwater conditions, groundwater may take up storage volume. Requires use of engineered soil for groundwater protection. Requires wetland reseeding in areas disturbed. Only provides infiltration for areas that drain into the west side of the Sub-Zero Kettle. Does not infiltrate water in the Sub-Zero Kettle below elevation 1,019.00. Maintenance required as infiltration rate naturally decreases. 	Select a pumping option to work in tandem with this alternative.	This alternative only provides infiltration for areas draining from the west side off the kettle for small design storms. All other stormwater will need other means to be removed from the kettle by Alternatives B1, B2, and C1.	<ul style="list-style-type: none"> Property acquisition required for new infiltration basin. 	While this alternative provides some level of volume control through infiltration, it is still dependent on a pumping station to lower the kettle as required. This option is considered semi-sustainable.	With proper maintenance this alternative should be effective to infiltrate small design storms (when the groundwater table is down); however, a pumping station alternative is required to lower the kettle as required.	Provides more than 4.5 feet of freeboard from overtopping elevations to south and adjacent structure FFE.	Installation Cost: \$837,700 Anticipated Annual Operating Cost: \$3,750 Years 5 and 15 Operation Cost: \$58,240 Years 10 and 20 Operating Cost: \$145,585
A2	New Infiltration Basin outside of the Sub-Zero Kettle	<ul style="list-style-type: none"> 5 feet of separation between the bottom of the basin and groundwater allows for infiltration. 	<ul style="list-style-type: none"> Dependent on pumping to get stormwater from the kettle to the new basin. Land acquisition is required to construct a new infiltration basin. Requires use of engineered soil for groundwater protection. Maintenance required as infiltration rate naturally decreases over time. 	Select a pumping option to work in tandem with this alternative.	18 days	<ul style="list-style-type: none"> Utility easement required for all piping. Property acquisition required for new infiltration basin. 	This alternative is dependent on infiltration; however, a pumping station alternative is required to get the stormwater to the infiltration basin. This option is considered semi-sustainable.	With proper maintenance this alternative should be effective to lower the kettle as required without conveying additional stormwater to Dunn's Marsh.	Provides more than 4.5 feet of freeboard from overtopping elevations to south and adjacent structure FFE.	Installation Cost: \$752,300 Anticipated Annual Operating Cost: 2,500 Years 5 and 15 Operation Cost: \$38,720 Years 10 and 20 Operating Cost: \$96,765
B1	Fixed Pumping Station	<ul style="list-style-type: none"> Set pump on and off elevations and pump time restraints require little oversight. Automated system reduces potential for human error No fueling is required to run the pumping station. 	<ul style="list-style-type: none"> High installation cost. Testing of pumped stormwater for TSS and phosphorous required when pumping. Land acquisition required for pumping station location and force main. Significantly lower operating cost. 	Requires an infiltration alternative. Pumping only occurs as a Plan B in case infiltration fails.	9 days	<ul style="list-style-type: none"> Utility easement required for all piping. Property acquisition required for wet well, pumping station controls, and access to pump. 	Due to pumping stations reliance on fossil fuels, they are not considered sustainable.	With proper maintenance this alternative should be effective to lower the kettle as required.	Provides more than 4.5 feet of freeboard from overtopping elevations to south and adjacent structure FFE.	Installation Cost: \$856,600 Anticipated Annual Operating Cost: \$19,250
B2	Mobile Pumping Station	<ul style="list-style-type: none"> Lower installation cost as compared to the Fixed pumping station option. Could use pump already owned by the City. 	<ul style="list-style-type: none"> Lack of controls and fueling requires significantly more oversight to run the pumping station. Manual operation of the pump at regular intervals increases potential for human error. Testing of pumped stormwater for TSS and phosphorous required when pumping. Land acquisition required for the pumping station location and force main. Significantly higher annual operational cost. 	Requires an infiltration alternative. Pumping only occurs as a Plan B in case infiltration fails.	9 days	<ul style="list-style-type: none"> Utility easement required for all piping. Property acquisition required for wet well, pump lay down area, and access to pump. 	Due to pumping stations reliance on fossil fuels, they are not considered sustainable.	With proper maintenance this alternative should be effective to lower the kettle as required.	Provides more than 4.5 feet of freeboard from overtopping elevations to south and adjacent structure FFE.	Installation Cost: \$567,800 Anticipated Annual Operating Cost: \$32,600
B3	Low-Flow Gravity Pipe to Seminole Village Pond	<ul style="list-style-type: none"> Does not require pumping to draw down the kettle. Low O&M. 	<ul style="list-style-type: none"> High installation cost. Testing of pumped stormwater for TSS and phosphorous required when gates are open. Manual operation of gate valve required to regulate water elevations. 	Could be used in combination with Alternative A1.	9 days	<ul style="list-style-type: none"> Utility Easement required for piping from Sub-Zero Kettle to Sub-Zero Parkway. 	This option requires very little attention after installation and is considered to be sustainable.	With proper maintenance this alternative should be effective to lower the kettle as required.	Provides more than 4.5 feet of freeboard from overtopping elevations to south and adjacent structure FFE.	Installation Cost: \$2,288,000 Anticipated Annual Operating Cost: \$9,000
C1	Low-Flow Gravity Pipe from the Kettle South of Lacy Road to Sub-Zero Kettle	<ul style="list-style-type: none"> Does not require pumping to draw down the kettle. Low O&M. 	<ul style="list-style-type: none"> Manual operation of gate valve required to regulate water elevations 	Select a pumping option to work in tandem with this alternative.	17 days	<ul style="list-style-type: none"> Utility easement required for all piping. 	This option requires very little attention after installation and is considered to be sustainable.	With proper maintenance this alternative should be effective to lower the kettle as required.	Provides approximately 3 inches of freeboard between Utility pads and 100-year back-to-back events.	Installation Cost: \$649,150 Anticipated Annual Operating Cost: \$10,050

APPENDIX A
GROUNDWATER TECHNICAL MEMORANDUM AND SOILS REPORT



Strand Associates, Inc.®
910 West Wingra Drive
Madison, WI 53715
(P) 608.251.4843

TECHNICAL MEMORANDUM

To: Ms. Claudia Guy, P.E.
City of Fitchburg, Wisconsin

From: Luke Hellermann, P.G.
Strand Associates, Inc.®

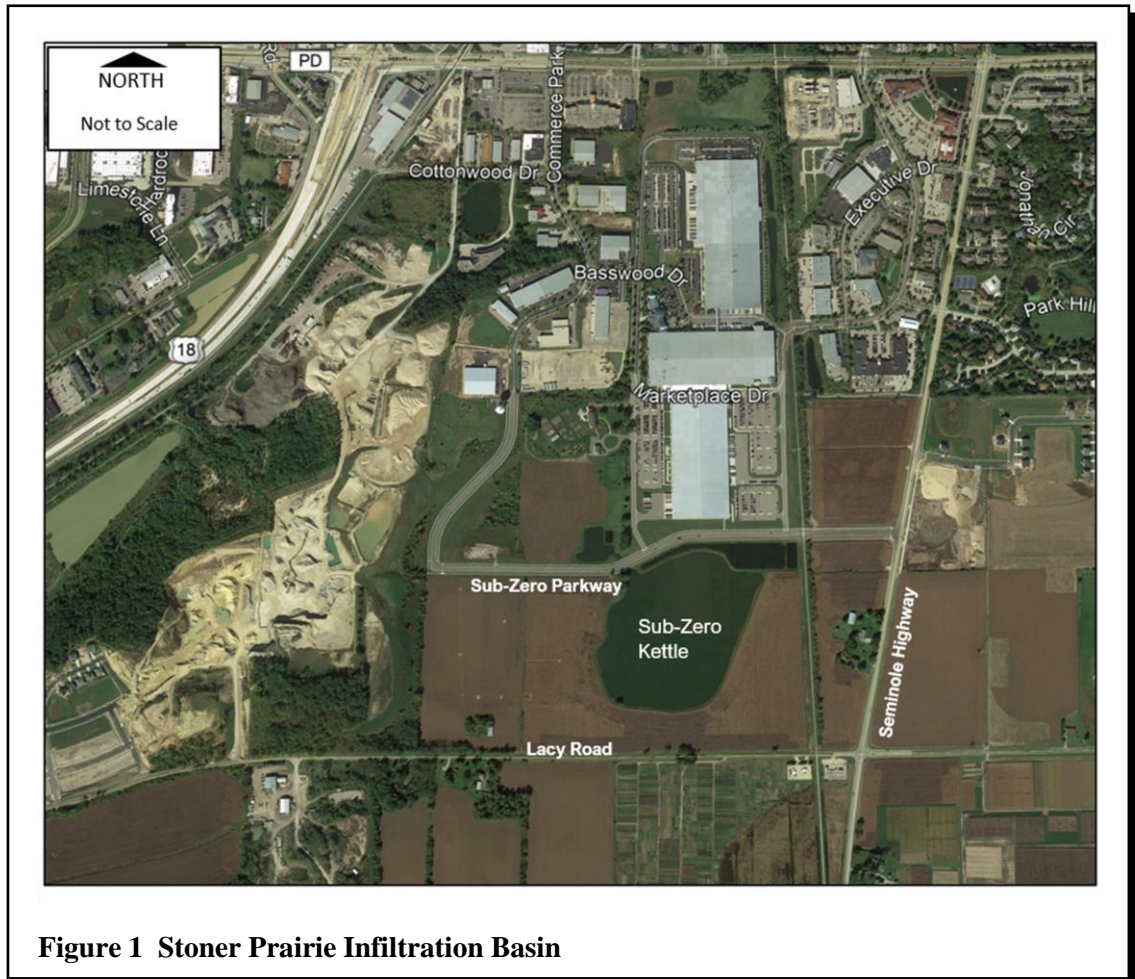
Date: May 6, 2021

Re: Hydrogeologic Evaluation
Regional Stormwater Management Study for the Sub-Zero/Stone Prairie Area
City of Fitchburg, Wisconsin

Introduction

Review of the local hydrogeology was completed for the area of the Sub-Zero Kettle located south of Sub-Zero Parkway. The basin serves as a stormwater management facility for the Sub-Zero/Stoner Prairie area on the southwest side of the City. The bottom of the stormwater basin is at approximate elevation 1,015 feet and the basin was designed to infiltrate 100-year storm events that occur in quick succession. In recent years, the basin has been holding water and is typically full, limiting the effectiveness of the basin. Figure 1 shows the location of the infiltration basin.

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 City of Fitchburg
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 May 6, 2020



Review of Regional Data and Boring Logs from the Project Area

Existing hydrogeologic data was reviewed to assess existing conditions.

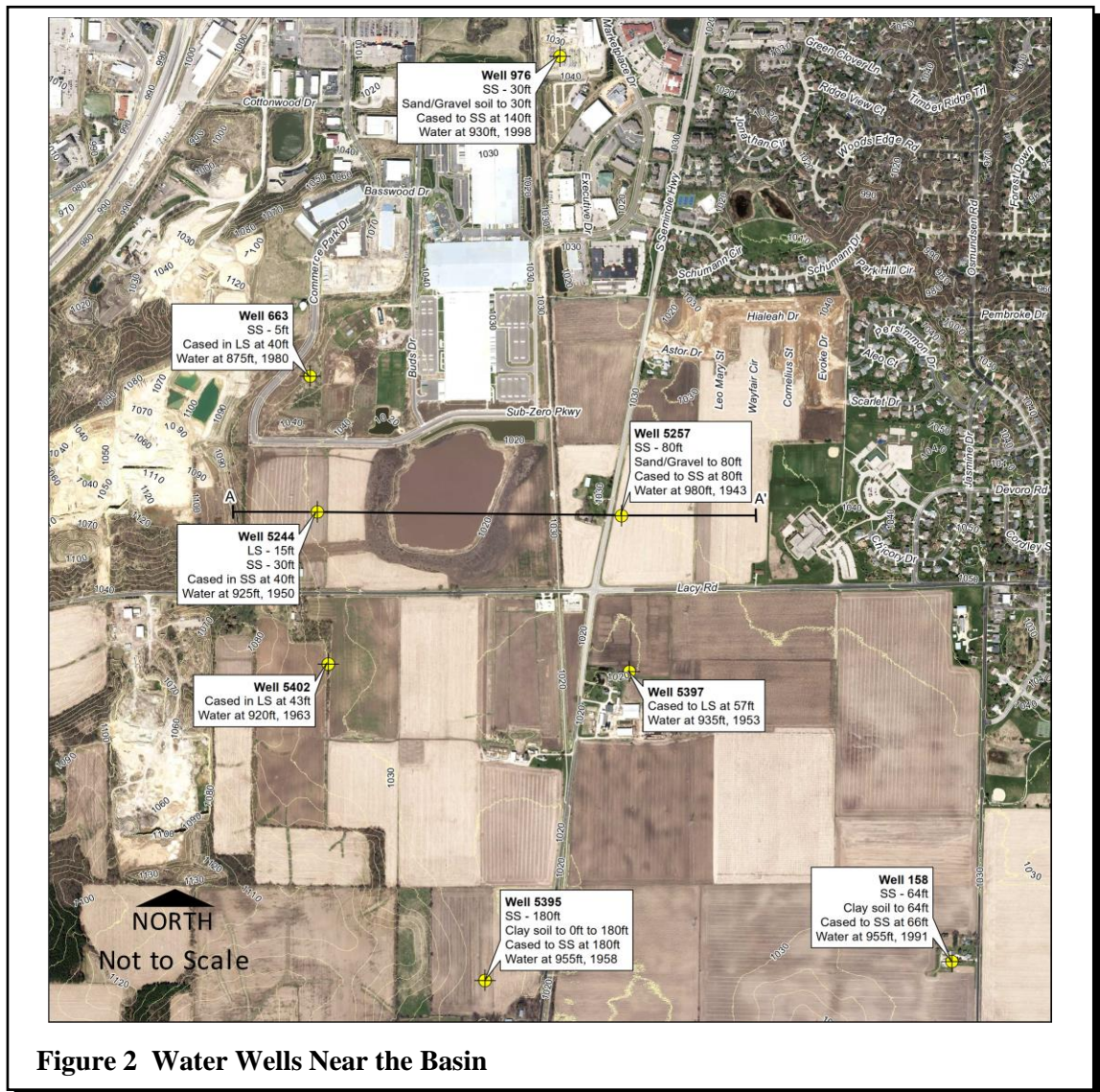
A. Dane County Regional Groundwater Flow Model

Review of the 2016 Dane County groundwater flow model provided a regional perspective of the water table aquifer, the deeper confined bedrock aquifer, and the geology in the area. The model's simulations show a regional water table flow direction to the northeast, toward the City of Madison lakes and Yahara River. However, the model's water table aquifer is the unconfined aquifer in hundreds of feet of all the unconsolidated units and bedrock units located above the Eau Claire shale formation. Near the basin, the water table elevation simulated by the Dane County model is at approximately 930 feet, a depth of almost 100 feet below the ground surface. The water table simulated by the Dane County model does not represent the shallow water table in the glacial till soils near the basin where the water table has been recorded at depths of approximately 10 to 20 feet. The shallow water table being evaluated for this study is locally variable and influenced by local topography.

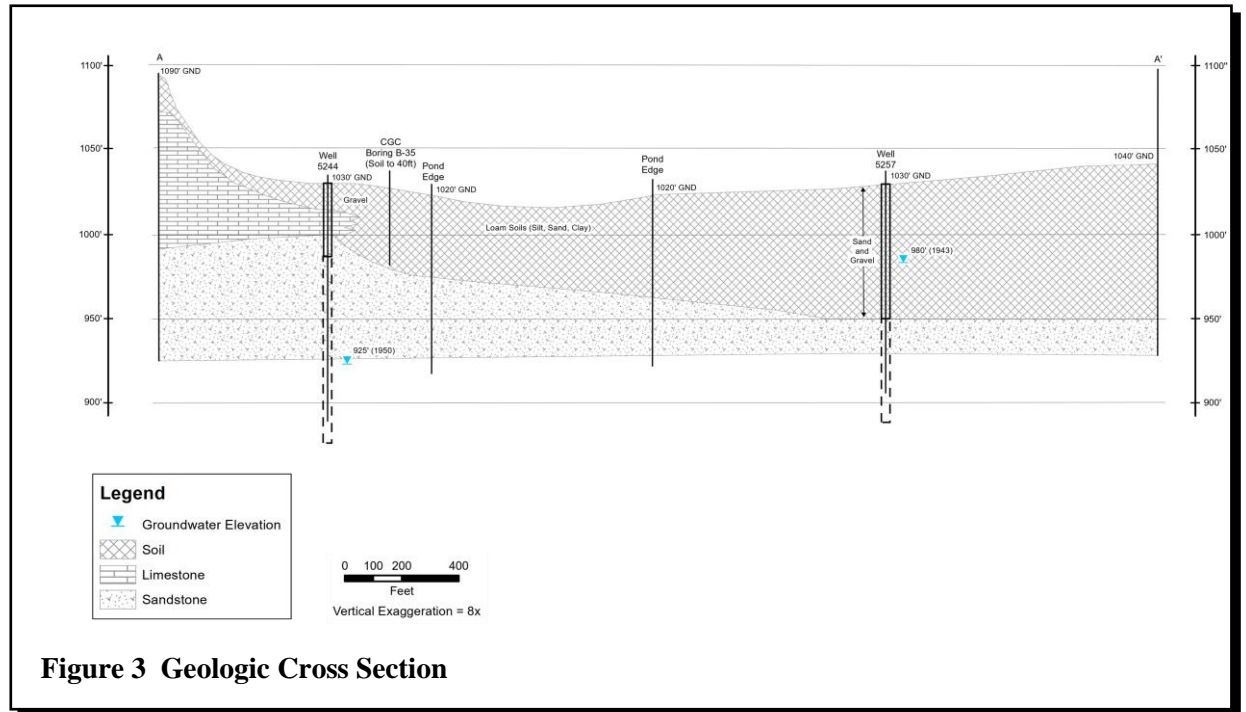
Ms. Claudia Guy, P.E.
 City of Fitchburg
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 May 6, 2020

B. Area Water Well Logs

Well construction forms for private water wells in the area were reviewed. The locations of eight wells near the basin and a summary the geology and reported water depths are shown on Figure 2. The construction forms report that approximately 500 feet west of the basin, limestone bedrock was observed at a depth of 15 feet. The forms indicated that bedrock was observed at greater depths (approximately 60 to 80 feet) to the east. Heterogeneous soils consisting of clay loams to sand and gravel were reported above the bedrock. Figure 3 is a geologic cross section through the basin based on area well construction reports and geotechnical borings.



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 May 6, 2020



C. Soil Borings Previously Completed at the Location of the Basin

1. North Stoner Prairie Neighborhood (NSPN) Plan, 2013

This report summarized the soil and water table conditions at 12 soil borings and one monitoring well installed at the current basin location and surrounding area north of Lacy Road. The observations were made in 2012 and, at that time, the water table elevation recorded in the monitoring well at the current location of the basin was approximately 1,006 feet (depth of 14 feet) and at soil borings to the east, the water table was at an approximate elevation of 1,000 feet. In general, the water table elevations recorded in 2012 were approximately 10 feet lower than the current water table elevations in the vicinity of the basin.

2. 2017 Geotechnical Exploration Report, Interceptor Sewer Corridor along the Badger State Trail

This geotechnical report included boring logs for four borings constructed along the Badger State Trail from approximately Market Place Drive to Lacy Road. The boring logs showed a southerly groundwater flow gradient with approximate water table elevations of 1,010 feet near Market Place Drive to approximately 1006 feet near Lacy Road. These 2017 water table elevations were approximately 7 feet lower than current water table elevations in the vicinity of the basin, but the borings were also farther away from the basin to the east.

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May 6, 2020

3. 2019 Geotechnical Exploration Report for Promega Corporation

This geotechnical report summarized the findings at 45 soil borings and ten test pits constructed directly west of the basin between Sub-Zero Parkway and Lacy Road. This investigation documented shallow limestone bedrock just 500 to 600 feet west of the basin at approximate elevation 1015 to 1,000 feet (depths of 15 to 30 feet). Figure 3 provides a geologic cross section and Figure 4 shows the approximate limestone bedrock contours west of the basin.

Current Investigations of the Basin

A. Soil Borings and Monitoring Well Installation

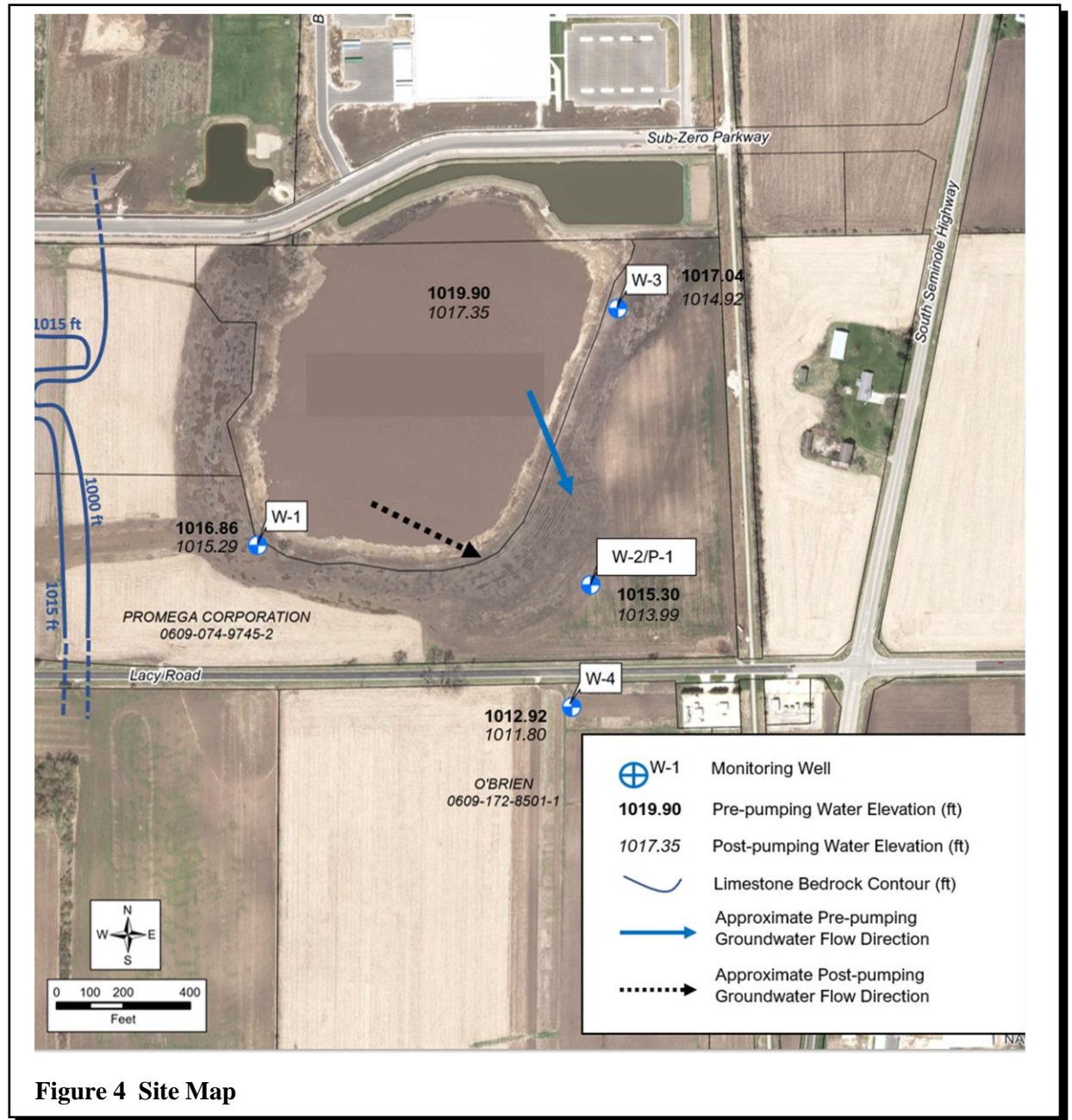
In August 2020, five soil borings were drilled around the basin by CGC, Inc. and monitoring wells W-1 through W-4 and piezometer P-1 were installed in the borings (see Figure 4). In October 2020, two additional soil borings were drilled in the kettle to further evaluate soil conditions (B-1 and B-2). The October 16, 2020 report by CGC, Inc. is enclosed and provides a map showing the soil boring and well location, soil boring logs, and well construction forms.

The soil borings were logged by CGC, Inc. to evaluate soils at the basin and to the southeast, including well W-4 located south of Lacy Road. As summarized in the October 2020 CGC, Inc. report, the soil stratigraphy generally consists of:

1. 10 inches of topsoil.
2. 10 inches to 3 feet of native silty clay loam and clay loam.
3. 3 to 17 feet of Coarser-grained strata, including gravelly sand, sand, loamy sand, fine sand, loamy fine sand and fine sandy loam, interspersed with occasional fine-grained silt loam and silty clay loam seams and layers.
4. A zone of clay or silt soils was generally observed at depths of approximately 17 to 26 feet.

At the W-2 and P-1 well nest located southeast of the basin, a zone of fine to medium grained sand was recorded from the approximate depth of 5 to 22 feet (elevation 1,018.4 to 1,001.4 feet). Well W-2 was constructed with a screen interval in this sand layer, extending from near the ground surface to a depth of approximately 20 feet (elevation 1003.4). Piezometer P-1 was constructed with a screen interval at 35 to 45 feet (approximate elevation 988 to 978 feet), separated from well W-2 by a 4-foot-thick clay layer at the depth of 22 to 26 feet (elevation 1,001.4 to 997.4 feet). Refer to the enclosed CGC, Inc. report for soil boring logs and well construction forms.

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B. Water Extraction from the Basin and Monitoring Groundwater Elevations

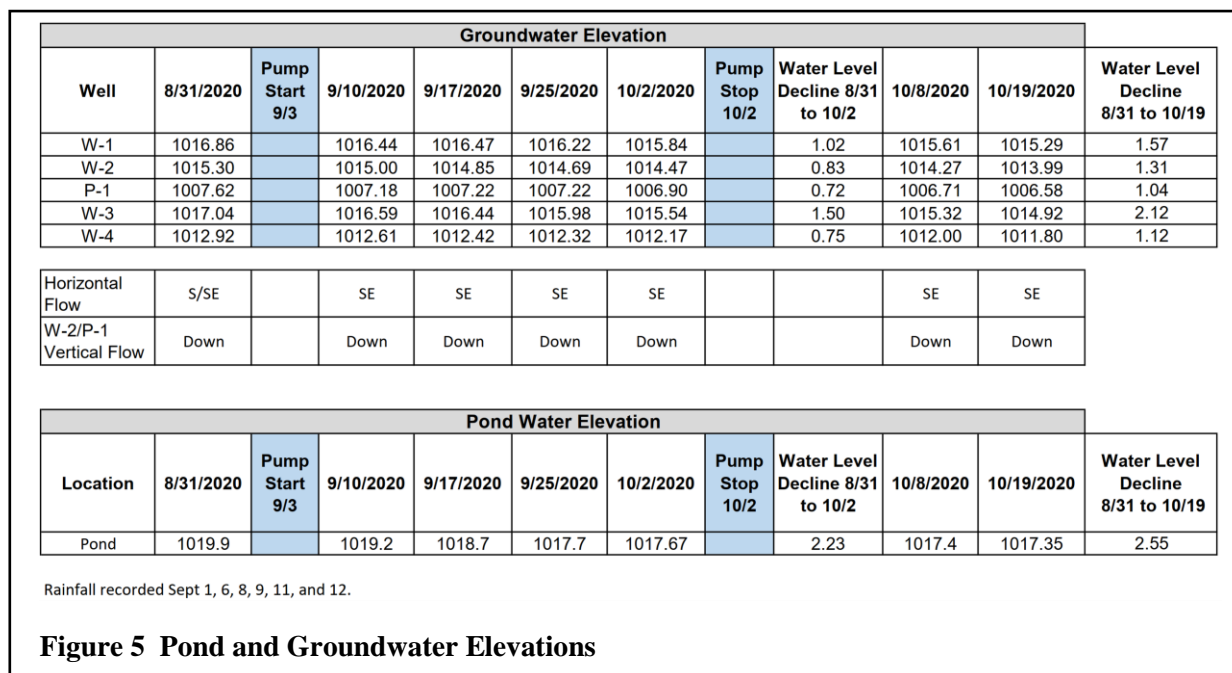
The wells and piezometer installed by CGC, Inc. were used to record groundwater elevations, evaluate the horizontal and vertical flow gradients near the basin, and to monitor groundwater elevations during the planned pumping of water from the basin. Each monitoring well was constructed with a screen interval extending from near the ground surface to a depth of approximately 20 feet (approximate

Ms. Claudia Guy, P.E.
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 May 6, 2020

screened elevations from 1,023 to 1,003 feet). The piezometer was installed adjacent to well W-2, creating a well nest for assessment of the vertical groundwater flow gradient and to observe potential changes during the pumping of water from the basin. The piezometer was constructed with a screen interval at a depth of 35 to 45 feet (approximate screened elevation from 988 to 978 feet). Refer to the enclosed CGC, Inc. report.

The wells were installed in August 2020 and pumping of water from the basin was initiated by the City on September 3, 2020. The pumping continued until October 2, 2020 with the pump operating for a total of approximately 364 hours at an approximate rate of 850 gallons per minute. Water levels in the pond and at each well were recorded by the City on August 31, 2020, before the start of pumping. The pumping started on September 3 and continued until October 2, 2020. On October 8 and October 19, 2020, after the pumping ceased, water levels in the pond and at each well were again recorded by the City.

The basin water level dropped 2.23 feet from August 31 to October 2, 2020. The basin level continued to drop after pumping ceased and the decline was recorded at 2.55 feet on October 19, 2020. Similarly, the water elevations in each well dropped from August 31 to October 2, 2020, after the start of water pumping from the basin, with declines of 1.02, 0.83, 1.5, 0.75, and 0.72 feet at wells W-1 through W-4 and P-1, respectively. Like the basin, after pumping stopped the water levels in the wells continued to decline. The total declines from August 31 to October 19, 2020, were 1.57, 1.31, 2.12, 1.12, and 1.04 feet at wells W-1 through W-4 and P-1, respectively. Figure 5 summarizes the dates of pumping and recorded water levels.



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May 6, 2020

Conclusions that can be drawn from the basin pumping are as follow:

1. The water elevation in the basin remained higher than the water elevations recorded at wells W-1 through W-4, indicating groundwater was not being drawn into the pond as a result of pumping.
2. Wells W-1 through W-4 showed a consistent southeastern groundwater flow direction, before, during, and after pumping.
3. Well nest W-2/P-1 showed a consistent downward vertical groundwater gradient before, during, and after pumping.
4. It appears the water levels at wells W-1 and W-3 dropped more than the levels at wells W-2 and W-4 because W-1 and W-3 were adjacent to the basin. The nearby wells appear to have been more quickly influenced by the basin level and the water table mounding that is occurring at the basin. Moving farther away and downgradient from the basin, the water level drops recorded at wells W-2 and W-4 were less than at wells W-1 and W-3.
5. The water level drop at well W-3 may have been greater than at well W-1 because well W-3 appears to be more upgradient.
6. After pumping stopped, the basin water level declined another 14 percent. The continued declines at the wells were 54, 58, 41, 49, and 44 percent at wells W-1 through W-4 and P-1, respectively. This appears to show the delayed effects of reduced groundwater mounding at the basin after the basin level was dropped.



Construction • Geotechnical
Consulting Engineering/Testing

October 16, 2020
C20290

Mr. Mike Williams
Strand Associates, Inc.
910 West Wingra Drive
Madison, WI 53715

Re: Geotechnical Exploration Report
Regional Stormwater Management
Sub-Zero / Stoner Prairie Area
City of Fitchburg, Dane County, Wisconsin

Dear Mr. Williams:

We understand that Strand Associates, in conjunction with the City of Fitchburg, is working on the improvement of an existing stormwater infiltration basin south of Sub-Zero Parkway that serves as a regional stormwater management facility for the Sub-Zero / Stoner Prairie Area on the southwest side of Fitchburg, Wisconsin. It is understood that the bottom of the basin has been established at EL 1,015 ft, and that the basin was designed to infiltrate 100-year rain events occurring in quick succession. However, the basin has been observed to be filled with water over the majority of the time.

Construction • Geotechnical Consultants, Inc. (CGC) has completed the requested subsurface exploration program, and the results are summarized and discussed in this report. We are sending you an electronic copy of this report, and we can provide a paper copy upon request.

SUBSURFACE CONDITIONS

Subsurface conditions for this study were explored by performing six Standard Penetration Test (SPT) soil borings (labeled B-1, B-2, P-1, W-1, W-3 and W-4) to planned depths between 20 and 45 ft below current site grades at locations selected by Strand and field-staked by CGC. After the completion of drilling, temporary groundwater monitoring wells (1-in. PVC casing set at 20 ft with full-depth screen section) were installed in W-1, W-3 and W-4, and a piezometer (1-in. PVC casing set at 45 ft with a 10-ft long screen section) was installed in P-1. In addition, a fourth temporary groundwater monitoring well (1-in. PVC casing set at 20 ft with full-depth screen section) was installed in W-2, which was blind-drilled (i.e., without sampling) next to P-1. Borings B-1 and B-2 were backfilled after drilling in accordance with WDNR regulations, and no temporary groundwater monitoring wells/piezometers were installed in these boreholes.

Borings P-1 and W-1 through W-4, including subsequent piezometer/well installation, were performed by Badger State Drilling (under subcontract to CGC) on August 17 and 18, 2020 using a track-mounted D-50 rotary drill rig equipped with hollow stem augers, mud-rotary tooling and an

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automatic SPT hammer. Borings B-1 and B-2 were drilled by Badger State Drilling (under subcontract to CGC) on October 6, 2020 during a second mobilization of the same drill rig, after the existing stormwater basin had been partially drained (via pumping). The specific procedures used for drilling and sampling are described in Appendix A, and the boring locations are shown in plan on the Soil Boring Location Exhibit presented in Appendix B. A Monitoring Well Construction Form for each well/piezometer, along with the individual Boring Logs are also included in Appendix B. Ground surface elevations at P-1 and W-1 through W-4 were provided by Strand, and ground surface elevations at B-1 and B-2 were estimated by CGC based on publicly-available topographic data (DCiMap; 1-ft contour lines).

The subsurface profiles at the boring locations were fairly consistent and can be described, in general terms, by the following strata (in descending order):

- About 10 to 30 in. of *topsoil*; followed by
- About 2 to 3 ft of native *silty clay loam* and *clay loam* soils; over
- Various coarse-grained/granular strata, including, *gravelly sand*, *sand*, *loamy sand*, *fine sand*, *loamy fine sand* and *fine sandy loam*, interspersed with occasional fine-grained *silt loam* and *silty clay loam* seams and layers, to the maximum depths explored.

As an exception to the above generalized subsurface profile, an approximately 2-ft thick layer of *cohesive fill (clay loam)* was encountered between the topsoil and the native clay in Boring W-1.

Representative samples obtained from the granular soils encountered in the borings were analyzed for their particle size distribution (gradation) to aid in their classification, and the Particle Size Distribution Test Reports are attached in Appendix C.

Groundwater levels that were encountered while drilling the soil borings and observed in subsequent readings (by others) in the installed piezometer/monitoring wells are summarized in the following Table 1. In addition, recorded water levels in the stormwater basin are also included.

TABLE 1
Summary of Groundwater Level Observations and Water Levels in Stormwater Basin

Basin/ Piezo./ Well	Approx. Ground surface EL (ft)	Water Level Elevation (ft)						
		Aug. 17/18, 2020	Aug. 26, 2020	Aug. 31, 2020	Sep. 10, 2020	Sep. 17, 2020	Oct. 6, 2020	Oct. 7, 2020
Basin	--	--	1019.9	--	1019.2	1018.7	1,017.7	1,017.7
P-1	1,023.4	1,017.9 ⁽¹⁾	--	1,007.6	1,007.2	1,007.3	--	--
W-1	1,022.9	1,017.4 ⁽¹⁾	--	1,016.9	1,016.4	1,016.5	--	--
W-2	1,023.4	--	--	1,015.3	1,015.0	1,014.9	--	--
W-3	1,023.3	1,017.8 ⁽¹⁾	--	1,017.0	1,016.6	1,016.5	--	--
W-4	1,024.7	1,012.7 ⁽¹⁾	--	1,012.9	1,012.6	1,012.5	--	--
B-1	1,018±	--	--	--	--	--	1,015± ⁽¹⁾	1,017± ⁽²⁾
B-2	1,018±	--	--	--	--	--	1,015± ⁽¹⁾	1,017± ⁽²⁾

Notes: ⁽¹⁾ Approximate water level in borehole during drilling.
⁽²⁾ Approximate water level in borehole on the day after the completion of drilling.

Note that, redoximorphic features (redox or mottling), partially in combination with low-chroma/high-value (gray) matrix color were noted in the majority of the clay and some of the silt layers encountered at various depths in the soil borings, which indicate the level of past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater at depths shallower than the observed groundwater table. Groundwater levels are expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, the water level in nearby waterbodies, as well as other factors. A more detailed description of the site soil and groundwater conditions is presented on the individual Soil Boring Logs attached in Appendix B, as well as the WDSPS Soil and Site Evaluation – Storm forms for the SPT borings contained in Appendix D.

INTERPRETATION AND DISCUSSION

Based on the water level readings in the Piezometer P-1, which was screened between 35 and 45 ft below the ground surface, it appears that two aquifers exist in the project area, which are separated by a fairly impermeable horizon of clay and/or silt soils that was encountered in the soil borings performed for this study typically between about 17 and 26 ft below current site grades. The lower aquifer appears to be confined by the clay/silt soils, but the hydraulic head of the confined aquifer extends above the separating clay/silt horizon to approximately EL 1,007 to 1,008 ft, as observed in P-1 during the same time the groundwater levels in the other wells were recorded.

Based on W-1 through W-4, B-1 and B-2, groundwater levels in the upper aquifer were generally observed to range between about EL 1,015 and 1,018 ft during August, September and October of

Mr. Patrick Eagan, S.E., P.E.
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2020. Slightly lower groundwater levels between about EL 1,012 and 1,013 ft were observed during the same time on the south side of Lacy Road (see W-4). In general, the depths to groundwater within the borings and monitoring wells appear to generally increase with increasing distance away from the existing basin. Groundwater mounding effects due to infiltration in the existing basin may have developed in the immediate vicinity of the basin, but are not assumed to raise the upper groundwater table on a larger scale. Additionally, the apparent groundwater trend may also be due to ground surface elevations in the larger Sub-Zero / Stoner-Prairie area generally sloping from about northwest down towards the south/southeast, and the unconfined upper groundwater table potentially having a natural gradient. A similar gradient may also exist for the hydraulic head of the lower, confined water table.

It must be noted that the bottom of the existing stormwater basin (Design Bottom EL 1,015 ft) has been established at or below the observed unconfined upper groundwater table. In addition, clay layers were encountered in the upper $3\pm$ ft of Borings B-1 and B-2, which were drilled in outer portions of the basin after the water in the basin had been pump down to a level of approximately EL 1,017.7 ft. It is not known if the near surface clay has been completely removed towards the center of the basin at the time of its construction. Furthermore, about 10 in. of “muck” were present at the ground surface in B-1 and B-2 which may be the result of siltation (i.e., accumulation of fines transported into the basin via stormwater runoff or wind).

In our opinion, the following factors may play a role in the existing stormwater basin not performing satisfactorily:

- Lack of separation between the bottom of the basin and the groundwater table, potentially exacerbated by localized groundwater mounding effects. Per the Wisconsin Department of Natural Resources *Chapter NR 151 – Runoff Management*, a minimum 5 ft separation between the bottom of the infiltration system and the seasonal high groundwater table is required.
- Potential presence of clay soils at and/or below the bottom of the basin that act as a relatively impermeable layer. However, it not known if the profiles encountered in B-1 and B-2 are representative for the entire footprint of the basin, or if the surficial clays have been removed below the basin bottom towards the center of the basin. *One way to further investigate would be to dig a series of shallow test pits closer to the center of the basin after the basin has been drained completely.*
- Siltation or the accumulation of silt/clay soils, potentially as a result of recent nearby construction activities, could also be contributing to the poor performance of the basin.

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If clay soils and/or siltation are determined to be present throughout the basin footprint, one way of potentially improving the performance of the infiltration basin would be to remove these layers to expose the underlying sand soils. However, it is important to recognize that the bottom of the basin is within very close proximity to or even below the apparent seasonal high groundwater level of the upper, unconfined aquifer, which will ultimately limit the infiltration potential of the basin. Note that excavating down to the top of the lower, confined aquifer (i.e., removing the separating clay/silt horizon at greater depth) would most likely not lower the upper groundwater table. To the contrary, groundwater levels in the vicinity of the pond may even rise due to the localized inflow of groundwater from below.

* * * * *

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix E.

Sincerely,

CGC, Inc.



Tim F. Gassenheimer, EIT, CST
Staff Engineer



Ryan J. Portman, PE, CST
Senior Consulting Professional

- Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Logs of Test Borings (6)
Log of Test Boring-General Notes
Unified Soil Classification System
Monitoring Well Construction Forms (5)
Appendix C - Particle Size Distribution Test Reports
Appendix D - WDSPS Soil and Site Evaluation – Storm Forms
Appendix E - Document Qualifications

APPENDIX A
FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

Subsurface conditions for this study were explored by drilling six Standard Penetration Test (SPT) soil borings to depths between about 24 to 28 ft below current site grades, which were sampled at 2.5-ft intervals to a depth of 10 ft and at 5-ft intervals thereafter. The samples were obtained in general accordance with specifications for standard penetration testing, ASTM D1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

The boring is extended downward, between samples, by a hollow-stem auger. The deeper Piezometer Boring P-1 was advanced to the planned depth, starting at a depth of 10 ft below the ground surface, using a roller bit in combination with a drilling slurry/mud. The slurry transports the soil that is loosened by the roller bit to the surface, while at the same time stabilizing the sidewalls and preventing hydrostatic blow-up of the bottom of the borehole.

2. Standard Penetration Test and Split-Barrel Sampling of Soils (ASTM Designation: D 1586)

This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance.

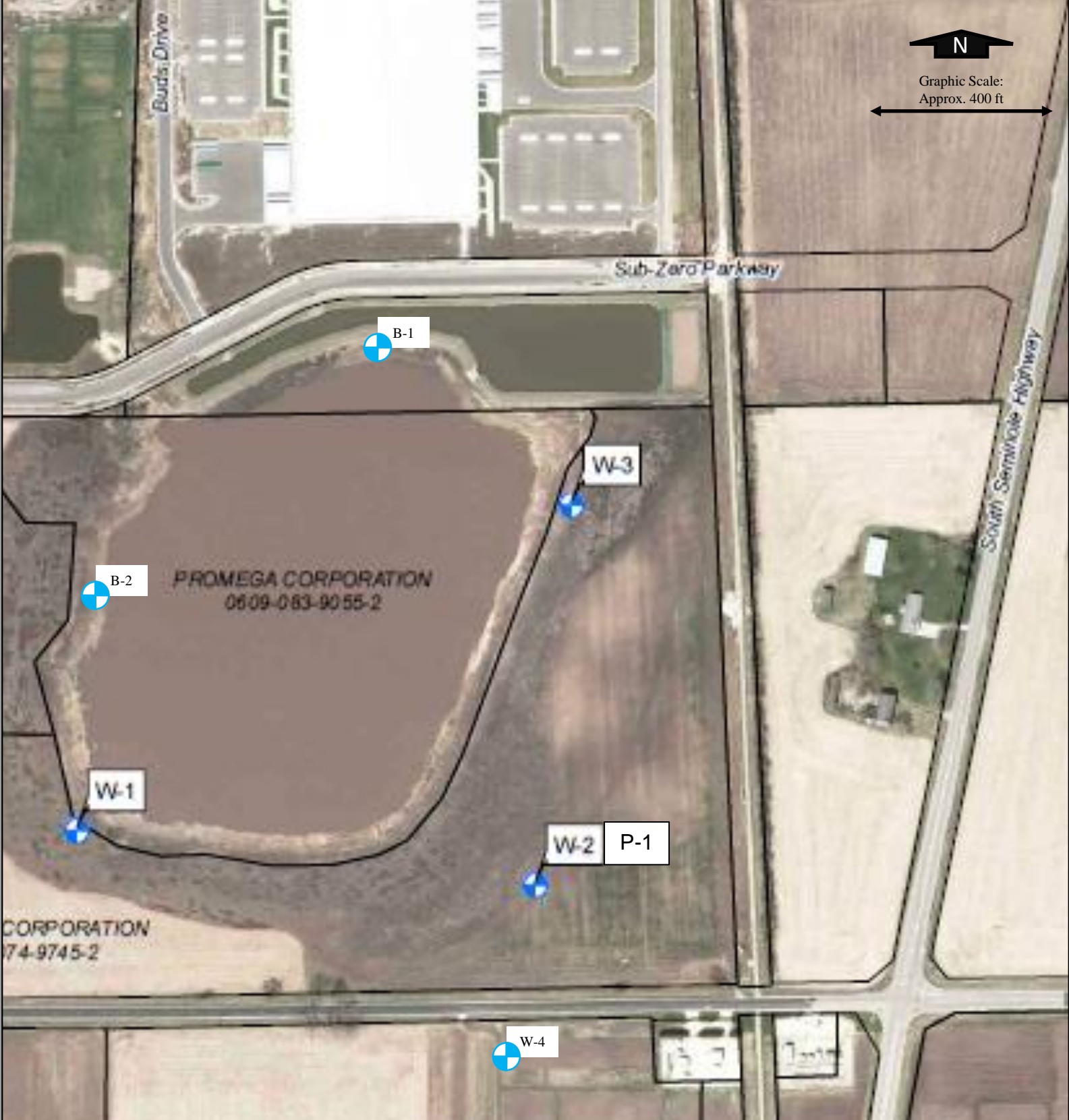
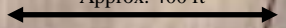
During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the driller as these services were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite to satisfy WDNR regulations (where no piezometer or groundwater monitoring wells were installed) and the soil samples were delivered to our laboratory for visual classification and laboratory testing. The soils were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer, including laboratory test results, as well as a Soil Boring Location Exhibit and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

**SOIL BORING LOCATION EXHIBIT
LOGS OF TEST BORINGS (6)
LOG OF TEST BORING-GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM
MONITORING WELL CONSTRUCTION FORMS (5)**



Graphic Scale:
Approx. 400 ft



Legend

 Denotes Soil Boring/GWM/Piezometer Location and Number

Notes

1. GWMs/piezometer (W-1 through W-4 and P-1) were drilled by Badger State Drilling on August 17 and 18, 2020.
2. Soil borings (B-1 and B-2) were drilled by Badger State Drilling on October 6, 2020.
3. GWM/piezometer and soil boring locations are approximate.
4. Base map was prepared by Strand.

Job No.: C20290
Date: Oct. 2020



GWM LOCATION EXHIBIT
Proposed Stormwater Management
Sub-Zero / Stoner Prairie Area
City of Fitchburg, Dane Co., WI



LOG OF TEST BORING

Project **Proposed Stormwater Management**
Sub-Zero / Stoner Prairie Area
 Location **City of Fitchburg, Dane Co., WI**

Boring No. **B-1**
 Surface Elevation (ft) **1018±**
 Job No. **C20290**
 Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
				0	10± in. TOPSOIL / MUCK					
1	18	M	12	1	Stiff, Gray/Brown (Mottled) Lean CLAY, Trace to Little Sand (CL) <i>USDA: 5Y 6/1 (Redox: c2p 10YR 3/6) Silty Clay</i>	(1.25-1.75)				
2	18	W	7	5	Loose, Brownish Gray Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) <i>USDA: 10YR 6/2 Sand</i>					
3	18	W	7	5						
4	18	W	3	10	Very Loose, Brown Fine SAND, Some Silt, Trace Gravel, Scattered Silt Seams (SM) <i>USDA: 10YR 5/3 Fine Sandy Loam, Scattered Silt Loam Seams</i>					
5	18	W	7	15	Loose, Light Brown SILT, Little to Some Sand (ML) <i>USDA: 10YR 6/3 Silt Loam</i>					
6	18	W	13	20	Stiff, Light Brown/Brown (Lightly Mottled) Lean CLAY, Trace Sand, Scattered Silt Seams (CL) <i>USDA: 7.5YR 6/3 (Redox: f2d 7.5YR 5/4) Silty Clay Loam, Scattered Silt Loam Seams</i>	(1.5-1.75)				
7	18	W	29	25	Medium Dense to Dense, Light Brown Fine to Coarse SAND, Trace Silt and Gravel, Scattered Lean Clay Seams (SP) <i>USDA: 10YR 6/3 Sand, Scattered Silty Clay Loam Seams</i>					
8	18	W	31	30						
					End of Boring at 30 ft					
					Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS				GENERAL NOTES			
While Drilling	▽ 3.0'	Upon Completion of Drilling	Next Day	Start	10/6/20	End	10/6/20
Time After Drilling				Driller	BSD	Chief	KD Rig D-50
Depth to Water			1.0' ▼	Logger	MC/GB	Editor	TFG
Depth to Cave in			3.0'	Drill Method	2.25" HSA; Autohammer		
<small>The stratification lines represent the approximate boundary between soil types and the transition may be gradual.</small>							



LOG OF TEST BORING

Project **Proposed Stormwater Management**
Sub-Zero / Stoner Prairie Area
 Location **City of Fitchburg, Dane Co., WI**

Boring No. **B-2**
 Surface Elevation (ft) **1018±**
 Job No. **C20290**
 Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
					10± in. TOPSOIL / MUCK					
1	18	M	7		Stiff, Gray/Brown (Mottled) Lean CLAY, Little to Some Sand, Trace Gravel (CL) USDA: 2.5Y 6/1 (Redox: m3p 10YR 4/4) Clay	(1.0-1.5)				
2	18	W	8		Loam					
				5	Loose, Brownish Gray Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 6/2 Sand					
3	18	W	10							
4	18	W	11		Medium Dense, Brown Fine SAND, Little to Some Silt, Trace Gravel (SP-SM/SM) USDA: 10YR 5/3 Loamy Fine Sand					
				10						
5	18	W	11		Medium Dense, Light Brown/Brown (Lightly Mottled) SILT, Trace to Little Sand, Scattered Lean Clay Seams (CL) USDA: 10YR 6/3 (Redox: f1f 10YR 5/4) Silt Loam, Scattered Silty Clay Loam Seams					
				15						
6	18	W	13							
				20						
7	18	W	36		Dense, Light Brown to Brown Fine to Coarse SAND, Trace Silt and Gravel, Scattered Lean Clay Seams (SP) USDA: 10YR 6/3 to 4/6 Sand, Scattered Silty Clay Loam Seams					
				25						
8	18	W	37							
				30						
					End of Boring at 30 ft					
					Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	▽	3.0'	Upon Completion of Drilling		Start	10/6/20	End	10/6/20	
Time After Drilling				Next Day	Driller	BSD Chief	KD	Rig D-50	
Depth to Water					Logger	MC/GB	Editor	TFG	
Depth to Cave in					Drill Method	2.25" HSA; Autohammer			

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



LOG OF TEST BORING

Project **Proposed Stormwater Management**
Sub-Zero / Stoner Prairie Area
 Location **City of Fitchburg, Dane Co., WI**

Boring No. **P-1**
 Surface Elevation (ft) **1023.40**
 Job No. **C20290**
 Sheet **1** of **2**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
					10.5± in. TOPSOIL (OL)					
1	6	M	9		Hard, Brown/Gray (Lightly Mottled) Lean CLAY, Trace to Little Sand and Gravel (CL) <i>USDA: 10YR 5/3 (Redox: c1f 10YR 6/1) Silty Clay Loam</i>	(4.5+)				
2	12	M/W	5							
				5	Loose, Brown Fine to Medium SAND, Some Silt, Trace Gravel (SM) <i>USDA: 10YR 4/4 Loamy Sand</i>					
3	12	W	18							
4	14	W	9		Loose to Medium Dense, Light Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) <i>USDA: 10YR 6/3 Sand</i>					
				10						
5	10	W	17							
				15						
					Composite P200 - Samples 5 and 6: 8.8%					
6	18	W	13							
				20						
7	18	W	28		Stiff, Light Brown/Light Reddish Brown/Gray (Mottled) Lean to Silty CLAY, Trace Sand (CL/CL-ML) <i>USDA: 10YR 6/3 (Redox: c2d 7.5YR 6/4, 6/1) Silty Clay Loam</i>	(1.0-1.5)				
				25						
					Dense, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM) <i>USDA: 10YR 6/3 Sand</i>					
8	12	W	43							
				30						

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	▽	5.5'	Upon Completion of Drilling		Start	8/17/20	End	8/17/20	
Time After Drilling				8/31/20	Driller	BSD	Chief	KD	Rig D-50
Depth to Water				15.8'	Logger	DB	Editor	TFG	
Depth to Cave in				--	Drill Method	4.25" HSA (0-10') / 3.875" RB-DM (10-45'); Autohammer			
				16.1' ▼					
				--					

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



LOG OF TEST BORING

Project **Proposed Stormwater Management**
Sub-Zero / Stoner Prairie Area
 Location **City of Fitchburg, Dane Co., WI**

Boring No. **P-1**
 Surface Elevation **1023.4**
 Job No. **C20290**
 Sheet **2** of **2**

2921 PERRY STREET, MADISON, WIS. 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES					
No.	DEPTH (ft)	Rec (in.)	Moist	N		Depth (ft)	qu (qa) (tsf)	W	LL	PL	LI
9		16	W	27	35	Medium Dense, Light Brown Fine SAND, Trace to Little Silt, Scattered Lean Clay Seams (SP/SP-SM) <i>USDA: 10YR 6/4 Fine Sand, Scattered Silty Clay Loam Seams</i>					
10		14	W	27	40	Medium Dense, Light Brown SILT, Trace to Little Sand (ML) <i>USDA: 10YR 6/3 Silt Loam</i>					
11		18	W	13	45	Very Stiff, Brown Lean CLAY, Trace Sand, Scattered Thin Silt Seams (CL) <i>USDA: 7.5YR 5/4 Silty Clay Loam, Scattered Silt Loam Seams</i>	(2.0-2.25)				
					End of Boring at 45 ft						
					Installed Temporary 1" PVC Groundwater Piezometer (P-1) in Borehole; Refer to Well Construction Form for Details						
					50						
					55						
					60						
					65						
					70						



LOG OF TEST BORING

Project Proposed Stormwater Management
 Sub-Zero / Stoner Prairie Area
 Location City of Fitchburg, Dane Co., WI

Boring No. W-1
 Surface Elevation (ft) 1022.90
 Job No. C20290
 Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
					10± in. Topsoil FILL					
1	6	M	5		FILL: Very Stiff, Grayish Brown Lean Clay, Little to Some Sand, Trace Gravel <i>USDA: 10YR 5/2 Clay Loam (Fill)</i>	(2.75-4.0)				
2	14	M/W	4		Medium Stiff, Gray/Brown (Mottled) Lean CLAY, Little to Some Sand, Trace Gravel (CL) <i>USDA: 10YR 6/1 (Redox: c2d 10YR 5/6) Clay Loam</i>	(0.75-1.0)				
3	16	W	6		Loose, Light Brown Fine to Medium SAND, Trace Silt and Gravel (SP) <i>USDA: 10YR 6/3 Sand</i>					
4	18	W	6							
5	8	W	3		Very Loose, Brown Silty Fine SAND, Trace Gravel (SM) <i>10YR 4/3 Fine Sandy Loam</i> P200 - Sample 5: 41.6%					
6	18	W	12		Medium Dense, Light Brown SILT, Little Sand (ML) <i>USDA: 10YR 6/3 Silt Loam</i>					
					End of Boring at 20 ft					
					Installed Temporary 1" PVC Groundwater Monitoring Well (W-1) in Borehole; Refer to Well Construction Form for Details					

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	▽ 5.5'	Upon Completion of Drilling			Start	8/17/20	End	8/17/20	
Time After Drilling			8/31/20	9/10/20	Driller	BSD	Chief	KD	Rig D-50
Depth to Water			6.0'	6.5'	Logger	DB	Editor	TFG	
Depth to Cave in			--	--	Drill Method	2.25" HSA; Autohammer			

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



LOG OF TEST BORING

Project Proposed Stormwater Management
Sub-Zero / Stoner Prairie Area
 Location City of Fitchburg, Dane Co., WI

Boring No. W-2
 Surface Elevation (ft) 1023.40
 Job No. C20290
 Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
				5	Blind-Drilled (without Sampling) to 20 ft See P-1 for Approximate Soil Description					
			▼	10						
				15	End of Boring at 20 ft Installed Temporary 1" PVC Groundwater Monitoring Well (W-2) in Borehole; Refer to Well Construction Form for Details					
				20						
				25						
				30						

WATER LEVEL OBSERVATIONS					GENERAL NOTES					
While Drilling	∇	Upon Completion of Drilling			Start	8/17/20	End	8/17/20		
Time After Drilling		8/31/20	9/10/20	9/17/20	Driller	BSD	Chief	KD	Rig D-50	
Depth to Water		8.1'	8.4'	8.5' ▼	Logger	DB	Editor	TFG		
Depth to Cave in		--	--	--	Drill Method	2.25" HSA; Autohammer				
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.										



LOG OF TEST BORING

Project **Proposed Stormwater Management**
Sub-Zero / Stoner Prairie Area
 Location **City of Fitchburg, Dane Co., WI**

Boring No. **W-3**
 Surface Elevation (ft) **1023.30**
 Job No. **C20290**
 Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	DEPTH (ft)	Rec (in.)	Moist	N		qu (qa) (tsf)	W	LL	PL	LI
1	0-14	14	M	9	Loose, Black SILT, Trace Sand and Organics, Scattered Organic Matter (ML/OL - Topsoil) USDA: 10YR 3/1 Silt Loam					
2	14-22	8	M	6	Brown/Gray (Lightly Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/3 (Redox: mlf 10YR 6/1) Silty Clay Loam	(2.0-2.25)				
3	22-30	14	W	7	Loose, Grayish Brown Fine to Medium SAND, Some Gravel, Trace to Little Silt (SP/SP-SM) USDA: 10YR 4/2 Gravelly Sand					
4	30-38	8	W	8	Composite P200 - Samples 3 and 4: 7.9%					
5	38-54	14	W	9	Loose, Brown Fine to Medium SAND, Trace to Little Gravel, Trace Silt (SP) USDA 10YR 5/3 Sand					
6	54-70	16	W	20	Medium Dense, Light Brown SILT, Little Sand (ML) USDA: 10YR 6/3 Silt Loam					
					End of Boring at 20 ft					
					Installed Temporary 1" PVC Groundwater Monitoring Well (W-3) in Borehole; Refer to Well Construction Form for Details					

WATER LEVEL OBSERVATIONS					GENERAL NOTES	
While Drilling	▽ 5.5'	Upon Completion of Drilling			Start	8/17/20
Time After Drilling		8/31/20	9/10/20	9/17/20	End	8/17/20
Depth to Water		6.3'	6.7'	6.8'	Driller	BSD Chief KD Rig D-50
Depth to Cave in		--	--	--	Logger	DB Editor TFG
					Drill Method	2.25" HSA; Autohammer

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



LOG OF TEST BORING

Project **Proposed Stormwater Management**
Sub-Zero / Stoner Prairie Area
 Location **City of Fitchburg, Dane Co., WI**

Boring No. **W-4**
 Surface Elevation (ft) **1024.70**
 Job No. **C20290**
 Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	DEPTH (ft)	Rec (in.)	Moist	N		qu (qa) (tsf)	W	LL	PL	LI
					9.5± in. TOPSOIL (OL)					
1	8	M	8		Hard, Brown/Gray (Lightly Mottled) Lean CLAY, Trace to Little Sand and Gravel (CL) <i>USDA: 10YR 5/3 (Redox: c1f 10YR 6/1) Silty Clay Loam</i>	(4.5+)				
2	16	M	6		Loose, Brown Fine to Medium SAND, Some Silt, Trace Gravel (SM) <i>USDA: 10YR 4/4 Loamy Sand</i>					
3	14	M	11		Medium Dense, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM) <i>USDA: 10YR 6/3 Sand</i>					
4	16	M	14		Composite P200 - Samples 3 and 4: 7.3%					
5	14	W	18		Medium Dense, Light Brown Fine SAND, Little to Some Silt (SP-SM/SM) <i>USDA: 10YR 6/3 Loamy Fine Sand</i>					
6	10	W	13		Stiff, Light Brown/Light Reddish Brown/Gray (Mottled) Lean to Silty CLAY, Trace Sand (CL/CL-ML) <i>USDA: 10YR 6/3 (Redox: c2d 7.5YR 6/4, 6/1) Silty Clay Loam</i>	(1.0-1.5)				
					End of Boring at 20 ft					
					Installed Temporary 1" PVC Groundwater Monitoring Well (W-4) in Borehole; Refer to Well Construction Form for Details					

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	▽	12.0'	Upon Completion of Drilling		Start	8/18/20	End	8/18/20	
Time After Drilling			8/31/20	9/10/20	9/17/20	Driller	BSD	Chief	KD Rig D-50
Depth to Water			11.8'	12.1'	12.2'	Logger	DB	Editor	TFG
Depth to Cave in			--	--	--	Drill Method	2.25" HSA; Autohammer		

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF TEST BORING
General Notes

DESCRIPTIVE SOIL CLASSIFICATION

Grain Size Terminology

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse.....	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse.....	2.00 mm to 4.76 mm.....	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm.....	#200 to #40
Silt.....	0.005 mm to 0.074 mm.....	Smaller than #200
Clay.....	Smaller than 0.005 mm.....	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

General Terminology

Physical Characteristics
 Color, moisture, grain shape, fineness, etc.
Major Constituents
 Clay, silt, sand, gravel
Structure
 Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
 Glacial, alluvial, eolian, residual, etc.

Relative Density

Term "N" Value
 Very Loose..... . 0 - 4
 Loose..... 4 - 10
 Medium Dense.....10 - 30
 Dense.....30 - 50
 Very Dense.....Over 50

Relative Proportions Of Cohesionless Soils

Proportional Term	Defining Range by Percentage of Weight
Trace.....	0% - 5%
Little.....	5% - 12%
Some.....	12% - 35%
And	35% - 50%

Consistency

Term	q _u -tons/sq. ft
Very Soft.....	0.0 to 0.25
Soft.....	0.25 to 0.50
Medium.....	0.50 to 1.0
Stiff.....	1.0 to 2.0
Very Stiff.....	2.0 to 4.0
Hard.....	Over 4.0

Organic Content by Combustion Method

Soil Description	Loss on Ignition
Non Organic.....	Less than 4%
Organic Silt/Clay.....	4 - 12%
Sedimentary Peat.....	12% - 50%
Fibrous and Woody Peat...	More than 50%

Plasticity

Term	Plastic Index
None to Slight.....	0 - 4
Slight.....	5 - 7
Medium.....	8 - 22
High to Very High ..	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

SYMBOLS

Drilling and Sampling

- CS – Continuous Sampling
- RC – Rock Coring: Size AW, BW, NW, 2"W
- RQD – Rock Quality Designation
- RB – Rock Bit/Roller Bit
- FT – Fish Tail
- DC – Drove Casing
- C – Casing: Size 2 ½", NW, 4", HW
- CW – Clear Water
- DM – Drilling Mud
- HSA – Hollow Stem Auger
- FA – Flight Auger
- HA – Hand Auger
- COA – Clean-Out Auger
- SS - 2" Dia. Split-Barrel Sample
- 2ST – 2" Dia. Thin-Walled Tube Sample
- 3ST – 3" Dia. Thin-Walled Tube Sample
- PT – 3" Dia. Piston Tube Sample
- AS – Auger Sample
- WS – Wash Sample
- PTS – Peat Sample
- PS – Pitcher Sample
- NR – No Recovery
- S – Sounding
- PMT – Borehole Pressuremeter Test
- VS – Vane Shear Test
- WPT – Water Pressure Test

Laboratory Tests

- q_a – Penetrometer Reading, tons/sq ft
- q_a – Unconfined Strength, tons/sq ft
- W – Moisture Content, %
- LL – Liquid Limit, %
- PL – Plastic Limit, %
- SL – Shrinkage Limit, %
- LI – Loss on Ignition
- D – Dry Unit Weight, lbs/cu ft
- pH – Measure of Soil Alkalinity or Acidity
- FS – Free Swell, %

Water Level Measurement

- ▽ - Water Level at Time Shown
- NW – No Water Encountered
- WD – While Drilling
- BCR – Before Casing Removal
- ACR – After Casing Removal
- CW – Cave and Wet
- CM – Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

CGC, Inc.

Madison - Milwaukee

Unified Soil Classification System

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS

(more than 50% of material is larger than No. 200 sieve size)

Clean Gravels (Less than 5% fines)



GW

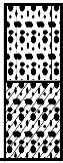
Well-graded gravels, gravel-sand mixtures, little or no fines



GP

Poorly-graded gravels, gravel-sand mixtures, little or no fines

Gravels with fines (More than 12% fines)



GM

Silty gravels, gravel-sand-silt mixtures



GC

Clayey gravels, gravel-sand-clay mixtures

Clean Sands (Less than 5% fines)



SW

Well-graded sands, gravelly sands, little or no fines



SP

Poorly graded sands, gravelly sands, little or no fines

Sands with fines (More than 12% fines)



SM

Silty sands, sand-silt mixtures



SC

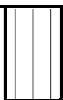
Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS

(50% or more of material is smaller than No. 200 sieve size.)

SILTS AND CLAYS

Liquid limit less than 50%



ML

Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity



CL

Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays



OL

Organic silts and organic silty clays of low plasticity

SILTS AND CLAYS

Liquid limit 50% or greater



MH

Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts



CH

Inorganic clays of high plasticity, fat clays



OH

Organic clays of medium to high plasticity, organic silts

HIGHLY ORGANIC SOILS



PT

Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA

GW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3

GP Not meeting all gradation requirements for GW

GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line or P.I. greater than 7	

SW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3

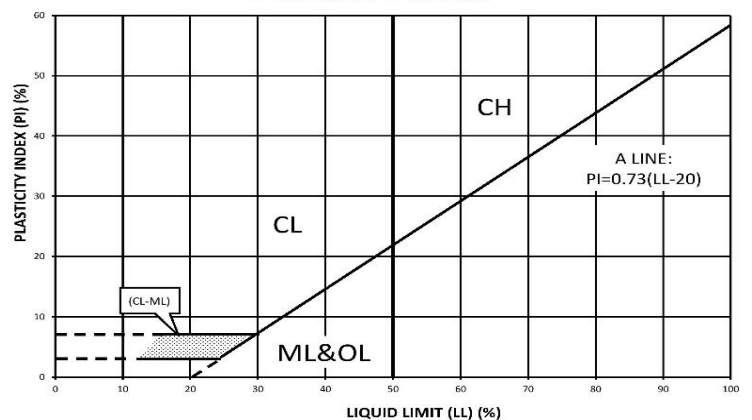
SP Not meeting all gradation requirements for GW

SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent GW, GP, SW, SP
 More than 12 percent GM, GC, SM, SC
 5 to 12 percent Borderline cases requiring dual symbols

PLASTICITY CHART



Facility/Project Name <u>Subzero/Stoner Prairie Area</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> S. ft. <input type="checkbox"/> E. <input type="checkbox"/> W.	Well Name <u>W-21</u>
Facility License, Permit or Monitoring Number	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number _____ DNR Well Number _____
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> 11 Piezometer <input type="checkbox"/> 12	Section Location of Waste/Source 1/4 of _____ 1/4 of Sec. _____ T. _____ N. R. _____ E. W.	Date Well Installed <u>8/17/20</u> m m d d y y
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <u>Dakota Bevans</u> <u>Badger State Drilling</u>

A. Protective pipe, top elevation _____ ft. MSL	1. Cap and lock? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
B. Well casing, top elevation _____ ft. MSL	2. Protective cover pipe: a. Inside diameter: _____ in. b. Length: _____ ft. c. Material: Steel <input type="checkbox"/> 04 Other <input type="checkbox"/> d. Additional protection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: _____
C. Land surface elevation _____ ft. MSL	3. Surface seal: Bentonite <input type="checkbox"/> 30 Concrete <input type="checkbox"/> 01 Other <input type="checkbox"/>
D. Surface seal, bottom _____ ft. MSL or _____ ft.	4. Material between well casing and protective pipe: Bentonite <input checked="" type="checkbox"/> 30 Annular space seal <input type="checkbox"/> Other <input type="checkbox"/>
12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/>	5. Annular space seal: a. Granular Bentonite <input type="checkbox"/> 33 b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> 35 c. _____ Lbs/gal mud weight Bentonite slurry <input type="checkbox"/> 31 d. _____ % Bentonite Bentonite-cement grout <input type="checkbox"/> 50 e. _____ Ft ³ volume added for any of the above f. How installed: Tremie <input type="checkbox"/> 01 Tremie pumped <input type="checkbox"/> 02 Gravity <input checked="" type="checkbox"/> 08
13. Sieve analysis attached? <input type="checkbox"/> Yes <input type="checkbox"/> No	6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> 33 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite pellets <input checked="" type="checkbox"/> 32 c. _____ Other <input type="checkbox"/>
14. Drilling method used: Rotary <input type="checkbox"/> 50 Hollow Stem Auger <input checked="" type="checkbox"/> 41 Other <input type="checkbox"/>	7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft ³
15. Drilling fluid used: Water <input type="checkbox"/> 02 Air <input type="checkbox"/> 01 Drilling Mud <input type="checkbox"/> 03 None <input checked="" type="checkbox"/> 99	8. Filter pack material: Manufacturer, product name and mesh size a. <u>Sudley</u> b. Volume added _____ ft ³
16. Drilling additives used? <input type="checkbox"/> Yes <input type="checkbox"/> No	9. Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> 23 Flush threaded PVC schedule 80 <input type="checkbox"/> 24 Other <input type="checkbox"/>
Describe _____	10. Screen material: <u>Sch 40</u> a. Screen type: Factory cut <input type="checkbox"/> 11 Continuous slot <input type="checkbox"/> 01 Other <input type="checkbox"/>
17. Source of water (attach analysis): _____	b. Manufacturer <u>MonoFlex</u> c. Slot size: 0.010 in. d. Slotted length: 20 ft.
E. Bentonite seal, top _____ ft. MSL or <u>0</u> ft.	11. Backfill material (below filter pack): None <input type="checkbox"/> 14 Other <input type="checkbox"/>
F. Fine sand, top _____ ft. MSL or _____ ft.	
G. Filter pack, top _____ ft. MSL or <u>0.5</u> ft.	
H. Screen joint, top _____ ft. MSL or <u>0.5</u> ft.	
I. Well bottom _____ ft. MSL or <u>20</u> ft.	
J. Filter pack, bottom _____ ft. MSL or <u>20</u> ft.	
K. Borehole, bottom _____ ft. MSL or <u>20</u> ft.	
L. Borehole, diameter <u>6.5</u> in.	
M. O.D. well casing <u>1.0</u> in.	
N. I.D. well casing _____ in.	

I hereby certify that the information on this form is true and correct to the best of my knowledge.
Signature _____ Firm _____

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than \$10, nor more than \$5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than \$10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

Route to: Solid Waste Haz. Waste Wastewater
Env. Response & Repair Underground Tanks Other _____

Facility/Project Name <u>Sub Zero/Prairie Area</u>	County Name <u>Dane</u>	Well Name <u>AW-1</u>
Facility License, Permit or Monitoring Number _____	County Code _____	Wis. Unique Well Number _____
		DNR Well Number _____

1. Can this well be purged dry? Yes No

2. Well development method

- surged with bailer and bailed 41
- surged with bailer and pumped 61
- surged with block and bailed 42
- surged with block and pumped 62
- surged with block, bailed and pumped 70
- compressed air 20
- bailed only 10
- pumped only 51
- pumped slowly 50
- Other _____

3. Time spent developing well 30 min.

4. Depth of well (from top of well casing) 23 ft.

5. Inside diameter of well 1.2 in.

6. Volume of water in filter pack and well casing _____ gal.

7. Volume of water removed from well 5 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added _____

10. Analysis performed on water added? Yes No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. <u>19</u> ft.	<u>12</u> ft.
Date	b. <u>8/17/20</u> m m d d y y	<u>8/17/20</u> m m d d y y
Time	c. <u>11:30</u> <input checked="" type="checkbox"/> a.m. <input type="checkbox"/> p.m.	<u>12:00</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.
12. Sediment in well bottom	<u>0</u> inches	<u>0</u> inches
13. Water clarity	Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) _____	Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) _____
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: Marc Cramton

Firm: Badger State Drilling

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: [Signature]

Print Initials: NMC

Firm: Badger State Drilling

Facility/Project Name <u>Sub Zero/Storm Pranic Area</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> S. <input type="checkbox"/> E. <input type="checkbox"/> W.	Well Name <u>W-2</u>
Facility License, Permit or Monitoring Number	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number _____ DNR Well Number _____
Type of Well Water Table Observation Well <input type="checkbox"/> 11 Piezometer <input type="checkbox"/> 12	Section Location of Waste/Source _____ 1/4 of _____ 1/4 of Sec. _____, T. _____ N. R. _____ E. <input type="checkbox"/> W. <input type="checkbox"/>	Date Well Installed <u>8/17/20</u> m m d d y y
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <u>Dakota Bevans</u> <u>Badger State Drilling</u>

A. Protective pipe, top elevation _____ ft. MSL	1. Cap and lock? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
B. Well casing, top elevation _____ ft. MSL	2. Protective cover pipe: a. Inside diameter: _____ in. b. Length: _____ ft. c. Material: Steel <input type="checkbox"/> 04 Other <input type="checkbox"/>
C. Land surface elevation _____ ft. MSL	d. Additional protection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: _____
D. Surface seal, bottom _____ ft. MSL or _____ ft.	3. Surface seal: Bentonite <input checked="" type="checkbox"/> 30 Concrete <input type="checkbox"/> 01 Other <input type="checkbox"/>
12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/>	4. Material between well casing and protective pipe: Bentonite <input type="checkbox"/> 30 Annular space seal <input type="checkbox"/>
13. Sieve analysis attached? <input type="checkbox"/> Yes <input type="checkbox"/> No	5. Annular space seal: a. Granular Bentonite <input type="checkbox"/> 33 b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> 35 c. _____ Lbs/gal mud weight Bentonite slurry <input type="checkbox"/> 31 d. _____ % Bentonite Bentonite-cement grout <input type="checkbox"/> 50 e. _____ Ft ³ volume added for any of the above
14. Drilling method used: Rotary <input type="checkbox"/> 50 Hollow Stem Auger <input checked="" type="checkbox"/> 41 Other <input type="checkbox"/>	f. How installed: Tremie <input type="checkbox"/> 01 Tremie pumped <input type="checkbox"/> 02 Gravity <input checked="" type="checkbox"/> 08
15. Drilling fluid used: Water <input type="checkbox"/> 02 Air <input type="checkbox"/> 01 Drilling Mud <input type="checkbox"/> 03 None <input type="checkbox"/> 99	6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> 33 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite pellets <input checked="" type="checkbox"/> 32 c. _____ Other <input type="checkbox"/>
16. Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft ³
Describe _____	8. Filter pack material: Manufacturer, product name and mesh size a. <u>Sidley</u> b. Volume added _____ ft ³
17. Source of water (attach analysis): _____	9. Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> 23 Flush threaded PVC schedule 80 <input type="checkbox"/> 24 Other <input type="checkbox"/>
E. Bentonite seal, top _____ ft. MSL or <u>0</u> ft.	10. Screen material: <u>Sch 40</u> a. Screen type: Factory cut <input type="checkbox"/> 11 Continuous slot <input type="checkbox"/> 01 Other <input type="checkbox"/>
F. Fine sand, top _____ ft. MSL or _____ ft.	b. Manufacturer <u>Mono Pley</u> c. Slot size: 0.010 in. d. Slotted length: 20 ft.
G. Filter pack, top _____ ft. MSL or <u>0.5</u> ft.	11. Backfill material (below filter pack): None <input type="checkbox"/> 14 Other <input type="checkbox"/>
H. Screen joint, top _____ ft. MSL or <u>0.5</u> ft.	
I. Well bottom _____ ft. MSL or <u>20</u> ft.	
J. Filter pack, bottom _____ ft. MSL or <u>20</u> ft.	
K. Borehole, bottom _____ ft. MSL or <u>20</u> ft.	
L. Borehole, diameter <u>6.5</u> in.	
M. O.D. well casing <u>1.0</u> in.	
N. I.D. well casing _____ in.	

I hereby certify that the information on this form is true and correct to the best of my knowledge.
Signature [Signature] Firm Badger State Drilling

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than \$10, nor more than \$5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than \$10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

Route to: Solid Waste Haz. Waste Wastewater
Env. Response & Repair Underground Tanks Other

Facility/Project Name <u>Sub Zero/Stone Prairie Area</u>	County Name	Well Name <u>W-2</u>
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number
		DNR Well Number

1. Can this well be purged dry? Yes No

2. Well development method

- surged with bailer and bailed 41
- surged with bailer and pumped 61
- surged with block and bailed 42
- surged with block and pumped 62
- surged with block, bailed and pumped 70
- compressed air 20
- bailed only 10
- pumped only 51
- pumped slowly 50
- Other

3. Time spent developing well 30 min.

4. Depth of well (from top of well casing) 23 ft.

5. Inside diameter of well 1.0 in.

6. Volume of water in filter pack and well casing _____ gal.

7. Volume of water removed from well 5 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added _____

10. Analysis performed on water added? Yes No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. <u>13</u> ft.	<u>13</u> ft.
Date	b. <u>8/17/20</u> m m d d y y	<u>8/17/20</u> m m d d y y
Time	c. <u>12:30</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.	<u>1:0</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.
12. Sediment in well bottom	<u>0</u> inches	<u>0</u> inches
13. Water clarity	Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe)	Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe)
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: Marc Cramton

Firm: Badger State Drilling

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: Marc Cramton

Print Initials: MC

Firm: Badger State Drilling

Facility/Project Name <i>Sub Zero/Stone Prairie Area</i>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> S. <input type="checkbox"/> E. <input type="checkbox"/> W.	Well Name <i>W-3</i>
Facility License, Permit or Monitoring Number	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number _____ DNR Well Number _____
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> 11 Piezometer <input type="checkbox"/> 12	Section Location of Waste/Source 1/4 of _____ 1/4 of Sec. _____ T. _____ N. R. _____ E. <input type="checkbox"/> W. <input type="checkbox"/>	Date Well Installed <i>8/17/20</i> m m d d y y
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <i>Dakota Bevans Badger State Drilling</i>
Is Well A Point of Enforcement Std. Application? <input type="checkbox"/> Yes <input type="checkbox"/> No		

A. Protective pipe, top elevation _____ ft. MSL	1. Cap and lock? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
B. Well casing, top elevation _____ ft. MSL	2. Protective cover pipe: a. Inside diameter: _____ in. b. Length: _____ ft. c. Material: Steel <input type="checkbox"/> 04 Other <input type="checkbox"/>
C. Land surface elevation _____ ft. MSL	d. Additional protection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: _____
D. Surface seal, bottom _____ ft. MSL or _____ ft.	3. Surface seal: Bentonite <input checked="" type="checkbox"/> 30 Concrete <input type="checkbox"/> 01 Other <input type="checkbox"/>
12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/>	4. Material between well casing and protective pipe: Bentonite <input type="checkbox"/> 30 Annular space seal <input type="checkbox"/> Other <input type="checkbox"/>
13. Sieve analysis attached? <input type="checkbox"/> Yes <input type="checkbox"/> No	5. Annular space seal: a. Granular Bentonite <input type="checkbox"/> 33 b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> 35 c. _____ Lbs/gal mud weight Bentonite slurry <input type="checkbox"/> 31 d. _____ % Bentonite Bentonite-cement grout <input type="checkbox"/> 50 e. _____ Ft ³ volume added for any of the above
14. Drilling method used: Rotary <input type="checkbox"/> 50 Hollow Stem Auger <input checked="" type="checkbox"/> 41 Other <input type="checkbox"/>	f. How installed: Tremie <input type="checkbox"/> 01 Tremie pumped <input type="checkbox"/> 02 Gravity <input checked="" type="checkbox"/> 08
15. Drilling fluid used: Water <input type="checkbox"/> 02 Air <input type="checkbox"/> 01 Drilling Mud <input type="checkbox"/> 03 None <input checked="" type="checkbox"/> 99	6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> 33 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite pellets <input checked="" type="checkbox"/> 32 c. _____ Other <input type="checkbox"/>
16. Drilling additives used? <input type="checkbox"/> Yes <input type="checkbox"/> No	7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft ³
Describe _____	8. Filter pack material: Manufacturer, product name and mesh size a. <i>Sidley</i> b. Volume added _____ ft ³
17. Source of water (attach analysis): _____	9. Well casing: Flush threaded PVC schedule 40 <input type="checkbox"/> 23 Flush threaded PVC schedule 80 <input checked="" type="checkbox"/> 24 Other <input type="checkbox"/>
E. Bentonite seal, top _____ ft. MSL or <i>0</i> ft.	10. Screen material: <i>Monoflex sch 80</i> a. Screen type: Factory cut <input checked="" type="checkbox"/> 11 Continuous slot <input type="checkbox"/> 01 Other <input type="checkbox"/>
F. Fine sand, top _____ ft. MSL or _____ ft.	b. Manufacturer <i>Monoflex</i> c. Slot size: <i>0.520</i> in. d. Slotted length: <i>20</i> ft.
G. Filter pack, top _____ ft. MSL or <i>0.5</i> ft.	11. Backfill material (below filter pack): None <input type="checkbox"/> 14 Other <input type="checkbox"/>
H. Screen joint, top _____ ft. MSL or <i>0.5</i> ft.	
I. Well bottom _____ ft. MSL or <i>20</i> ft.	
J. Filter pack, bottom _____ ft. MSL or <i>20</i> ft.	
K. Borehole, bottom _____ ft. MSL or <i>20</i> ft.	
L. Borehole, diameter <i>6.5</i> in.	
M. O.D. well casing <i>1.0</i> in.	
N. I.D. well casing _____ in.	

I hereby certify that the information on this form is true and correct to the best of my knowledge.
Signature: *[Signature]* Firm: *Badger State Drilling*

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than \$10, nor more than \$5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than \$10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

Route to: Solid Waste Haz. Waste Wastewater
Env. Response & Repair Underground Tanks Other _____

Facility/Project Name <u>Sub Zero/ Stoner Prairie Area</u>	County Name <u>Dane</u>	Well Name <u>MW-3</u>
Facility License/Permit or Monitoring Number _____	County Code _____	Wis. Unique Well Number _____
		DNR Well Number _____

1. Can this well be purged dry? Yes No

2. Well development method

surged with bailer and bailed	<input checked="" type="checkbox"/>	41
surged with bailer and pumped	<input type="checkbox"/>	61
surged with block and bailed	<input type="checkbox"/>	42
surged with block and pumped	<input type="checkbox"/>	62
surged with block, bailed and pumped	<input type="checkbox"/>	70
compressed air	<input type="checkbox"/>	20
bailed only	<input type="checkbox"/>	10
pumped only	<input type="checkbox"/>	51
pumped slowly	<input type="checkbox"/>	50
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

3. Time spent developing well 30 min.

4. Depth of well (from top of well casing) 23 ft.

5. Inside diameter of well 1.0 in.

6. Volume of water in filter pack and well casing _____ gal.

7. Volume of water removed from well 5 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added _____

10. Analysis performed on water added? Yes No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. <u>13</u> ft.	<u>13</u> ft.
Date	b. <u>8/17/20</u> m m d d y y	<u>8/17/20</u> m m d d y y
Time	c. <u>10:30</u> <input checked="" type="checkbox"/> a.m. <input type="checkbox"/> p.m.	<u>11:00</u> <input checked="" type="checkbox"/> a.m. <input type="checkbox"/> p.m.
12. Sediment in well bottom	<u>0</u> inches	<u>0</u> inches
13. Water clarity	Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) _____	Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) _____
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm	I hereby certify that the above information is true and correct to the best of my knowledge.
Name: <u>Mare Bramton</u>	Signature: <u></u>
Firm: <u>Badger State Drilling</u>	Print Initials: <u>N M C</u>
	Firm: <u>Badger State Drilling</u>

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

Facility/Project Name <i>Sub Zero/Stone Prairie Area</i>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> S. <input type="checkbox"/> E. <input type="checkbox"/> W.	Well Name <i>W-4</i>
Facility License, Permit or Monitoring Number	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number _____ DNR Well Number _____
Type of Well Water Table Observation Well <input type="checkbox"/> 11 Piezometer <input type="checkbox"/> 12	Section Location of Waste/Source 1/4 of _____ 1/4 of Sec. _____, T. _____ N. R. _____ <input type="checkbox"/> E. <input type="checkbox"/> W.	Date Well Installed <i>8/18/20</i> m m d d y y
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <i>Dakota Bevans Badger State Drilling</i>

A. Protective pipe, top elevation _____ ft. MSL	1. Cap and lock? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
B. Well casing, top elevation _____ ft. MSL	2. Protective cover pipe: a. Inside diameter: _____ in. b. Length: _____ ft. c. Material: Steel <input type="checkbox"/> 04 Other <input type="checkbox"/>
C. Land surface elevation _____ ft. MSL	d. Additional protection? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, describe: _____
D. Surface seal, bottom _____ ft. MSL or _____ ft.	3. Surface seal: Bentonite <input checked="" type="checkbox"/> 30 Concrete <input type="checkbox"/> 01 Other <input type="checkbox"/>
12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/>	4. Material between well casing and protective pipe: Bentonite <input type="checkbox"/> 30 Annular space seal <input type="checkbox"/> Other <input type="checkbox"/>
13. Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. Annular space seal: a. Granular Bentonite <input type="checkbox"/> 33 b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> 35 c. _____ Lbs/gal mud weight Bentonite slurry <input type="checkbox"/> 31 d. _____ % Bentonite Bentonite-cement grout <input type="checkbox"/> 50 e. _____ Ft ³ volume added for any of the above
14. Drilling method used: Rotary <input type="checkbox"/> 50 Hollow Stem Auger <input checked="" type="checkbox"/> 41 Other <input type="checkbox"/>	f. How installed: Tremie <input type="checkbox"/> 01 Tremie pumped <input type="checkbox"/> 02 Gravity <input type="checkbox"/> 08
15. Drilling fluid used: Water <input type="checkbox"/> 02 Air <input type="checkbox"/> 01 Drilling Mud <input type="checkbox"/> 03 None <input checked="" type="checkbox"/> 99	6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> 33 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite pellets <input type="checkbox"/> 32 c. _____ Other <input type="checkbox"/>
16. Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft ³
Describe _____	8. Filter pack material: Manufacturer, product name and mesh size a. <i>Sidley</i> b. Volume added _____ ft ³
17. Source of water (attach analysis): _____	9. Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> 23 Flush threaded PVC schedule 80 <input type="checkbox"/> 24 Other <input type="checkbox"/>
E. Bentonite seal, top _____ ft. MSL or <u>0</u> ft.	10. Screen material: <i>Monoglar</i> a. Screen type: Factory cut <input checked="" type="checkbox"/> 11 Continuous slot <input type="checkbox"/> 01 Other <input type="checkbox"/>
F. Fine sand, top _____ ft. MSL or _____ ft.	b. Manufacturer _____ c. Slot size: _____ 0.222 in. d. Slotted length: _____ 20 ft.
G. Filter pack, top _____ ft. MSL or <u>0.5</u> ft.	11. Backfill material (below filter pack): None <input type="checkbox"/> 14 Other <input type="checkbox"/>
H. Screen joint, top _____ ft. MSL or <u>0.5</u> ft.	
I. Well bottom _____ ft. MSL or <u>20</u> ft.	
J. Filter pack, bottom _____ ft. MSL or <u>20</u> ft.	
K. Borehole, bottom _____ ft. MSL or <u>20</u> ft.	
L. Borehole, diameter <u>6.5</u> in.	
M. O.D. well casing <u>1.0</u> in.	
N. I.D. well casing _____ in.	

I hereby certify that the information on this form is true and correct to the best of my knowledge.
Signature *Mark Pelt* Firm *Badger State Drilling*

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Route to: Solid Waste Haz. Waste Wastewater
Env. Response & Repair Underground Tanks Other _____

Facility/Project Name <u>Sub Zero/Stonehenge Positive Area</u>	County Name <u>Dane</u>	Well Name <u>W-4</u>
Facility License, Permit or Monitoring Number _____	County Code _____	Wis. Unique Well Number _____
		DNR Well Number _____

1. Can this well be purged dry? Yes No
2. Well development method
- surged with bailer and bailed 41
 - surged with bailer and pumped 61
 - surged with block and bailed 42
 - surged with block and pumped 62
 - surged with block, bailed and pumped 70
 - compressed air 20
 - bailed only 10
 - pumped only 51
 - pumped slowly 50
 - Other _____
3. Time spent developing well _____ 30 min.
4. Depth of well (from top of well casing) _____ 23 ft.
5. Inside diameter of well _____ 1.0 in.
6. Volume of water in filter pack and well casing _____ gal.
7. Volume of water removed from well _____ 5 gal.
8. Volume of water added (if any) _____ gal.
9. Source of water added _____
10. Analysis performed on water added? Yes No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. <u>10</u> ft.	<u>15</u> ft.
Date	b. <u>8/18/20</u> m m d d y y	<u>8/18/20</u> m m d d y y
Time	c. <u>12:00</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.	<u>12:30</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.
12. Sediment in well bottom	<u>0</u> inches	<u>0</u> inches
13. Water clarity	Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe)	Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe)
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: Marc Cranston

Firm: Badger State Drilling

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: Marc Cranston

Print Initials: NMC

Firm: Badger State Drilling

Facility/Project Name <i>Sub Zero/Stoner Prairie Area</i>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> S. ft. <input type="checkbox"/> E. <input type="checkbox"/> W.	Well Name <i>P-1</i>
Facility License, Permit or Monitoring Number	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number DNR Well Number
Type of Well Water Table Observation Well <input type="checkbox"/> 11 Piezometer <input type="checkbox"/> 12	Section Location of Waste/Source 1/4 of _____ 1/4 of Sec. _____, T. _____ N. R. _____ E. W.	Date Well Installed <i>8/18/20</i> m m d d y y
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <i>Dakota Bevens Badger State Drilling</i>
Is Well A Point of Enforcement Std. Application? <input type="checkbox"/> Yes <input type="checkbox"/> No		

A. Protective pipe, top elevation _____ ft. MSL	1. Cap and lock? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
B. Well casing, top elevation _____ ft. MSL	2. Protective cover pipe: a. Inside diameter: _____ in. b. Length: _____ ft. c. Material: Steel <input type="checkbox"/> 04 Other <input type="checkbox"/>
C. Land surface elevation _____ ft. MSL	d. Additional protection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: _____
D. Surface seal, bottom _____ ft. MSL or _____ ft.	3. Surface seal: Bentonite <input checked="" type="checkbox"/> 30 Concrete <input type="checkbox"/> 01 Other <input type="checkbox"/>
12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/>	4. Material between well casing and protective pipe: Bentonite <input type="checkbox"/> 30 Annular space seal <input type="checkbox"/> Other <input type="checkbox"/>
13. Sieve analysis attached? <input type="checkbox"/> Yes <input type="checkbox"/> No	5. Annular space seal: a. Granular Bentonite <input type="checkbox"/> 33 b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> 35 c. _____ Lbs/gal mud weight Bentonite slurry <input type="checkbox"/> 31 d. _____ % Bentonite Bentonite-cement grout <input type="checkbox"/> 50 e. _____ Ft ³ volume added for any of the above f. How installed: Tremie <input type="checkbox"/> 01 Tremie pumped <input type="checkbox"/> 02 Gravity <input type="checkbox"/> 08
14. Drilling method used: Rotary <input checked="" type="checkbox"/> 50 Hollow Stem Auger <input checked="" type="checkbox"/> 41 Other <input type="checkbox"/>	6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> 33 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite pellets <input checked="" type="checkbox"/> 32 c. _____ Other <input type="checkbox"/>
15. Drilling fluid used: Water <input type="checkbox"/> 02 Air <input type="checkbox"/> 01 Drilling Mud <input checked="" type="checkbox"/> 03 None <input type="checkbox"/> 99	7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft ³
16. Drilling additives used? <input type="checkbox"/> Yes <input type="checkbox"/> No	8. Filter pack material: Manufacturer, product name and mesh size a. <i>Sidley</i> b. Volume added _____ ft ³
Describe _____	9. Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> 23 Flush threaded PVC schedule 80 <input type="checkbox"/> 24 Other <input type="checkbox"/>
17. Source of water (attach analysis): _____	10. Screen material: <i>Mono Dey</i> a. Screen type: Factory cut <input type="checkbox"/> 11 Continuous slot <input type="checkbox"/> 01 Other <input type="checkbox"/>
E. Bentonite seal, top _____ ft. MSL or <i>0</i> ft.	b. Manufacturer _____ c. Slot size: 0. <i>010</i> in. d. Slotted length: <i>10</i> ft.
F. Fine sand, top _____ ft. MSL or <i>33</i> ft.	11. Backfill material (below filter pack): None <input type="checkbox"/> 14 Other <input type="checkbox"/>
G. Filter pack, top _____ ft. MSL or <i>34</i> ft.	
H. Screen joint, top _____ ft. MSL or <i>35</i> ft.	
I. Well bottom _____ ft. MSL or <i>45</i> ft.	
J. Filter pack, bottom _____ ft. MSL or <i>45</i> ft.	
K. Borehole, bottom _____ ft. MSL or <i>45</i> ft.	
L. Borehole, diameter <i>8.5</i> in.	
M. O.D. well casing <i>1.0</i> in.	
N. I.D. well casing _____ in.	

I hereby certify that the information on this form is true and correct to the best of my knowledge.
Signature *Marc A. [unclear]* Firm *Badger State Drilling*

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Route to: Solid Waste Haz. Waste Wastewater
Env. Response & Repair Underground Tanks Other _____

Facility/Project Name <u>Sub Zero/Stone Prairie Area</u>	County Name	Well Name <u>1-1</u>
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number
		DNR Well Number

		Before Development	After Development
1. Can this well be purged dry?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
2. Well development method		11. Depth to Water (from top of well casing)	
surged with bailer and bailed	<input checked="" type="checkbox"/> 41	a. <u>12</u> ft.	<u>23</u> ft.
surged with bailer and pumped	<input type="checkbox"/> 61	Date	
surged with block and bailed	<input type="checkbox"/> 42	b. <u>8/18/20</u>	<u>8/18/20</u>
surged with block and pumped	<input type="checkbox"/> 62	m m d d y y	m m d d y y
surged with block, bailed and pumped	<input type="checkbox"/> 70	Time	
compressed air	<input type="checkbox"/> 20	c. <u>10:30</u> <input checked="" type="checkbox"/> a.m.	<u>11:00</u> <input checked="" type="checkbox"/> a.m.
bailed only	<input type="checkbox"/> 10		<input type="checkbox"/> p.m.
pumped only	<input type="checkbox"/> 51	12. Sediment in well bottom	
pumped slowly	<input type="checkbox"/> 50	<u>0</u> inches	<u>0</u> inches
Other	<input type="checkbox"/>	13. Water clarity	
		Clear <input type="checkbox"/> 10	Clear <input checked="" type="checkbox"/> 20
		Turbid <input checked="" type="checkbox"/> 15	Turbid <input type="checkbox"/> 25
		(Describe)	(Describe)
3. Time spent developing well	<u>30</u> min.		
4. Depth of well (from top of well casing)	<u>48</u> ft.		
5. Inside diameter of well	<u>1.0</u> in.		
6. Volume of water in filter pack and well casing	_____ gal.		
7. Volume of water removed from well	<u>5</u> gal.		
8. Volume of water added (if any)	_____ gal.		
9. Source of water added	_____		
10. Analysis performed on water added?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (If yes, attach results)		
16. Additional comments on development:		Fill in if drilling fluids were used and well is at solid waste facility:	
		14. Total suspended solids	_____ mg/l
		15. COD	_____ mg/l

Well developed by: Person's Name and Firm	I hereby certify that the above information is true and correct to the best of my knowledge.
Name: <u>Marc Cramton</u>	Signature: <u>[Signature]</u>
Firm: <u>Badger State Drilling</u>	Print Initials: <u>NMC</u>
	Firm: <u>Badger State Drilling</u>

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

APPENDIX C

PARTICLE SIZE DISTRIBUTION TEST REPORTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.6	13.3	77.0	8.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.7		
#8	99.4		
#10	99.1		
#16	98.6		
#30	95.8		
#40	85.8		
#50	67.8		
#80	23.8		
#100	15.1		
#200	8.8		

Material Description

Brown Fine to Medium Sand, Little Silt, Trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.4794 D₈₅= 0.4160 D₆₀= 0.2726
 D₅₀= 0.2445 D₃₀= 0.1960 D₁₅= 0.1491
 D₁₀= 0.0860 C_u= 3.17 C_c= 1.64

Classification

USCS= SP-SM AASHTO=

Remarks

* (no specification provided)

Sample Number: P-1: S-5

Date: 8/26/20

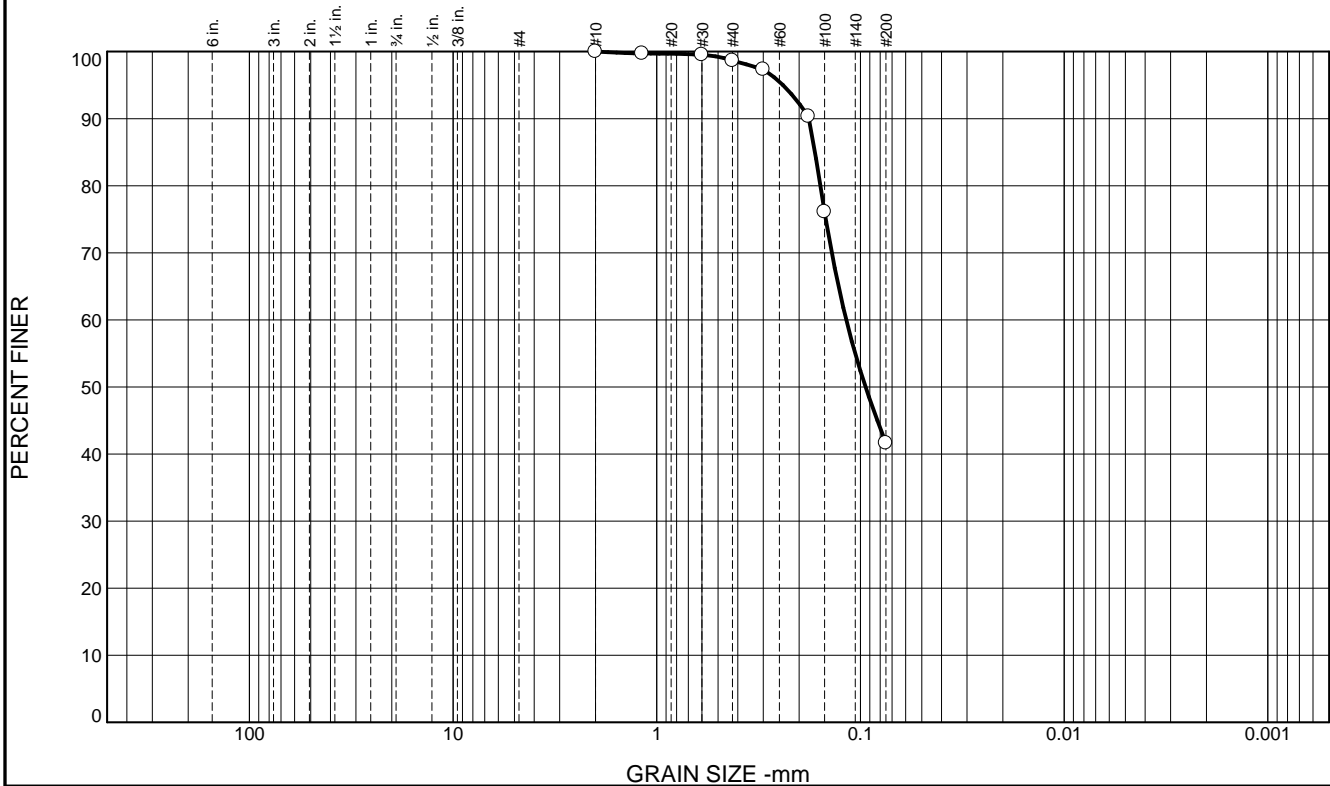


Client: Strand & Assoc.
Project: City of Fitchburg Stormwater
Project No: C20290

Figure

Tested By: DRW Checked By: TFG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.4	57.0	41.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	99.7		
#30	99.5		
#40	98.6		
#50	97.3		
#80	90.3		
#100	76.1		
#200	41.6		

Material Description

Brown Silty Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.1791 D₈₅= 0.1672 D₆₀= 0.1174

D₅₀= 0.0944 D₃₀= D₁₅=

D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

* (no specification provided)

Sample Number: W-1: S-5

Date: 8/26/20



Client: Strand & Assoc.
Project: City of Fitchburg Stormwater
Project No: C20290

Figure

Tested By: DRW Checked By: TFG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.1	20.1	4.2	16.5	49.2	7.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	97.9		
1/2	87.7		
3/8	84.5		
#4	77.8		
#8	74.8		
#10	73.6		
#16	71.7		
#30	67.0		
#40	57.1		
#50	43.0		
#80	16.8		
#100	11.8		
#200	7.9		

Material Description

Brown Fine to Medium Sand, Some Gravel, Little Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 13.9971 D₈₅= 10.1880 D₆₀= 0.4637
D₅₀= 0.3509 D₃₀= 0.2364 D₁₅= 0.1707
D₁₀= 0.1095 C_u= 4.23 C_c= 1.10

Classification

USCS= SP-SM AASHTO=

Remarks

* (no specification provided)

Sample Number: W-3: S-3

Date: 8/26/20



Client: Strand & Assoc.
Project: City of Fitchburg Stormwater
Project No: C20290

Figure

Tested By: DRW Checked By: TFG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.0	2.0	13.8	72.9	7.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	98.6		
3/8	97.8		
#4	96.0		
#8	94.8		
#10	94.0		
#16	92.7		
#30	89.5		
#40	80.2		
#50	59.4		
#80	20.1		
#100	12.8		
#200	7.3		

Material Description

Brown Fine to Medium Sand, Little Silt, Trace Gravel

PL= **Atterberg Limits** PI=

LL=

Coefficients

D₉₀= 0.6237 D₈₅= 0.4868 D₆₀= 0.3024

D₅₀= 0.2671 D₃₀= 0.2095 D₁₅= 0.1605

D₁₀= 0.1055 C_u= 2.87 C_c= 1.38

USCS= SP-SM **Classification** AASHTO=

Remarks

* (no specification provided)

Sample Number: W-4: S-3

Date: 8/26/20



Client: Strand & Assoc.
 Project: City of Fitchburg Stormwater
 Project No: C20290

Figure

Tested By: DRW

Checked By: TFG

APPENDIX D

**WISCONSIN DEPARTMENT OF SAFETY & PROFESSIONAL SERVICES
SOIL AND SITE EVALUATION – STORM FORMS**



Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	County	Dane
	Parcel I.D.	225/0609-083-8740-2
	Reviewed by:	
		Date:

Property Owner Sub-Zero Group, Inc.	Property Location Govt. Lot NW 1/4 SW 1/4 S 08 T 06 N R 09 E		
Property Owner's Mail Address 4717 Hammersley Road	Lot # 1	Block#	Subd. Name or CSM # CSM 14235
City Madison	State WI	Zip Code 53711	Phone Number
		<input checked="" type="checkbox"/> City Fitchburg	<input type="checkbox"/> Village <input type="checkbox"/> Town Nearest Road Sub-Zero Pkwy
Drainage area _____ <input type="checkbox"/> sq ft <input type="checkbox"/> acres	Hydraulic Application Test Method		Soil Moisture Date of soil borings: _____ USDA-NRCS WETS Value:
Test site suitable for (check all that apply): <input type="checkbox"/> Site not suitable;	<input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double Ring Infiltrometer <input type="checkbox"/> Other: (specify) _____		<input type="checkbox"/> Dry = 1; <input type="checkbox"/> Normal = 2; <input type="checkbox"/> Wet = 3.
<input type="checkbox"/> Bioretention; <input type="checkbox"/> Subsurface Dispersal System; <input type="checkbox"/> Reuse; <input type="checkbox"/> Irrigation; <input type="checkbox"/> Other _____			

B-1 #OBS. Pit Boring Ground surface elevation 1018 ± ft. Elevation of limiting factor 1017.2 ± ft. (Redox)
1017.0 ± ft. (Groundwater)

Horizon	Approx. Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-10	Topsoil / Muck (not sampled)								
2	10-36	5Y 6/1	c2p 10YR 3/6	SiCL	0m	mvfi		<5		0.04
3	36-96	10YR 6/2	none	S	0sg	ml		<10		3.60
4	96-144	10YR 5/3	none	FSL, SiL Seams	0sg	ml		<5		0.13-0.50 ⁽¹⁾
5	144-204	10YR 6/3	none	SiL	2mabk	mfr		<5		0.13
6	204-264	7.5YR 6/3	f2d 7.5YR 5/4	SiCL, SiL Seams	0m	mfi		<5		0.04
7	264-360	10YR 6/3	none	S, SiCL Seams	0sg	ml		<10		0.04-3.60 ⁽¹⁾

Comments: Groundwater was encountered at about 3 ft below the ground surface during drilling and at approximately 1 ft the day after drilling. However, low-chroma/high-value dominant color and redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater at a shallower depth.
⁽¹⁾ Infiltration potential will likely be controlled by silt loam/silty clay loam seams but can potentially be improved by excavating and turning-over (deep-tilling) the layer to disrupt silt loam/silty clay loam seams; gradations should be collected during construction to check that texture of blended soil is consistent with design infiltration rate.

Overall Site Comments: See Comments above and Stormwater Infiltration Potential section in Geotechnical Exploration Report.

Name (Please Print)	Tim F. Gassenheimer	Signature		Credential Number	SP-011900004
Address	129 Milky Way, Madison, WI 53718	Date Evaluation Conducted	October 6, 2020	Telephone Number	(608) 288-4100



Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701

Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Page 1 of 1

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	County	Dane
	Parcel I.D.	225/0609-083-9055-2
	Reviewed by:	
Date:		

Property Owner Promega Corporation	Property Location Govt. Lot SE ¼ SE ¼ S 07 T 06 N R 09 E		
Property Owner's Mail Address 2800 Woods Hollow Road	Lot # 3	Block#	Subd. Name or CSM # CSM 15053
City Fitchburg	State WI	Zip Code 53711	Phone Number
<input checked="" type="checkbox"/> City <input type="checkbox"/> Village <input type="checkbox"/> Town Fitchburg		Nearest Road Sub-Zero Pkwy	
Drainage area _____ <input type="checkbox"/> sq ft <input type="checkbox"/> acres	Hydraulic Application Test Method		Soil Moisture Date of soil borings: _____ USDA-NRCS WETS Value: <input type="checkbox"/> Dry = 1; <input type="checkbox"/> Normal = 2; <input type="checkbox"/> Wet = 3.
Test site suitable for (check all that apply): <input type="checkbox"/> Site not suitable;	<input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double Ring Infiltrometer <input type="checkbox"/> Other: (specify) _____		
<input type="checkbox"/> Bioretention; <input type="checkbox"/> Subsurface Dispersal System; <input type="checkbox"/> Reuse; <input type="checkbox"/> Irrigation; <input type="checkbox"/> Other _____			

B-2	#OBS.	<input type="checkbox"/> Pit	<input checked="" type="checkbox"/> Boring	Ground surface elevation	1018 ± ft.	Elevation of limiting factor	1017.2 ± ft. (Color/Redox) 1017.0 ± ft. (Groundwater)
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Horizon	Approx. Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-10	Topsoil (not sampled)								
2	10-36	2.5Y 6/1	m3p 10YR 4/4	CL	0m	mvfi		<10		0.03
3	36-96	10YR 6/2	none	S	0sg	ml		<10		3.60
4	96-144	10YR 5/3	none	LFS	0sg	ml		<10		0.50
5	144-264	10YR 6/3	f1f 10YR 5/4	SiL, SiCL Seams	2mabk	mfr		<5		0.04-0.13 ⁽¹⁾
6	264-360	10YR 6/3 to 4/6	none	S, SiCL Seams	0sg	ml		<10		0.04-3.60 ⁽¹⁾

Comments: Groundwater was encountered at about 3 ft below the ground surface during drilling and at approximately 1 ft the day after drilling. However, low-chroma/high-value dominant color and redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater at a shallower depth.

⁽¹⁾ Infiltration potential will likely be controlled by silty clay loam seams but can potentially be improved by excavating and turning-over (deep-tilling) the layer to disrupt silty clay loam seams; gradations should be collected during construction to check that texture of blended soil is consistent with design infiltration rate.

Overall Site Comments: See Comments above and Stormwater Infiltration Potential section in Geotechnical Exploration Report.

Name (Please Print)	Tim F. Gassenheimer	Signature		Credential Number	SP-011900004
Address	129 Milky Way, Madison, WI 53718	Date Evaluation Conducted	October 6, 2020	Telephone Number	(608) 288-4100



Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	County Dane Parcel I.D. 225/0609-074-9745-2 Reviewed by: Date:
---	---

Property Owner Promega Corporation	Property Location Govt. Lot SW 1/4 SW 1/4 S 08 T 06 N R 09 E		
Property Owner's Mail Address 2800 Woods Hollow Road	Lot # O.L. 2	Block#	Subd. Name or CSM # CSM 15053
City Fitchburg State WI Zip Code 53711 Phone Number	<input checked="" type="checkbox"/> City <input type="checkbox"/> Village <input type="checkbox"/> Town Fitchburg		Nearest Road Sub-Zero Pkwy, Lacy Rd
Drainage area _____ <input type="checkbox"/> sq ft <input type="checkbox"/> acres Test site suitable for (check all that apply): <input type="checkbox"/> Site not suitable; <input type="checkbox"/> Bioretention; <input type="checkbox"/> Subsurface Dispersal System; <input type="checkbox"/> Reuse; <input type="checkbox"/> Irrigation; <input type="checkbox"/> Other _____	Hydraulic Application Test Method <input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double Ring Infiltrometer <input type="checkbox"/> Other: (specify) _____		Soil Moisture Date of soil borings: _____ USDA-NRCS WETS Value: <input type="checkbox"/> Dry = 1; <input type="checkbox"/> Normal = 2; <input type="checkbox"/> Wet = 3.

P-1 #OBS. Pit Boring Ground surface elevation 1023.4 ± ft. Elevation of limiting factor 1022.5 ± ft. (Redox)
1017.9 ± ft. (Groundwater)

Horizon	Approx. Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-11	Topsoil (not sampled)								
2	11-36	10YR 5/3	c1f 10YR 6/1	SiCL	0m	mvfi		<10		0.04
3	36-66	10YR 4/4	none	LS	0sg	ml		<10		1.63
4	66-264	10YR 6/3	none	S	0sg	ml		<1	9	3.60
5	264-324	10YR 6/3	c2d 7.5YR 6/4, 6/1	SiCL	1mabk	mfi		<5		0.04
6	324-384	10YR 6/3	none	S	0sg	ml		<10		3.60
7	384-444	10YR 6/4	none	FS, SiCL Seams	0sg	ml		<5		0.04-0.50 ⁽¹⁾
8	444-504	10YR 6/3	none	SiL	1mabk	mfi		<5		0.13
9	504-540	7.5YR 5/4	none	SiCL, SiL Seams	2mpl	mfi		<5		0.04 ⁽²⁾

Comments: Groundwater was encountered at about 5.5 ft below the ground surface during drilling. However, redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater at a shallower depth.

⁽¹⁾ Infiltration potential will likely be controlled by silty clay loam seams but can potentially be improved by excavating and turning-over (deep-tilling) the layer to disrupt silty clay loam seams; gradations should be collected during construction to check that texture of blended soil is consistent with design infiltration rate.

⁽²⁾ Platy structure may result in reduced infiltration rate compared to published value.

Name (Please Print)	Tim F. Gassenheimer	Signature		Credential Number	SP-011900004
Address	129 Milky Way, Madison, WI 53718	Date Evaluation Conducted	August 17, 2020	Telephone Number	(608) 288-4100

W-3 #OBS.
 Pit
 Boring
 Ground surface elevation 1023.3 ± ft.
 Elevation of limiting factor 1020.8 ± ft. (Redox)
1017.8 ± ft. (Groundwater)

Horizon	Approx. Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-30	10YR 3/1	none	SiL	3mabk	mvfi		<5		0.13
2	30-66	10YR 5/3	m1f 10YR 6/1	SiCL	0m	mvfi		<5		0.04
3	66-144	10YR 4/2	none	GRS	0sg	ml		26	8	3.60
4	144-204	10YR 5/3	none	S	0sg	ml		<10		3.60
5	204-240	10YR 6/3	none	SiL	1mabk	mfr		<5		0.13

Comments: Groundwater was encountered at about 5.5 ft below the ground surface during drilling. However, redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater at a shallower depth.

Overall Site Comments: See Comments above and Stormwater Infiltration Potential section in Geotechnical Exploration Report.



Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701

Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Page 1 of 1

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	County	Dane
	Parcel I.D.	225/0609-074-9745-2
	Reviewed by:	
		Date:

Property Owner Promega Corporation	Property Location Govt. Lot SE ¼ SE ¼ S 07 T 06 N R 09 E		
Property Owner's Mail Address 2800 Woods Hollow Road	Lot # O.L. 2	Block#	Subd. Name or CSM # CSM 15053
City Fitchburg	State WI	Zip Code 53711	Phone Number
<input checked="" type="checkbox"/> City <input type="checkbox"/> Village <input type="checkbox"/> Town Fitchburg		Nearest Road Sub-Zero Pkwy, Lacy Rd	
Drainage area _____ <input type="checkbox"/> sq ft <input type="checkbox"/> acres	Hydraulic Application Test Method		Soil Moisture Date of soil borings: _____ USDA-NRCS WETS Value:
Test site suitable for (check all that apply): <input type="checkbox"/> Site not suitable;	<input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double Ring Infiltrometer <input type="checkbox"/> Other: (specify) _____		<input type="checkbox"/> Dry = 1; <input type="checkbox"/> Normal = 2; <input type="checkbox"/> Wet = 3.
<input type="checkbox"/> Bioretention; <input type="checkbox"/> Subsurface Dispersal System; <input type="checkbox"/> Reuse; <input type="checkbox"/> Irrigation; <input type="checkbox"/> Other _____			

W-1	#OBS.	<input type="checkbox"/> Pit	<input checked="" type="checkbox"/> Boring	Ground surface elevation	1022.9 ± ft.	Elevation of limiting factor	1019.9 ± ft. (Color/Redox) 1017.4 ± ft. (Groundwater)
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Horizon	Approx. Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-10	Topsoil (not sampled)								
2	10-36	10YR 5/2	none	CL (Fill)	1msbk	mfi		5-15		0.03 ⁽¹⁾
3	36-66	10YR 6/1	c2d 10YR 5/6	CL	1msbk	mfi		<10		0.03
4	66-144	10YR 6/3	none	S	0sg	ml		<10		3.60
5	144-204	10YR 4/3	none	FSL	0sg	ml		<1	42	0.50
6	204-240	10YR 6/3	none	SiL	1mabk	mfr		<5		0.13

Comments: Groundwater was encountered at about 5.5 ft below the ground surface during drilling. However, low-chroma/high-value dominant color and redox in Horizon 3 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater at a shallower depth.
⁽¹⁾ Infiltration potential in *fill* should be considered very approximate due to the potential for seams of dissimilar material and/or variable composition.

Overall Site Comments: See Comments above and Stormwater Infiltration Potential section in Geotechnical Exploration Report.

Name (Please Print)	Tim F. Gassenheimer	Signature		Credential Number	SP-011900004
Address	129 Milky Way, Madison, WI 53718	Date Evaluation Conducted	August 17, 2020	Telephone Number	(608) 288-4100



Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	County	Dane
	Parcel I.D.	225/0609-172-8501-1
	Reviewed by:	
		Date:

Property Owner	Patrick O'Brien			Property Location	Govt. Lot NW 1/4 NW 1/4 S 17 T 06 N R 09 E		
Property Owner's Mail Address	2652 South Seminole Highway			Lot #	Block#	Subd. Name or CSM #	
						CSM 6477	
City	State	Zip Code	Phone Number	<input checked="" type="checkbox"/> City	<input type="checkbox"/> Village	<input type="checkbox"/> Town	Nearest Road
Fitchburg	WI	53711-7004		Fitchburg			Sub-Zero Pkwy, Lacy Rd
Drainage area			<input type="checkbox"/> sq ft <input type="checkbox"/> acres	Hydraulic Application Test Method			Soil Moisture
Test site suitable for (check all that apply): <input type="checkbox"/> Site not suitable;				<input checked="" type="checkbox"/> Morphological Evaluation			Date of soil borings: _____
<input type="checkbox"/> Bioretention;	<input type="checkbox"/> Subsurface Dispersal System;			<input type="checkbox"/> Double Ring Infiltrometer			USDA-NRCS WETS Value:
<input type="checkbox"/> Reuse;	<input type="checkbox"/> Irrigation;			<input type="checkbox"/> Other: (specify) _____			<input type="checkbox"/> Dry = 1;
							<input type="checkbox"/> Normal = 2;
							<input type="checkbox"/> Wet = 3.

W-4 #OBS. Pit Boring Ground surface elevation 1024.7 ± ft. Elevation of limiting factor 1023.9 ± ft. (Redox)
1012.7 ± ft. (Groundwater)

Horizon	Approx. Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-10	Topsoil (not sampled)								
2	10-36	10YR 5/3	c1f 10YR 6/1	SiCL	0m	mvfi		<10		0.04
3	36-66	10YR 4/4	none	LS	0sg	ml		<10		1.63
4	66-144	10YR 6/3	none	S	0sg	ml		6	7	3.60
5	144-204	10YR 6/3	none	LFS	0sg	ml		<5		0.50
6	204-240	10YR 6/3	c2d 7.5YR 6/4, 6/1	SiCL	1mabk	mfi		<5		0.04

Comments: Groundwater was encountered at about 5.5 ft below the ground surface during drilling. However, redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater at a shallower depth.

Overall Site Comments: See Comments above and Stormwater Infiltration Potential section in Geotechnical Exploration Report.

Name (Please Print)	Tim F. Gassenheimer	Signature		Credential Number	SP-011900004
Address	129 Milky Way, Madison, WI 53718		Date Evaluation Conducted	August 18, 2020	
				Telephone Number	(608) 288-4100

APPENDIX E
DOCUMENT QUALIFICATIONS

APPENDIX E DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who

developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering

disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

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Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

Sub-Zero Kettle Temporary Pumping Plan

May 14, 2020

Background

The Sub-Zero Kettle, located north of Lacy Road, south of Sub-Zero Parkway and west of the Badger State Trail, has no natural outlet. We are proposing a temporary pumping plan for the Sub-Zero Kettle to study how drawdown rates, water surface elevations, and groundwater elevations interact. The plan would generally route pumped water north to the Business Park A wet pond, where it would enter the existing storm sewer system, pass through the Business Park B and Seminole Village Pond, and ultimately outfall at Dunn's Marsh (see **Figure 3**).

Based on reviewing aerial imagery (earliest available image from 1955), it does not appear that the Sub-Zero Kettle has ever overtopped; however, if it were to overtop, water would spill over Lacy Road to the south and continue south through a series of kettles, flooding farmland before ultimately reaching Lake Harriett. Though the natural overflow route is to the south, we are proposing to pump water to the north because existing drainage infrastructure is in place to enable this plan to be implemented. Were the water to be routed to the south, it would require overland flow routes across multiple spans of private property. Pumping is planned to occur during dry periods between May 2020 and December 2020.

DNR concurrence has been obtained for this temporary pumping plan through the end of 2020. Discharge from the pumping operation is authorized under the Madison Area MS4 Permit No. WI-S058416-4, pursuant to section 1.5.2. There is no additional wetland permit required for the temporary pumping of water from this wetland.

Pumping Setup

City staff are in the process of purchasing a 6-inch pump, piping, and hose ramps, which will be used to pump down the Sub-Zero Kettle. This size pump is small enough to maneuver and set up properly and large enough to dewater the pond at a satisfactory rate.

The City plans to use a combination of solid and flexible piping to pump the stormwater to the east side of Badger State Trail and approximately 1,330 feet north to the Business Park A Pond (see **Figure 1**). Based on measurements by City staff in 2019, water in the kettle has reached an elevation of 1022.21 (October 15, 2019). At this elevation there is approximately 4.5 million gallons (138-acre feet) of water in the kettle. At a pumping rate of approximately 40,000 gallons per hour, it will take approximately 1,120 hours (47 days) to completely dewater the Sub-Zero Kettle.

Pumping will only occur during dry conditions to minimize potential downstream flooding and erosion impacts. Since dewatering the kettle will take several weeks, it will be necessary to turn off the pump if rain is in the forecast for the next business day.

The pump will initially be set up at a pumping manhole, which was constructed as part of a Sub-Zero Expansion project in 2016 (see **Figure 1**). Using this in-place infrastructure will allow the kettle to be pumped down to elevation 1021.00'. At that point, the City will move the pump to a second location at northeast corner of the kettle and continue pumping from this location. It will be necessary to cross the road and sidewalks in order to get the hose to the north side of Sub Zero Parkway. Pipe ramps will be installed to allow vehicle and pedestrian traffic to continue while pumping occurs. Exact pump setup locations may be modified in the field if warranted based on field conditions.

The pump intake will be anchored approximately 20 feet from shore and attached to drums full of air, which will act as a flotation device. This will prevent sediment and vegetation from entering the pump, which prevents clogs and decreases the possibility of sending dirty water downstream (see **Figure 2**).



Figure 1. Pump Initial and Secondary Pump Locations

Data Collection

Drawdown Rates

Staff will survey water elevations in the kettle prior to pumping and at least twice per week thereafter. The data collection form included with this plan (or equivalent) will be filled out as measurements are made.

Downstream Observations

Downgradient conveyance from the pump outfall at the Business Park A Pond to Dunn's Marsh shall be inspected during the period of pumping and afterward to evaluate potential problem areas.



Figure 2. Second Pumping Setup

The following areas will be inspected for potential erosion issues (see **Figure 3**): Business Park A Pond (A), Business Park B Pond (B), the Seminole Valley Pond (C), the culvert crossing South Seminole Highway (D), and the ditch connecting the Seminole Highway wet pond to Dunn's Marsh the outfall (E). Where erosion is identified, management measures will be evaluated and implemented with the goal of eliminating channel erosion.

Storm sewer near the intersection of Marketplace Drive and Executive Drive constricts from a 29x45-inch pipe, to a 15-inch pipe. This area will be observed for potential surcharging. If surcharging is observed, the pumping rate will be modified accordingly.

Observations will take place prior to pumping, within three days after the start of pumping, and at least once per week thereafter. The data collection form included with this plan (or equivalent) will be filled out as field inspection observations are made.

Groundwater Observations

Five (5) piezometer tubes will be installed in locations surrounding the kettle to monitor groundwater elevations before, during and after pumping. **Figure 3** shows the approximate locations of each piezometer tube.

Staff will measure the water depths in the piezometer tubes prior to pumping and at least twice per week thereafter. The data collection form included with this plan (or equivalent) will be filled out as measurements are made.

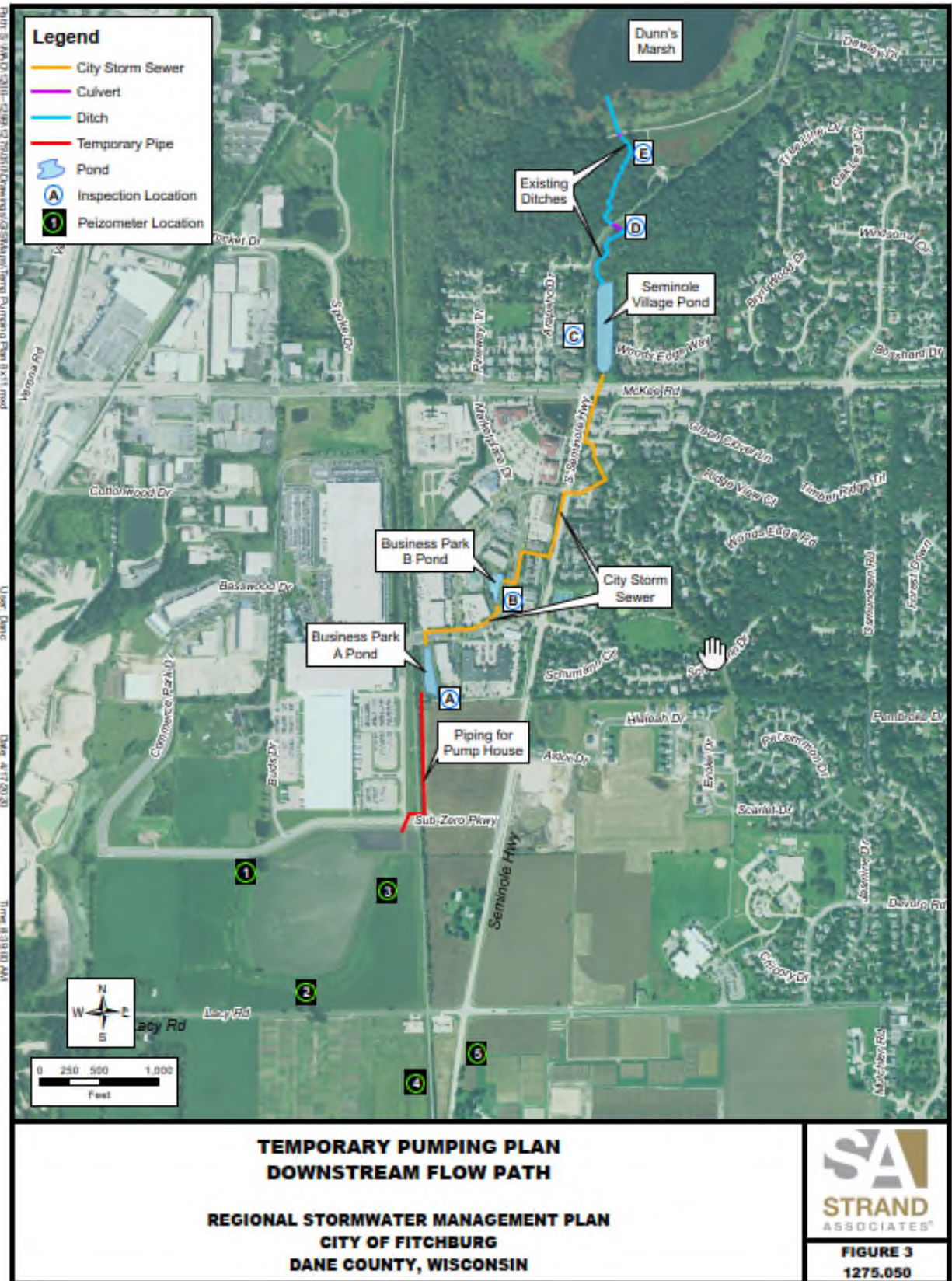


Figure 3. Temporary Pumping Plan Downstream Flow Path

FIELD INSPECTION - VISUAL OBSERVATION

Name	
Date	
Inspection Location	

Weather	
Time	

Inspection Type (Circle One)

Pump Hose Outfall Culvert/Pipe Outfall Detention Basin Swale

Is There Flow Present? Yes No

Does Flow Appear to Have Sediment in It? Yes No

Comments/Observation

Sub Zero Kettle Temporary Pumping Plan
 Drawdown Measurement Record Sheet

Date	Time	Kettle Elev. (ft)	Piezometer 1		Piezometer 2		Piezometer 3		Piezometer 4		Piezometer 5	
			Depth (ft)	Elev. (ft)	Depth (ft)	Elev. (ft)	Depth (ft)	Elev. (ft)	Depth (ft)	Elev. (ft)	Depth (ft)	Elev. (ft)

Data Collection for the Sub Zero Pumping Plan

Inspectors: Dakota Dorn and Claudia Guy

Inspection Date: August 26, 2020 & August 31, 2020 (well measure downs only)

Conditions: Dry, Sunny

Comments: Inspection occurred prior to the start of pumping.

Water Level Elevation: 1019.9'

Well Information

	Top of Casing Elevation	Ground Elevation	Depth to Groundwater (ft)	Groundwater Elevation
W-1	1026.31'	1022.9'	9.45	1016.86'
W-2	1026.75'	1023.4'	11.45	1015.30'
P-1	1026.77'	1023.4'	19.15	1007.62'
W-3	1026.19'	1023.3'	9.15	1017.04'
W-4	1028.47'	1024.7'	15.55	1012.92'



Data Collection for the Sub Zero Pumping Plan

Inspectors: Dakota Dorn

Inspection Date: September 10, 2020

Conditions: Raining

Comments: Inspection occurred during a break in pumping due to rain

Water Level Elevation: 1019.2'

Well Information

	Top of Casing Elevation	Ground Elevation	Depth to Groundwater (ft)	Groundwater Elevation
W-1	1026.31	1022.9'	9.87	1016.44
W-2	1026.75	1023.4'	11.75	1015.00
P-1	1026.77	1023.4'	19.59	1007.18
W-3	1026.19	1023.3'	9.60	1016.59
W-4	1028.47	1024.7'	15.86	1012.61



Data Collection for the Sub Zero Pumping Plan

Inspectors: Claudia Guy and Hannah Buscemi

Inspection Date: September 17, 2020

Conditions: Dry

Comments: Inspection occurred during early afternoon while pumping was occurring

Water Level Elevation: 1018.7'

Well Information

	Top of Casing Elevation	Ground Elevation	Depth to Groundwater (ft)	Groundwater Elevation
W-1	1026.31	1022.9'	9.84	1016.47
W-2	1026.75	1023.4'	11.90	1014.85
P-1	1026.77	1023.4'	19.55	1007.22
W-3	1026.19	1023.3'	9.75	1016.44
W-4	1028.47	1024.7'	16.05	1012.42



Data Collection for the Sub Zero Pumping Plan

Inspectors: Claudia Guy and Gabriella Gerhardt

Inspection Date: September 25, 2020

Conditions: Dry

Comments: Inspection occurred before noon. Pump was off.

Water Level Elevation: 1017.7'

Well Information

	Top of Casing Elevation	Ground Elevation	Depth to Groundwater (ft)	Groundwater Elevation
W-1	1026.31	1022.9	10.09	1016.22
W-2	1026.75	1023.4	12.06	1014.69
P-1	1026.77	1023.4	19.55	1007.22
W-3	1026.19	1023.3	10.21	1015.98
W-4	1028.47	1024.7	16.15	1012.32



Data Collection for the Sub Zero Pumping Plan

Inspectors: Zach Trzebiatowski

Inspection Date: October 2, 2020

Conditions: Dry

Comments:

Water Level Elevation: 1017.67'

Well Information

	Top of Casing Elevation	Ground Elevation	Depth to Groundwater (ft)	Groundwater Elevation
W-1	1026.31	1022.9	10.47	1015.84
W-2	1026.75	1023.4	12.28	1014.47
P-1	1026.77	1023.4	19.87	1006.90
W-3	1026.19	1023.3	10.65	1015.54
W-4	1028.47	1024.7	16.30	1012.17



Data Collection for the Sub Zero Pumping Plan

Inspectors: Hannah Buscemi

Inspection Date: October 8, 2020

Conditions: Dry

Comments: Inspection occurred before noon. Pump was off.

Water Level Elevation: 1017.4'

Well Information

	Top of Casing Elevation	Ground Elevation	Depth to Groundwater (ft)	Groundwater Elevation
W-1	1026.3'	1022.9'	10.70'	1015.6'
W-2	1026.8'	1023.4'	12.48'	1014.3'
P-1	1026.8'	1023.4'	20.06'	1006.7
W-3	1026.2'	1023.3'	10.87'	1015.3
W-4	1028.5'	1024.7'	16.47'	1012.0'



Data Collection for the Sub Zero Pumping Plan

Inspectors: Dakota Dorn

Inspection Date: October 19, 2020

Conditions: Dry

Comments: Inspection occurred at 2pm. Pump was off.

Water Level Elevation: 1017.35'

Well Information

	Top of Casing Elevation	Ground Elevation	Depth to Groundwater (ft)	Groundwater Elevation
W-1	1026.31	1022.9	11.02	1015.29
W-2	1026.75	1023.4	12.76	1013.99
P-1	1026.77	1023.4	20.19	1006.58
W-3	1026.19	1023.3	11.27	1014.92
W-4	1028.47	1024.7	16.67	1011.80





Minutes
 Regulatory Meeting No. 1
 Regional Stormwater Management Study for the Sub-Zero/Stoner Prairie Area
 City of Fitchburg, Wisconsin
 February 18, 2020, 9 A.M.

Invitee	Representing	Present	Absent
Mike Bisbach, Director of Public Works, City Engineer	City of Fitchburg (City)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Claudia Guy, Environmental Project Engineer	City of Fitchburg	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Weston Matthews, Water Regulation, Zoning Specialist	Wisconsin Department of Natural Resources (WDNR)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Theresa Nelson, Stormwater Engineer	Dane County	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Samuel Woboril, Project Manager	United States Army Corps of Engineers (USACE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Mike Rupiper, Deputy Agency Director, Director of Environmental Resource Planning	Capital Area Regional Planning Commission (CARPC)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Luke Hellermann, Project Engineer	Strand Associates, Inc. [®] (Strand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Mark Shubak, Project Engineer	Strand Associates, Inc. [®]	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Josh Straka, Project Engineer	Strand Associates, Inc. [®]	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Mike Williams, Project Manager	Strand Associates, Inc. [®]	<input checked="" type="checkbox"/>	<input type="checkbox"/>

1. Project Background

- a. Mike W. started the meeting by reviewing the 1937, 2014, and 2017 aerial photography of the 236.5-acre watershed. The aerials show the level of development at each year and that the site just south of Sub Zero Parkway has always been a depression. Claudia stated that according to available aerial imagery, it does not appear the kettle has ever overflowed to the south. On October 15, 2019, the City surveyed the lake level elevation at 1022.21 feet.
- b. Mike W. stated the depression needed to continue to meet a City requirement of holding back to back 100-year storms without releasing stormwater from the site. The current overflow elevation of the site is near elevation 1,024 located along the bike path just north of Lacy Road. Based on current aerials the water elevation in the depression is between elevations 1,019 to 1,020. The storage volume being used by this water is 60 to 80 acre-feet (ac-ft). This storage volume needs to be reactivated to meet the back to back storm requirement. Claudia stated that the enclosed depression has never overflowed.
- c. Mike W. stated Stantec performed a wetland delineation of the depression in July 2015, and D’Onfrio Kottke designed the wetland scrape project in 2016. The wetland scrape project was needed to offset 15 ac-ft of storage within the depression that was filled in by the new Sub Zero Parkway. A cross section was provided showing how the wetland scrape lowered elevations between 2 and 5 feet and how some fill was placed along the outside edge to create a steeper side slope to the depression. Weston stated a General Permit was issued by the WDNR in 2016 to perform this project.
- d. Mike W. provided a map showing locations of future development within the watershed. Mike W. called out the ProMega, Sub Zero, and Blackhawk Church sites as either currently under construction or completed after the last aerial. Mike B. also stated that the land located in the southwest quadrant of the bike path and Lacy Road and the southeast quadrant of

Seminole Highway and Lacy Road are slated to be developed so these locations should be excluded when determining potential areas for infiltration basins.

- e. Luke provided two exhibits showing groundwater elevations for the shallow aquifer from 1999 and 2016. Both versions of the model show the groundwater through the project watershed draining to the northeast. Luke also displayed a soil boring map with a few observations from the boring logs. The logs show a shallow limestone layer exists from the west and tapers out just west of the depression. In the area of the depression, the boring logs described the underlying soils as being loam soils down to the sandstone. Moving to the east side of Seminole Highway, it appears the underlying soils were sand and gravel to the sandstone layers. Luke also described the three water tables near the depression. He stated that there is a mounded/perched water table near the surface between elevations 1,020 and 1,010, the shallow water table is at an approximate elevation of 930, and the deep-water table is at an elevation of 825. Luke stated there is a confining layer holding the perched water table not allowing it to drain in a downward direction to the shallow water table.

2. Concept Level Ideas

- a. Mike W. displayed the “Pump to The North” option stating the water would be pumped to the existing Marketplace Drive detention basin. From this basin it will drain through the existing City storm sewer system to Dunn’s Marsh. The pumping process would not begin until the downstream storm sewer system has emptied from the previous storm event. Mike W. stated this was the current emergency pumping plan that Sub Zero has documented. Claudia stated Sub Zero has not pumped and she does not foresee Sub Zero pumping down this pond in the future. Theresa stated that Dunn’s Marsh is a sensitive area that has its own drainage problems. She believed that coordination with City of Madison staff will be necessary to get this approved. She also thought the City of Madison was putting together a Dunn’s Marsh Watershed Study and this might be a good time to discuss it with them.
- b. Mike W. displayed the “Convey to a Nearby Infiltration Basin” option stating areas close by could be used for infiltration. This option would require either pumping or gravity flow of the water from the depression to the new site. Unfortunately, the sites to the west and south have already been slated for development. He also stated the underlying sand and gravel layers (discussed earlier) change to clay further to the south. Weston stated that while this option has its issues trying to infiltrate the water, he prefers it over releasing it to the north or south. Please note that pumping water to the north or gravity draining to the south would be considered a "Plan B" option only if the area was overwhelmed and the "Plan A" option was overwhelmed. The team’s goal is to provide a reuse, infiltration, and irrigation project near the source and only pump if necessary.
- c. Mike W. displayed the third and final option of providing a “Low Flow Pipe to the South”. This project would consist of a low flow pipe or channel to drain water to an unnamed tributary of Story Creek (just south of Whalen Road). From there it will drain along the unnamed creek to Lake Harriett. Because Lake Harriett is also considered a closed depression, an additional stretch of low flow pipe/channel will be required from Lake Harriett to a point where Story Creek starts (just south of Highway D). Weston stated that he has concerns regarding this option because Story Creek is a cold-water creek and the project would be releasing pond water to it. Mike B. stated that while he understood that Story Creek was a cold-water creek, the amount of flow that would likely be added to the creek base flow from the low flow pipe would be such a small fraction that it may likely be negligible. Mike B. also stated this was the preferred option because it directs the flow in the direction of the overland flow route. He did state that this project would likely be done in stages moving to the south.

- d. Josh asked Wes and Theresa whether there was an option shown that WDNR and Dane County thought was a nonstarter for permitting or whether WDNR and Dane County had one option that seemed better than the others. Unfortunately, both Weston and Theresa stated WDNR and Dane County could not say whether one project was better than another in regard to permitting. Weston and Theresa both stated they plan on returning to their offices and discussing with their peers to see whether they could provide some additional information and feedback. Theresa also stated she would be willing to call Eric Rortvedt with WDNR to see whether he had any ideas or thoughts with the project and options.
- e. Mark shared an idea to provide temporary pumping at the site to see how the depression water levels react. Ultimately, by performing this task the group would be able to confirm whether the water in the depression is because of a groundwater mounding condition versus regionally high groundwater. The group would also be able to determine the rate and volume of groundwater directed to the depression, which could be used to size the pump or low flow piping. Weston stated if the group did proceed with temporary pumping, the group would have to file a plan with the High Water Control Board at the WDNR.

3. Other Topics

- a. Claudia stated the current schedule for this project is to have the planning complete in 2020, the design completed in 2021, and the construction would proceed in 2022. She also asked Weston and Theresa if they would mind being invited to future meetings. Weston and Theresa both said they would be willing to come to future meetings.
- b. Samuel from USACE was on the phone for the meeting until 10 A.M., but was disconnected. After the meeting, Mike W. sent an e-mail to Samuel to just ask for his thoughts on the depression area and the wetlands. He stated the following, "The wetland area which was identified as "North Stoner Prairie Area Basin" appears to be an isolated feature. With that said, the Corps would not have jurisdiction over any work occurring within that area, however we would need to complete an AJD to finalize that determination. If you decide you would like an AJD for that feature, please let me know and I can fill you in on what information needs to be submitted. As for future meetings, I am happy to participate if you believe there are wetland features within the review area that would be subject to Corps jurisdiction. If not, I don't believe my attendance is completely necessary, but as always do not hesitate to contact me if you have any questions."

If there are any additions or comments, please call me at 608-251-2129 ext. 1182.

Prepared and respectfully submitted by Mike Williams.

c: All Participants

Williams, Mike

From: Williams, Mike <Mike.Williams@strand.com>
Sent: Thursday, April 9, 2020 3:41 PM
To: Claudia Guy; Rupiper, Mike; Matthews, Weston K - DNR; Nelson, Theresa; Rortvedt, Eric - DNR
Subject: April 6, 2020 Meeting Notes for the Sub Zero Kettle in Fitchburg Wisconsin

EXTERNAL EMAIL: BEWARE OF UNKNOWN ATTACHMENTS AND LINKS.

Hello,

I just wanted to send a few of my notes from our phone conversation on April 6, 2020. Please let me know if you have any questions or if you have any information to add.

Mike

Attendees:

- Claudia Guy, City of Fitchburg
- Mike Rupiper, CARPC
- Wes Matthews, WDNR
- Theresa Nelson, Dane County
- Eric Rortvedt, WDNR
- Mike Williams, Strand Associates

Main Discussion Points:

- It was noted that the City is investigating three potential options to drain the kettle (pump to north, infiltration on site or nearby, pipe to the south). The City hopes that the selected option will include local infiltration/reuse as Plan A, and pumping to the north or piping to the south as Plan B. It is understood that sending this water to other waterways will have downstream impacts that need to be evaluated. Draining the Sub Zero Kettle is essential to continue to provide flood storage and flood protection for back to back 100-year events.
- Eric stated that while trying to utilize infiltration seems reasonable, areas that are used for long-term infiltration will have a greater chance of clogging. Infiltration BMP's do need a dry out period to remain viable. A plan B will be needed in case the infiltration option is not working.
- A temporary pumping plan is currently being developed by the City and this information will be sent to Eric Rortvedt for review and approval. The temporary plan includes pumping water in the kettle to the north where it will drain through the City's existing storm sewer system to Dunn's Marsh.
- It was noted that because drainage- infrastructure was already in place to receive pumping to the north and considering potential environmental impacts of going south, pumping to the north may be the best option for a Plan B if infiltration and water reuse measures fail or are insufficient.
- The temporary pumping plan will not require testing; however, for a permanent pumping plan, the DNR will require water quality testing be performed to verify the amount of TSS and Phosphorous being sent to Dunn's Marsh. The number of tests required will be dependent on how often and how long the pump will need to be operated.
- It was noted by Mike Rupiper, Theresa Nelson, and Weston Matthews that while they will not need to provide comments on the project moving forward, they would still like to be kept in the loop as the project moves forward.

Action Items:

- Claudia will work with Strand to put together the temporary pumping plan for submittal to Eric Rortved. The approved plan will be provided to Mike, Theresa, and Weston for their information.



Mike Williams, P.E.

Strand Associates, Inc.®

608.251.4843 ext. 1182

mike.williams@strand.com | www.strand.com

P.E. (IL, WI)

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Williams, Mike

From: Williams, Mike
Sent: Thursday, November 5, 2020 11:45 AM
To: 'Ramminger, Allen J - DNR'
Cc: Rortvedt, Eric - DNR; 'Claudia Guy'
Subject: RE: Lowering water levels within sub zero Kettle.

Hi Al,

Thanks again for the time on Tuesday to discuss the Sub-Zero kettle located just south of Sub Zero Parkway in Fitchburg WI.. I wanted to provide a quick summary of our conversation for my records. Can you please review and reply to this email if I missed anything.

- A DNR approved wetland scrape construction project was completed in 2016 to allow for the kettle to be able to hold back to back 100-year design storms without flooding adjacent areas.
- Since the wetland scrape project was completed the kettle has continued to fill up. The bottom of the kettle is elevation 1015, the water elevation in the kettle this summer was 1020, and the groundwater elevations from the monitoring wells located around the kettle was around 1017.
- The kettle was pumped down in September to elevation 1017.7 (based on an approved temporary pumping plan). While pumping down the kettle the groundwater elevations dropped from 1017 to 1015 around the perimeter of the kettle.
- There is a wetland benefit to allowing the kettle to drain out and the DNR would prefer this over having water sit for extended periods of time.
- The options to drain the kettle include establishing infiltration in the kettle itself, constructing a new infiltration basin south east of the kettle (the water would likely need to be pumped to this new infiltration basin), and pumping the water through the existing city infrastructure to Dunn's Marsh.
- DNR is amenable with removing a 1-1.5 thick clay limiting layer in the bottom of the kettle to allow infiltration. There is concern about protecting the groundwater from stormwater runoff. It was noted that each development surrounding the kettle does have their own treatment devices that meet regulatory requirements before out letting to the kettle. One approvable option may be to remove the clay limiting layer and replacing that material with an engineered soil to help protect the groundwater.
- This wasn't discussed in the phone call but I wanted to throw this option out there. One thing we have done successfully in the past is to till in 4-inches of compost into the top foot of the sand and gravel layer to turn it into an engineered soil. Removing sand to replace with a sand/compost mix is costly and simply modifying the existing sand and gravel layer seems to make sense.
- The DNR is interested in the use of the Parjana product. Once I receive this information from Parjana I will forward it on to you.

Thanks again,

Mike

From: Ramminger, Allen J - DNR <Allen.Ramminger@wisconsin.gov>
Sent: Tuesday, November 3, 2020 2:36 PM
To: Williams, Mike <Mike.Williams@strand.com>
Cc: Ramminger, Allen J - DNR <Allen.Ramminger@wisconsin.gov>; Rortvedt, Eric - DNR <Eric.Rortvedt@wisconsin.gov>
Subject: Lowering water levels within sub zero pond.

[EXTERNAL EMAIL]: Verify sender before opening links or attachments.

Hi Mike;

Nice discussion on lowering water levels at Sub zero. I'm including some information sent to me by another DNR employee Mike Sorge last year. We discussed the removal of the clay layer within this basin and utilizing some protections of filtration to protect the direct influx of stormwater to the ground water. Was this pond built as a storm water feature?

As for the use of parjana, I look forward to information that you will be sending me.

Thanks



We are committed to service excellence.

Visit our survey at <http://dnr.wi.gov/customersurvey> to evaluate how I did.

Allen Ramming

Wetland Specialist

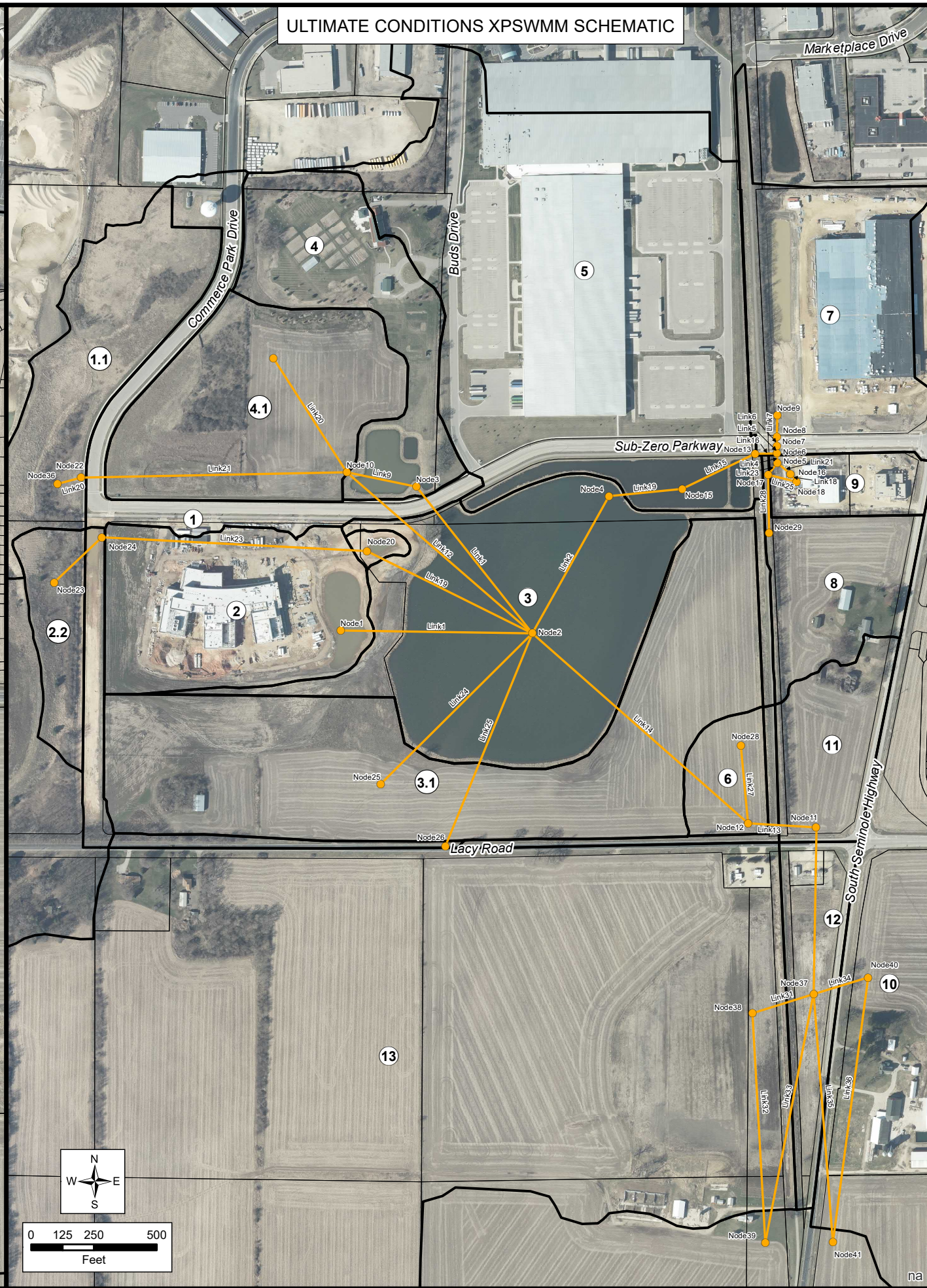
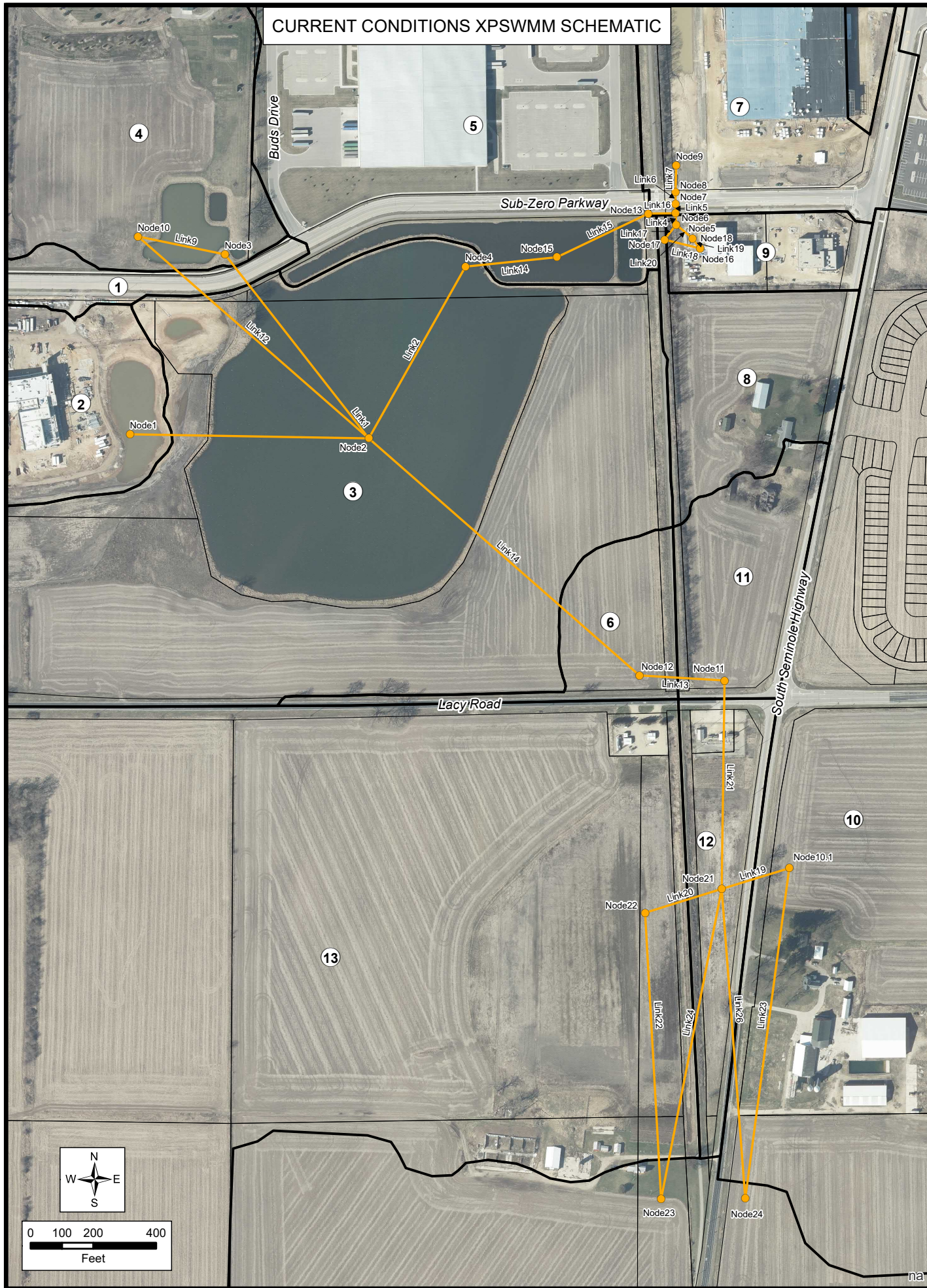
Wisconsin Department of Natural Resources

3911 Fish Hatchery Road, Fitchburg, WI 53711

Cell Phone: 608-228-4067

Allen.Ramming@wisconsin.gov





XPSWMM MODEL SCHEMATIC

**REGIONAL STORMWATER MANAGEMENT STUDY FOR THE SUB-ZERO/STONER PRAIRIE AREA
CITY OF FITCHBURG
DANE COUNTY, WISCONSIN**



**FIGURE 1
1275.050**

Current Directory: C:\PROGRA-1\Innovaze\XPSWMM-3.1_X
Engine Name: C:\PROGRA-1\Innovaze\XPSWMM-3.1_X\engine\SWMMEN-2.EXE
Input File: C:\Temp\1D\Existing Condition_1\Existing Condition_1.XP

xpswmm
Storm and Wastewater Management Model
Developed by Innovaze.
Last Update: Dec 01 2020
Interface Version: 2020.1
Engine Version: 12.0
Data File Version: 12.62

Engine Name: C:\PROGRA-1\Innovaze\XPSWMM-3.1_X\engine\SWMMEN-2.EXE

Input and Output file names by Layer
Input File to Layer # 1 JIN.US
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 JOT.US
Output File to Layer # 2 JOT.US

Configuration Parameters
Configuration Parameters, both those that are hardwired
and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in
the engine as defaults. The remaining in UPPER CASE
have been added to the simulation in the Configuration->
Configuration Parameters dialog or as Engine Defaults in
the SWMXP.INI file.
Consult the Help File for the specific meaning/purpose
of any particular parameter.

Table of configuration parameters including \$powerstation, \$pen, \$soldeg, \$sas, \$noflat, \$soldoma, \$soldvol, \$simplic, \$soldhot, \$soldscs, \$flood, \$snokeys, \$szero, \$soldx2, \$storage2, \$soldhot1, \$spumpwt, \$sedss, \$sexout, \$spatial, \$djref, \$weirlen, \$soldhd, \$nograev.

- O(218.2) office
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(261.1) seminele
W(263.1) bikepath
W(264.1) lacy
W(279.1) south
W(281.1) south1
W(281.2) dway 2
W(282.1) driveway
W(285.1) sem2

Parameter Values on the Tapes Common Block. These are the
values read from the data file and dynamically allocated
by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 13
Number of Channel/Pipes in the Runoff Block (NG)... 0
Runoff Water quality constituents (NRG)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 38
Number of Groundwater Subcatchments in Runoff (NGW)... 0
Number of Interface locations for all Blocks (NIE)... 38
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG)... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage Junctions in Extran (NVSE)..... 12
Number of Time history data points in Extran (NTVAL) 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS)... 0
Number of User defined conduits (NHW)..... 13
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTCC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 38
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovaze

RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
for example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75

Table of simulation parameters: \$ncmid, \$new, \$scsdepth, \$sbest, \$newbound, \$sq, \$new_storage, \$old_iteration, \$minlen, \$sreview, \$suse_half_volume, \$vert_walls, \$smin_ts, \$sdesign_restart, \$szero_value, \$subcatchment_res, \$srelax_depth, \$ssavealpts, \$pump_neghd, \$channel_geometry, \$projunits.

The XPSWMM/XPSTORM engine internally uses object IDs
instead of full object names to represent objects.
Included below is a table of these IDs along with the
name of the object that ID corresponds to.

Table mapping Object ID to Object Name: 201 Node1, 202 Node2, 204 Node3, 206 Node4, 208 Node5, 209 Node6, 211 Node7, 213 Node8, 215 Node9, 217 Node10, 222 Node12, 224 Node13, 228 Node15, 230 Node16, 232 Node17, 235 Node18, 259 Node11.1, 260 Node21, 262 Node22, 277 Node10.1, 278 Node23, 280 Node24, 205 Link2, 210 Link4, 212 Link5, 214 Link6, 216 Link7, 219 Link9, 225 Link12, 226 Link13, 231 Link15, 233 Link16, C(203.1) 203.1, C(203.2) 203.2, C(223.1) ditch1, C(261.1) 250.1, C(261.2) 250.2, C(263.1) 263.1, C(264.1) 264.1, O(207.2) orifice 5

- Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Rainage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments

A1
RUNOFF JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time ZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAy
Decay is read in for each subcatchment
REGEN = 0.01000
Rainage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 241
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0=Yes, 1=No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
Total rainfall for gage # 1 is 2.4900 inches
Data Group F1 #

Evaporation Rate (in/day) #
 #####
 JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

 # Table R1. SUBCATCHMENT DATA #
 # Physical Hydrology Data #
 #####

Subcatchment Number	Channel Name	Width (ft)	Area (ac)	Per-imperv	Deprs	Deprs	Print-sion	Print	Print	Print	
					ft/ft	ft/ft	Zero	Storge	Storge	Storge	
1	Node10.1#1	Node10.1	1,000.0	184.60	0.00	1,000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1,000.0	28.600	0.00	1,000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1,000.0	26.930	0.00	1,000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1,000.0	18.400	0.00	1,000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1,000.0	48.700	0.00	1,000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1,000.0	3.6100	0.00	1,000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1,000.0	7.6600	0.00	1,000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1,000.0	18.650	0.00	1,000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1,000.0	63.350	0.00	1,000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1,000.0	4.7500	0.00	1,000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1,000.0	6.5200	0.00	1,000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1,000.0	6.2800	0.00	1,000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1,000.0	151.46	0.00	1,000	0.020	0.020	0.000	0.000	0.000

 # Table R2. SUBCATCHMENT DATA #
 # Infiltration or Time of Concentration Data #
 #####

Infiltration Type	Inf1 #1(#5)	Inf1 #2(#6)	Inf1 #3(#7)	Inf1 #4(#8)	#
# SCS	-> Comp CN	Time Conc	Shape Factor	Depth or Fraction	#
# SBUH	-> Comp CN	Time Conc	N/A	N/A	#
# Green Ampt	-> Suction	Hydr Cond	Initial MD	N/A	#
# Horton	-> Max Rate	Min Rate	Decay Rate (1/sec)	Max. Infiltr. Volume	#
# Proportional	-> Constant	N/A	N/A	N/A	#
# Initial/Cont Loss	-> Initial	Continuing	N/A	N/A	#
# Initial/Proportional	-> Initial	Constant	N/A	N/A	#
# Laurenson Parameters	-> B Value	Pervious "n"	Impervious Cont	Exponent	#
# Rational Formula	-> Tc Method	Flow Path Length	Flow Path Slope	Roughness or Retardance	#
#	(#1 -#4 is Impervious Data / #5 -#8 is Pervious Data)	#	#	#	#
#	Rational Formula Tc Method: 1 = Constant	#	#	#	#
#	2 = Friend's Equation	#	#	#	#
#	3 = Kinematic Wave	#	#	#	#
#	4 = Alameda Method	#	#	#	#
#	5 = Izzard's Formula	#	#	#	#
#	6 = Kerby's Equation	#	#	#	#
#	7 = Kirpich's Equation	#	#	#	#
#	8 = Bransby-Williams Equation	#	#	#	#
#	9 = Federal Aviation Authority Equation	#	#	#	#

Subcatchment Number	Inf1	Inf2	Inf3	Inf4	Inf5	Inf6	Inf7	Inf8
1	Node10.1#1	78,000	0.838	484,000	0.200			
2	Node10#1	79,000	0.4	484,000	0.200			
3	Node10#2	72,000	0.405	484,000	0.200			
4	Node1#1	84,000	0.338	484,000	0.200			
5	Node4#1	88,000	0.288	484,000	0.200			
6	Node16#1	91,000	0.322	484,000	0.200			
7	Node17#1	75,000	0.433	484,000	0.200			
8	Node9#1	86,000	0.212	484,000	0.200			

Node2 No Tributary Channel/Pipes
 Tributary Subareas..... Node2#1
 Node12 No Tributary Channel/Pipes
 Tributary Subareas..... Node12#1
 Node11.1 No Tributary Channel/Pipes
 Tributary Subareas..... Node11.1#1
 Node21 No Tributary Channel/Pipes
 Tributary Subareas..... Node21#1
 Node22 No Tributary Channel/Pipes
 Tributary Subareas..... Node22#1

* Hydrographs will be stored for the following 12 INLETS *

Node10.1 Node10 Node1
 Node4 Node16 Node17
 Node9 Node2 Node12
 Node11.1 Node21 Node22

* Quality Simulation not included in this run *

 # Precipitation Interface File Summary #
 # Number of precipitation station..... 1 #

Location Station Number

1. 1

XXX End of Header Section XXX

 # Entry made to the HYDRAULIC Layer of XP-SWMM #
 # Last Updated in June, 2014 by Innovaze #
 #####
 # Entry made to the Runoff Layer(Block) of SWMM #
 # Last Updated June, 2014 by Innovaze #
 #####

 | RUNOFF TABLES IN THE OUTPUT FILE. |
 | These are the more important tables in the output file. |
 | You can use your editor to find the table numbers. |
 | for example: search for Table R3 to check continuity. |
 | This output file can be imported into a Word Processor |
 | and printed on US letter or A4 paper using portrait |
 | mode, courier font, a size of 8 pt. and margins of 0.75 |
 | |
 | Table R1 - Physical Hydrology Data |
 | Table R2 - Infiltration data |
 | Table R3 - Rainage and Infiltration Database Names |
 | Table R4 - Groundwater Data |
 | Table R5 - Continuity Check for Surface Water |
 | Table R6 - Continuity Check for Channels/Pipes |
 | Table R7 - Continuity Check for Subsurface Water |
 | Table R8 - Infiltration/Inflow Continuity Check |
 | Table R9 - Summary Statistics for Subcatchments |
 | Table R10 - Sensitivity analysis for Subcatchments |

9	Node2#1	78,000	0.258	484,000	0.200
10	Node12#1	76,000	0.312	484,000	0.200
11	Node11.1#1	76,000	0.320	484,000	0.200
12	Node21#1	76,000	0.252	484,000	0.200
13	Node22#1	78,000	0.617	484,000	0.200

 # Table R3. SUBCATCHMENT DATA #
 # Rainfall and Infiltration Database Names #
 #####

Subcatchment Number	Gage Name	Infiltration No	Infiltration Type	Routing Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

Total Number of Subcatchments..... 13
 Total Tributary Area (acres)..... 568.51
 Impervious Area (acres)..... 0.00
 Pervious Area (acres)..... 568.51
 Total Width (feet)..... 13.00
 Impervious Area (%)..... 0.00

 # SUBCATCHMENT DATA #
 #####

Default Ratio values for subcatchment data #
 # Used with the calibrate node in the runoff. #
 # 1 - width 2 - area 3 - impervious % #
 # 4 - slope 5 - imp "n" 6 - perv "n" #
 # 7 - imp ds 8 - perv ds 9 - 1st infil #
 # 10 - 2nd infil 11 - 3rd infil #
 #####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
 Node10.1 No Tributary Channel/Pipes
 Tributary Subareas..... Node10.1#1
 Node10 No Tributary Channel/Pipes
 Tributary Subareas..... Node10#1 Node10#2
 Node1 No Tributary Channel/Pipes
 Tributary Subareas..... Node1#1
 Node4 No Tributary Channel/Pipes
 Tributary Subareas..... Node4#1
 Node16 No Tributary Channel/Pipes
 Tributary Subareas..... Node16#1
 Node17 No Tributary Channel/Pipes
 Tributary Subareas..... Node17#1
 Node9 No Tributary Channel/Pipes
 Tributary Subareas..... Node9#1

 # RUNOFF JOB CONTROL #
 #####

Snowmelt parameter - ISNOW..... 0
 Number of rain gages - NRGAG..... 0
 Quality is not simulated - KWALTY..... 0
 Default evaporation rate used - IVAP..... 0
 Hour of day at start of storm - NHR..... 0
 Minute of hour at start of storm - NMIN..... 0
 Time TZERO at start of storm (hours)..... 0.000
 Use U.S. Customary units for most I/O - METRIC... 0
 Runoff input print control... 0
 Runoff graph plot control... 0
 Runoff output print control... 0
 Limit number of groundwater convergence messages to 10000

Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
 Print land use load percentages -LANDUPR (0=no, 1=yes) 0
 Month, day, year of start of storm is: 1/1/2014
 Wet time step length (seconds)..... 60.0
 Dry time step length (seconds)..... 86400.0
 Wet/Dry time step length (seconds)... 60.0
 Simulation length is..... 72.0 Hours

If Horton infiltration model is being used
 A mixture of infiltration options may be used in
 XP-SWMM as a watershed specific option.
 Rate for regeneration of infiltration = REGEN * DECAY
 Decay is read in for each subcatchment
 REGEN = 0.01000

Raingage #..... 1
 KTYPE - Rainfall input type..... 0
 NHISTO - Total number of rainfall values... 241
 KINC - Rainfall values(pairs) per line... 10
 KPRINT - Print rainfall(0=Yes, 1=No)..... 0
 KTIME - Precipitation time units
 0 -> Minutes 1 -> Hours..... 1
 KPREP - Precipitation unit type
 0 -> Intensity 1 -> Volume..... 1
 KTHS - Variable rainfall intervals
 0 -> No, >= 1 -> Yes..... 0
 THISTO - Rainfall time interval..... 0.10
 TZRAIN - Starting time(KTIME units)..... 0.00

 # Rainfall input summary from Runoff #
 #####

Total rainfall for gage # 1 is 2.4900 inches

 # Data Group F1 #
 # Evaporation Rate (in/day) #
 #####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

 # Table R1. SUBCATCHMENT DATA #
 # Physical Hydrology Data #
 #####

Subcatchment Number	Channel Name	Per-Width (ft)	Area (ac)	Deprs cent	Deprs ft/ft	Print Zero	Storge	Storge	Deten		
1	Node10.1#1	Node10.1	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1.0000	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1.0000	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1.0000	19.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1.0000	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1.0000	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1.0000	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

```

#####
# Table R2. SUBCATCHMENT DATA
# Infiltration or Time of Concentration Data
#
# Infiltration Type Infi #1(#5) Infi #2(#6) Infi #3(#7) Infi #4(#8) #
# SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
# SBLH -> Comp CN Time Conc N/A #
# Green Ampt -> Suction Hydr Cond Initial MD N/A #
# Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
# Proportional -> Constant N/A N/A #
# Initial/Cont Loss -> Initial Continuing N/A N/A #
# Initial/Proportional -> Initial Constant N/A N/A #
# Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
# Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance #
# (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)
#
# Rational Formula To Method: 1 = Constant
#
# 2 = Friend's Equation
#
# 3 = Kinematic Wave
#
# 4 = Alameda Method
#
# 5 = Izzard's Formula
#
# 6 = Kerby's Equation
#
# 7 = Kirpich's Equation
#
# 8 = Bransby Williams Equation
#
# 9 = Federal Aviation Authority Equation
#####

```

Subcatchment Number	Infi #1	Infi #2	Infi #3	Infi #4	Infi #5	Infi #6	Infi #7	Infi #8
1	Node10.1#1	78.000	0.838	484.000	0.200			
2	Node10#1	79.000	0.375	484.000	0.200			
3	Node10#2	72.000	0.465	484.000	0.200			
4	Node1#1	84.000	0.338	484.000	0.200			
5	Node4#1	88.000	0.288	484.000	0.200			
6	Node16#1	91.000	0.322	484.000	0.200			
7	Node17#1	75.000	0.433	484.000	0.200			
8	Node9#1	86.000	0.212	484.000	0.200			
9	Node2#1	76.000	0.258	484.000	0.200			
10	Node12#1	76.000	0.312	484.000	0.200			
11	Node11.1#1	76.000	0.320	484.000	0.200			
12	Node21#1	76.000	0.252	484.000	0.200			
13	Node22#1	78.000	0.617	484.000	0.200			

```

#####
# Table R3. SUBCATCHMENT DATA
# Rainfall and Infiltration Database Names
#####
Subcatchment Gage Infiltration Routing

```

* Hydrographs will be stored for the following 12 INLETS *

- Node10.1 Node10 Node1
- Node4 Node16 Node17
- Node9 Node2 Node12
- Node11.1 Node21 Node22

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *
 * Number of precipitation station... 1 *

Location Station Number
 1. 1

A1

```

=====
| HYDRAULICS TABLES IN THE OUTPUT FILE |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers, |
| for example: search for Table E20 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table E1 - Basic Conduit Data |
| Table E2 - Conduit Factor Data |
| Table E3a - Junction Data |
| Table E3b - Junction Data |
| Table E4 - Conduit Connectivity Data |
| Table E4a - Dry Weather Flow Data |
| Table E4b - Real Time Control Data |
| Table E5 - Junction Time Step Limitation Summary |
| Table E5a - Conduit Explicit Condition Summary |
| Table E6 - Final Model Condition |
| Table E7 - Iteration Summary |
| Table E8 - Junction Time Step Limitation Summary |
| Table E9 - Junction Summary Statistics |
| Table E10 - Conduit Summary Statistics |
| Table E11 - Area assumptions used in the analysis |
| Table E12 - Mean conduit information |
| Table E13 - Channel losses(H) and culvert info |
| Table E13a - Culvert Analysis Classification |
| Table E14 - Natural Channel Overbank Flow Information |
| Table E14a - Natural Channel Encroachment Information |
| Table E14b - Floodplain Mapping |
| Table E15 - Spreadsheet Info List |
| Table E15a - Spreadsheet Read List |
| Table E16 - New Conduit Output Section |
| Table E17 - Pump Operation |
| Table E18 - Junction Continuity Error |
| Table E19 - Junction Inflow & Outflow Listing |
| Table E20 - Junction Flooding and Volume List |
| Table E21 - Continuity balance at simulation end |
| Table E22 - Model Judgement Section |
=====

```

Time Control from Hydraulics Job Control

Number	Name	No	Type	Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

```

Total Number of Subcatchments... 13
Total Tributary Area (acres).... 568.51
Impervious Area (acres)..... 0.00
Previous Area (acres)..... 568.51
Total Width (feet)..... 13.00
Impervious Area (%)..... 0.00

```

```

#####
# SUBCATCHMENT DATA #
# Default, Ratio values for subcatchment data #
# Used with the calibrate node in the runoff. #
# 1 - width 2 - area 3 - impervious % #
# 4 - slope 5 - imp "n" 6 - perv "n" #
# 7 - imp ds 8 - perv ds 9 - 1st inffi #
# 10 - 2nd inffi 11 - 3rd inffi #
#####
Column 1 2 3 4 5 6 7 8 9 10 11
Default 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Ratio 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

```

```

* Arrangement of Subcatchments and Channel/Pipes *
-----
Inlet
Node10.1 No Tributary Channel/Pipes
Tributary Subareas..... Node10.1#1
Node10 No Tributary Channel/Pipes
Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Tributary Subareas..... Node4#1
Node16 No Tributary Channel/Pipes
Tributary Subareas..... Node16#1
Node17 No Tributary Channel/Pipes
Tributary Subareas..... Node17#1
Node9 No Tributary Channel/Pipes
Tributary Subareas..... Node9#1
Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11.1 No Tributary Channel/Pipes
Tributary Subareas..... Node11.1#1
Node21 No Tributary Channel/Pipes
Tributary Subareas..... Node21#1
Node22 No Tributary Channel/Pipes
Tributary Subareas..... Node22#1

```

Year..... 2014 Month..... 1
 Day..... 1 Hour..... 0
 Minute..... 0 Second..... 0

Control information for simulation

```

Integration cycles..... 38880
Length of integration step is..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL)... 0
Use U.S. customary units for I/O... 0
Printing starts in cycle..... 1
Intermediate printout intervals of... 500 cycles
Intermediate printout intervals of... 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of... 83.33 minutes
Hot start file parameter (REDO)... 0
Initial time..... 0.00 hours

```

```

Iteration variables: Flow Tolerance. 0.00010
Head Tolerance. 0.00050
Minimum depth (m or ft)..... 0.00001
Underrelaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K. 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.000
Ponding Area Exponent..... 1.00000
Minimum Orifice Length..... 1000.00 feet.
NJSW input hydrograph junctions.... 0
or user defined hydrographs....

```

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef. (ft)	Max Width (ft)	Hazen Slopes	Depth	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333			
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000			
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000			
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000			
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000			
6	Link9	66.0000	Trapezoid	52.5000	0.0150	10.0000	0.5000	10.0000	10.0000	
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000			
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500			
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000			
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000			
11	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000			
12	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000			
13	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000	
14	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333			
15	250.2	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333			
16	263.1	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833			
17	264.1	43.0000	Circular	1.2272	0.0130	1.2500	1.2500			
Total length of all conduits 883.0000 feet										

```

=====
| Table E2 - Conduit Factor Data |
=====

```


Node12	100.00	100.00	0.0
Node13	100.00	100.00	0.0
Node15	100.00	100.00	0.0
Node16	100.00	100.00	0.0
Node17	100.00	100.00	0.0
Node18	10.98	27.46	0.0
Node11.1	100.00	100.00	0.0
Node21	51.59	100.00	0.0
Node22	53.23	100.00	0.0
Node10.1	61.80	100.00	0.0
Node23	100.00	100.00	0.0
Node24	100.00	100.00	0.0

The junction requiring the smallest time step was...Node1

```

-----
Table E5a - Conduit Explicit Condition Summary
Courant = Conduit Length
Time step = Velocity + sqrt(g*depth)
Conduit Implicit Condition Summary
Courant = Conduit Length
Time step = Velocity
-----
The 3rd column is the explicit time step times the
minimum courant time step factor
Minimum Conduit Time Step in seconds in the 4th column
in the list. Maximum possible is 10 * maximum time step
The 5th column is the maximum change at any time step
during the simulation. The 6th column is the wobble
value which is an indicator of the flow stability.
You should use this section to find those conduits that
are slowing your model down. Use modify conduits to
alter the length of the slow conduits to make your
simulation faster, or change the conduit name to
"CHME?????" where ????? are any characters, this will
lengthen the conduit based on the model time step,
not the value listed in modify conduits.
-----

```

Conduit	Time(exp)	Exp/Cmin	Time(imp)	Time(min)	Max Change	Wobble	Type of Soln
Link2	17.40	17.40	38.27	708.2	0.002	0.092	Normal Soln
Link4	2.82	2.82	5.25	0.0	0.005	0.131	Normal Soln
Link5	0.79	0.79	1.82	1189.2	0.092	1.346	Normal Soln
Link6	4.40	4.40	11.24	0.0	0.004	0.296	Normal Soln
Link7	3.00	3.00	7.17	0.0	0.004	0.288	Normal Soln
Link9	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link12	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link13	18.43	18.43	100.00	0.0	-0.000	0.014	Normal Soln
Link15	2.90	2.90	5.57	0.0	0.002	0.054	Normal Soln
Link16	1.49	1.49	2.14	0.0	0.004	0.978	Normal Soln
203.1	5.47	5.47	9.04	0.0	0.207	1.186	Normal Soln
203.2	3.73	3.73	5.72	0.0	0.003	0.298	Normal Soln
ditch1	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
250.1	5.52	5.52	15.49	0.0	0.016	2.405	Normal Soln
250.2	4.18	4.18	10.17	344.3	0.041	3.236	Normal Soln
263.1	2.56	2.56	7.60	4238.3	0.065	61.190	Normal Soln
264.1	4.79	4.79	14.45	0.0	0.006	1.750	Normal Soln
office 5	94.27	94.27	100.00	0.0	0.002	1.598	Normal Soln
office	87.69	87.69	100.00	0.0	0.003	1.778	Normal Soln
on 1	97.07	97.07	100.00	0.0	0.001	2.510	Normal Soln

The conduit with the smallest time step limitation was...263.1
The conduit with the largest wobble was...263.1
The conduit with the largest flow change in any consecutive time step...203.1

```

-----
* Table R6. Continuity Check for Channel/Pipes
* You should have zero continuity error
* If you are not using runoff hydraulics
-----
Inches over
cubic feet Total Basin
Initial Channel/Pipe Storage..... 0.000000E+00 0.000
Final Channel/Pipe Storage..... 0.000000E+00 0.000
Surface Runoff from Watersheds..... 1.591223E+06 0.771
Groundwater Subsurface Inflow or Diversion... 0.000000E+00 0.000
Evaporation Loss from Channels..... 0.000000E+00 0.000
Groundwater Flow Diverted Out of Network.... 0.000000E+00 0.000
Channel/Pipe/Inlet Outflow..... 1.591223E+06 0.771
Initial Storage + Inflow..... 1.591223E+06 0.771
Final Storage + Outflow + Diverted GW..... 1.591223E+06 0.771
-----
* Final Storage + Outflow + Evaporation - *
* Watershed Runoff - Groundwater Inflow - *
* Initial Channel/Pipe Storage
-----
* Final Storage + Outflow + Evaporation *
Percent Continuity Error..... -0.0000
-----

```

```

-----
# Table R9. Summary Statistics for Subcatchments #
-----
Note: Total Runoff Depth includes pervious & impervious areas.
Pervious and Impervious Runoff Depth is only the runoff from those two areas.
For catchments receiving redirected flow, this flow will only be shown if the flow is not
directed directly to the outlet. Flow that is getting redirected is also listed with
the original subcatchment.
-----
Subcatchment..... Node10.1#1 Node10#1 Node10#2 Node1#1 Node4#1
Area (acres)..... 184.8900 28.9000 26.9300 19.4000 46.7000
Percent Impervious..... 0.0000 0.0000 0.0000 0.0000 0.0000
Total Rainfall (in)..... 2.49000 2.49000 2.49000 2.49000 2.49000
Max Intensity (in/hr)..... 3.59729 3.59729 3.59729 3.59729 3.59729
-----
Pervious Area
-----
Total Runoff Depth (in) 0.71773 0.76484 0.47267 1.03153 1.28810
Peak Runoff Rate (cfs) 75.96743 20.53267 9.92671 20.68791 68.10798
-----
Total Impervious Area
-----
Total Runoff Depth (in) 0.00000 0.00000 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000 0.00000 0.00000
-----
Impervious Area with depression storage
-----
Total Runoff Depth (in) 0.00000 0.00000 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000 0.00000 0.00000
-----
Impervious Area without depression storage
-----
Total Runoff Depth (in) 0.00000 0.00000 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000 0.00000 0.00000
-----
Total Area
-----
Total Runoff Depth (in) 0.71773 0.76484 0.47267 1.03153 1.28810
Peak Runoff Rate (cfs) 75.96743 20.53267 9.92671 20.68791 68.10798
-----
Rational Formula
-----

```

```

-----
* End of time step DO-loop in Runoff
-----
Final Date (Mo/Day/Year) = 1/4/2014
Total number of time steps = 4340
Final Julian Date = 2014004
Final time of day = 0 seconds.
Final time of day = 0.00 hours.
Final running time = 72.0000 hours.
Final running time = 3.0000 days.
-----

```

```

-----
* Extrapolation Summary for Watersheds
* Explains the number of time steps and iterations
* used in the solution of the subcatchments.
* # Steps ==> Total Number of Extrapolated Steps
* # Calls ==> Total Number of OVERLND Calls
-----

```

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node10.1#1	0	0	Node10#1	0	0	Node10#2	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node17#1	0	0	Node9#1	0	0	Node2#1	0	0
Node12#1	0	0	Node11.1#1	0	0	Node21#1	0	0
Node22#1	0	0						

```

-----
#####
# Rainfall input summary from Runoff Continuity Check #
#####
-----

```

```

Total rainfall read for gage # 1 is 2.4900 in
Total rainfall duration for gage # 1 is 1434.02 minutes
-----

```

```

-----
* Table R5. CONTINUITY CHECK FOR SURFACE WATER
* Any continuity error can be fixed by lowering the
* wet and transition time step. The transition time
* should not be much greater than the wet time step.
-----

```

	Inches over	Total Basin	
Total Precipitation (Rain plus Snow)	5.138591E+06	2.490	
Total Infiltration	3.341742E+06	1.619	
Total Evaporation	2.055128E+05	0.100	
Surface Runoff from Watersheds	1.591223E+06	0.771	
Total Water remaining in Surface Storage	0.000000E+00	0.000	
Infiltration over the Pervious Area...	3.341742E+06	1.619	
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	5.138477E+06	2.490	
Total Precipitation + Initial Storage.	5.138591E+06	2.490	

```

The error in continuity is calculated as
-----
* Precipitation + Initial Snow Cover *
* - Infiltration - *
* Evaporation - Snow removal - *
* Surface Runoff from Watersheds - *
* Water in Surface Storage - *
* Water remaining in Snow Cover - *
-----
* Precipitation + Initial Snow Cover *
Percent Continuity Error..... 0.0022
-----

```

Pervious Tc. (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node16#1	Node17#1	Node9#1	Node2#1	Node12#1
Area (acres).....	3.61000	7.66000	18.65000	63.35000	4.75000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in).....	2.49000	2.49000	2.49000	2.49000	2.49000
Max Intensity (in/hr).....	3.59729	3.59729	3.59729	3.59729	3.59729

Total Runoff Depth (in)	1.51093	0.58751	1.15450	0.62913	0.62913
Peak Runoff Rate (cfs)	5.81622	3.65343	28.17931	43.59789	2.96461

Total Impervious Area	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area	1.51093	0.58751	1.15450	0.62913	0.62913
Peak Runoff Rate (cfs)	5.81622	3.65343	28.17931	43.59789	2.96461

Pervious Tc. (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node11.1#1	Node21#1	Node22#1
Area (acres).....	6.52000	6.28000	151.46000
Percent Impervious.....	0.00000	0.00000	0.00000
Total Rainfall (in).....	2.49000	2.49000	2.49000
Max Intensity (in/hr).....	3.59729	3.59729	3.59729

Total Runoff Depth (in)	0.62913	0.62913	0.71773
Peak Runoff Rate (cfs)	4.01195	4.38196	75.68255

Total Impervious Area	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000

or1 731.02 5741.93 0.00 7.05 0.135 0.129 2.967

Table E12. Mean Conduit Flow Information

Table with 11 columns: Conduit Name, Flow (cfs), Total Flow (ft³/s), Mean Flow Change, Mean Flow Percent, Mean Flow Weighting, Mean Flow Number, Mean Flow Radius, Mean Flow Area, Mean Flow Roughness. Rows include Link2 through Link16, orifice 5, and various weirs and freeboards.

Table E13. Channel losses(H), headwater depth (HW), tailwater | depth (TW), critical and normal depth (Yc and Yn).

Table with 7 columns: Conduit Name, Maximum Flow, Head Loss, Friction Loss, Critical Depth, Normal Depth, HW Elevat, TW Elevat. Rows include Link2 through Link16, orifice 5, and various weirs and freeboards.

Table E15 - SPREADSHEET INFO LIST

Conduit Flow and Junction Depth Information for use in spreadsheets. The maximum values in this table are the true maximum values because they sample every time step. The values in the review results may only be the maximum of a subset of all the time steps in the run. Note: These flows are only the flows in a single barrel.

Table with 11 columns: Conduit Name, Maximum Flow (cfs), Total Flow (ft³/s), Maximum Velocity (ft/s), Maximum Volume (#), Maximum #, Junction Elevation (ft), Invert Elevation (ft), Maximum Elevation. Rows include Link2 through Link16, orifice 5, and various weirs and freeboards.

Table E15a - SPREADSHEET REACH LIST

Peak flow and Total flow in conduits or diversions having the same upstream and downstream nodes.

Table with 4 columns: Upstream Node, Downstream Node, Maximum Flow (cfs), Total Flow (ft³/s). Rows include Node3 through Node9.

Large table with multiple columns containing flow data for various conduits and orifices, including flow rates and dimensions.

Table E11. Area assumptions used in the analysis

Subcritical and Critical flow assumptions from Subroutine Head. See Figure 17-1 in the manual for further information.

Table with 10 columns: Duration of Sub-Conduit Name, Duration of Upstream Flow, Duration of Downstream Flow, Maximum Flow, Maximum X-Section Area, Maximum Velocity. Rows include Link2 through Link16, orifice 5, and various weirs and freeboards.

Table E13a. CULVERT ANALYSIS CLASSIFICATION

and the time the culvert was in a particular classification during the simulation. The time is in minutes. The Dynamic Wave Equation is used for all conduit analysis but the culvert flow classification condition is based on the HW and TW depths.

Table with 10 columns: Conduit Name, Control, Outlet, Inlet, Inlet Control, Configuration. Rows include Link2 through Link16, orifice 5, and various weirs and freeboards.

Kinematic Wave Approximations

Time in Minutes for Each Condition

Table with 5 columns: Conduit Name, Duration of Normal Flow, Slope Criteria, Super-Critical Flow, Roll Waves. Rows include Link2 through Link16, orifice 5, and various weirs and freeboards.

Current Directory: C:\Temp\1D\Existing Condition_1
Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_X\Engine\SWMMEN-2.EXE
Input File: C:\Temp\1D\Existing Condition_2\Existing Condition_2.XP

xpswmm
Storm and Wastewater Management Model
Developed by Innovyze.
Last Update: Dec 01 2020
Interface Version: 2020.1
Engine Version: 12.0
Data File Version: 12.62

Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_X\Engine\SWMMEN-2.EXE

Input and Output file names by Layer
Input File to Layer # 1 JIN.US
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 JOT.US
Output File to Layer # 2 JOT.US

Configuration Parameters
Configuration Parameters, both those that are hardwired
and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in
the engine as defaults. The remaining in UPPER CASE
have been added to the simulation in the Configuration->
Configuration Parameters dialog or as Engine Defaults in
the SWMXP.INI file.
Consult the Help File for the specific meaning/purpose
of any particular parameter.
Note:
The second column denotes the value of the parameter.

Table with 3 columns: Parameter Name, Value, and another Value. Includes parameters like \$powerstation, \$pen, \$soldeg, \$sas, \$noflat, \$soldoma, \$soldvol, \$simplic, \$soldhot, \$soldscs, \$flood, \$snokeys, \$szero, \$soldx2, \$storage2, \$soldhot1, \$spumpwt, \$sedss, \$sexout, \$spatial, \$djref, \$weirflen, \$solbrd, \$nograev.

- O(218.2) office
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(261.1) seminele
W(263.1) bikepath
W(264.1) lacy
W(279.1) south
W(281.1) south1
W(281.2) dway 2
W(282.1) driveway
W(285.1) sem2

Parameter Values on the Tapes Common Block. These are the
values read from the data file and dynamically allocated
by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 13
Number of Channel/Pipes in the Runoff Block (NG)... 0
Runoff Water quality constituents (NRG)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 38
Number of Groundwater Subcatchments in Runoff (NGW)... 0
Number of Interface locations for all Blocks (NIE)... 38
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG)... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage Junctions in Extran (NVSE)..... 12
Number of Time history data points in Extran (NTVAL) 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS)... 0
Number of User defined conduits (NHW)..... 13
Number of Connecting conduits in Extran (NECC).... 20
Number of Upstream elements in Transport (NTCC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 38
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovyze

RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
for example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75

Table with 3 columns: Parameter Name, Value, and another Value. Includes parameters like \$snamid, \$snow, \$scsdepth, \$sbes97, \$snowbound, \$sq_tol, \$snow_storage, \$sold_iteration, \$minlen, \$sreview_elevation, \$suse_half_volume, \$vert_walls, \$smin_ts, \$sdesign_restart, \$szero_value, \$subcatchment_res, \$srelax_depth, \$ssavealpts, \$pump_neghd, \$channel_geometry, \$projunits.

The XPSWMM/XPSTORM engine internally uses object IDs
instead of full object names to represent objects.
Included below is a table of these IDs along with the
name of the object that ID corresponds to.

Table with 2 columns: Object Number and Object Name. Lists objects from 201 Node1 to 237 Node17, and various channels and orifices like C(203.1) 203.1, C(203.2) 203.2, etc.

- Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Rainage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments

A1
RUNOFF JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - MNL..... 0
Time ZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAy
Decay is read in for each subcatchment
REGEN = 0.01000
Rainage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 241
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0=Yes, 1=No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Total rainfall for gage # 1 is 2.8400 inches
Data Group F1 #

Evaporation Rate (in/day) #

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Width (ft)	Area (ac)	Per-imperv	Deprs ft/ft	Deprs	Print-sion Zero	Storge	Storge	Deten	
1	Node10.1#1	Node10.1	1,000.0	184.60	0.00	1,000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1,000.0	28.600	0.00	1,000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1,000.0	26.930	0.00	1,000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1,000.0	18.400	0.00	1,000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1,000.0	48.700	0.00	1,000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1,000.0	3.6100	0.00	1,000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1,000.0	7.6600	0.00	1,000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1,000.0	18.650	0.00	1,000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1,000.0	63.350	0.00	1,000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1,000.0	4.7500	0.00	1,000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1,000.0	6.5200	0.00	1,000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1,000.0	6.2800	0.00	1,000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1,000.0	151.46	0.00	1,000	0.020	0.020	0.000	0.000	0.000

Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data #
#####

Infiltration Type	Inf #1(#5)	Inf #2(#6)	Inf #3(#7)	Inf #4(#8)	Shape Factor	Depth or Fraction
# SCS	-> Comp CN	Time Conc	N/A	N/A	N/A	N/A
# SBUH	-> Comp CN	Time Conc	N/A	N/A	N/A	N/A
# Green Ampt	-> Suction	Hydr Cond	Initial MD	N/A	N/A	N/A
# Horton	-> Max Rate	Min Rate	Decay Rate (1/sec)	Max. Infiltr. Volume	N/A	N/A
# Proportional	-> Constant	N/A	N/A	N/A	N/A	N/A
# Initial/Cont Loss	-> Initial	Continuing	N/A	N/A	N/A	N/A
# Initial/Proportional	-> Initial	Constant	N/A	N/A	N/A	N/A
# Laurenson Parameters	-> B Value	Pervious "n"	Impervious Cont	Exponent	N/A	N/A
# Rational Formula	-> Tc Method	Flow Path Length	Flow Path Slope	Roughness or Retardance	N/A	N/A
# Rational Formula Tc Method: 1 = Constant	#1	#4 is Impervious Data / #5 - #8 is Pervious Data	#	#	#	#
# 2 = Friend's Equation	#	#	#	#	#	#
# 3 = Kinematic Wave	#	#	#	#	#	#
# 4 = Alameda Method	#	#	#	#	#	#
# 5 = Izzard's Formula	#	#	#	#	#	#
# 6 = Kerby's Equation	#	#	#	#	#	#
# 7 = Kirpich's Equation	#	#	#	#	#	#
# 8 = Bransby-Williams Equation	#	#	#	#	#	#
# 9 = Federal Aviation Authority Equation	#	#	#	#	#	#

Subcatchment Number	Inf #1	Inf #2	Inf #3	Inf #4	Inf #5	Inf #6	Inf #7	Inf #8
1	Node10.1#1	78.000	0.838	484.000	0.200			
2	Node10#1	79.000	0.434	484.000	0.200			
3	Node10#2	72.000	0.405	484.000	0.200			
4	Node1#1	84.000	0.338	484.000	0.200			
5	Node4#1	88.000	0.288	484.000	0.200			
6	Node16#1	91.000	0.322	484.000	0.200			
7	Node17#1	75.000	0.433	484.000	0.200			
8	Node9#1	86.000	0.212	484.000	0.200			

Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11.1 No Tributary Channel/Pipes
Tributary Subareas..... Node11.1#1
Node21 No Tributary Channel/Pipes
Tributary Subareas..... Node21#1
Node22 No Tributary Channel/Pipes
Tributary Subareas..... Node22#1

* Hydrographs will be stored for the following 12 INLETS *

Node10.1 Node10 Node1
Node4 Node16 Node17
Node9 Node2 Node12
Node11.1 Node21 Node22

* Quality Simulation not included in this run *

Precipitation Interface File Summary #
Number of precipitation station..... 1 #

Location Station Number

1. 1

XXX End of Header Section XXX

Entry made to the HYDRAULIC Layer of XP-SWMM #
Last Updated in June, 2014 by Innovoze #
#####

Entry made to the Runoff Layer(Block) of SWMM #
Last Updated June, 2014 by Innovoze #
#####

RUNOFF TABLES IN THE OUTPUT FILE.

| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| for example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |

| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Rainage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |

9 Node2#1 78.000 0.258 484.000 0.200
10 Node12#1 76.000 0.312 484.000 0.200
11 Node11.1#1 76.000 0.320 484.000 0.200
12 Node21#1 76.000 0.252 484.000 0.200
13 Node22#1 78.000 0.617 484.000 0.200

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Gage Name	Infiltration No	Type	Routing Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

Total Number of Subcatchments..... 13
Total Tributary Area (acres)..... 568.51
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 568.51
Total Width (feet)..... 13.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA

Default Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infil #
10 - 2nd infil 11 - 3rd infil #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node10.1 No Tributary Channel/Pipes
Tributary Subareas..... Node10.1#1
Node10 No Tributary Channel/Pipes
Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Tributary Subareas..... Node4#1
Node16 No Tributary Channel/Pipes
Tributary Subareas..... Node16#1
Node17 No Tributary Channel/Pipes
Tributary Subareas..... Node17#1
Node9 No Tributary Channel/Pipes
Tributary Subareas..... Node9#1

RUNOFF JOB CONTROL #
#####

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 0
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMIN..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000

Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)..... 60.0
Simulation length is..... 72.0 Hours

If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = 0.01000

Raingage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 241
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0=Yes, 1=No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 2.8400 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Per-Width (ft)	Area (ac)	Deprs cent	Deprs ft/ft	Print Zero	Storge	Storge	Deten		
1	Node10.1#1	Node10.1	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1.0000	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1.0000	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1.0000	19.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1.0000	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1.0000	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1.0000	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

```

#####
# Table R2. SUBCATCHMENT DATA
# Infiltration or Time of Concentration Data
#
# Infiltration Type Infi #1(#5) Infi #2(#6) Infi #3(#7) Infi #4(#8) #
# SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
# SBLH -> Comp CN Time Conc N/A #
# Green Ampt -> Suction Hydr Cond Initial MD N/A #
# Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
# Proportional -> Constant N/A N/A #
# Initial/Cont Loss -> Initial Continuing N/A N/A #
# Initial/Proportional -> Initial Constant N/A N/A #
# Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
# Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance #
# (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)
#
# Rational Formula To Method: 1 = Constant
#
# 2 = Friend's Equation
#
# 3 = Kinematic Wave
#
# 4 = Alameda Method
#
# 5 = Izzard's Formula
#
# 6 = Kerby's Equation
#
# 7 = Kirpich's Equation
#
# 8 = Bransby Williams Equation
#
# 9 = Federal Aviation Authority Equation
#####

```

Subcatchment Number	Name	Infi #1	Infi #2	Infi #3	Infi #4	Infi #5	Infi #6	Infi #7	Infi #8
1	Node10.1#1	78.000	0.838	484.000	0.200				
2	Node10#1	79.000	0.375	484.000	0.200				
3	Node10#2	72.000	0.465	484.000	0.200				
4	Node1#1	84.000	0.338	484.000	0.200				
5	Node4#1	88.000	0.288	484.000	0.200				
6	Node16#1	91.000	0.322	484.000	0.200				
7	Node17#1	75.000	0.433	484.000	0.200				
8	Node9#1	86.000	0.212	484.000	0.200				
9	Node2#1	76.000	0.258	484.000	0.200				
10	Node12#1	76.000	0.312	484.000	0.200				
11	Node11.1#1	76.000	0.320	484.000	0.200				
12	Node21#1	76.000	0.252	484.000	0.200				
13	Node22#1	78.000	0.617	484.000	0.200				

```

#####
# Table R3. SUBCATCHMENT DATA
# Rainfall and Infiltration Database Names #
#####
Subcatchment Gage Infiltration Routing

```

* Hydrographs will be stored for the following 12 INLETS *

```

Node10.1 Node10 Node1
Node4 Node16 Node17
Node9 Node2 Node12
Node11.1 Node21 Node22

```

* Quality Simulation not included in this run *

```

* Precipitation Interface File Summary
* Number of precipitation station.... 1 *

```

Location Station Number

```

1. 1
A1

```

```

*****
| HYDRAULICS TABLES IN THE OUTPUT FILE
| These are the more important tables in the output file.
| You can use your editor to find the table numbers,
| for example: search for Table E20 to check continuity.
| This output file can be imported into a Word Processor
| and printed on US letter or A4 paper using portrait
| mode, courier font, a size of 8 pt. and margins of 0.75
|
| Table E1 - Basic Conduit Data
| Table E2 - Conduit Factor Data
| Table E3a - Junction Data
| Table E3b - Junction Data
| Table E4 - Conduit Connectivity Data
| Table E4a - Dry Weather Flow Data
| Table E4b - Real Time Control Data
| Table E5 - Junction Time Step Limitation Summary
| Table E5a - Conduit Explicit Condition Summary
| Table E6 - Final Model Condition
| Table E7 - Iteration Summary
| Table E8 - Junction Time Step Limitation Summary
| Table E9 - Junction Summary Statistics
| Table E10 - Conduit Summary Statistics
| Table E11 - Area assumptions used in the analysis
| Table E12 - Mean conduit information
| Table E13 - Channel losses(H) and culvert info
| Table E13a - Culvert Analysis Classification
| Table E14 - Natural Channel Overview Flow Information
| Table E14a - Natural Channel Encroachment Information
| Table E14b - Floodplain Mapping
| Table E15 - Spreadsheet Info List
| Table E15a - Spreadsheet Read List
| Table E16 - New Conduit Output Section
| Table E17 - Pump Operation
| Table E18 - Junction Continuity Error
| Table E19 - Junction Inflow & Outflow Listing
| Table E20 - Junction Flooding and Volume List
| Table E21 - Continuity balance at simulation end
| Table E22 - Model Judgement Section
*****

```

Time Control from Hydraulics Job Control

Number	Name	No	Type	Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

```

Total Number of Subcatchments.... 13
Total Tributary Area (acres).... 568.51
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 568.51
Total Width (feet)..... 13.00
Impervious Area (%)..... 0.00

```

```

#####
# SUBCATCHMENT DATA #
# Default, Ratio values for subcatchment data #
# Used with the calibrate node in the runoff. #
# 1 - width 2 - area 3 - impervious % #
# 4 - slope 5 - imp "n" 6 - perv "n" #
# 7 - imp ds 8 - perv ds 9 - 1st inffi #
# 10 - 2nd inffi 11 - 3rd inffi #
#####
Column 1 2 3 4 5 6 7 8 9 10 11
Default 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Ratio 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

```

```

* Arrangement of Subcatchments and Channel/Pipes
*
Inlet
Node10.1 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node10.1#1
Node16 Tributary Subareas..... Node10#1 Node10#2
Node1 Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node4#1
Node17 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node17#1
Node2 Tributary Subareas..... Node9#1
Node12 Tributary Subareas..... Node2#1
Node11.1 No Tributary Channel/Pipes
Node21 Tributary Subareas..... Node11.1#1
Node22 No Tributary Channel/Pipes
Node22 Tributary Subareas..... Node21#1

```

```

Year..... 2014 Month..... 1
Day..... 1 Hour..... 0
Minute..... 0 Second..... 0

```

Control information for simulation

```

Integration cycles..... 38880
Length of integration step is..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL)..... 0
Use U.S. customary units for I/O..... 0
Printing starts in cycle..... 1
Intermediate printout intervals of..... 500 cycles
Intermediate printout intervals of..... 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of..... 83.33 minutes
Hot start file parameter (REDO)..... 0
Initial time..... 0.00 hours

```

```

Iteration variables: Flow Tolerance. 0.00010
Head Tolerance. 0.00050
Minimum depth (m or ft)..... 0.00001
Underrelaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K..... 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.000
Ponding Area Exponent..... 1.00000
Minimum Orifice Length..... 1000.00 feet.
NJSW input hydrograph junctions..... 0
or user defined hydrographs....

```

```

*****
| Table E1 - Conduit Data
*****

```

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef. (ft)	Hazen Slopes (ft)	Depth	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	10.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
12	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
13	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
14	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
15	250.2	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
16	263.1	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
17	264.1	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		

Total length of all conduits 883.0000 feet

```

*****
| Table E2 - Conduit Factor Data
*****

```

Table with columns: Time, Low Flow, Depth, etc. Rows include Link2, Link4, Link5, Link6, Link7, Link12, Link13, Link15, 203.1, 250.1, 250.2, 263.1, 264.1.

If there are messages about (sqrt(g*d)/d(dx), or | the sqrt(wave celerity)*time step/conduit length | in the output file all it means is that the | program will lower the internal time step to | satisfy this condition (explicit condition). | You control the actual internal time step by | Using the minimum courant time step factor in the | HYDRAULICS job control. The message put in words | states that the smallest conduit with the fastest | velocity will control the time step selection. | You have further control by using the model | conduit option in the HYDRAULICS Job Control. |

Table with columns: Conduit Name, Courant Ratio. Rows include Link4, Link5, Link6, Link7, Link9, Link12, Link13, Link15, Link16, 203.1, 203.2, 250.1, 250.2, 263.1, 264.1.

Conduit Volume | Full pipe or full open conduit volume Input full depth volume..... 8.9576E+03 cubic feet

Table E3a - Junction Data

Table with columns: Inp Num, Junction Name, Ground Elevation, Invert Elevation, Qint, Initial Inflow (%). Rows include Node1, Node2, Node3, Node4, Node5, Node6, Node7, Node8, Node9, Node10, Node11, Node12, Node13, Node15, Node16, Node17, Node18.

Storage Junction Data

Table with columns: STORAGE JUNCTION NUMBER OR NAME, JUNCTION TYPE, MAXIMUM OR CONSTANT SURFACE AREA (FT2), PEAK OR SURFACE (CUBIC FEET), CROWN DEPTH CONSTANT VOLUME (FT), DEPTH CONSTANT VOLUME (FT), ELEVATION, STARTS.

Table with columns: Node, Stage/Area, Invert. Rows include Node1 through Node17.

Variable storage data for node | Node1

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node4.

Variable storage data for node | Node2

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node12.

Variable storage data for node | Node3

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node3.

Table with columns: Node, X Coord, Y Coord, Type of Manhole, Inlet Capacity, Pavement Shape, Slope. Rows include Node1 through Node24.

Table E3b - Junction Data

Table with columns: Inp Num, Junction Name, X Coord, Y Coord, Type of Manhole, Inlet Capacity, Pavement Shape, Slope. Rows include Node1 through Node24.

Table E4 - Conduit Connectivity

Table with columns: Input Number, Conduit Name, Upstream Node, Downstream Node, Upstream Elevation, Downstream Elevation. Rows include Link2 through Link13.

Variable storage data for node | Node4

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node9.

Variable storage data for node | Node9

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node11.

Variable storage data for node | Node10

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node7.

Variable storage data for node | Node12

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node3.

Variable storage data for node | Node16

Table with columns: Data Point, Elevation, Depth, Area, Volume, Area, Volume. Rows include Node1 through Node5.


```

Node12 100.0 100.0 0.0
Node13 100.0 100.0 0.0
Node15 100.0 100.0 0.0
Node16 100.0 100.0 0.0
Node17 100.0 100.0 0.0
Node18 11.88 29.70 0.0
Node11.1 100.0 100.0 0.0
Node21 73.44 100.0 0.0
Node22 78.41 100.0 0.0
Node10.1 83.87 100.0 0.0
Node23 100.0 100.0 0.0
Node24 100.0 100.0 0.0

```

The junction requiring the smallest time step was...Node1

```

=====
Table E5a - Conduit Explicit Condition Summary
|
Courant = Conduit Length
Time step = Velocity + sqrt(g*depth)
Velocity
|
Conduit Implicit Condition Summary
|
Courant = Conduit Length
Time step = Velocity
|
=====
The 3rd column is the explicit time step times the
minimum courant time step factor
|
Minimum Conduit Time Step in seconds in the 4th column
| in the list. Maximum possible is 10 * maximum time step
|
The 5th column is the maximum change at any time step
| during the simulation. The 6th column is the wobble
| value which is an indicator of the flow stability.
|
You should use this section to find those conduits that
| are slowing your model down. Use modify conduits to
| alter the length of the slow conduits to make your
| simulation faster, or change the conduit name to
| *CHME????* where ????? are any characters, this will
| lengthen the conduit based on the model time step,
| not the value listed in modify conduits.
=====

```

Conduit	Time(exp)	Exp\Cmin	Time(imp)	Time(min)	Max Change	Wobble	Type of Soln
Link2	15.95	15.55	33.73	693.2	0.003	0.137	Normal Soln
Link4	2.63	2.63	4.98	0.0	0.006	0.183	Normal Soln
Link5	0.72	0.72	1.66	1080.8	0.075	1.503	Normal Soln
Link6	4.03	4.03	10.46	0.0	0.005	0.400	Normal Soln
Link7	2.75	2.75	6.57	0.0	0.007	0.401	Normal Soln
Link9	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link12	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link13	16.32	16.32	100.00	0.0	-0.001	0.029	Normal Soln
Link15	2.77	2.77	5.35	0.0	0.002	0.064	Normal Soln
Link16	1.36	1.36	1.97	0.0	0.003	1.377	Normal Soln
203.1	4.70	4.70	9.04	0.0	0.132	1.559	Normal Soln
203.2	3.68	3.68	5.65	0.0	0.062	0.638	Normal Soln
ditch1	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
250.1	4.84	4.84	12.57	0.0	0.017	2.785	Normal Soln
250.2	3.97	3.97	9.63	230.5	0.036	3.242	Normal Soln
263.1	2.40	2.40	6.99	4475.5	0.047	64.528	Normal Soln
264.1	4.39	4.39	12.86	0.0	0.006	2.114	Normal Soln
office 5	83.25	83.25	100.00	0.0	0.003	1.889	Normal Soln
office	74.01	74.01	100.00	0.0	0.004	2.218	Normal Soln
on 1	84.71	84.71	100.00	0.0	0.001	2.984	Normal Soln

The conduit with the smallest time step limitation was...263.1
The conduit with the largest wobble was...263.1
The conduit with the largest flow change in any consecutive time step...203.1

* Table R6. Continuity Check for Channel/Pipes *
* You should have zero continuity error *
* If you are not using runoff hydraulics *

```

=====
Inches over
cubic feet Total Basin
Initial Channel/Pipe Storage..... 0.000000E+00 0.000
Final Channel/Pipe Storage..... 0.000000E+00 0.000
Surface Runoff from Watersheds..... 2.077671E+06 1.007
Groundwater Subsurface Inflow or Diversion... 0.000000E+00 0.000
Evaporation Loss from Channels..... 0.000000E+00 0.000
Groundwater Flow Diverted Out of Network... 0.000000E+00 0.000
Channel/Pipe/Inlet Outflow..... 2.077671E+06 1.007
Initial Storage + Inflow..... 2.077671E+06 1.007
Final Storage + Outflow + Diverted GW..... 2.077671E+06 1.007
* Final Storage + Outflow + Evaporation - *
* Watershed Runoff - Groundwater Inflow - *
* Initial Channel/Pipe Storage *
=====
* Final Storage + Outflow + Evaporation *
=====
Percent Continuity Error..... 0.0000
=====

```

Table R9. Summary Statistics for Subcatchments

Note: Total Runoff Depth includes pervious & impervious areas.
Pervious and Impervious Runoff Depth is only the runoff from those two areas.
For catchments receiving redirected flow, this flow will only be shown if the flow is not directed directly to the outlet. Flow that is getting redirected is also listed with the original subcatchment.

Subcatchment.....	Node10.1#1	Node10#1	Node10#2	Node1#1	Node4#1
Area (acres).....	184.6000	28.9000	26.9300	19.4000	46.7000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in).....	2.84000	2.84000	2.84000	2.84000	2.84000
Max Intensity (in/hr).....	4.10293	4.10293	4.10293	4.10293	4.10293
Pervious Area					
Total Runoff Depth (in)	0.94780	1.00232	0.65823	1.30543	1.58928
Peak Runoff Rate (cfs)	102.84244	27.39408	14.76773	26.22600	83.57581
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Total Area					
Total Runoff Depth (in)	0.94780	1.00232	0.65823	1.30543	1.58928
Peak Runoff Rate (cfs)	102.84244	27.39408	14.76773	26.22600	83.57581
Rational Formula					
Pervious Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity	0.00000	0.00000	0.00000	0.00000	0.00000
Subcatchment.....					
Area (acres).....	Node11.1#1	Node21#1	Node22#1		
Percent Impervious.....	0.00000	6.52000	151.46000		
Total Rainfall (in).....	2.84000	2.84000	2.84000		
Max Intensity (in/hr).....	4.10293	4.10293	4.10293		
Pervious Area					
Total Runoff Depth (in)	0.84433	0.84433	0.94780		
Peak Runoff Rate (cfs)	5.58963	6.05499	102.31027		
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000		
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000		

* End of time step DO-loop in Runoff *

```

Final Date (Mo/Day/Year) = 1/ 4/2014
Total number of time steps = 4340
Final Julian Date = 2014004
Final time of day = 0 seconds.
Final time of day = 0.00 hours.
Final running time = 72.0000 hours.
Final running time = 3.0000 days.

```

* Extrapolation Summary for Watersheds *
* Explains the number of time steps and iterations *
* used in the solution of the subcatchments. *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls *

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node10.1#1	0	0	Node10#1	0	0	Node10#2	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node17#1	0	0	Node9#1	0	0	Node2#1	0	0
Node12#1	0	0	Node11.1#1	0	0	Node21#1	0	0
Node22#1	0	0						

* Rainfall input summary from Runoff Continuity Check *
#####

Total rainfall read for gage # 1 is 2.8400 in
Total rainfall duration for gage # 1 is 1434.02 minutes

* Table R5. CONTINUITY CHECK FOR SURFACE WATER

* Any continuity error can be fixed by lowering the *
* wet and transition time step. The transition time *
* should not be much greater than the wet time step. *

```

=====
Inches over
cubic feet Total Basin
Total Precipitation (Rain plus Snow)..... 5.860883E+06 2.840
Total Infiltration..... 3.577550E+06 1.734
Total Evaporation..... 2.055128E+05 0.100
Surface Runoff from Watersheds..... 2.077671E+06 1.007
Total Water remaining in Surface Storage..... 0.000000E+00 0.000
Infiltration over the Pervious Area..... 3.577550E+06 1.734
=====
Infiltration + Evaporation +
Surface Runoff + Snow removal +
Water remaining in Surface Storage +
Water remaining in Snow Cover..... 5.860734E+06 2.840
Total Precipitation + Initial Storage..... 5.860883E+06 2.840
=====

```

The error in continuity is calculated as

```

+ Precipitation + Initial Snow Cover *
- Infiltration -
*Evaporation - Snow removal -
*Surface Runoff from Watersheds -
*Water in Surface Storage -
*Water remaining in Snow Cover *
=====
* Precipitation + Initial Snow Cover *
=====
Percent Continuity Error..... 0.0025

```

Pervious Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node16#1	Node17#1	Node9#1	Node2#1	Node12#1
Area (acres).....	3.61000	7.66000	18.65000	63.35000	4.75000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in).....	2.84000	2.84000	2.84000	2.84000	2.84000
Max Intensity (in/hr).....	4.10293	4.10293	4.10293	4.10293	4.10293

Pervious Area					
Total Runoff Depth (in)	1.83044	0.79528	1.44235	0.84433	0.84433
Peak Runoff Rate (cfs)	6.98153	5.14415	35.08392	60.35010	4.10485

Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area					
Total Runoff Depth (in)	1.83044	0.79528	1.44235	0.84433	0.84433
Peak Runoff Rate (cfs)	6.98153	5.14415	35.08392	60.35010	4.10485

```

=====
Rational Formula
-----
Pervious Tc (mins)..... 0.00000 0.00000 0.00000 0.00000 0.00000
Perv. Intensity (in/hr) 0.00000 0.00000 0.00000 0.00000 0.00000
Impervious Tc (mins)..... 0.00000 0.00000 0.00000 0.00000 0.00000
Imp. Intensity (in/hr) 0.00000 0.00000 0.00000 0.00000 0.00000
Partial Area Tc (mins)..... 0.00000 0.00000 0.00000 0.00000 0.00000
Partial Area Intensity 0.00000 0.00000 0.00000 0.00000 0.00000
=====
Subcatchment.....
Area (acres)..... Node11.1#1 Node21#1 Node22#1
Percent Impervious..... 0.00000 6.52000 151.46000
Total Rainfall (in)..... 2.84000 2.84000 2.84000
Max Intensity (in/hr)..... 4.10293 4.10293 4.10293
=====
Pervious Area
Total Runoff Depth (in) 0.84433 0.84433 0.94780
Peak Runoff Rate (cfs) 5.58963 6.05499 102.31027
=====
Total Impervious Area
Total Runoff Depth (in) 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000

```

Impervious Area with depression storage
Total Runoff Depth (in) 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000
Impervious Area without depression storage
Total Runoff Depth (in) 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000
Total Area
Total Runoff Depth (in) 0.84433 0.84433 0.94780
Peak Runoff Rate (cfs) 5.5963 6.05499 102.31027
Rational Formula
Pervious Tc (mins).... 0.00000 0.00000 0.00000
Perv. Intensity (in/hr) 0.00000 0.00000 0.00000
Previous C 0.00000 0.00000 0.00000
Impervious Tc (mins)... 0.00000 0.00000 0.00000
Imp. Intensity (in/hr) 0.00000 0.00000 0.00000
Impervious C 0.00000 0.00000 0.00000
Partial Area (ft^2) 0.00000 0.00000 0.00000
Partial Area Tc..... 0.00000 0.00000 0.00000
Partial Area Intensity. 0.00000 0.00000 0.00000

====> Runoff simulation ended normally.
Table E6: Final Model Condition
This table is used for steady state flow comparison and is the information saved to the hot-restart file.
Final Time = 108.000 hours

Junction / Depth / Elevation
Node1/ 0.01 / 1025.01/
Node2/ 1.90 / 1016.90/
Node3/ 0.01 / 1018.01/
Node4/ 0.15 / 1019.15/
Node5/ 0.00 / 1021.99/
Node6/ 0.00 / 1021.34/
Node7/ 0.00 / 1021.31/
Node8/ 0.00 / 1021.12/
Node9/ 3.76 / 1018.76/
Node10/ 0.07 / 1019.07/
Node12/ 0.57 / 1023.57/
Node13/ 3.00 / 1021.92/
Node15/ 0.00 / 1023.15/
Node16/ 1.02 / 1023.02/
Node17/ 0.00 / 1022.87/
Node18/ 1.00 / 1023.00/
Node11.1/ 0.00 / 1021.98/
Node21/ 4.12 / 1018.62/
Node22/ 4.12 / 1018.62/
Node10.1/ 1.89 / 1018.62/
Node23/ 0.00 / 1021.50/
Node24/ 0.00 / 1019.80/
Conduit / Flow
Link2/ 0.01 / Link4/ 0.00/ Link5/ 0.00/
Link6/ 0.00/ Link7/ 0.00/ Link9/ 0.00/
Link12/ 0.00/ Link13/ 0.00/ Link15/ 0.00/
Link16/ 0.00/ 203.1/ 0.00/ 203.2/ 0.00/
ditch1/ 0.00/ 250.1/ 0.00/ 250.2/ -0.00/
263.1/ 0.00/ 264.1/ 0.00/ orifice 5/ 0.04/
orifice/ 0.01/ ori 1/ 0.00/ Weir5/ 0.00/
weir6/ 0.00/ weir 1/ 0.00/ weir 2/ 0.00/
weir3/ 0.00/ weir 4/ 0.00/
weir9/ 0.00/ semiole/ 0.00/ bikepath/ 0.00/
lacy/ 0.00/ south/ 0.00/ south1/ 0.00/
dway2/ 0.00/ driveway/ 0.00/ sem2/ 0.00/
FREE# 1/ 0.00/ FREE# 2/ 0.00/
Conduit / Velocity
Link2/ 0.39 / Link4/ 0.54 / Link5/ 0.27 /
Link6/ 0.39 / Link7/ 0.23 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.33 /
Link16/ 0.00 / 203.1/ 0.60 / 203.2/ 0.00 /
ditch1/ 0.00 / 250.1/ 0.00 / 250.2/ -0.00 /
263.1/ 0.00 / 264.1/ 0.00 / orifice 5/ 0.54 /
orifice/ 0.27 / ori 1/ 0.11 /

Conduit / Upstream/ Downstream Elevation
Link2/ 1018.01/ 1017.7/ 1021.99/ 1021.34/ Link5/ 1021.34/ 1021.31/
Link6/ 1021.31/ 1021.12/ Link7/ 1021.12/ 1021.00/ Link9/ 1016.90/ 1016.90/
Link12/ 1021.32/ 1021.92/ Link13/ 1021.34/ 1021.34/ Link15/ 1023.00/ 1022.79/
Link16/ 1022.87/ 1021.99/ 203.1/ 1025.01/ 1024.00/ 203.2/ 1018.90/ 1016.90/
ditch1/ 1023.15/ 1023.15/ 250.1/ 1018.62/ 1018.62/ 250.2/ 1018.62/ 1018.62/
263.1/ 1018.62/ 1018.62/ 264.1/ 1021.98/ 1021.82/ orifice 5/ 1019.15/ 1019.07/
orifice/ 1019.07/ 1019.02 ori 1/ 1023.02/ 1023.00/

Table E7 - Iteration Summary
Total number of time steps simulated..... 38880
Total number of passes in the simulation..... 4622623
Total number of time steps during simulation.... 129511
Ratio of actual # of time steps / NTIC..... 3.331
Average number of iterations per time step..... 35.683
Average time step size(seconds)..... 3.002
Smallest time step size(seconds)..... 1.000
Largest time step size(seconds)..... 10.000
Average minimum Conduit Courant time step (sec) 4.427
Average minimum implicit time step (sec)..... 3.190
Average minimum junction time step (sec)..... 3.190
Average Courant Factor TI..... 3.190
Number of times omega reduced..... 13161

Table E8 - Junction Time Step Limitation Summary
Not Conv = Number of times this junction did not converge during the simulation.
Avg Conv = Average junction iterations.
Conv err = Mean convergence error.
Omega Cng = Change of omega during iterations
Max Iter = Maximum number of iterations
Junction Not Conv Avg Conv Totl It Omega Cng Max Iter Itrn >10 Itrn >25 Itrn >40
Node1 17654 72.29 9362336 2134 501 19942 19727 19721
Node2 19169 80.74 10456246 1477 501 22848 22463 22357
Node3 0 1.11 143789 0 5 0 0 0
Node4 0 1.03 133169 0 5 0 0 0
Node5 0 1.05 136033 0 5 0 0 0
Node6 27 5.31 687164 2598 501 2896 2420 1363
Node7 0 19.63 2541967 6243 500 6200 6108 6018
Node8 0 1.11 143794 0 5 0 0 0
Node9 0 1.03 133923 0 4 0 0 0
Node10 0 1.04 135203 0 4 2 1 1
Node12 0 1.00 129511 0 1 0 0 0
Node13 0 1.00 129689 0 4 0 0 0
Node15 0 1.00 129511 0 1 0 0 0
Node16 0 1.01 130729 0 4 0 0 0
Node17 0 1.06 137724 0 4 0 0 0
Node18 0 1.01 131137 0 4 0 0 0
Node11.1 27 1.17 151368 12 501 27 27 27
Node21 105 1.56 201580 218 501 110 105 105
Node22 0 1.09 144116 0 1 0 0 0
Node10.1 0 1.13 145761 89 16 5 0 0 0
Node23 0 1.00 129511 0 1 0 0 0
Node24 0 1.00 129511 0 1 0 0 0
Total number of iterations for all junctions... 25561052
Minimum number of possible iterations..... 4943242
Efficiency of the simulation..... 8.997

Conduit / Width
Link2/ 1.73 / Link4/ 0.98 / Link5/ 0.98 /
Link6/ 0.98 / Link7/ 0.98 / Link9/ 0.30 /
Link12/ 0.00 / Link13/ 0.49 / Link15/ 0.78 /
Link16/ 0.39 / 203.1/ 0.39 / 203.2/ 0.59 /
ditch1/ 0.00 / 250.1/ 2.80 / 250.2/ 0.01 /
263.1/ 0.01 / 264.1/ 0.49 / orifice 5/ 0.69 /
orifice/ 0.50 / ori 1/ 0.18 /
Junction / EGL
Node1/ 0.01 / Node2/ 9.01 / Node3/ 1.02 /
Node4/ 0.15 / Node5/ 0.80 / Node6/ 0.01 /
Node7/ 0.00 / Node8/ 0.00 / Node9/ 6.00 /
Node10/ 0.07 / Node12/ 0.57 / Node13/ 0.00 /
Node15/ 0.00 / Node16/ 1.02 / Node17/ 0.00 /
Node18/ 1.00 / Node11.1/ 0.00 / Node21/ 7.32 /
Node22/ 4.12 / Node10.1/ 1.89 / Node23/ 0.00 /
Node24/ 0.00 /
Junction / Freeboard
Node1/ 2.99 / Node2/ 11.10 / Node3/ 6.99 /
Node4/ 5.85 / Node5/ 4.01 / Node6/ 4.68 /
Node7/ 4.87 / Node8/ 4.90 / Node9/ 7.24 /
Node10/ 1.93 / Node12/ 1.43 / Node13/ 3.81 /
Node15/ 1.85 / Node16/ 2.98 / Node17/ 3.13 /
Node18/ 3.00 / Node11.1/ 3.02 / Node21/ 4.48 /
Node22/ 4.38 / Node10.1/ 5.68 / Node23/ 1.50 /
Node24/ 3.20 /

Junction / Max Volume
Node1/ 45585.35 / Node2/ 705343.69 / Node3/ 299.96 /
Node4/ 186517.40 / Node5/ 7.91 / Node6/ 9.83
Node7/ 11.73 / Node8/ 10.96 / Node9/ 139481.58 /
Node10/ 89782.84 / Node12/ 14557.46 / Node13/ 2.54 /
Node15/ 0.00 / Node16/ 14346.36 / Node17/ 7.70 /
Node18/ 15.36 / Node11.1/ 1816.35 / Node21/ 270047.56 /
Node22/ 1009716.93 / Node10.1/ 141646.14 / Node23/ 0.00 /
Node24/ 0.00 /
Junction / Total Fitting
Node1/ 0.00 / Node2/ 0.00 / Node3/ 0.00 /
Node4/ 0.00 / Node5/ 0.00 / Node6/ 0.00 /
Node7/ 0.00 / Node8/ 0.00 / Node9/ 0.00 /
Node10/ 0.00 / Node12/ 0.00 / Node13/ 0.00 /
Node15/ 0.00 / Node16/ 0.00 / Node17/ 0.00 /
Node18/ 0.00 / Node11.1/ 0.00 / Node21/ 0.00 /
Node22/ 0.00 / Node10.1/ 0.00 / Node23/ 0.00 /
Node24/ 0.00 /

Conduit / Cross Sectional Area
Link2/ 0.02 / Link4/ 0.00 / Link5/ 0.00 /
Link6/ 0.00 / Link7/ 0.00 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.00 /
Link16/ 0.00 / 203.1/ 0.00 / 203.2/ 0.00 /
ditch1/ 0.00 / 250.1/ 1.62 / 250.2/ 4.10 /
263.1/ 3.33 / 264.1/ 0.00 / orifice 5/ 0.07 /
orifice/ 0.02 / ori 1/ 0.00 /

Conduit / Final Volume
Link2/ 2.04 / Link4/ 0.01 / Link5/ 0.01 /
Link6/ 0.03 / Link7/ 0.00 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.01 /
Link16/ 0.00 / 203.1/ 0.12 / 203.2/ 0.00 /
ditch1/ 0.00 / 250.1/ 108.31 / 250.2/ 287.27 /
263.1/ 149.92 / 264.1/ 0.00 / orifice 5/ 69.44 /
orifice/ 23.12 / ori 1/ 2.05 /

Conduit / Hydraulic Radius
Link2/ 0.01 / Link4/ 0.01 / Link5/ 0.01 /
Link6/ 0.01 / Link7/ 0.01 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.01 /

Poor Efficiency

Extran Efficiency is an indicator of the efficiency of the simulation. Ideal efficiency is one iteration per time step. Altering the underrelaxation parameter, lowering the time step, increasing the flow and head tolerance are good ways of improving the efficiency. Another is lowering the internal time step. The lower the efficiency generally the faster your model will run. If your efficiency is less than 1.5 then you may try increasing your time step so that your overall simulation is faster. Ideal efficiency would be around 2.0.
Good Efficiency < 1.5 mean iterations
Excellent Efficiency < 2.5 and > 1.5 mean iterations
Good Efficiency < 4.0 and > 2.5 mean iterations
Fair Efficiency < 7.5 and > 4.0 mean iterations
Poor Efficiency > 7.5 mean iterations

Table E9 - JUNCTION SUMMARY STATISTICS
The Maximum area is only the area of the node, it does not include the area of the surrounding conduits.
Uppermost Maximum Time Feet of Maximum Maximum Maximum
Ground PipeCrown Junction Occurrence at Max of node Area Depth Width Gutter
Junction Name feet feet feet Hr. Min. Elevation feet ft^2 feet feet ft/s
Node1 1028.0000 1026.9000 1026.0855 13 4 0.0000 1.9145 48958.579 0.0000 0.00 0.0000
Node2 1028.0000 1025.5000 1016.8965 108 0 0.0000 11.1035 888115.07 0.0000 0.00 0.0000
Node3 1025.0000 1023.0000 1023.5683 25 48 0.5683 1.4317 39743.261 0.0000 0.00 0.0000
Node4 1025.0000 1025.0000 1020.6964 15 10 0.0000 4.3036 117775.32 0.0000 0.00 0.0000
Node5 1026.0000 1024.7900 1022.6243 12 26 0.0000 3.3757 12.5660 0.0000 0.00 0.0000
Node6 1026.0200 1023.8400 1022.1222 12 26 0.0000 3.8978 12.5660 0.0000 0.00 0.0000
Node7 1026.1800 1023.1000 1022.4346 12 26 0.0000 3.3366 12.5660 0.0000 0.00 0.0000
Node8 1026.0200 1023.6200 1021.9919 12 26 0.0000 4.0281 12.5660 0.0000 0.00 0.0000
Node9 1026.0000 1023.5000 1018.7607 108 0 0.0000 7.2393 43584.269 0.0000 0.00 0.0000
Node10 1025.0000 1025.0000 1021.0622 13 47 0.0000 3.9378 49463.352 0.0000 0.00 0.0000
Node12 1025.0000 1023.0000 1023.5683 25 48 0.5683 1.4317 39743.261 0.0000 0.00 0.0000
Node13 1025.7000 1023.1700 1022.1225 12 26 0.0000 3.6075 12.5660 0.0000 0.00 0.0000
Node15 1025.0000 1024.6500 1023.1500 0 0 0.0000 1.8500 12.5660 0.0000 0.00 0.0000
Node16 1026.0000 1022.0000 1024.4523 13 22 2.4523 1.5477 9092.1930 0.0000 0.00 0.0000
Node17 1026.0000 1023.8700 1023.4629 12 26 0.0000 2.5711 12.5660 0.0000 0.00 0.0000
Node18 1026.0000 1025.0000 1023.2701 13 24 0.0000 2.7289 12.5660 0.0000 0.00 0.0000
Node11.1 1025.0000 1023.2300 1023.2726 12 29 0.0426 1.7274 7205.8243 0.0000 0.00 0.0000
Node21 1023.1000 1023.0700 1019.2308 15 13 0.0000 3.8692 146889.17 0.0000 0.00 0.0000
Node22 1023.0000 1016.0833 1018.6156 26 58 2.5323 4.3844 644287.75 0.0000 0.00 0.0000
Node10.1 1024.9000 1019.8833 1020.0593 13 23 0.4119 4.2047 203165.34 0.0000 0.00 0.0000
Node23 1023.0000 1021.5000 1021.5000 0 0 0.0000 1.5000 12.5660 0.0000 0.00 0.0000
Node24 1023.0000 1019.8000 1019.8000 0 0 0.0000 3.2000 12.5660 0.0000 0.00 0.0000

Table E10 - CONDUIT SUMMARY STATISTICS
Note: The peak flow may be less than the design flow and the conduit may still surcharge because of the downstream boundary conditions.
denotes an open conduit that has been overtopped
this is a potential source of severe errors
Conduit Maximum Maximum Time Maximum Time Ratio of Maximum Water
Design Design Vertical Computed of Computed of Max. to Elev at Pipe Ends d/D
Conduit Flow Velocity Depth Flow Occurrence Velocity Occurrence Design Upstream Downstrm US DS
Name (cfs) (ft/s) (in) (cfs) (ft/s) (ft/s) Hr. Min. Flow (ft/s) Hr. Min. Flow (ft/s)

or1 725.50 5746.35 0.00 8.15 0.135 0.135 4.303

Table E12. Mean Conduit Flow Information

Table with columns: Conduit Name, Mean Flow (cfs), Total Flow (ft³/s), Mean Flow Change, Mean Flow Weighting, Mean Flow Number, Mean Flow Radius, Mean Flow Area, Mean Flow Roughness. Lists conduits like Link2, Link4, Link5, etc.

Table with columns: Link ID, Duration, Upstream, Downstream, Maximum, etc. Lists various link IDs and their associated flow data.

Table E11. Area assumptions used in the analysis

Subcritical and Critical flow assumptions from | Subroutine Head. See Figure 17-1 in the manual for further information.

Table with columns: Conduit Name, Duration, Upstream, Downstream, Maximum, etc. Lists conduit names and their flow characteristics.

Table E13. Channel losses(H), headwater depth (HW), tailwater |

Table with columns: Conduit Name, Maximum Flow, Head Loss, Friction Loss, Critical Depth, Normal Depth, HW Elevat, TW Elevat. Lists conduit names and their loss/depth data.

Table with columns: Link ID, Duration, Upstream, Downstream, Maximum, etc. Lists link IDs and their flow data.

Table E13a. CULVERT ANALYSIS CLASSIFICATION

and the time the culvert was in a particular classification during the simulation. The time is in minutes. The Dynamic Wave Equation is used for all conduit analysis but the culvert flow classification condition is based on the HW and TW depths.

Table with columns: Conduit Name, Control, Inlet, Outlet, Inlet, Outlet, Control, Configuration. Lists conduit names and their control configurations.

Kinematic Wave Approximations

Time in Minutes for Each Condition

Table with columns: Conduit Name, Duration, Slope, Super-Critical, Roll. Lists conduit names and their kinematic wave data.

Table E15 - SPREADSHEET INFO LIST

Conduit Flow and Junction Depth Information for use in spreadsheets. The maximum values in this table are the true maximum values because they sample every time step. The values in the review results may only be the maximum of a subset of all the time steps in the run. Note: These flows are only the flows in a single barrel.

Table with columns: Conduit Name, Maximum Flow, Total Flow, Maximum Velocity, Maximum Volume, Junction Invert, Maximum Elevation. Lists conduit names and their maximum flow/velocity data.

Table E15a - SPREADSHEET REACH LIST

Peak flow and Total flow those | conduits or diversions having the same | upstream and downstream nodes.

Table with columns: Upstream Node, Downstream Node, Maximum Flow, Total Flow. Lists node numbers and their flow data.

Current Directory: C:\Temp\1D\Existing Condition_2
Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_XEngine\SWMMEN-2.EXE
Input File: C:\Temp\1D\Existing Condition_10\Existing Condition_10.XP

xpswmm
Storm and Wastewater Management Model
Developed by Innovyze.
Last Update: Dec 01 2020
Interface Version: 2020.1
Engine Version: 12.0
Data File Version: 12.62

Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_XEngine\SWMMEN-2.EXE

Input and Output file names by Layer
Input File to Layer # 1 JIN.US
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 JOT.US
Output File to Layer # 2 JOT.US

Configuration Parameters
Configuration Parameters, both those that are hardwired
and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in
the engine as defaults. The remaining in UPPER CASE
have been added to the simulation in the Configuration->
Configuration Parameters dialog or as Engine Defaults in
the SWMXP.INI file.
Consult the Help File for the specific meaning/purpose
of any particular parameter.

Table of configuration parameters including \$powerstation, \$pen, \$soldeg, \$sas, \$noflat, \$soldoma, \$soldvol, \$simplic, \$soldhot, \$soldscs, \$flood, \$snokeys, \$szero, \$soldx2, \$storage2, \$soldhot1, \$spumpwt, \$seclss, \$sexout, \$spatial, \$sdjref, \$swefilen, \$soldbrd, \$snoqretev.

O(218.2) office
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(261.1) seminele
W(263.1) bikepath
W(264.1) lacy
W(279.1) south
W(281.1) south1
W(281.2) dway 2
W(282.1) driveway
W(285.1) sem2

Parameter Values on the Tapes Common Block. These are the
values read from the data file and dynamically allocated
by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 13
Number of Channel/Pipes in the Runoff Block (NG).... 0
Runoff Water quality constituents (NRG)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 38
Number of Groundwater Subcatchments in Runoff (NGW) 0
Number of Interface locations for all Blocks (NIE).... 38
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG)... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage Junctions in Extran (NVSE)..... 12
Number of Time history data points in Extran (NVTAL) 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 13
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTCC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 38
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovyze

RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
for example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75

Table of simulation parameters including \$sncmid, \$snew, \$scsdepth, \$sbs97, \$snewbound, \$sq, \$snew_storage, \$sold, \$minlen, \$sreview, \$suse_half, \$vert_walls, \$smin_ts, \$sdesign_restart, \$szero_value, \$subcatchment_res, \$srelax_depth, \$ssavealpts, \$pump_neghd, \$channel_geometry, \$projunits.

The XPSWMM/XPSTORM engine internally uses object IDs
instead of full object names to represent objects.
Included below is a table of these IDs along with the
name of the object that ID corresponds to.

Table mapping Object ID to Object Name, including 201 Node1, 202 Node2, 204 Node3, 206 Node4, 208 Node5, 209 Node6, 211 Node7, 213 Node8, 215 Node9, 217 Node10, 222 Node12, 224 Node13, 228 Node15, 230 Node16, 232 Node17, 235 Node18, 259 Node11.1, 260 Node21, 262 Node22, 277 Node10.1, 278 Node23, 280 Node24, 205 Link2, 210 Link4, 212 Link5, 214 Link6, 216 Link7, 219 Link9, 225 Link12, 226 Link13, 231 Link15, 233 Link16, C(203.1) 203.1, C(203.2) 203.2, C(223.1) ditch1, C(261.1) 250.1, C(261.2) 250.2, C(263.1) 263.1, C(264.1) 264.1, O(207.2) orifice 5

Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Rainage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments

A1
RUNOFF JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - MNL..... 0
Time ZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC..... 0
Runoff input print control..... 0
Runoff graph plot control..... 0
Runoff output print control..... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds).... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAy
Decay is read in for each subcatchment
REGEN = 0.01000
Rainage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 241
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0=Yes, 1=No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
Total rainfall for gage # 1 is 4.0900 inches
Data Group F1 #

Evaporation Rate (in/day) #

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name or Inlet	Width (ft)	Area (ac)	Permperv	Deprs	Deprs	Print	Print	Print	Print	
					ft/ft	ft/ft	sion	sion	Zero	Storge	
							ft	ft	ft	Storge	
1	Node10.1#1	Node10.1	1,000.00	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1,000.00	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1,000.00	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1,000.00	19.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1,000.00	48.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1,000.00	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1,000.00	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1,000.00	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1,000.00	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1,000.00	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1,000.00	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1,000.00	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1,000.00	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data #
#####

#	Infiltration Type	Int #1(#5)	Int #2(#6)	Int #3(#7)	Int #4(#8)	#
#	SCS	-> Comp CN	Time Conc	Shape Factor	Depth or Fraction	#
#	SBUH	-> Comp CN	Time Conc	N/A	N/A	#
#	Green Ampt	-> Suction	Hydr Cond	Initial MD	N/A	#
#	Horton	-> Max Rate	Min Rate	Decay Rate (1/sec)	Max. Infiltr. Volume	#
#	Proportional	-> Constant	N/A	N/A	N/A	#
#	Initial/Cont Loss	-> Initial	Continuing	N/A	N/A	#
#	Initial/Proportional	-> Initial	Constant	N/A	N/A	#
#	Laurenson Parameters	-> B Value	Pervious "n"	Impervious Cont	Exponent	#
#	Rational Formula	-> Tc Method	Flow Path Length	Flow Path Slope	Roughness or Retardance	#
#		(#1 -#4 is Impervious Data / #5 -#8 is Pervious Data)				#
#	Rational Formula Tc Method:	1 = Constant				#
#		2 = Friend's Equation				#
#		3 = Kinematic Wave				#
#		4 = Alameda Method				#
#		5 = Izzard's Formula				#
#		6 = Kerby's Equation				#
#		7 = Kirpich's Equation				#
#		8 = Bransby Williams Equation				#
#		9 = Federal Aviation Authority Equation				#

Subcatchment Number	Inlet Name	#1	#2	#3	#4	#5	#6	#7	#8
1	Node10.1#1	78.000	0.838	484.000	0.200				
2	Node10#1	79.000	0.434	484.000	0.200				
3	Node10#2	72.000	0.405	484.000	0.200				
4	Node1#1	84.000	0.338	484.000	0.200				
5	Node4#1	88.000	0.288	484.000	0.200				
6	Node16#1	91.000	0.322	484.000	0.200				
7	Node17#1	75.000	0.433	484.000	0.200				
8	Node9#1	86.000	0.212	484.000	0.200				

Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11.1 No Tributary Channel/Pipes
Tributary Subareas..... Node11.1#1
Node21 No Tributary Channel/Pipes
Tributary Subareas..... Node21#1
Node22 No Tributary Channel/Pipes
Tributary Subareas..... Node22#1

* Hydrographs will be stored for the following 12 INLETS *

Node10.1	Node10	Node1
Node4	Node16	Node17
Node9	Node2	Node12
Node11.1	Node21	Node22

* Quality Simulation not included in this run *

Precipitation Interface File Summary
Number of precipitation station..... 1 *

Location Station Number

1. 1

XXX End of Header Section XXX

Entry made to the HYDRAULIC Layer of XP-SWMM #
Last Updated in June, 2014 by Innovye #
#####

Entry made to the Runoff Layer(Block) of SWMM #
Last Updated June, 2014 by Innovye #
#####

RUNOFF TABLES IN THE OUTPUT FILE.

| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| for example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Rainage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |

9	Node2#1	76.000	0.258	484.000	0.200
10	Node12#1	76.000	0.312	484.000	0.200
11	Node11.1#1	76.000	0.320	484.000	0.200
12	Node21#1	76.000	0.252	484.000	0.200
13	Node22#1	78.000	0.617	484.000	0.200

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Gage Name	Infiltration No	Type	Routing Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

Total Number of Subcatchments.....	13
Total Tributary Area (acres).....	568.51
Impervious Area (acres).....	0.00
Pervious Area (acres).....	568.51
Total Width (feet).....	13.00
Impervious Area (%).....	0.00

SUBCATCHMENT DATA #
#####

#	Default	Ratio values for subcatchment data #
#	Used with the calibrate node in the runoff.	#
#	1 - width 2 - area 3 - impervious %	#
#	4 - slope 5 - imp "n" 6 - perv "n"	#
#	7 - imp ds 8 - perv ds 9 - 1st infil #	#
#	10 - 2nd infil 11 - 3rd infil	#
Column	1	2 3 4 5 6 7 8 9 10 11
Default	0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Ratio	1.0000	1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node10.1 No Tributary Channel/Pipes
Tributary Subareas..... Node10.1#1
Node10 No Tributary Channel/Pipes
Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Tributary Subareas..... Node4#1
Node16 No Tributary Channel/Pipes
Tributary Subareas..... Node16#1
Node17 No Tributary Channel/Pipes
Tributary Subareas..... Node17#1
Node9 No Tributary Channel/Pipes
Tributary Subareas..... Node9#1

RUNOFF JOB CONTROL #
#####

Snowmelt parameter - ISNOW.....	0
Number of rain gages - NRGAG.....	0
Quality is not simulated - KWALTY.....	0
Default evaporation rate used - IVAP.....	0
Hour of day at start of storm - NHR.....	0
Minute of hour at start of storm - NMIN.....	0
Time TZERO at start of storm (hours).....	0.000
Use U.S. Customary units for most I/O - METRIC.....	0
Runoff input print control.....	0
Runoff graph plot control.....	0
Runoff output print control.....	0
Limit number of groundwater convergence messages to	10000

Print headers every 50 lines - NOHEAD (0=yes, 1=no)	0
Print land use load percentages -LANDUPR (0=no, 1=yes)	0
Month, day, year of start of storm is:	1/1/2014
Wet time step length (seconds).....	60.0
Dry time step length (seconds).....	86400.0
Wet/Dry time step length (seconds).....	60.0
Simulation length is.....	72.0 Hours

If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECA
Decay is read in for each subcatchment
REGEN = 0.01000

Raingage #.....	1
KTYPE - Rainfall input type.....	0
NHISTO - Total number of rainfall values.....	241
KINC - Rainfall values(pairs) per line.....	10
KPRINT - Print rainfall(0=Yes, 1=No).....	0
KTIME - Precipitation time units	0
0 -> Minutes 1 -> Hours.....	1
KPREP - Precipitation unit type	0
0 -> Intensity 1 -> Volume.....	1
KTHIS - Variable rainfall intervals	0
0 -> No, >= 1 -> Yes.....	0
THISTO - Rainfall time interval.....	0.10
TZRAIN - Starting time(KTIME units).....	0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 4.0900 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Per-Width (ft)	Area (ac)	Deprs cent	Deprs ft/ft	Print Zero	Storge	Storge	Deten		
1	Node10.1#1	Node10.1	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1.0000	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1.0000	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1.0000	19.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1.0000	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1.0000	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1.0000	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

```

#####
# Table R2. SUBCATCHMENT DATA
# Infiltration or Time of Concentration Data
#
# Infiltration Type Infi #1(#5) Infi #2(#6) Infi #3(#7) Infi #4(#8) #
# SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
# SBLH -> Comp CN Time Conc N/A #
# Green Ampt -> Suction Hydr Cond Initial MD N/A #
# Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
# Proportional -> Constant N/A N/A #
# Initial/Cont Loss -> Initial Continuing N/A N/A #
# Initial/Proportional -> Initial Constant N/A N/A #
# Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
# Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance #
# # (1-4 is Impervious Data / 5-8 is Pervious Data) #
# Rational Formula To Method: 1 = Constant #
# 2 = Friend's Equation #
# 3 = Kinematic Wave #
# 4 = Alameda Method #
# 5 = Izzard's Formula #
# 6 = Kerby's Equation #
# 7 = Kirpich's Equation #
# 8 = Bransby Williams Equation #
# 9 = Federal Aviation Authority Equation #
#####

```

Subcatchment Number	Infi #1	Infi #2	Infi #3	Infi #4	Infi #5	Infi #6	Infi #7	Infi #8
1	Node10.1#1	78.000	0.838	484.000	0.200			
2	Node10#1	79.000	0.375	484.000	0.200			
3	Node10#2	72.000	0.465	484.000	0.200			
4	Node1#1	84.000	0.338	484.000	0.200			
5	Node4#1	88.000	0.288	484.000	0.200			
6	Node16#1	91.000	0.322	484.000	0.200			
7	Node17#1	75.000	0.433	484.000	0.200			
8	Node9#1	86.000	0.212	484.000	0.200			
9	Node2#1	76.000	0.258	484.000	0.200			
10	Node12#1	76.000	0.312	484.000	0.200			
11	Node11.1#1	76.000	0.320	484.000	0.200			
12	Node21#1	76.000	0.252	484.000	0.200			
13	Node22#1	78.000	0.617	484.000	0.200			

```

#####
# Table R3. SUBCATCHMENT DATA
# Rainfall and Infiltration Database Names #
#####
Subcatchment Gage Infiltration Routing

```

* Hydrographs will be stored for the following 12 INLETS *

```

Node10.1 Node10 Node1
Node4 Node16 Node17
Node9 Node2 Node12
Node11.1 Node21 Node22

```

* Quality Simulation not included in this run *

```

* Precipitation Interface File Summary *
* Number of precipitation station.... 1 *

```

Location Station Number

```

1. 1
A1

```

HYDRAULICS TABLES IN THE OUTPUT FILE

- These are the more important tables in the output file.
 - You can use your editor to find the table numbers.
 - for example: search for Table E20 to check continuity.
 - This output file can be imported into a Word Processor
 - and printed on US letter or A4 paper using portrait
 - mode, courier font, a size of 8 pt. and margins of 0.75
- Table E1 - Basic Conduit Data
 - Table E2 - Conduit Factor Data
 - Table E3a - Junction Data
 - Table E3b - Junction Data
 - Table E4 - Conduit Connectivity Data
 - Table E4a - Dry Weather Flow Data
 - Table E4b - Real Time Control Data
 - Table E5 - Junction Time Step Limitation Summary
 - Table E5a - Conduit Explicit Condition Summary
 - Table E6 - Final Model Condition
 - Table E7 - Iteration Summary
 - Table E8 - Junction Time Step Limitation Summary
 - Table E9 - Junction Summary Statistics
 - Table E10 - Conduit Summary Statistics
 - Table E11 - Area assumptions used in the analysis
 - Table E12 - Mean conduit information
 - Table E13 - Channel losses(H) and culvert info
 - Table E13a - Culvert Analysis Classification
 - Table E14 - Natural Channel Encroachment Information
 - Table E14a - Natural Channel Encroachment Information
 - Table E14b - Floodplain Mapping
 - Table E15 - Spreadsheet Info List
 - Table E15a - Spreadsheet Read List
 - Table E16 - New Conduit Output Section
 - Table E17 - Pump Operation
 - Table E18 - Junction Continuity Error
 - Table E19 - Junction Inflow & Outflow Listing
 - Table E20 - Junction Flooding and Volume List
 - Table E21 - Continuity balance at simulation end
 - Table E22 - Model Judgement Section

Time Control from Hydraulics Job Control

Number	Name	No	Type	Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

```

Total Number of Subcatchments.... 13
Total Tributary Area (acres).... 568.51
Impervious Area (acres)..... 0.00
Previous Area (acres)..... 568.51
Total Width (feet)..... 13.00
Impervious Area (%)..... 0.00

```

```

#####
# SUBCATCHMENT DATA #
# Default, Ratio values for subcatchment data #
# Used with the calibrate node in the runoff. #
# 1 - width 2 - area 3 - impervious % #
# 4 - slope 5 - imp "n" 6 - perv "n" #
# 7 - imp ds 8 - perv ds 9 - 1st inffi #
# 10 - 2nd inffi 11 - 3rd inffi #
#####
Column 1 2 3 4 5 6 7 8 9 10 11
Default 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Ratio 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

```

```

* Arrangement of Subcatchments and Channel/Pipes *
Inlet
Node10.1 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node10.1#1
Node16 Tributary Subareas..... Node10#1 Node10#2
Node1 Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node4#1
Node17 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node17#1
Node2 No Tributary Channel/Pipes
Node12 Tributary Subareas..... Node2#1
Node11.1 No Tributary Channel/Pipes
Node21 Tributary Subareas..... Node11.1#1
Node22 No Tributary Channel/Pipes
Node22 Tributary Subareas..... Node21#1

```

```

Year..... 2014 Month..... 1
Day..... 1 Hour..... 0
Minute..... 0 Second..... 0

```

Control information for simulation

```

Integration cycles..... 38880
Length of integration step is..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL)..... 0
Use U.S. customary units for I/O..... 0
Printing starts in cycle..... 1
Intermediate printout intervals of..... 500 cycles
Intermediate printout intervals of..... 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of..... 83.33 minutes
Hot start file parameter (REDO)..... 0
Initial time..... 0.00 hours

```

```

Iteration variables: Flow Tolerance. 0.00010
Head Tolerance. 0.00050
Minimum depth (m or ft)..... 0.00001
Underrelaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K..... 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.000
Ponding Area Exponent..... 1.00000
Minimum Orifice Length..... 1000.00 feet.
NJSW input hydrograph junctions..... 0
or user defined hydrographs....

```

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef. (ft)	Trapezoid Hazen	Depth (ft)	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	10.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
12	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
13	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
14	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
15	250.2	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
16	263.1	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
17	264.1	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		
Total length of all conduits 883.0000 feet									

Table E2 - Conduit Factor Data

Variable storage data for node | Node11.1

Table with 7 columns: Data Point, Elevation ft, Depth ft, Area ft^2, Area ft^3, Volume acres, Area ac-ft, Volume. Rows 1-7 showing storage data for Node11.1.

Variable storage data for node | Node21

Table with 7 columns: Data Point, Elevation ft, Depth ft, Area ft^2, Area ft^3, Volume acres, Area ac-ft, Volume. Rows 1-18 showing storage data for Node21.

Variable storage data for node | Node22

Table with 7 columns: Data Point, Elevation ft, Depth ft, Area ft^2, Area ft^3, Volume acres, Area ac-ft, Volume. Rows 1-17 showing storage data for Node22.

Variable storage data for node | Node10.1

Table with 7 columns: Data Point, Elevation ft, Depth ft, Area ft^2, Area ft^3, Volume acres, Area ac-ft, Volume. Row 1 showing storage data for Node10.1.

Table with 7 columns: Name, Node, Node, Node, Node, Node, Node. Rows including weir9, semindc, bikesiph, lacy, south, south1, dway 2, driveway, sem2.

WARNING: Having weirs in series can occasionally lead to large continuity errors for short duration simulations. Please check your continuity errors and make adjustments to your model as required.

FREE OUTFALL DATA (DATA GROUP 1) BOUNDARY CONDITION ON DATA GROUP J1

Outfall at Junction...Node23 has boundary condition number... 1
Outfall at Junction...Node24 has boundary condition number... 2
Warning!! Outfall Junction Node23 has two or more connecting conduits.

Weir Outfall Data Boundary Condition on data group J1

Weir Outfall at Junction...Node23 has boundary condition number... 1
Weir Outfall at Junction...Node24 has boundary condition number... 2

INTERNAL CONNECTIVITY INFORMATION

Table with 3 columns: CONDUIT, JUNCTION, JUNCTION. Rows listing connections for various conduits like orifice 5, orifice, ori 1, weir5, weir6, weir 1, weir 2, weir3, weir 4, weir8, weir9, semindc, bikesiph, lacy, south, south1, dway 2, driveway, sem2.

Table with 7 columns: Node, Node, Node, Node, Node, Node, Node. Rows 2-11 showing node connections.

Orifice Data

Table with 8 columns: Conduit Name, From Junction, To Junction, Area Type, Depth (ft), Discharge Coefficient, Height Above Junction (ft). Rows for orifice 5 and ori 1.

EQUIVALENT PIPE INFORMATION FOR ORIFICE 1

CONDUIT NAME... orifice 5
Upstream node... Node4
Downstream node... Node6
PIPE DIAMETER... 1000.00
PIPE LENGTH... 1000.00
MANNINGS ROUGHNESS... 0.0039
INVERT ELEVATION AT UPSTREAM END... 1019.0000
INVERT ELEVATION AT DOWNSTREAM END... 1018.9900

EQUIVALENT PIPE INFORMATION FOR ORIFICE 2

CONDUIT NAME... orifice
Upstream node... Node10
Downstream node... Node3
PIPE DIAMETER... 1.00
PIPE LENGTH... 1000.00
MANNINGS ROUGHNESS... 0.0039
INVERT ELEVATION AT UPSTREAM END... 1019.0000
INVERT ELEVATION AT DOWNSTREAM END... 1018.9900

EQUIVALENT PIPE INFORMATION FOR ORIFICE 3

CONDUIT NAME... ori 1
Upstream node... Node16
Downstream node... Node18
PIPE DIAMETER... 0.46
PIPE LENGTH... 1000.00
MANNINGS ROUGHNESS... 0.0023
INVERT ELEVATION AT UPSTREAM END... 1023.0000
INVERT ELEVATION AT DOWNSTREAM END... 1022.9900

Note: For a Bottom-outlet orifice the invert elevation of the downstream node will be adjusted to accommodate the equivalent conduit. Conduit grades are not affected.

Weir Data

Table with 11 columns: Weir Name, From Junction, To Junction, Crest Type, Weir Height(ft), Weir Top(ft), Discharge Length(ft), Coefficient, Weir Power, Length, Power. Rows for weir5, weir6, weir 1, weir 2, weir3, weir 4, weir8.

Table with 3 columns: FREE# 1, Node23, BOUNDARY; FREE# 2, Node24, BOUNDARY.

Boundary Condition Information Data Groups J1-J4

BC NUMBER... 1 has no control water surface.
BC NUMBER... 2 has no control water surface.

XP Node Field Summary

Conduit Convergence Criteria

Table with 3 columns: Conduit Name, Full Flow, Conduit Slope. Rows for Link2, Link4, Link5, Link6, Link7, Link9, Link12, Link13, Link15, Link16, 203.1, 203.2, dthc1, 250.1, 250.2, 263.1, 264.1, orifice 5, ori 1.

Table E5 - Junction Time Limitation Summary (0.10 or 0.25) Depth * Area

Time step... Sum of Flow... The time this junction was the limiting junction is listed in the third column.

Table with 4 columns: Junction, Time(10), Time(25), Time(sec). Rows for Node1, Node2, Node3, Node4, Node5, Node6, Node7, Node8, Node9, Node10, Node12.

Node13	99.32	100.00	0.0
Node15	100.00	100.00	0.0
Node16	92.44	100.00	0.0
Node17	7.64	19.09	344580.0
Node18	21.78	54.45	0.0
Node11.1	100.00	100.00	0.0
Node21	100.00	100.00	0.0
Node22	100.00	100.00	0.0
Node10.1	100.00	100.00	0.0
Node23	100.00	100.00	0.0
Node24	100.00	100.00	0.0

The junction requiring the smallest time step was...Node17

Table E5a - Conduit Explicit Condition Summary	
Courant =	Conduit Length
Time step =	Velocity + sqrt(g*depth)
Conduit Implicit Condition Summary	
Courant =	Conduit Length
Time step =	Velocity

The 3rd column is the Explicit time step times the minimum courant time step factor

Minimum Conduit Time Step in seconds in the 4th column in the list. Maximum possible is 10 * maximum time step

The 5th column is the maximum change at any time step during the simulation. The 6th column is the wobble value which is an indicator of the flow stability.

You should use this section to find those conduits that are slowing your model down. Use modify conduits to alter the length of the slow conduits to make your simulation faster, or change the conduit name to "CHME?????" where ????? are any characters, this will lengthen the conduit based on the model time step, not the value listed in modify conduits.

Conduit	Time(exp)	Exp\Cmin	Time(imp)	Time(min)	Max Ochange	Wobble	Type of Soln
Link2	9.04	9.04	26.27	635.8	0.104	1.368	Normal Soln
Link4	2.25	2.25	4.47	0.0	0.034	0.401	Normal Soln
Link5	0.58	0.58	1.15	1089.3	-0.053	2.303	Normal Soln
Link6	3.28	3.28	8.76	0.0	0.026	0.832	Normal Soln
Link7	2.23	2.23	5.36	0.0	0.017	0.858	Normal Soln
Link9	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link12	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link13	12.46	12.46	100.00	0.0	-0.003	0.168	Normal Soln
Link15	2.29	2.29	4.43	0.0	0.001	0.134	Normal Soln
Link16	0.89	0.89	1.40	0.0	-0.039	3.129	Normal Soln
203.1	3.14	3.14	7.03	0.0	0.207	2.485	Normal Soln
203.2	3.68	3.68	5.65	0.0	0.087	1.053	Normal Soln
ditch1	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
250.1	3.80	3.80	9.17	8.0	0.013	3.917	Normal Soln
250.2	3.57	3.57	8.72	134.0	0.015	3.685	Normal Soln
263.1	2.15	2.15	6.31	4603.8	0.024	73.269	Normal Soln
264.1	3.51	3.51	8.99	0.0	0.017	3.037	Normal Soln
office 5	62.80	62.80	100.00	0.0	0.003	2.725	Normal Soln
office	63.70	63.70	100.00	0.0	-0.016	3.669	Normal Soln
on 1	65.05	65.05	100.00	0.0	0.001	4.217	Normal Soln

The conduit with the smallest time step limitation was...263.1
The conduit with the largest wobble was...263.1
The conduit with the largest flow change in any consecutive time step...203.1

Table R6. Continuity Check for Channel/Pipes
* You should have zero continuity error *
* if you are not using runoff hydraulics *

Inches over		
cubic feet	Total Basin	
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	4.030604E+06	1.953
Groundwater Subsurface Inflow or Diversion.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Groundwater Flow Diverted Out of Network.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	4.030604E+06	1.953
Initial Storage + Inflow.....	4.030604E+06	1.953
Final Storage + Outflow + Diverted GW.....	4.030604E+06	1.953

* Final Storage + Outflow + Evaporation *
* Watershed Runoff - Groundwater Inflow *
* Initial Channel/Pipe Storage *
* Final Storage + Outflow + Evaporation *

Percent Continuity Error..... 0.0000

Table R9. Summary Statistics for Subcatchments #

Note: Total Runoff Depth includes pervious & impervious areas.
Pervious and Impervious Runoff Depth is only the runoff from those two areas.
For catchments receiving redirected flow, this flow will only be shown if the flow is not directed directly to the outlet. Flow that is getting redirected is also listed with the original subcatchment.

Subcatchment.....	Node10.1#1	Node10#1	Node10#2	Node1#1	Node4#1
Area (acres).....	184.60000	28.60000	26.93000	19.40000	46.70000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in).....	4.09000	4.09000	4.09000	4.09000	4.09000
Max Intensity (in/hr).....	5.90880	5.90880	5.90880	5.90880	5.90880

Pervious Area

Total Runoff Depth (in)	1.87916	1.95557	1.45325	2.36249	2.71981
Peak Runoff Rate (cfs)	210.44919	54.39807	35.46194	47.11845	139.88128

Total Impervious Area

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area

Total Runoff Depth (in)	1.87916	1.95557	1.45325	2.36249	2.71981
Peak Runoff Rate (cfs)	210.44919	54.39807	35.46194	47.11845	139.88128

Rational Formula

Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
-------------------------	---------	---------	---------	---------	---------

End of time step DO-loop in Runoff

Final Date (Mo/Day/Year) = 1/4/2014
Total number of time steps = 4340
Final Julian Date = 2014004
Final time of day = 0. seconds.
Final time of day = 0.00 hours.
Final running time = 72.0000 hours.
Final running time = 3.0000 days.

Extrapolation Summary for Watersheds
* Explains the number of time steps and iterations *
* used in the solution of the subcatchments. *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls *

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node10.1#1	0	0	Node10#1	0	0	Node10#2	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node17#1	0	0	Node9#1	0	0	Node2#1	0	0
Node12#1	0	0	Node11.1#1	0	0	Node2#1	0	0
Node22#1	0	0						

Rainfall input summary from Runoff Continuity Check #

Total rainfall read for gage # 1 is 4.0900 in
Total rainfall duration for gage # 1 is 1434.02 minutes

Table R5. CONTINUITY CHECK FOR SURFACE WATER
* Any continuity error can be fixed by lowering the wet and transition time step. The transition time should not be much greater than the wet time step.

Inches over		
cubic feet	Total Basin	
Total Precipitation (Rain plus Snow)	8.440497E+06	4.090
Total Infiltration	4.204090E+06	2.037
Total Evaporation	2.055128E+05	0.100
Surface Runoff from Watersheds	4.030604E+06	1.953
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Pervious Area.....	4.204090E+06	2.037
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	8.440208E+06	4.090
Total Precipitation + Initial Storage.	8.440497E+06	4.090

The error in continuity is calculated as

* Precipitation - Initial Snow Cover *
* - Infiltration -
* Evaporation - Snow removal -
* Surface Runoff from Watersheds -
* Water in Surface Storage -
* Water remaining in Snow Cover -
* Precipitation + Initial Snow Cover *

Percent Continuity Error..... 0.0034

Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C.....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area C.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node16#1	Node17#1	Node9#1	Node2#1	Node12#1
Area (acres).....	3.61000	7.66000	18.65000	63.35000	4.75000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in).....	4.09000	4.09000	4.09000	4.09000	4.09000
Max Intensity (in/hr).....	5.90880	5.90880	5.90880	5.90880	5.90880

Pervious Area					
Total Runoff Depth (in)	3.00795	1.65936	2.53746	1.73108	1.73108
Peak Runoff Rate (cfs)	11.14705	11.28612	60.55057	127.90911	8.73615

Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area					
Total Runoff Depth (in)	3.00795	1.65936	2.53746	1.73108	1.73108
Peak Runoff Rate (cfs)	11.14705	11.28612	60.55057	127.90911	8.73615

Rational Formula					
Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C.....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node11.1#1	Node21#1	Node22#1
Area (acres).....	6.52000	6.28000	151.46000
Percent Impervious.....	0.00000	0.00000	0.00000
Total Rainfall (in).....	4.09000	4.09000	4.09000
Max Intensity (in/hr).....	5.90880	5.90880	5.90880

Pervious Area		
Total Runoff Depth (in)	1.73108	1.73108
Peak Runoff Rate (cfs)	11.83673	12.85396

Total Impervious Area		
Total Runoff Depth (in)	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000

Impervious Area with depression storage

Total Runoff Depth (in) 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000

Impervious Area without depression storage

Total Runoff Depth (in) 0.00000 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000 0.00000

Total Area

Total Runoff Depth (in) 1.73108 1.73108 1.87916
Peak Runoff Rate (cfs) 11.83673 12.85396 208.76218

Rational Formula

Pervious Tc (mins).... 0.00000 0.00000 0.00000
Perv. Intensity (in/hr) 0.00000 0.00000 0.00000
Pervious C 0.00000 0.00000 0.00000
Impervious Tc (mins).... 0.00000 0.00000 0.00000
Imp. Intensity (in/hr) 0.00000 0.00000 0.00000
Impervious C 0.00000 0.00000 0.00000
Partial Area (Ha)..... 0.00000 0.00000 0.00000
Partial Area Tc..... 0.00000 0.00000 0.00000
Partial Area Intensity, 0.00000 0.00000 0.00000

====> Runoff simulation ended normally.

Table E6. Final Model Condition
This table is used for steady state
flow comparison and is the information
saved to the hot-restart file.
Final Time = 108.000 hours

Junction / Depth / Elevation ==> *** Junction is Surcharged.

Node1/ 0.01 / 1025.01/ Node2/ 2.75 / 1017.75/ Node3/ 0.01 / 1018.01/
Node4/ 0.16 / 1019.16/ Node5/ 0.00 / 1021.99/ Node6/ 0.00 / 1021.34/
Node7/ 0.00 / 1021.31/ Node8/ 0.00 / 1021.12/ Node9/ 5.64 / 1020.64/
Node10/ 0.07 / 1019.07/ Node12/ 0.80 / 1023.80/ Node13/ 0.00 / 1021.52/
Node15/ 0.00 / 1023.15/ Node16/ 1.02 / 1023.02/ Node17/ 0.00 / 1022.87/
Node18/ 1.00 / 1023.00/ Node11.1/ 0.00 / 1021.98/ Node21/ 5.39 / 1019.89/
Node22/ 5.39 / 1019.89/ Node10.1/ 3.16 / 1019.89/ Node23/ 0.00 / 1021.50/
Node24/ 0.00 / 1019.89/

Conduit/ Flow ==> *** Conduit uses the normal flow option.

Link2/ 0.01/ Link4/ 0.00/ Link5/ 0.00/
Link6/ 0.00/ Link7/ 0.00/ Link9/ 0.00/
Link12/ 0.00/ Link13/ 0.00/ Link15/ 0.00/
Link16/ 0.00/ 203.1/ 0.00/ 203.2/ 0.00/
ditch1/ 0.00/ 250.1/ 0.00/ 250.2/ 0.00/
263.1/ 0.00/ 264.1/ 0.00/ orifice 5/ 0.04/
orifice/ 0.01 / or1/ 0.00 / Weir5/ 0.00 /
weir6/ 0.00 / weir 1/ 0.00 / weir 2/ 0.00 /
weir3/ 0.00 / weir 4/ -0.00 / weir8/ 0.00 /
weir9/ 0.00 / semicant/ 0.00 / bikespath/ 0.00 /
lacy/ 0.00 / south/ 0.00 / south1/ 0.00 /
dway 2/ 0.00 / driveway/ 0.00 / sem2/ 0.00 /
FREE# 1/ 0.00 / FREE# 2/ 0.00 /

Conduit/ Velocity Link4/ 0.54 / Link5/ 0.27 /
Link6/ 0.30 / Link7/ 0.23 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.33 /
Link16/ 0.00 / 203.1/ 0.61 / 203.2/ 0.00 /
ditch1/ 0.00 / 250.1/ 0.00 / 250.2/ 0.00 /
263.1/ 0.00 / 264.1/ 0.00 / orifice 5/ 0.58 /
orifice/ 0.27 / or1/ 0.11 /

Conduit/ Width

ditch1/ 0.00 / 250.1/ 0.55 / 250.2/ 0.55 /
263.1/ 0.49 / 264.1/ 0.00 / orifice 5/ 0.09 /
orifice/ 0.04 / or1/ 0.01 /

Conduit/ Upstream/ Downstream Elevation
Link2/ 1018.01/ 1017.75 Link4/ 1021.99/ 1021.34 Link5/ 1021.34/ 1021.31/
Link6/ 1021.31/ 1021.12 Link7/ 1021.12/ 1021.00 Link9/ 1017.75/ 1017.75/
Link12/ 1021.92/ 1021.92 Link13/ 1021.34/ 1021.34 Link15/ 1023.00/ 1022.79/
Link16/ 1022.87/ 1021.99 203.1/ 1025.01/ 1024.00 203.2/ 1017.75/ 1017.75/
ditch1/ 1023.15/ 1023.15 250.1/ 1019.89/ 1019.89 250.2/ 1019.89/ 1019.89/
263.1/ 1019.89/ 1019.89 264.1/ 1021.98/ 1021.82 orifice 5/ 1019.16/ 1019.07/
orifice/ 1019.07/ 1019.02 or1/ 1023.02/ 1023.00

Table E7 - Iteration Summary

Total number of time steps simulated..... 38890
Total number of passes in the simulation..... 4232008
Total number of time steps during simulation..... 138371
Ratio of actual # of time steps / NTCCY..... 3.559
Average number of iterations per time step..... 30.585
Average time step size(seconds)..... 2.810
Smallest time step size(seconds)..... 1.000
Largest time step size(seconds)..... 10.000
Average minimum Conduit Courant time step (sec)..... 3.850
Average minimum implicit time step (sec)..... 2.652
Average minimum junction time step (sec)..... 2.652
Average Courant Factor T1..... 2.652
Number of times Omega reduced..... 12115

Table E8 - Junction Time Step Limitation Summary

Not Conv = Number of times this junction did not converge during the simulation.
Avg Conv = Average junction iterations.
Conv Err = Mean convergence error.
Omega Cng = Change of omega during iterations
Max Iter = Maximum number of iterations

Junction Not Conv Avg Conv Tot ltr Omega Cng Max ltr ltrn >10 ltrn >25 ltrn >40

Node1 16628 64.25 8890220 1458 501 18943 18837 18830
Node2 16937 70.56 9763099 1443 501 21174 20927 20877
Node3 0 1.22 168312 345 8 0 0 0
Node4 0 1.04 143810 4 4 0 0 0
Node5 0 1.07 148039 0 5 0 0 0
Node6 15 6.23 862598 2759 501 2676 1990 1736
Node7 0 17.63 2439305 5680 499 5631 5562 5459
Node8 0 1.14 157784 0 4 0 0 0
Node9 0 1.05 144714 0 4 0 0 0
Node10 0 1.08 149530 0 72 3 0 1 1
Node12 0 1.00 138371 0 1 0 0 0
Node13 0 1.01 139341 0 1 0 0 0
Node15 0 1.00 138371 0 1 0 0 0
Node16 0 1.02 140539 0 57 1 1 1 1
Node17 0 1.08 149635 1 259 1 1 1 1
Node18 0 1.06 146119 0 4 0 0 0
Node11.1 47 1.24 171946 24 501 49 47 47
Node21 100 1.53 212122 258 501 109 105 105
Node22 0 1.10 152193 0 12 1 0 0 0
Node10.1 0 1.11 153701 0 147 13 2 0 0 0
Node23 0 1.00 138371 0 1 0 0 0
Node24 0 1.00 138371 0 1 0 0 0

Total number of iterations for all junctions.. 24686190
Minimum number of possible iterations..... 304162
Efficiency of the simulation..... 8.11
Poor Efficiency

Link2/ 1.85 / Link4/ 0.98 / Link5/ 0.98 /
Link6/ 0.98 / Link7/ 0.98 / Link9/ 0.00 /
Link12/ 0.99 / Link13/ 0.49 / Link15/ 0.78 /
Link16/ 0.39 / 203.1/ 0.39 / 203.2/ 0.59 /
ditch1/ 0.00 / 250.1/ 0.01 / 250.2/ 0.01 /
263.1/ 0.01 / 264.1/ 0.49 / orifice 5/ 0.72 /
orifice/ 0.50 / or1/ 0.18 /

Junction/ EGL
Node1/ 0.01 / Node2/ 9.01 / Node3/ 1.02 /
Node4/ 0.16 / Node5/ 0.50 / Node6/ 0.01 /
Node7/ 0.00 / Node8/ 0.00 / Node9/ 6.00 /
Node10/ 0.07 / Node12/ 0.80 / Node13/ 0.00 /
Node15/ 0.00 / Node16/ 1.02 / Node17/ 0.00 /
Node18/ 1.00 / Node11.1/ 0.00 / Node21/ 7.32 /
Node22/ 5.39 / Node10.1/ 3.16 / Node23/ 0.00 /
Node24/ 0.00 /

Junction/ Freeboard
Node1/ 2.99 / Node2/ 10.25 / Node3/ 6.99 /
Node4/ 5.84 / Node5/ 4.01 / Node6/ 4.68 /
Node7/ 4.87 / Node8/ 4.90 / Node9/ 5.36 /
Node10/ 5.93 / Node12/ 1.20 / Node13/ 3.81 /
Node15/ 1.85 / Node16/ 2.98 / Node17/ 3.13 /
Node18/ 3.00 / Node11.1/ 3.02 / Node21/ 3.21 /
Node22/ 3.11 / Node10.1/ 4.41 / Node23/ 1.50 /
Node24/ 3.20 /

Junction/ Max Volume
Node1/ 80836.65 / Node2/ 1353918.58 / Node3/ 2490.74 /
Node4/ 312961.71 / Node5/ 12.93 / Node6/ 14.84 /
Node7/ 18.46 / Node8/ 16.74 / Node9/ 25302.26 /
Node10/ 129033.86 / Node12/ 26145.63 / Node13/ 7.56 /
Node15/ 0.00 / Node16/ 23522.11 / Node17/ 26.68 /
Node18/ 17.57 / Node11.1/ 7653.69 / Node21/ 469010.32 /
Node22/ 169735.41 / Node10.1/ 458197.96 / Node23/ 0.00 /
Node24/ 0.00 /

Junction/ Total Flng
Node1/ 0.00 / Node2/ 0.00 / Node3/ 0.00 /
Node4/ 0.00 / Node5/ 0.00 / Node6/ 0.00 /
Node7/ 0.00 / Node8/ 0.00 / Node9/ 0.00 /
Node10/ 0.00 / Node12/ 0.00 / Node13/ 0.00 /
Node15/ 0.00 / Node16/ 0.00 / Node17/ 0.00 /
Node18/ 0.00 / Node11.1/ 0.00 / Node21/ 0.00 /
Node22/ 0.00 / Node10.1/ 0.00 / Node23/ 0.00 /
Node24/ 0.00 /

Conduit/ Cross Sectional Area
Link2/ 0.08 / Link4/ 0.00 / Link5/ 0.00 /
Link6/ 0.00 / Link7/ 0.00 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.00 /
Link16/ 0.00 / 203.1/ 0.00 / 203.2/ 0.00 /
ditch1/ 0.00 / 250.1/ 4.10 / 250.2/ 4.12 /
263.1/ 3.35 / 264.1/ 0.00 / orifice 5/ 0.08 /
orifice/ 0.02 / or1/ 0.00 /

Conduit/ Final Volume
Link2/ 10.23 / Link4/ 0.01 / Link5/ 0.01 /
Link6/ 0.03 / Link7/ 0.03 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.01 /
Link16/ 0.00 / 203.1/ 0.12 / 203.2/ 0.00 /
ditch1/ 0.00 / 250.1/ 274.91 / 250.2/ 288.34 /
263.1/ 150.64 / 264.1/ 0.00 / orifice 5/ 76.37 /
orifice/ 23.67 / or1/ 2.08 /

Conduit/ Hydraulic Radius
Link2/ 0.03 / Link4/ 0.01 / Link5/ 0.01 /
Link6/ 0.01 / Link7/ 0.01 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.01 /
Link16/ 0.00 / 203.1/ 0.01 / 203.2/ 0.00 /

Extran Efficiency is an indicator of the efficiency of the simulation. Ideal efficiency is one iteration per time step. Altering the underrelaxation parameter, lowering the time step, increasing the flow and head tolerance are good ways of improving the efficiency, another is lowering the internal time step. The lower the efficiency generally the faster your model will run. If your efficiency is less than 1.5 then you may try increasing your time step so that your overall simulation is faster. Ideal efficiency would be around 2.0
Good Efficiency < 1.5 mean iterations
Excellent Efficiency < 2.5 and > 1.5 mean iterations
Good Efficiency < 4.0 and > 2.5 mean iterations
Fair Efficiency < 7.5 and > 4.0 mean iterations
Poor Efficiency > 7.5 mean iterations

Table E9 - JUNCTION SUMMARY STATISTICS
The Maximum area is only the area of the node it does not include the area of the surrounding conduits

Uppermost Maximum Time Feet of Maximum Maximum Maximum
Ground Pipe/Crown Junction of Surchage Freeboard Junction Gutter Gutter
Junction Elevation Elevation Elevation at Max of node Area Depth Width Velocity
Name feet feet feet Hr. Min. Elevation feet ft2 feet feet ft/s
Node1 1028.0000 1026.9000 1026.7819 12 51 0.0000 1.2181 54369.422 0.0000 0.00 0.0000
Node2 1028.0000 1025.5000 1017.7506 108 0 0.0000 10.2494 815524.03 0.0000 0.00 0.0000
Node3 1025.0000 1020.8333 1020.5575 12 42 0.0000 4.4425 1541.9327 0.0000 0.00 0.0000
Node4 1025.0000 1025.0000 1021.2697 13 43 0.0000 3.2733 127827.30 0.0000 0.00 0.0000
Node5 1028.0000 1024.7900 1023.0187 12 25 0.0000 2.9813 12.5660 0.0000 0.00 0.0000
Node6 1026.0200 1023.8400 1022.5213 12 25 0.0000 3.4987 12.5660 0.0000 0.00 0.0000
Node7 1026.1800 1023.8100 1022.7790 12 25 0.0000 3.4010 12.5660 0.0000 0.00 0.0000
Node8 1026.0200 1025.0000 1022.6521 12 25 0.0000 3.5679 12.5660 0.0000 0.00 0.0000
Node9 1028.0000 1023.5000 1020.6376 108 0 0.0000 3.3624 78369.834 0.0000 0.00 0.0000
Node10 1025.0000 1025.0000 1021.8204 12 41 0.0000 3.1796 54104.271 0.0000 0.00 0.0000
Node12 1025.0000 1023.0000 1023.8137 18 44 0.8137 1.1863 55142.382 0.0000 0.00 0.0000
Node13 1025.7000 1023.1700 1022.5216 12 24 0.0000 3.2084 12.5660 0.0000 0.00 0.0000
Node15 1025.0000 1024.6500 1023.1500 0 0 0.0000 1.8500 12.5660 0.0000 0.00 0.0000
Node16 1028.0000 1022.0000 1025.3094 13 59 3.3094 0.6906 12522.703 0.0000 0.00 0.0000
Node17 1026.0000 1023.8700 1024.9933 12 24 1.2333 1.0067 12.5660 0.0000 0.00 0.0000
Node18 1026.0000 1025.0000 1023.3986 13 0 0.0000 2.6014 12.5660 0.0000 0.00 0.0000
Node11.1 1025.0000 1023.2300 1023.7127 12 35 0.4827 1.2873 19505.714 0.0000 0.00 0.0000
Node21 1023.1000 1023.0700 1020.4862 16 46 0.0000 2.6138 168518.43 0.0000 0.00 0.0000
Node22 1023.0000 1016.0833 1019.8917 27 54 3.8084 3.1083 746934.94 0.0000 0.00 0.0000
Node10.1 1024.3000 1019.8833 1021.1740 13 45 1.4906 3.1280 385464.08 0.0000 0.00 0.0000
Node23 1023.0000 1021.5000 1021.5000 0 0 0.0000 1.5000 12.5660 0.0000 0.00 0.0000
Node24 1023.0000 1019.8000 1019.8000 0 0 0.0000 3.2000 12.5660 0.0000 0.00 0.0000

Table E10 - CONDUIT SUMMARY STATISTICS
Note: The peak flow may be less than the design flow and the conduit may still surcharge because of the downstream boundary conditions.
* denotes an open conduit that has been overtopped
* this is a potential source of severe errors

Conduit Maximum Maximum Time Maximum Time Ratio of Maximum Water Ratio
Design Design Vertical Computed of Computed of Max. to Elev at Pipe Ends d/D
Conduit Flow Velocity Depth Flow Occurrence Velocity Occurrence Design Design Dwnstrm US DS
Name (cfs) (ft/s) (in) (cfs) Hr. Min. (ft/s) Hr. Min. Flow (ft) (ft)
Link2 73.8984 7.2449 34.0000 44.2204 12 43 4.7580 12 43 0.5984 1020.558 1018.959 0.903 0.550

Node17	Node5	11.2839	46139.9703
Node18	Node2	10.2962	165927.194
Node10.1	Node21	61.2965	1155029.55
Node21	Node22	23.9062	864101.308
Node11	Node21	5.7839	40972.4733
Node4	Node2	9.8724	444470.708
Node10	Node2	44.4922	242421.027
Node16	Node18	1.6792	35161.7605
Node2	Node12	-0.2160	-4449.0037

Node16	24.9482	0.0325	0.0006	4231.6625	0.0000	4256.6107	74580.7555	0
Node17	-0.8614	-0.0007	0.0000	0.0007	0.0000	-0.6607	92279.9708	0
Node18	-3.6806	-0.0001	0.0001	13.4669	0.0000	9.8589	70313.4701	0
Node11.1	-1.6897	-0.0021	0.0000	0.0019	0.0000	-1.6878	81943.1870	47
Node21	-319.4622	-0.0140	0.0079	371687.4036	0.0000	371367.9413	2099566.052	100
Node22	-145.3802	-0.0051	0.0036	1897415.747	0.0000	1897270.366	1897269.878	0
Node10.1	287.0942	0.0016	0.0071	103906.2867	0.0000	104196.3510	2414255.559	0
Node23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0
Node24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0

```

#####
# Table E16. New Conduit Information Section
# Conduit Invert (IE) Elevation and Conduit #
# Maximum Water Surface (WS) Elevations
#####

```

The total continuity error was 1259.5 cubic feet
The remaining total volume was 4.02937E+06 cubic feet
Your mean node continuity error was Excellent
Your worst node continuity error was Excellent

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
Link2	Node3	Node2	1018.	1017.	1021.	1019.	H Ellipse
Link4	Node6	Node6	1022.	1022.	1023.	1023.	Circular
Link5	Node7	Node7	1021.	1021.	1023.	1023.	Circular
Link6	Node7	Node8	1021.	1021.	1022.	1022.	Circular
Link7	Node8	Node9	1021.	1021.	1022.	1022.	Circular
Link9	Node10	Node2	1024.	1024.	1018.	1018.	Trapezoid
Link12	Node15	Node13	1023.	1022.	1023.	1023.	Circular
Link13	Node13	Node6	1022.	1022.	1023.	1023.	Circular
Link15	Node18	Node5	1023.	1023.	1023.	1023.	Circular
Link16	Node5	Node3	1023.	1022.	1025.	1023.	Circular
203.1	Node1	Node2	1025.	1024.	1027.	1025.	Circular
203.2	Node1	Node2	1025.	1024.	1027.	1025.	Circular
ditch1	Node4	Node15	1024.	1023.	1023.	1023.	Trapezoid
250.1	Node10.1	Node21	1018.	1018.	1021.	1020.	H Ellipse
250.2	Node10.1	Node21	1017.	1016.	1021.	1020.	H Ellipse
263.1	Node21	Node22	1014.	1014.	1020.	1020.	H Ellipse
264.1	Node11.1	Node21	1022.	1022.	1024.	1023.	Circular
orifice 5	Node4	Node2	1019.	1019.	1022.	1020.	Circ Orif
orifice	Node10	Node3	1019.	1019.	1022.	1021.	Circ Orif
or 1	Node16	Node18	1023.	1023.	1025.	1023.	Circ Orif

Table E19 - Junction Inflow & Outflow Listing
Units are either ft^3 or m^3
depending on the units in your model.

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inflow to Node	Inflow through Outfall	RNF Layer Inflow to Node	Inflow from 2D Layer	Evaporation from Node	Basin Inflow	Infill	
Node1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	166365.1159	0.0000	0.0000	0.0000	0.00
Node2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	398074.0095	0.0000	0.0000	0.0000	0.00
Node4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	461041.5548	0.0000	0.0000	0.0000	0.00
Node5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	171776.3925	0.0000	0.0000	0.0000	0.00
Node10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	345082.5383	0.0000	0.0000	0.0000	0.00
Node12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	29847.7193	0.0000	0.0000	0.0000	0.00
Node16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	39414.8883	0.0000	0.0000	0.0000	0.00
Node17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	46139.5519	0.0000	0.0000	0.0000	0.00
Node11.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	40969.9308	0.0000	0.0000	0.0000	0.00
Node21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	39461.7971	0.0000	0.0000	0.0000	0.00
Node22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.033E+06	0.0000	0.0000	0.0000	0.00
Node10.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.259E+06	0.0000	0.0000	0.0000	0.00

```

=====
Table E18 - Junction Continuity Error. Division by Volume added 11/96
=====
Continuity Error = Net Flow + Beginning Volume - Ending Volume
Total Flow = (Beginning Volume + Ending Volume)/2
Net Flow = Node Inflow - Node Outflow
Total Flow = absolute (Inflow + Outflow)
Intermediate column is a judgement on the node continuity error.
Excellent < 1 percent Great 1 to 2 percent Good 2 to 5 percent
Fair 5 to 10 percent Poor 10 to 25 percent Bad 25 to 50 percent
Terrible > 50 percent
=====

```

```

=====
Table E20 - Junction Flooding and Volume Listing.
=====
The maximum volume is the total volume in the node including the volume in the flooded storage area. This is the max volume at any time. The volume in the flooded storage area is the total volume above the ground elevation, where the flooded pond storage area starts.
The fourth column is instantaneous, the fifth is the sum of the flooded volume over the entire simulation.
Units are either ft^3 or m^3 depending on the units.
=====

```

Junction Name	Continuity Error	Remaining Volume	Beginning Volume	Net Flow	Total Flow	Failed to Converge
Node1	22.2004	0.0067	0.0006	426.7966	0.0000	448.9970 332303.0821 16628
Node2	1322.1137	0.0651	0.0328	135997.534	0.0000	1359319.647 1355325.577 16937
Node3	3.7620	0.0005	0.0001	28.6549	0.0000	32.4168 68416.5926 0
Node4	119.3130	0.0131	0.0030	16490.3489	0.0000	16609.6619 905554.3517 0
Node5	-1.3488	-0.0008	0.0000	0.0203	0.0000	-1.3285 162583.8369 0
Node6	-4.8192	-0.0030	0.0001	0.0289	0.0000	-4.7903 162581.2041 15
Node7	-5.3317	-0.0033	0.0000	0.0339	0.0000	-5.2977 162596.5678 0
Node8	-6.3488	-0.0039	0.0002	0.0450	0.0000	-6.3037 162822.1054 0
Node9	-56.6285	-0.0149	0.0014	253163.1058	0.0000	253106.4773 253105.0049 0
Node10	35.5621	0.0052	0.0009	2600.7090	0.0000	2636.2710 687511.1205 0
Node12	-9.0330	-0.0192	0.0002	25408.1376	0.0000	25399.1046 34297.3072 0
Node13	-1.1954	-0.0014	0.0000	0.0005	0.0000	-1.1949 1.1348 0
Node15	-0.0009	0.0000	0.0000	0.0009	0.0000	0.0000 0.0000 0

Junction Name	Surcharged Time (min)	Flooded Time (min)	Flooded Volume	Maximum Volume of 1D-System	Volume Pond of 1D-System
Node1	0.000	0.000	0.000	6.94E+04	0.000
Node2	0.000	0.000	0.000	1.354E+06	0.000
Node3	0.000	0.000	0.000	2.491E+03	0.000
Node4	0.000	0.000	0.000	3.130E+05	0.000
Node5	0.000	0.000	0.000	12.9	0.000
Node6	0.000	0.000	0.000	14.8	0.000
Node7	0.000	0.000	0.000	18.5	0.000
Node8	0.000	0.000	0.000	16.7	0.000
Node9	0.000	0.000	0.000	2.531E+04	0.000
Node10	0.000	0.000	0.000	1.290E+05	0.000
Node12	5.867E+03	0.000	0.000	2.615E+04	0.000
Node13	0.000	0.000	0.000	7.56	0.000
Node15	0.000	0.000	0.000	0.000	0.000
Node16	6.453E+03	0.000	0.000	2.362E+04	0.000
Node17	21.3	0.000	0.000	26.7	0.000

```

=====
# Table E21. Continuity balance at the end of the simulation
# Junction Inflow, Outflow or Street Flooding
# Error = Inflow + Initial Volume - Outflow - Final Volume
=====
Inflow Junction Volume,ft^3
Average Inflow, cfs
Node1 166375.8881 0.4279
Node2 398083.1052 1.0239
Node4 461083.6434 1.1859
Node9 171791.5462 0.4419
Node10 345090.0937 0.8876
Node12 29847.3034 0.0768
Node16 39414.8883 0.1014
Node17 46140.0005 0.1187
Node11.1 40970.7137 0.1054
Node21 39462.7167 0.1015
Node22 1.0332E+06 2.6373
Node10.1 1.2592E+06 3.2388
=====
Outflow Junction Volume,ft^3
Average Outflow, cfs
Node1 166375.8881 0.4279
Node2 398083.1052 1.0239
Node4 461083.6434 1.1859
Node9 171791.5462 0.4419
Node10 345090.0937 0.8876
Node12 29847.3034 0.0768
Node16 39414.8883 0.1014
Node17 46140.0005 0.1187
Node11.1 40970.7137 0.1054
Node21 39462.7167 0.1015
Node22 1.0332E+06 2.6373
Node10.1 1.2592E+06 3.2388
=====
Initial system volume = 0.0000 Cu Ft
Total system inflow volume = 4.03054E+06 Cu Ft
Inflow + Initial volume = 4.03054E+06 Cu Ft
Total system outflow = 0.0000 Cu Ft
Volume left (Final volume) = 4.02937E+06 Cu Ft
Evaporation = 0.0000 Cu Ft
Basin Infiltration = 0.0000 Cu Ft
Outflow + Final Volume = 4.02937E+06 Cu Ft
=====
Total Model Continuity Error
Error in Continuity, Percent = 0.0289
=====

```

```

| Error in Continuity, ft^3 = 1164.1912 |
| + Error means a continuity loss, - a gain |
=====

```

```

=====
# Simulation Specific Information
=====
Number of Input Conduits..... 17 Number of Simulated Conduits..... 38
Number of Natural Channels..... 0 Number of Junctions..... 22
Number of Storage Junctions..... 12 Number of Weirs..... 16
Number of Orifices..... 3 Number of Pumps..... 0
Number of Free Outfalls..... 2 Number of Tide Gate Outfalls..... 0
=====
| Average % Change in Junction or Conduit is defined as:
| Conduit % Change ==> 100.0 ( Q(n+1) - Q(n) ) / Q(n)
| Junction % Change ==> 100.0 ( Y(n+1) - Y(n) ) / Y(n)
=====
The Conduit with the largest average change was..... Link5 with 0.001 percent
The Junction with the largest average change was..... Node21 with 0.003 percent
The Conduit with the largest sinuosity was..... 263.1 with 73.269
=====

```

```

=====
# Table E22. Numerical Model Judgment section #
# Maximum Hydraulic Grade Line, #
# Out Conduit Sizes and Maximum Flow #
=====
Overall error was (minimum of Table E18 & E21) 0.0289 percent
Worst nodal error was in node Node2 with 0.0975 percent
Of the total inflow this loss was 0.0328 percent
Your overall continuity error was Excellent
Efficiency of the simulation 8.11
Most Number of Non Convergences at one Node 16937.
Total Number Non Convergences at all Nodes 33727.
Total Number of Nodes with Non Convergences 5.
=====

```

```

=====
# Table E23. New Basin Design Information #
# Maximum Hydraulic Grade Line, #
# Out Conduit Sizes and Maximum Flow #
=====
A) Resize d/s Pipes based on given HGL
B) Resize Basin based on given HGL
C) Resize d/s Pipes and Basin based on HGL and max discharge
D) Resize d/s pipes based on given max discharge
=====
Basin Name Type Max-HGL Conduit Depth Width Barrels Max-Flow
(ft) (ft) (ft) (ft) (ft^3/s)
=====
=====> Hydraulic model simulation ended normally.
=====> XP-SWMM Simulation ended normally.
=====> Your input file was named : C:\Temp\1D\Existing Condition_10\Existing Condition_10.DAT
=====> Your output file was named : C:\Temp\1D\Existing Condition_10\Existing Condition_10.out
=====
# XPSWMM\XPSTORM Simulation Date and Time Summary
=====
| Starting Date... February 17, 2021 Time... 18:50:39.755 |
| Ending Date... February 17, 2021 Time... 18:52:10.210 |
| Elapsed Time... 2.02656 minutes or 121.59375 seconds |
=====

```

Current Directory: C:\Temp\1D\Existing Condition_100 B-B
Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_XEngine\SWMMEN-2.EXE
Input File: C:\Temp\1D\Existing Condition_100-Y\Existing Condition_100-Y.XP

xpswmm
Storm and Wastewater Management Model
Developed by Innovyze.
Last Update: Dec 01 2020
Interface Version: 2020.1
Engine Version: 12.0
Data File Version: 12.62

Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_XEngine\SWMMEN-2.EXE

Input and Output file names by Layer

Input File to Layer # 1 JIN.US
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 JOT.US
Output File to Layer # 2 JOT.US

Configuration Parameters
Configuration Parameters, both those that are hardwired
and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in
the engine as defaults. The remaining in UPPERCASE
have been added to the simulation in the Configuration->
Configuration Parameters dialog or as Engine Defaults in
the SWMXP.INI file.
Consult the Help File for the specific meaning/purpose
of any particular parameter.
Note:
The second column denotes the value of the parameter.

Powerstation 0.0000 1 2
Sperv 0.0000 0 4
Soldegg 0.0000 0 7
\$as 0.0000 0 11
\$oflat 0.0000 0 21
\$oldomaga 0.0000 0 24
\$oldvol 0.0000 1 28
\$implicit 0.0000 1 29
\$oldhot 0.0000 1 31
\$oldscs 0.0000 0 33
\$lflood 0.0000 1 40
\$nokeys 0.0000 0 42
\$zzero 0.0000 0 55
\$oldx2 0.0000 2 59
\$storage2 0.0000 3 62
\$oldhot1 0.0000 1 63
\$spumpwt 0.0000 1 70
\$oldscs 0.0000 1 77
\$sexout 0.0000 0 97
\$spatial = 0.90 0.9000 5 124
\$djref = -1.0 -0.1000 3 143
\$weirflen = 50 50.0000 1 153
\$oldbrnd 0.0000 1 154
\$noqretev 0.0000 1 161

O(218.2) office
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(261.1) seminele
W(263.1) bikepath
W(264.1) lacy
W(279.1) south
W(281.1) south1
W(281.2) dway 2
W(282.1) driveway
W(285.1) sem2

Parameter Values on the Tapes Common Block. These are the
values read from the data file and dynamically allocated
by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 13
Number of Channel/Pipes in the Runoff Block (NG).... 0
Runoff Water quality constituents (NRG)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 38
Number of Groundwater Subcatchments in Runoff (NGW) 0
Number of Interface locations for all Blocks (NIE).... 38
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG)... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4399
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage Junctions in Extran (NVSE)..... 12
Number of Time history data points in Extran (NVTAL) 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 13
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTCC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 38
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovyze

RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
for example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75

\$ncmid 0.0000 0 164
\$nev_n1_97 0.0000 2 290
SCSIDEPTH=ON 0.0000 1 293
\$best97 0.0000 1 294
\$nevbound 0.0000 1 295
\$qq_tsl = 0.01 0.0001 1 316
\$nev_storage 0.0000 1 322
\$old_iteration 0.0000 1 333
MINLEN=6 6.0000 1 346
\$review_elevation 0.0000 1 383
\$use_half_volume 0.0000 1 385
VERT_WALLS=ON 0.0000 1 389
\$min_ts = 1.0 1.0000 1 407
\$design_restart = on 0.0000 1 412
\$sczn_value=1.e05 0.0000 1 415
SUBCATCHMENT_RES=ON 0.0000 1 419
\$relax_depth = on 0.0000 1 427
\$saveallpts = on 0.0000 1 434
PUMP_NEGHD=ON 0.0000 1 437
\$channel_geometry=1 0.0000 1 456
PROJUNITS = US 0.0000 1 462

The XPSWMM/XPSTORM engine internally uses object IDs
instead of full object names to represent objects.
Included below is a table of these IDs along with the
name of the object that ID corresponds to.

Table with 2 columns: Object Number, Object Name. Lists various objects like Node1-Node18, Link4-Link9, and various catchment and office objects.

Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Rainage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments

A1
RUNOFF JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - MINL..... 0
Time ZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds).... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAy
Decc is read in for each subcatchment
REGEN = 0.01000
Rainage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 241
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0=Yes, 1=No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
Total rainfall for gage # 1 is 6.6600 inches
Data Group F1 #

Evaporation Rate (in/day) #

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Per- son Width (ft)	Area (ac)	Imperv %	Deptrs ft/ft	Deprs ft/ft	Print sion Zero n"	Storge n"	Strge n"	Deten n"	
1	Node10.1#1	Node10.1	1,000.0	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1,000.0	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1,000.0	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1,000.0	18.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1,000.0	48.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1,000.0	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1,000.0	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1,000.0	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1,000.0	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1,000.0	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1,000.0	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1,000.0	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1,000.0	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data #
#####

Infiltration Type	Infl #1(#5)	Infl #2(#6)	Infl #3(#7)	Infl #4(#8)	#
# SCS	-> Comp CN	Time Conc	Shape Factor	Depth or Fraction	#
# SBUH	-> Comp CN	Time Conc	N/A	N/A	#
# Green Ampt	-> Suction	Hydr Cond	Initial MD	N/A	#
# Horton	-> Max Rate	Min Rate	Decay Rate (1/sec)	Max. Infiltr. Volume	#
# Proportional	-> Constant	N/A	N/A	N/A	#
# Initial/Cont Loss	-> Initial	Continuing	N/A	N/A	#
# Initial/Proportional	-> Initial	Constant	N/A	N/A	#
# Laurenson Parameters	-> B Value	Pervious "n"	Impervious Cont	Exponent	#
# Rational Formula	-> Tc Method	Flow Path Length	Flow Path Slope	Roughness or Retardance	#
#	(#1 -#4 is Impervious Data / #5 -#8 is Pervious Data)	#	#	#	#
#	Rational Formula Tc Method: 1 = Constant	#	#	#	#
#	2 = Friend's Equation	#	#	#	#
#	3 = Kinematic Wave	#	#	#	#
#	4 = Alameda Method	#	#	#	#
#	5 = Izzard's Formula	#	#	#	#
#	6 = Kerby's Equation	#	#	#	#
#	7 = Kirpich's Equation	#	#	#	#
#	8 = Bransby-Williams Equation	#	#	#	#
#	9 = Federal Aviation Authority Equation	#	#	#	#

Subcatchment Number	Infl Name	#1	#2	#3	#4	#5	#6	#7	#8
1	Node10.1#1	78.000	0.838	484.000	0.200				
2	Node10#1	79.000	0.841	484.000	0.200				
3	Node10#2	72.000	0.405	484.000	0.200				
4	Node1#1	84.000	0.338	484.000	0.200				
5	Node4#1	88.000	0.288	484.000	0.200				
6	Node16#1	91.000	0.322	484.000	0.200				
7	Node17#1	75.000	0.433	484.000	0.200				
8	Node9#1	86.000	0.212	484.000	0.200				

Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11.1 No Tributary Channel/Pipes
Tributary Subareas..... Node11.1#1
Node21 No Tributary Channel/Pipes
Tributary Subareas..... Node21#1
Node22 No Tributary Channel/Pipes
Tributary Subareas..... Node22#1

* Hydrographs will be stored for the following 12 INLETS *
Node10.1 Node10 Node1
Node4 Node16 Node17
Node9 Node2 Node12
Node11.1 Node21 Node22

* Quality Simulation not included in this run *

Precipitation Interface File Summary *
Number of precipitation station..... 1 *

Location Station Number
.....
1. 1

XXX End of Header Section XXX

Entry made to the HYDRAULIC Layer of XP-SWMM #
Last Updated in June, 2014 by Innovoze #
#####

Entry made to the Runoff Layer(Block) of SWMM #
Last Updated June, 2014 by Innovoze #
#####

| RUNOFF TABLES IN THE OUTPUT FILE. |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| for example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Rainage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |

9	Node2#1	78.000	0.258	484.000	0.200
10	Node12#1	76.000	0.312	484.000	0.200
11	Node11.1#1	76.000	0.320	484.000	0.200
12	Node21#1	76.000	0.252	484.000	0.200
13	Node22#1	78.000	0.617	484.000	0.200

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Gage Name	Infiltration No	Type	Routing Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

Total Number of Subcatchments..... 13
Total Tributary Area (acres)..... 568.51
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 568.51
Total Width (feet)..... 13.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA #
#####

Default Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infl #
10 - 2nd infl 11 - 3rd infl #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node10.1 No Tributary Channel/Pipes
Tributary Subareas..... Node10.1#1
Node10 No Tributary Channel/Pipes
Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Tributary Subareas..... Node4#1
Node16 No Tributary Channel/Pipes
Tributary Subareas..... Node16#1
Node17 No Tributary Channel/Pipes
Tributary Subareas..... Node17#1
Node9 No Tributary Channel/Pipes
Tributary Subareas..... Node9#1

RUNOFF JOB CONTROL #
#####

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 0
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMIN..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control..... 0
Runoff graph plot control..... 0
Runoff output print control..... 0
Limit number of groundwater convergence messages to 10000

Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)..... 60.0
Simulation length is..... 72.0 Hours

If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = 0.01000

Raingage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values..... 241
KINC - Rainfall values(pairs) per line..... 10
KPRINT - Print rainfall(0=Yes, 1=No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 6.6600 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Per-Width (ft)	Area (ac)	Deprs cent	Deprs ft/ft	Print Zero	Storge	Storge	Deten		
1	Node10.1#1	Node10.1	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1.0000	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1.0000	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node4#1	Node4	1.0000	19.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1.0000	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1.0000	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1.0000	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

```

#####
# Table R2. SUBCATCHMENT DATA
# Infiltration or Time of Concentration Data
#
# Infiltration Type Infi #1(#5) Infi #2(#6) Infi #3(#7) Infi #4(#8) #
# SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
# SBUH -> Comp CN Time Conc N/A #
# Green Ampt -> Suction Hydr Cond Initial MD N/A #
# Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
# Proportional -> Constant N/A N/A #
# Initial/Cont Loss -> Initial Continuing N/A N/A #
# Initial/Proportional -> Initial Constant N/A N/A #
# Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
# Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance #
# #1 - #4 is Impervious Data / #5 - #8 is Pervious Data)
# Rational Formula To Method: 1 = Constant
# 2 = Friend's Equation
# 3 = Kinematic Wave
# 4 = Alameda Method
# 5 = Izzard's Formula
# 6 = Kerby's Equation
# 7 = Kirpich's Equation
# 8 = Bransby Williams Equation
# 9 = Federal Aviation Authority Equation
#####

```

Subcatchment Number	Name	Infi #1	Infi #2	Infi #3	Infi #4	Infi #5	Infi #6	Infi #7	Infi #8
1	Node10.1#1	78.000	0.838	484.000	0.200				
2	Node10#1	79.000	0.375	484.000	0.200				
3	Node10#2	72.000	0.465	484.000	0.200				
4	Node4#1	84.000	0.338	484.000	0.200				
5	Node4#1	88.000	0.288	484.000	0.200				
6	Node16#1	91.000	0.322	484.000	0.200				
7	Node17#1	75.000	0.433	484.000	0.200				
8	Node9#1	86.000	0.212	484.000	0.200				
9	Node2#1	76.000	0.258	484.000	0.200				
10	Node12#1	76.000	0.312	484.000	0.200				
11	Node11.1#1	76.000	0.320	484.000	0.200				
12	Node21#1	76.000	0.252	484.000	0.200				
13	Node22#1	78.000	0.617	484.000	0.200				

```

#####
# Table R3. SUBCATCHMENT DATA
# Rainfall and Infiltration Database Names #
#####
Subcatchment Gage Infiltration Routing

```

* Hydrographs will be stored for the following 12 INLETS *

```

Node10.1 Node10 Node1
Node4 Node16 Node17
Node9 Node2 Node12
Node11.1 Node21 Node22

```

* Quality Simulation not included in this run *

```

* Precipitation Interface File Summary *
* Number of precipitation station.... 1 *

```

Location Station Number

```

1. 1
A1

```

```

*****
| HYDRAULICS TABLES IN THE OUTPUT FILE |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers, |
| for example: search for Table E20 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table E1 - Basic Conduit Data |
| Table E2 - Conduit Factor Data |
| Table E3a - Junction Data |
| Table E3b - Junction Data |
| Table E4 - Conduit Connectivity Data |
| Table E4a - Dry Weather Flow Data |
| Table E4b - Real Time Control Data |
| Table E5 - Junction Time Step Limitation Summary |
| Table E5a - Conduit Explicit Condition Summary |
| Table E6 - Final Model Condition |
| Table E7 - Iteration Summary |
| Table E8 - Junction Time Step Limitation Summary |
| Table E9 - Junction Summary Statistics |
| Table E10 - Conduit Summary Statistics |
| Table E11 - Area assumptions used in the analysis |
| Table E12 - Mean conduit information |
| Table E13 - Channel losses(H) and culvert info |
| Table E13a - Culvert Analysis Classification |
| Table E14 - Natural Channel Overbank Flow Information |
| Table E14a - Natural Channel Encroachment Information |
| Table E14b - Floodplain Mapping |
| Table E15 - Spreadsheet Info List |
| Table E15a - Spreadsheet Read List |
| Table E16 - New Conduit Output Section |
| Table E17 - Pump Operation |
| Table E18 - Junction Continuity Error |
| Table E19 - Junction Inflow & Outflow Listing |
| Table E20 - Junction Flooding and Volume List |
| Table E21 - Continuity balance at simulation end |
| Table E22 - Model Judgement Section |
*****

```

Time Control from Hydraulics Job Control

Number	Name	No	Type	Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node4#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

```

Total Number of Subcatchments.... 13
Total Tributary Area (acres).... 568.51
Impervious Area (acres)..... 0.00
Previous Area (acres)..... 568.51
Total Width (feet)..... 13.00
Impervious Area (%)..... 0.00

```

```

#####
# SUBCATCHMENT DATA #
# Default, Ratio values for subcatchment data #
# Used with the calibrate node in the runoff. #
# 1 - width 2 - area 3 - impervious % #
# 4 - slope 5 - imp "n" 6 - perv "n" #
# 7 - imp ds 8 - perv ds 9 - 1st inffi #
# 10 - 2nd inffi 11 - 3rd inffi #
#####
Column 1 2 3 4 5 6 7 8 9 10 11
Default 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Ratio 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

```

```

* Arrangement of Subcatchments and Channel/Pipes *
-----
Inlet
Node10.1 No Tributary Channel/Pipes
Tributary Subareas..... Node10.1#1
Node10 No Tributary Channel/Pipes
Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Tributary Subareas..... Node4#1
Node16 No Tributary Channel/Pipes
Tributary Subareas..... Node16#1
Node17 No Tributary Channel/Pipes
Tributary Subareas..... Node17#1
Node9 No Tributary Channel/Pipes
Tributary Subareas..... Node9#1
Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11.1 No Tributary Channel/Pipes
Tributary Subareas..... Node11.1#1
Node21 No Tributary Channel/Pipes
Tributary Subareas..... Node21#1
Node22 No Tributary Channel/Pipes
Tributary Subareas..... Node22#1

```

```

Year..... 2014 Month..... 1
Day..... 1 Hour..... 0
Minute..... 0 Second..... 0

```

Control information for simulation

```

Integration cycles..... 38880
Length of integration step is..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL) 0
Use U.S. customary units for I/O... 0
Printing starts in cycle..... 1
Intermediate printout intervals of. 500 cycles
Intermediate printout intervals of. 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of.. 83.33 minutes
Hot start file parameter (REDO)..... 0
Initial time..... 0.00 hours

```

```

Iteration variables: Flow Tolerance. 0.00010
Head Tolerance. 0.00050
Minimum depth (m or ft)..... 0.00001
Underrelaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K. 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.000
Ponding Area Exponent..... 1.00000
Minimum Orifice Length..... 1000.00 feet.
NJSW input hydrograph junctions..... 0
or user defined hydrographs....

```

```

*****
| Table E1 - Conduit Data |
*****

```

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef. (ft)	Hazen Slopes (ft)	Depth	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	100.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
12	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
13	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
14	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
15	250.2	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
16	263.1	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
17	264.1	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		
Total length of all conduits 883.0000 feet									

```

*****
| Table E2 - Conduit Factor Data |
*****

```

Table with columns: Conduit, Number, Entrance, Exit, Exp., Con., Weighing, Roughness, Which, Sediment, Flow, Name of Barrels, Loss, Loss, Coef, Coefficient, Parameter, Factor n, Changes, Depth, Routing. Contains hydraulic data for various conduit links and nodes.

if there are messages about (sqrt(g*d)/d)/(dx, d) | |
| the sqrt(wave celerity)*time step/conduit length |
| in the output file all it means is that the
| program will lower the internal time step to
| satisfy this condition (explicit condition). |
| You control the actual internal time step by |
| using the minimum courant time step factor in the |
| HYDRAULICS job control. The message put in words |
| states that the smallest conduit with the fastest |
| velocity will control the time step selection. |
| You have further control by using the mode |
| conduit option in the HYDRAULICS Job Control. |

Table with columns: Conduit Name, Courant Ratio. Lists conduit names and their corresponding Courant ratios, with warning messages for some values.

Full pipe or open conduit volume
Input full depth volume..... 8.9576E+03 cubic feet

Table E3a - Junction Data

Table with columns: Inp Num, Junction Name, Ground Elevation, Invert Elevation, Qint Initial Flow (cfs), Intial Interf. Flow (%). Lists junction data for nodes 9 through 17.

Storage Junction Data

MAXIMUM OR PEAK OR CROWN DEPTH
STORAGE JUNCTION JUNCTION CONSTANT SURFACE CONSTANT VOLUME ELEVATION STARTS
NUMBER OR NAME TYPE AREA (FT2) (CUBIC FEET) (FT) FROM

Table with columns: Node, Stage/Area, Stage/Area, Stage/Area, Stage/Area, Node Invert. Lists storage junction data for nodes 9 through 17.

Variable storage data for node | Node1

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 1.

Variable storage data for node | Node2

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 2.

Variable storage data for node | Node3

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 3.

Table with columns: Node, Node. Lists node data for nodes 1 through 22.

Table E3b - Junction Data

Table with columns: Inp Num, Junction Name, X Coord., Y Coord., Manhole, Type of Inlet, Maximum Capacity, Pavement Shape, Slope. Lists junction data for nodes 1 through 22.

Table E4 - Conduit Connectivity

Table with columns: Input Number, Conduit Name, Upstream Node, Downstream Node, Upstream Elevation, Downstream Elevation. Lists conduit connectivity for nodes 1 through 8.

Table with columns: Node, Node. Lists node data for nodes 4 through 8.

Variable storage data for node | Node4

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 4.

Variable storage data for node | Node9

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 9.

Variable storage data for node | Node10

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 10.

Variable storage data for node | Node12

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 12.

Variable storage data for node | Node16

Table with columns: Data Point, Elevation ft, Depth ft, Area ft², Volume ft³, Area acres, Volume ac-ft. Lists variable storage data for Node 16.

Node15	71.77	100.00	0.0
Node16	61.71	100.00	0.0
Node17	1.91	4.77	10840.0
Node18	2.71	6.77	0.0
Node11.1	100.00	100.00	0.0
Node21	84.07	100.00	0.0
Node22	100.00	100.00	0.0
Node10.1	93.63	100.00	0.0
Node23	100.00	100.00	0.0
Node24	100.00	100.00	0.0

The junction requiring the smallest time step was...Node13

Table E5a - Conduit Explicit Condition Summary

Time step =	Conduit Length	Velocity + sqrt(g*depth)
Conduit Implicit Condition Summary		
Time step =	Conduit Length	Velocity

The 3rd column is the Explicit time step times the minimum Courant time step factor

Minimum Conduit Time Step in seconds in the 4th column in the list. Maximum possible is 10 * maximum time step

The 5th column is the maximum change at any time step during the simulation. The 6th column is the wobble value which is an indicator of the flow stability.

You should use this section to find those conduits that are slowing your model down. Use modify conduits to alter the length of the slow conduits to make your simulation faster, or change the conduit name to "CHME?????" where "?????" are any characters, this will lengthen the conduit based on the model time step, not the value listed in modify conduits.

Conduit	Time(exp)	Exp*Cmin	Time(inp)	Time(min)	Max Qchange	Wobble	Type of Soln
Link2	5.20	5.20	11.61	514.7	-2.362	3.175	Normal Soln
Link4	1.71	1.71	3.85	0.0	4.850	26.241	Normal Soln
Link5	0.40	0.40	0.67	5921.8	-31.810	450.517	Normal Soln
Link6	2.37	2.37	6.15	0.0	0.967	111.406	Normal Soln
Link7	1.68	1.68	3.89	22.5	1.531	99.852	Normal Soln
Link9	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link12	3.30	3.30	6.97	0.0	-0.383	139.214	Normal Soln
Link13	6.82	6.82	20.79	0.0	0.423	269.539	Normal Soln
Link15	1.07	1.07	2.21	0.0	-0.350	51.162	Normal Soln
Link16	0.73	0.73	1.17	6.0	1.998	118.826	Normal Soln
203.1	2.29	2.29	4.86	0.0	0.086	3.418	Normal Soln
203.2	2.37	2.37	5.24	0.0	0.215	1.878	Normal Soln
ditch1	63.18	63.18	100.00	0.0	0.001	0.017	Normal Soln
250.1	3.34	3.34	7.85	0.0	-0.019	5.336	Normal Soln
250.2	3.27	3.27	8.27	0.0	-0.019	4.551	Normal Soln
263.1	1.98	1.98	5.37	15.0	0.013	94.476	Normal Soln
264.1	2.89	2.89	7.06	0.0	0.019	3.888	Normal Soln
orifice 5	51.77	51.77	100.00	0.0	-0.023	3.533	Normal Soln
orifice 6	62.59	62.59	100.00	0.0	-0.015	5.521	Normal Soln
ot 1	64.36	64.36	100.00	0.0	-0.058	18.020	Normal Soln

The conduit with the smallest time step limitation was Link5
The conduit with the largest wobble was Link5
The conduit with the largest flow change in any consecutive time step was Link5

* End of time step DO-loop in Runoff *
Final Date (Mo/Day/Year) = 1/4/2014
Total number of time steps = 4340
Final Julian Date = 2014004
Final time of day = 0 seconds.
Final time of day = 0.00 hours.
Final running time = 72,000 hours.
Final running time = 3,000 days.

* Extrapolation Summary for Watersheds *
* Explains the number of time steps and iterations *
* used in the solution of the subcatchments. *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls *

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node10.1#1	0	0	Node10#1	0	0	Node10#2	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node7#1	0	0	Node6#1	0	0	Node2#1	0	0
Node12#1	0	0	Node11.1#1	0	0	Node21#1	0	0
Node22#1	0	0						

Rainfall input summary from Runoff Continuity Check

Total rainfall read for gage # 1 is 6.6600 in
Total rainfall duration for gage # 1 is 1434.02 minutes

* Table R5. CONTINUITY CHECK FOR SURFACE WATER *
* Any continuity error can be fixed by lowering the wet and transition time step. The transition time should not be much greater than the wet time step. *

Inches over	cubic feet	Total Basin
Total Precipitation (Rain plus Snow)	1.374418E+07	6.660
Total Infiltration	4.935337E+06	2.392
Total Evaporation	2.055128E+05	0.100
Surface Runoff from Watersheds	8.602716E+06	4.169
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Previous Area...	4.935337E+06	2.392
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	1.374357E+07	6.660
Total Precipitation + Initial Storage.	1.374418E+07	6.660

The error in continuity is calculated as
* Precipitation - Initial Snow Cover *
* Infiltration - *
* Evaporation - Snow removal - *
* Surface Runoff from Watersheds - *
* Water in Surface Storage - *
* Water remaining in Snow Cover *
* Precipitation + Initial Snow Cover *
Percent Continuity Error..... 0.0045

* Table R6. Continuity Check for Channel/Pipes *
* You should have zero continuity error *
* if you are not using runoff hydraulics *

Inches over	cubic feet	Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	8.602716E+06	4.169
Groundwater Subsurface Inflow or Diversion.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Groundwater Flow Diverted Out of Network.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	8.602716E+06	4.169
Initial Storage + Inflow.....	8.602716E+06	4.169
Final Storage + Outflow + Diverted GW.....	8.602716E+06	4.169

* Final Storage + Outflow + Evaporation - *
* Watershed Runoff - Groundwater Inflow - *
* Initial Channel/Pipe Storage *
* Final Storage + Outflow + Evaporation *
Percent Continuity Error..... 0.0000

Table R9. Summary Statistics for Subcatchments

Note: Total Runoff Depth includes pervious & impervious areas.
Pervious and Impervious Runoff Depth is only the runoff from those two areas.
For catchments receiving redirected flow, this flow will only be shown if the flow is not directed directly to the outlet. Flow that is getting redirected is also listed with the original subcatchment.

Subcatchment.....	Node10.1#1	Node10#1	Node10#2	Node1#1	Node4#1
Area (acres).....	184.60000	28.60000	26.93000	19.40000	46.70000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in).....	6.66000	6.66000	6.66000	6.66000	6.66000
Max Intensity (in/hr).....	9.62167	9.62167	9.62167	9.62167	9.62167
Pervious Area					
Total Runoff Depth (in)	4.07779	4.18366	3.45721	4.72315	5.16671
Peak Runoff Rate (cfs)	457.29939	115.16548	86.33897	91.72060	255.87516
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Total Area					
Total Runoff Depth (in)	4.07779	4.18366	3.45721	4.72315	5.16671
Peak Runoff Rate (cfs)	457.29939	115.16548	86.33897	91.72060	255.87516
Rational Formula					
Pervious Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000

Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc (mins).....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node16#1	Node17#1	Node9#1	Node2#1	Node12#1
Area (acres).....	3.51000	7.66000	18.65000	63.35000	4.75000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in).....	6.66000	6.66000	6.66000	6.66000	6.66000
Max Intensity (in/hr).....	9.62167	9.62167	9.62167	9.62167	9.62167

Total Runoff Depth (in)	5.50626	3.76433	4.94364	3.86813	3.86812
Peak Runoff Rate (cfs)	19.60046	25.79793	113.68069	285.16537	19.52012
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node11.1#1	Node21#1	Node22#1
Area (acres).....	6.52000	6.28000	151.46000
Percent Impervious.....	0.00000	0.00000	0.00000
Total Rainfall (in).....	6.66000	6.66000	6.66000
Max Intensity (in/hr).....	9.62167	9.62167	9.62167
Pervious Area			
Total Runoff Depth (in)	3.86812	3.86813	4.07779
Peak Runoff Rate (cfs)	26.41041	28.59219	452.24103
Total Impervious Area			
Total Runoff Depth (in)	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000
Impervious Area with depression storage			

Current Directory: C:\Temp\1D\Existing Condition_10
Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_Xengine\SWMMEN-2.EXE
Input File: C:\Temp\1D\Existing Condition_100 B-6\Existing Condition_100 B-6.XP

=====
| xpswmm |
| Storm and Wastewater Management Model |
| Developed by Innovyze. |
=====
| Last Update : Dec 01 2020 |
| Interface Version: 2020.1 |
| Engine Version : 12.0 |
| Data File Version: 12.62 |
=====

Engine Name: C:\PROGRA-1\Innovyze\XPSWMM-3.1_Xengine\SWMMEN-2.EXE

=====
| Input and Output file names by Layer |
=====

Input File to Layer # 1 JIN.US
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 JOT.US
Output File to Layer # 2 JOT.US

=====
| Configuration Parameters |
| Configuration Parameters, both those that are hardwired |
| and those added to the simulation are listed below. |
| Configuration Parameters that start with a \$ are set in |
| the engine as defaults. The remaining in UPPER CASE |
| have been added to the simulation in the Configuration-> |
| Configuration Parameters dialog or as Engine Defaults in |
| the SWMXP.INI file. |
| Consult the Help File for the specific meaning/purpose |
| of any particular parameter. |
| Note: |
| The second column denotes the value of the parameter. |
=====

\$powerstation	0.0000	1	2
\$pen	0.0000	0	4
\$soldeg	0.0000	0	7
\$sas	0.0000	0	11
\$noflat	0.0000	0	21
\$soldoma	0.0000	0	24
\$soldvol	0.0000	1	28
\$simplicit	0.0000	1	29
\$soldhot	0.0000	1	31
\$soldscs	0.0000	0	33
\$flood	0.0000	1	40
\$snokeys	0.0000	0	42
\$szero	0.0000	0	55
\$soldx2	0.0000	2	59
\$storage2	0.0000	3	62
\$soldhot1	0.0000	1	63
\$pumpwt	0.0000	1	70
\$soldscs	0.0000	1	77
\$sexout	0.0000	0	97
\$spatial = 0.90	0.9000	5	124
\$djref = -1.0	-0.1000	3	143
\$weirlen = 50	50.0000	1	153
\$soldbrd	0.0000	1	154
\$snoelev	0.0000	1	161

O(218.2) office
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(261.1) semipath
W(263.1) bikepath
W(264.1) lacy
W(279.1) south
W(281.1) south1
W(281.2) dway 2
W(282.1) driveway
W(285.1) sem2

=====
| Parameter Values on the Tapes Common Block. These are the |
| values read from the data file and dynamically allocated |
| by the model for this simulation. |
=====

Number of Subcatchments in the Runoff Block (NW).... 13
Number of Channel/Pipes in the Runoff Block (NG)... 0
Runoff Water quality constituents (NRG)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH)..... 0
Number of Elements in the Extran Block (NEE)..... 38
Number of Groundwater Subcatchments in Runoff (NGW)... 0
Number of Interface locations for all Blocks (NIE)... 38
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG)... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage Junctions in Extran (NSE)..... 12
Number of Time history data points in Extran (NTVAL) 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 13
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTCC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 38
Number of Plugs in a Storage Treatment Unit..... 1

=====
Entry made to the Runoff Layer(Block) of SWMM #
Last Updated June, 2014 by Innovyze #
=====

=====
| RUNOFF TABLES IN THE OUTPUT FILE |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| for example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
=====

\$sncmid	0.0000	0	164
\$snew_n1_97	0.0000	2	290
\$SCSIADDEPTH=ON	0.0000	1	293
\$sbst97	0.0000	1	294
\$snewbound	0.0000	1	295
\$sq_tkl = 0.01	0.0001	1	316
\$snew_storage	0.0000	1	322
\$sold_iteration	0.0000	1	333
\$MINLEN=6	6.0000	1	346
\$sreview_elevation	0.0000	1	383
\$suse_half_volume	0.0000	1	385
\$VERT_WALLS=ON	0.0000	1	389
\$smin_ts = 1.0	1.0000	1	407
\$sdesign_restart = on	0.0000	1	412
\$szero_value=1.e-05	0.0000	1	415
\$SUBCATCHMENT_RES=ON	0.0000	1	419
\$srelax_depth = on	0.0000	1	427
\$ssavealpts = on	0.0000	1	434
\$PUMP_NEGHD=ON	0.0000	1	437
\$channel_geometry=1	0.0000	1	456
\$PROJUNITS = US	0.0000	1	462

=====
| The XPSWMM/XPSTORM engine internally uses object IDs |
| instead of full object names to represent objects. |
| Included below is a table of these IDs along with the |
| name of the object that ID corresponds to. |
=====

Object Number	Object Name
201	Node1
202	Node2
204	Node3
206	Node4
208	Node5
209	Node6
211	Node7
213	Node8
215	Node9
217	Node10
222	Node12
224	Node13
226	Node15
230	Node16
232	Node17
235	Node18
259	Node11.1
260	Node21
262	Node22
277	Node10.1
278	Node23
280	Node24
205	Link2
210	Link4
212	Link5
214	Link6
216	Link7
219	Link9
225	Link12
226	Link13
231	Link15
233	Link16
C(203.1)	203.1
C(203.2)	203.2
C(223.1)	dlitch1
C(261.1)	250.1
C(261.2)	250.2
C(263.1)	263.1
C(264.1)	264.1
O(207.2)	orifice 5

| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Rainage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |
=====

A1

RUNOFF JOB CONTROL #

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - MINL..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds).... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECA
Decay is read in for each subcatchment
REGEN = 0.0100
Rainage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 482
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0=Yes, 1=No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

=====
Rainfall input summary from Runoff #

Total rainfall for gage # 1 is 13.2000 inches

Data Group F1 #
=====

Evaporation Rate (in/day) #
 #####
 JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

 # Table R1. SUBCATCHMENT DATA #
 #####
 # Physical Hydrology Data #
 #####

Subcatchment Number	Channel Name	Width (ft)	Area (ac)	Per-imperv	Deprs ft/ft	Deprs ft/ft	Print-sion Zero	Storge	Storge	Deten	
1	Node10.1#1	Node10.1	1,000.0	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1,000.0	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1,000.0	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1,000.0	18.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1,000.0	48.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1,000.0	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1,000.0	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1,000.0	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1,000.0	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1,000.0	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1,000.0	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1,000.0	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1,000.0	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

 # Table R2. SUBCATCHMENT DATA #
 #####
 # Infiltration or Time of Concentration Data #
 #####

Infiltration Type	Int #1(#5)	Int #2(#6)	Int #3(#7)	Int #4(#8)	#
# SCS	-> Comp CN	Time Conc	Shape Factor	Depth or Fraction	#
# SBUH	-> Comp CN	Time Conc	N/A	N/A	#
# Green Ampt	-> Suction	Hydr Cond	Initial MD	N/A	#
# Horton	-> Max Rate	Min Rate	Decay Rate (1/sec)	Max. Infiltr. Volume	#
# Proportional	-> Constant	N/A	N/A	N/A	#
# Initial/Cont Loss	-> Initial	Continuing	N/A	N/A	#
# Initial/Proportional	-> Initial	Constant	N/A	N/A	#
# Laurenson Parameters	-> B Value	Pervious "n"	Impervious Cont	Exponent	#
# Rational Formula	-> Tc Method	Flow Path Length	Flow Path Slope	Roughness or Retardance	#
#	(#1 -#4 is Impervious Data / #5 -#8 is Pervious Data)	#	#	#	#
#	Rational Formula Tc Method: 1 = Constant	#	#	#	#
#	2 = Friend's Equation	#	#	#	#
#	3 = Kinematic Wave	#	#	#	#
#	4 = Alameda Method	#	#	#	#
#	5 = Izzard's Formula	#	#	#	#
#	6 = Kerby's Equation	#	#	#	#
#	7 = Kirpich's Equation	#	#	#	#
#	8 = Bransby-Williams Equation	#	#	#	#
#	9 = Federal Aviation Authority Equation	#	#	#	#

Subcatchment Number	Inft #1	Inft #2	Inft #3	Inft #4	Inft #5	Inft #6	Inft #7	Inft #8
1	Node10.1#1	78.000	0.838	484.000	0.200			
2	Node10#1	79.000	0.484	484.000	0.200			
3	Node10#2	72.000	0.405	484.000	0.200			
4	Node1#1	84.000	0.338	484.000	0.200			
5	Node4#1	88.000	0.288	484.000	0.200			
6	Node16#1	91.000	0.322	484.000	0.200			
7	Node17#1	75.000	0.433	484.000	0.200			
8	Node9#1	86.000	0.212	484.000	0.200			

Node2 No Tributary Channel/Pipes
 Tributary Subareas..... Node2#1
 Node12 No Tributary Channel/Pipes
 Tributary Subareas..... Node12#1
 Node11.1 No Tributary Channel/Pipes
 Tributary Subareas..... Node11.1#1
 Node21 No Tributary Channel/Pipes
 Tributary Subareas..... Node21#1
 Node22 No Tributary Channel/Pipes
 Tributary Subareas..... Node22#1

.....
 * Hydrographs will be stored for the following 12 INLETS *

 Node10.1 Node10 Node1
 Node4 Node16 Node17
 Node9 Node2 Node12
 Node11.1 Node21 Node22

.....
 * Quality Simulation not included in this run *

 # Precipitation Interface File Summary *
 * Number of precipitation station..... 1 *

Location Station Number

 1. 1

 XXX End of Header Section XXX

 # Entry made to the HYDRAULIC Layer of XP-SWMM #
 # Last Updated in June, 2014 by Innovoze #
 #####

 # Entry made to the Runoff Layer(Block) of SWMM #
 # Last Updated June, 2014 by Innovoze #
 #####

 | RUNOFF TABLES IN THE OUTPUT FILE. |
 | These are the more important tables in the output file. |
 | You can use your editor to find the table numbers. |
 | for example: search for Table R3 to check continuity. |
 | This output file can be imported into a Word Processor |
 | and printed on US letter or A4 paper using portrait |
 | mode, courier font, a size of 8 pt. and margins of 0.75 |
 | |
 | Table R1 - Physical Hydrology Data |
 | Table R2 - Infiltration data |
 | Table R3 - Rainage and Infiltration Database Names |
 | Table R4 - Groundwater Data |
 | Table R5 - Continuity Check for Surface Water |
 | Table R6 - Continuity Check for Channels/Pipes |
 | Table R7 - Continuity Check for Subsurface Water |
 | Table R8 - Infiltration/Inflow Continuity Check |
 | Table R9 - Summary Statistics for Subcatchments |
 | Table R10 - Sensitivity analysis for Subcatchments |

9	Node2#1	78.000	0.258	484.000	0.200
10	Node12#1	76.000	0.312	484.000	0.200
11	Node11.1#1	76.000	0.320	484.000	0.200
12	Node21#1	76.000	0.252	484.000	0.200
13	Node22#1	78.000	0.617	484.000	0.200

 # Table R3. SUBCATCHMENT DATA #
 #####
 # Rainfall and Infiltration Database Names #
 #####

Subcatchment Number	Gage Name	Infiltration No	Type	Routing Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

Total Number of Subcatchments..... 13
 Total Tributary Area (acres)..... 568.51
 Impervious Area (acres)..... 0.00
 Pervious Area (acres)..... 568.51
 Total Width (feet)..... 13.00
 Impervious Area (%)..... 0.00

 # SUBCATCHMENT DATA #
 #####

Default Ratio values for subcatchment data #
 # Used with the calibrate node in the runoff. #
 # 1 - width 2 - area 3 - impervious % #
 # 4 - slope 5 - imp "n" 6 - perv "n" #
 # 7 - imp ds 8 - perv ds 9 - 1st inft #
 # 10 - 2nd inft 11 - 3rd inft #
 #####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

.....
 * Arrangement of Subcatchments and Channel/Pipes *

Inlet
 Node10.1 No Tributary Channel/Pipes
 Tributary Subareas..... Node10.1#1
 Node10 No Tributary Channel/Pipes
 Tributary Subareas..... Node10#1 Node10#2
 Node1 No Tributary Channel/Pipes
 Tributary Subareas..... Node1#1
 Node4 No Tributary Channel/Pipes
 Tributary Subareas..... Node4#1
 Node16 No Tributary Channel/Pipes
 Tributary Subareas..... Node16#1
 Node17 No Tributary Channel/Pipes
 Tributary Subareas..... Node17#1
 Node9 No Tributary Channel/Pipes
 Tributary Subareas..... Node9#1

 # RUNOFF JOB CONTROL #
 #####

Snowmelt parameter - ISNOW..... 0
 Number of rain gages - NRGAG..... 0
 Quality is not simulated - KWALTY..... 0
 Default evaporation rate used - IVAP..... 0
 Hour of day at start of storm - NHR..... 0
 Minute of hour at start of storm - NMN..... 0
 Time TZERO at start of storm (hours)..... 0.000
 Use U.S. Customary units for most I/O - METRIC... 0
 Runoff input print control... 0
 Runoff graph plot control... 0
 Runoff output print control... 0
 Limit number of groundwater convergence messages to 10000

 Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0

 Print land use load percentages -LANDUPR (0=no, 1=yes) 0
 Month, day, year of start of storm is: 1/1/2014
 Wet time step length (seconds)..... 60.0
 Dry time step length (seconds)..... 86400.0
 Wet/Dry time step length (seconds)... 60.0
 Simulation length is..... 72.0 Hours

 If Horton infiltration model is being used
 A mixture of infiltration options may be used in
 XP-SWMM as a watershed specific option.
 Rate for regeneration of infiltration = REGEN * DECAY
 Decay is read in for each subcatchment
 REGEN = 0.01000

Raingage #..... 1
 KTYPE - Rainfall input type..... 0
 NHISTO - Total number of rainfall values... 482
 KINC - Rainfall values(pairs) per line... 10
 KPRINT - Print rainfall(0=Yes, 1=No)..... 0
 KTIME - Precipitation time units
 0 -> Minutes 1 -> Hours..... 1
 KPREP - Precipitation unit type
 0 -> Intensity 1 -> Volume..... 1
 KTHS - Variable rainfall intervals
 0 -> No, >= 1 -> Yes..... 0
 THISTO - Rainfall time interval..... 0.10
 TZRAIN - Starting time(KTIME units)..... 0.00

 # Rainfall input summary from Runoff #
 #####

Total rainfall for gage # 1 is 13.2000 inches

 # Data Group F1 #
 # Evaporation Rate (in/day) #
 #####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

 # Table R1. SUBCATCHMENT DATA #
 #####
 # Physical Hydrology Data #
 #####

Subcatchment Number	Channel Name	Per-Width (ft)	Area (ac)	Deprs cent	Deprs ft/ft	Print Zero	Storge	Storge	Deten		
1	Node10.1#1	Node10.1	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node10#1	Node10	1.0000	28.600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node10#2	Node10	1.0000	26.930	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node1#1	Node1	1.0000	19.400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node17#1	Node17	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node9#1	Node9	1.0000	18.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node2#1	Node2	1.0000	63.350	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node12#1	Node12	1.0000	4.7500	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node11.1#1	Node11.1	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node21#1	Node21	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node22#1	Node22	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000

```

#####
# Table R2. SUBCATCHMENT DATA
# Infiltration or Time of Concentration Data
#
# Infiltration Type Infi #1(#5) Infi #2(#6) Infi #3(#7) Infi #4(#8) #
# SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
# SBLH -> Comp CN Time Conc N/A #
# Green Ampt -> Suction Hydr Cond Initial MD N/A #
# Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
# Proportional -> Constant N/A N/A #
# Initial/Cont Loss -> Initial Continuing N/A N/A #
# Initial/Proportional -> Initial Constant N/A N/A #
# Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
# Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance #
# (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)
#
# Rational Formula To Method: 1 = Constant
#
# 2 = Friend's Equation
# 3 = Kinematic Wave
# 4 = Alameda Method
# 5 = Izzard's Formula
# 6 = Kerby's Equation
# 7 = Kirpich's Equation
# 8 = Bransby Williams Equation
# 9 = Federal Aviation Authority Equation
#####

```

Subcatchment Number	Infi #1	Infi #2	Infi #3	Infi #4	Infi #5	Infi #6	Infi #7	Infi #8
1	Node10.1#1	78.000	0.838	484.000	0.200			
2	Node10#1	79.000	0.375	484.000	0.200			
3	Node10#2	72.000	0.465	484.000	0.200			
4	Node1#1	84.000	0.338	484.000	0.200			
5	Node4#1	88.000	0.288	484.000	0.200			
6	Node16#1	91.000	0.322	484.000	0.200			
7	Node17#1	75.000	0.433	484.000	0.200			
8	Node9#1	86.000	0.212	484.000	0.200			
9	Node2#1	76.000	0.258	484.000	0.200			
10	Node12#1	76.000	0.312	484.000	0.200			
11	Node11.1#1	76.000	0.320	484.000	0.200			
12	Node21#1	76.000	0.252	484.000	0.200			
13	Node22#1	78.000	0.617	484.000	0.200			

```

#####
# Table R3. SUBCATCHMENT DATA
# Rainfall and Infiltration Database Names
#####
Subcatchment Gage Infiltration Routing

```

* Hydrographs will be stored for the following 12 INLETS *

```

Node10.1 Node10 Node1
Node4 Node16 Node17
Node9 Node2 Node12
Node11.1 Node21 Node22

```

* Quality Simulation not included in this run *

```

* Precipitation Interface File Summary
* Number of precipitation station... 1 *

```

Location Station Number

```

1. 1
A1

```

```

*****
| HYDRAULICS TABLES IN THE OUTPUT FILE
| These are the more important tables in the output file.
| You can use your editor to find the table numbers,
| for example: search for Table E20 to check continuity.
| This output file can be imported into a Word Processor
| and printed on US letter or A4 paper using portrait
| mode, courier font, a size of 8 pt. and margins of 0.75
|
| Table E1 - Basic Conduit Data
| Table E2 - Conduit Factor Data
| Table E3a - Junction Data
| Table E3b - Junction Data
| Table E4 - Conduit Connectivity Data
| Table E4a - Dry Weather Flow Data
| Table E4b - Real Time Control Data
| Table E5 - Junction Time Step Limitation Summary
| Table E5a - Conduit Explicit Condition Summary
| Table E6 - Final Model Condition
| Table E7 - Iteration Summary
| Table E8 - Junction Time Step Limitation Summary
| Table E9 - Junction Summary Statistics
| Table E10 - Conduit Summary Statistics
| Table E11 - Area assumptions used in the analysis
| Table E12 - Mean conduit information
| Table E13 - Channel losses(H) and culvert info
| Table E13a - Culvert Analysis Classification
| Table E14 - Natural Channel Overview Flow Information
| Table E14a - Natural Channel Encroachment Information
| Table E14b - Floodplain Mapping
| Table E15 - Spreadsheet Info List
| Table E15a - Spreadsheet Read List
| Table E16 - New Conduit Output Section
| Table E17 - Pump Operation
| Table E18 - Junction Continuity Error
| Table E19 - Junction Inflow & Outflow Listing
| Table E20 - Junction Flooding and Volume List
| Table E21 - Continuity balance at simulation end
| Table E22 - Model Judgement Section
*****

```

Time Control from Hydraulics Job Control

Number	Name	No	Type	Type
1	Node10.1#1	1	SCS Method	SCS curvilinear
2	Node10#1	1	SCS Method	SCS curvilinear
3	Node10#2	1	SCS Method	SCS curvilinear
4	Node1#1	1	SCS Method	SCS curvilinear
5	Node4#1	1	SCS Method	SCS curvilinear
6	Node16#1	1	SCS Method	SCS curvilinear
7	Node17#1	1	SCS Method	SCS curvilinear
8	Node9#1	1	SCS Method	SCS curvilinear
9	Node2#1	1	SCS Method	SCS curvilinear
10	Node12#1	1	SCS Method	SCS curvilinear
11	Node11.1#1	1	SCS Method	SCS curvilinear
12	Node21#1	1	SCS Method	SCS curvilinear
13	Node22#1	1	SCS Method	SCS curvilinear

```

Total Number of Subcatchments... 13
Total Tributary Area (acres).... 568.51
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 568.51
Total Width (feet)..... 13.00
Impervious Area (%)..... 0.00

```

```

#####
# SUBCATCHMENT DATA
# Default, Ratio values for subcatchment data #
# Used with the calibrate node in the runoff. #
# 1 - width 2 - area 3 - impervious % #
# 4 - slope 5 - imp "n" 6 - perv "n" #
# 7 - imp ds 8 - perv ds 9 - 1st inlf #
# 10 - 2nd inlf 11 - 3rd inlf #
#####
Column 1 2 3 4 5 6 7 8 9 10 11
Default 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Ratio 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

```

```

* Arrangement of Subcatchments and Channel/Pipes
*
Inlet
Node10.1 No Tributary Channel/Pipes
Tributary Subareas..... Node10.1#1
Node10 No Tributary Channel/Pipes
Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Tributary Subareas..... Node1#1
Node4 No Tributary Channel/Pipes
Tributary Subareas..... Node4#1
Node16 No Tributary Channel/Pipes
Tributary Subareas..... Node16#1
Node17 No Tributary Channel/Pipes
Tributary Subareas..... Node17#1
Node9 No Tributary Channel/Pipes
Tributary Subareas..... Node9#1
Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11.1 No Tributary Channel/Pipes
Tributary Subareas..... Node11.1#1
Node21 No Tributary Channel/Pipes
Tributary Subareas..... Node21#1
Node22 No Tributary Channel/Pipes
Tributary Subareas..... Node22#1

```

```

Year..... 2014 Month..... 1
Day..... 1 Hour..... 0
Minute..... 0 Second..... 0

```

Control information for simulation

```

Integration cycles..... 38880
Length of integration step is..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL)... 0
Use U.S. customary units for I/O... 0
Printing starts in cycle..... 1
Intermediate printout intervals of... 500 cycles
Intermediate printout intervals of... 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of... 83.33 minutes
Hot start file parameter (REDO)... 0
Initial time..... 0.00 hours

```

```

Iteration variables: Flow Tolerance, 0.00010
Head Tolerance, 0.00050
Minimum depth (m or ft)..... 0.00001
Underrelaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K, 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.000
Ponding Area Exponent..... 1.00000
Minimum Orifice Length..... 1000.00 feet.
NJSW input hydrograph junctions.... 0
or user defined hydrographs....

```

```

*****
| Table E1 - Conduit Data
*****

```

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef. (ft)	Hazen Slopes (ft)	Depth	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	10.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
12	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
13	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
14	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
15	250.2	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
16	263.1	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
17	264.1	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		

Total length of all conduits 883.0000 feet

```

*****
| Table E2 - Conduit Factor Data
*****

```

Conduit Number	Entrance	Exit	Time of Loss	Flow Loss	Depth at Entrance	Depth at Exit	Exp. Coef.	Wave Roughness	Which Sediment	Flow Parameter	Factor n	Changes	Depth Routing
Link2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave				
Link4	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave				

If there are messages about (sqrt("g*d")/v(dx), or |
 | the sqrt(wave celerity)*time step/conduit length |
 | in the output file all it means is that the |
 | program will lower the internal time step to |
 | satisfy this condition (explicit condition). |
 | You control the actual internal time step by |
 | using the minimum courant time step factor in the |
 | HYDRAULICS job control. The message put in words |
 | states that the smallest conduit with the fastest |
 | velocity will control the time step selection. |
 | You have further control by using the model |
 | conduit option in the HYDRAULICS Job Control. |

Conduit Name	Courant Ratio
Link2	0.78
Link4	3.20 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link5	12.82 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)

Conduit Volume

Full pipe or full open conduit volume
 Input full depth volume..... 8.9576E+03 cubic feet

Table E3a - Junction Data

Imp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qint	Initial Interf Flow (%)
9	Link15	Node18	Node5	1023.0000	1022.7900	No Design

STORAGE JUNCTION NUMBER OR NAME	JUNCTION TYPE	MAXIMUM OR CONSTANT AREA (FT2)	PEAK OR SURFACE AREA (CUBIC FEET)	CROWN CONSTANT VOLUME (FT)	DEPTH FROM STARTS	ELEVATION	STARTS
Node1	Stage/Area	7.0611E+04	1.5654E+05	1028	Node Invert		
Node2	Stage/Area	2.0052E+06	1.5507E+07	1028	Node Invert		

Variable storage data for node | Node1

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	ac-ft	ac-ft
1	1025.0000	0.0000	37287.3600	0.0000	0.8560	0.0000

Variable storage data for node | Node2

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	acres	ac-ft
1	1015.0000	0.0000	35327.1600	0.0000	0.8110	0.0000

Variable storage data for node | Node3

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	acres	ac-ft
1	1018.0000	0.0000	38281.0000	0.0000	0.9000	0.0000

1	Node1	1028.0000	1026.9000	1025.0000	0.0000	0.0000	100.0000
2	Node2	1028.0000	1025.5000	1015.0000	0.0000	0.0000	100.0000
3	Node3	1025.0000	1020.8333	1018.0000	0.0000	0.0000	100.0000
4	Node4	1025.0000	1025.0000	1019.0000	0.0000	0.0000	100.0000
5	Node5	1026.0000	1024.7900	1021.9000	0.0000	0.0000	100.0000
6	Node6	1025.0000	1023.8400	1021.3400	0.0000	0.0000	100.0000
7	Node7	1026.1800	1023.8100	1021.3100	0.0000	0.0000	100.0000
8	Node8	1026.0200	1023.6200	1021.1200	0.0000	0.0000	100.0000
9	Node9	1026.0000	1023.5000	1015.0000	0.0000	0.0000	100.0000
10	Node10	1025.0000	1022.5000	1019.0000	0.0000	0.0000	100.0000

Table E3b - Junction Data

Imp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Maximum Inlet Capacity	Pavement Shape	Slope
1	Node1	0.0000	0.0000	Flooded	Normal	0	0.00
2	Node2	0.0000	0.0000	No Ponding	Normal	0	0.00
3	Node3	0.0000	0.0000	No Ponding	Normal	0	0.00

Table E4 - Conduit Connectivity

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation
1	Link2	Node3	Node2	1018.0000	1017.4000
2	Link4	Node5	Node6	1021.9000	1021.3400
3	Link5	Node6	Node7	1021.3400	1021.3100
4	Link6	Node7	Node8	1021.3100	1021.1200
5	Link7	Node8	Node9	1021.1200	1021.0000
6	Link8	Node9	Node2	1024.5000	1024.5000
7	Link12	Node15	Node13	1023.1500	1022.1600
8	Link13	Node13	Node6	1021.9200	1021.5700

Variable storage data for node | Node4

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	acres	ac-ft
1	1019.0000	0.0000	10248.2000	0.0000	2.3450	0.0000
2	1020.0000	1.0000	111382.9200	106731.1954	2.5570	2.4502
3	1021.0000	2.0000	120617.6400	222699.6715	2.7690	5.1125
4	1022.0000	3.0000	130592.8800	348270.6541	2.9980	7.9952
5	1023.0000	4.0000	139696.9200	483386.6417	3.2070	11.0971
6	1024.0000	5.0000	155552.7600	630940.9959	3.5710	14.4844
7	1025.0000	6.0000	210307.6800	813182.6380	4.8280	18.6681

Variable storage data for node | Node9

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	acres	ac-ft
1	1015.0000	0.0000	30927.6000	0.0000	0.7100	0.0000
2	1016.0000	1.0000	33976.8000	32439.9314	0.7800	0.7447
3	1017.0000	2.0000	37461.6000	68144.6001	0.8600	1.5644
4	1018.0000	3.0000	40946.4000	107335.2951	0.9400	2.4641
5	1019.0000	4.0000	44431.2000	150011.8103	1.0200	3.4438
6	1020.0000	5.0000	48824.8000	206196.2155	1.5800	4.7336
7	1021.0000	6.0000	54070.8000	282516.2478	1.9300	6.4877
8	1022.0000	7.0000	59140.4000	370447.9469	2.0900	8.4951
9	1023.0000	8.0000	64315.4000	464335.4357	2.2400	10.6597
10	1024.0000	9.0000	70408.4000	565158.1825	2.3900	12.9742
11	1026.0000	11.0000	104108.4000	773374.9825	2.3900	17.7542

Variable storage data for node | Node10

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	acres	ac-ft
1	1019.0000	0.0000	35849.8800	0.0000	0.8230	0.0000
2	1020.0000	1.0000	44344.0800	40021.3923	1.0180	0.9188
3	1021.0000	2.0000	49992.1200	86718.9621	1.1270	1.9908
4	1022.0000	3.0000	55234.0800	138851.3258	1.2680	3.1876
5	1023.0000	4.0000	59198.0400	196055.3676	1.3590	4.5008
6	1024.0000	5.0000	63249.1200	257267.1635	1.4520	5.9660
7	1025.0000	6.0000	71699.7600	324696.7868	1.6460	7.4540

Variable storage data for node | Node12

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	acres	ac-ft
1	1019.0000	0.0000	2962.0800	0.0000	0.0680	0.0000
2	1020.0000	1.0000	5401.4400	4121.1112	0.1240	0.0946
3	1021.0000	2.0000	7579.4400	10580.8162	0.1740	0.2429
4	1022.0000	3.0000	1107.8000	1985.3233	0.2650	0.4561
5	1026.0000	4.0000	15986.5200	33341.5384	0.3670	0.7654

Variable storage data for node | Node16

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	acres	ac-ft
1	1022.0000	0.0000	2962.0800	0.0000	0.0680	0.0000
2	1023.0000	1.0000	5401.4400	4121.1112	0.1240	0.0946
3	1024.0000	2.0000	7579.4400	10580.8162	0.1740	0.2429
4	1025.0000	3.0000	1107.8000	1985.3233	0.2650	0.4561
5	1026.0000	4.0000	15986.5200	33341.5384	0.3670	0.7654

Node13	4.18	10.44	410.0
Node15	72.05	100.00	0.0
Node16	61.75	100.00	0.0
Node17	1.64	4.11	50380.0
Node18	8.72	21.79	0.0
Node11.1	100.00	100.00	0.0
Node21	86.76	100.00	0.0
Node22	100.00	100.00	0.0
Node10.1	94.02	100.00	0.0
Node23	100.00	100.00	0.0
Node24	100.00	100.00	0.0

The junction requiring the smallest time step was...Node7

Table E5a - Conduit Explicit Condition Summary			
Conduit	Length	Time Step	Velocity
Conduit	Length	Time Step	Velocity
Conduit	Length	Time Step	Velocity

Conduit	Time(exp)	Exp^Cmin	Time(inp)	Time(min)	Max Ochange	Wobble	Type of Soln
Link2	4.61	4.61	10.03	517.5	0.222	6.540	Normal Soln
Link4	1.50	1.50	3.90	0.0	3.019	61.474	Normal Soln
Link5	0.15	0.15	0.21	5942.8	0.115	376.812	Normal Soln
Link6	1.88	1.88	5.82	0.0	0.924	95.795	Normal Soln
Link7	1.43	1.43	3.93	0.0	0.402	73.497	Normal Soln
Link9	15.52	15.52	49.00	0.0	0.170	7.420	Normal Soln
Link12	1.76	1.76	4.98	0.0	-0.322	54.157	Normal Soln
Link13	3.97	3.97	13.94	0.0	-0.325	120.095	Normal Soln
Link15	0.97	0.97	2.25	2.0	-0.371	57.537	Normal Soln
Link16	0.73	0.73	1.17	12.2	-0.585	192.898	Normal Soln
203.1	2.08	2.08	4.37	0.0	0.018	6.628	Normal Soln
203.2	2.10	2.10	4.54	0.0	0.088	3.950	Normal Soln
ditch1	21.17	21.17	94.45	0.0	0.312	1.765	Normal Soln
250.1	3.34	3.34	7.85	0.0	-0.017	5.987	Normal Soln
250.2	3.27	3.27	8.27	0.0	-0.017	5.100	Normal Soln
263.1	1.88	1.88	5.38	5.5	0.013	119.027	Normal Soln
264.1	2.80	2.80	6.79	0.0	0.018	8.074	Normal Soln
office 5	49.81	49.81	100.00	0.0	-0.019	4.795	Normal Soln
office 6	62.57	62.57	100.00	0.0	-0.016	6.388	Normal Soln
on 1	64.37	64.37	100.00	0.0	-0.030	19.184	Normal Soln

The conduit with the smallest time step limitation was...Link5
 The conduit with the largest wobble was...Link5
 The conduit with the largest flow change in any consecutive time step...Link5

Table R6. Continuity Check for Channel/Pipes			
Conduit	Length	Time Step	Velocity
Conduit	Length	Time Step	Velocity
Conduit	Length	Time Step	Velocity

Table R9. Summary Statistics for Subcatchments #					
Subcatchment	Node10.1#1	Node10#1	Node10#2	Node1#1	Node4#1
Area (acres)	184.60000	28.60000	26.93000	19.40000	46.70000
Percent Impervious	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)	13.20000	13.20000	13.20000	13.20000	13.20000
Max Intensity (in/hr)	9.53498	9.53498	9.53498	9.53498	9.53498

Table R5. CONTINUITY CHECK FOR SURFACE WATER								
Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node10.1#1	0	0	Node10#1	0	0	Node10#2	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node17#1	0	0	Node9#1	0	0	Node2#1	0	0
Node12#1	0	0	Node11.1#1	0	0	Node2#1	0	0
Node22#1	0	0						

Any continuity error can be fixed by lowering the wet and transition time step. The transition time should not be much greater than the wet time step.

End of time step DO-loop in Runoff
 Final Date (Mo/Day/Year) = 1/4/2014
 Total number of time steps = 4340
 Final Julian Date = 2014004
 Final time of day = 0. seconds.
 Final time of day = 0.00 hours.
 Final running time = 72.0000 hours.
 Final running time = 3.0000 days.

Extrapolation Summary for Watersheds
 Explains the number of time steps and iterations
 used in the solution of the subcatchments.
 # Steps ==> Total Number of Extrapolated Steps
 # Calls ==> Total Number of OVERLND Calls

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node10.1#1	0	0	Node10#1	0	0	Node10#2	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node17#1	0	0	Node9#1	0	0	Node2#1	0	0
Node12#1	0	0	Node11.1#1	0	0	Node2#1	0	0
Node22#1	0	0						

Rainfall input summary from Runoff Continuity Check #
 Total rainfall read for gage # 1 is 13.2000 in
 Total rainfall duration for gage # 1 is 2668.05 minutes

Table R5. CONTINUITY CHECK FOR SURFACE WATER								
Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node10.1#1	0	0	Node10#1	0	0	Node10#2	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node17#1	0	0	Node9#1	0	0	Node2#1	0	0
Node12#1	0	0	Node11.1#1	0	0	Node2#1	0	0
Node22#1	0	0						

Inches over Total Basin
 Total Precipitation (Rain plus Snow) 2.724073E+07 13.200
 Total Infiltration 5.688396E+06 2.756
 Total Evaporation 4.110257E+05 0.199
 Surface Runoff from Watersheds 2.113978E+07 10.244
 Total Water remaining in Surface Storage 0.000000E+00 0.000
 Infiltration over the Pervious Area... 5.688396E+06 2.756
 Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover... 2.723920E+07 13.199
 Total Precipitation + Initial Storage. 2.724073E+07 13.200

The error in continuity is calculated as
 Precipitation - Initial Snow Cover - Infiltration - Evaporation - Snow removal - Surface Runoff from Watersheds - Water in Surface Storage - Water remaining in Snow Cover
 Percent Continuity Error..... 0.0056

Subcatchment	Node16#1	Node17#1	Node9#1	Node2#1	Node12#1
Area (acres)	3.61000	7.66000	18.65000	63.35000	4.75000
Percent Impervious	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)	13.20000	13.20000	13.20000	13.20000	13.20000
Max Intensity (in/hr)	9.53498	9.53498	9.53498	9.53498	9.53498

Pervious Area					
Total Runoff Depth (in)	11.88408	9.70931	11.23187	9.85291	9.85290
Peak Runoff Rate (cfs)	20.52563	35.10582	125.99205	375.00451	25.79190
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area					
Total Runoff Depth (in)	11.88408	9.70931	11.23187	9.85291	9.85290
Peak Runoff Rate (cfs)	20.52563	35.10582	125.99205	375.00451	25.79190
Rational Formula					
Pervious Tc (mins)	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc (mins)	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha)	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment					
Subcatchment	Node11.1#1	Node2#1	Node22#1		
Area (acres)	6.52000	6.28000	151.46000		
Percent Impervious	0.00000	0.00000	0.00000		
Total Rainfall (in)	13.20000	13.20000	13.20000		
Max Intensity (in/hr)	9.53498	9.53498	9.53498		
Pervious Area					
Total Runoff Depth (in)	9.85290	9.85291	10.13689		
Peak Runoff Rate (cfs)	35.00265	37.65374	583.90741		
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000		
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000		

Impervious Area with depression storage

Current Directory: C:\Temp\New folder (5)\1D\Ultimate Condition_1
Executable Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe
Input File: C:\Temp\New folder (5)\1D\Ultimate Condition_1\XP

xpswmm
Storm and Wastewater Management Model
Developed by Innovyze.
Last Update : May 21 2019
Interface Version: 2019.1
Engine Version : 12.0
Data File Version: 12.62

Engine Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe

Input and Output file names by Layer

Input File to Layer # 1 J:\JUS
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 J:\JUS
Output File to Layer # 2 C:\Temp\Proposed Condition.INT

Configuration Parameters
Configuration Parameters, both those that are hardwired
and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in
the engine as defaults. The remaining in UPPER CASE
have been added to the simulation in the Configuration->
Configuration Parameters dialog or as Engine Defaults in
the SWMM.INI file.
Consult the Help File for the specific meaning/purpose
of any particular parameter.

Powerstation 0.0000 1 2
Sperv 0.0000 0 4
Soldegg 0.0000 0 7
Sas 0.0000 0 11
Soflat 0.0000 0 21
Soldomega 0.0000 0 24
Soldvol 0.0000 1 28
Simplicit 0.0000 1 29
Soldhot 0.0000 1 31
Soldsacs 0.0000 0 33
Sflood 0.0000 1 40
Snokeys 0.0000 0 42
Spzero 0.0000 0 55
Soldx2 0.0000 2 59
Sstorage2 0.0000 3 62
Soldhot1 0.0000 1 63
Spumpwt 0.0000 1 70
Sedss 0.0000 1 77
Sexout 0.0000 0 97
Sspatial = 0.90 0.9000 5 124
Sdjref = -1.0 -0.1000 3 143
Sweirfen = 50 50.0000 1 153
Soldbrd 0.0000 1 154
Snoqretev 0.0000 1 161

210 Link4
212 Link5
214 Link6
216 Link7
219 Link9
225 Link12
226 Link13
231 Link15
233 Link16
242 Link21
246 Link23
250 Link25
C(203.1) 203.1
C(203.2) 203.2
C(229.1) ditch1
C(238.1) 238.1
C(266.1) 264.11
C(268.1) 263.11
C(273.1) 250.11
C(273.2) 250.21
O(207.2) orifice 5
O(218.2) orifice
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(266.1) lazy
W(268.1) bikepath
W(270.1) south
W(271.1) driveway
W(273.1) semivale
W(275.1) sem2
W(276.1) south1
W(276.2) dway 2
D(240.1) 21
D(245.1) 23
D(248.1) 25
D(254.1) 28
D(256.1) 29
D(264.1) 36

Parameter Values on the Tapes Common Block. These are the
values read from the data file and dynamically allocated
by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 27
Number of Channel/Pipes in the Runoff Block (NG).... 0
Runoff Water quality constituents (NRQ)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 48
Number of Groundwater Subcatchments in Runoff (NGW).... 0
Number of Interface locations for all Blocks (NIE).... 48
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG).... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage junctions in Extran (NVSE)..... 19

Sncmid 0.0000 0 164
Snew_nl_97 0.0000 2 290
SCSIDEPTH=ON 0.0000 1 293
Sbst97 0.0000 1 294
Snewbound 0.0000 1 295
USE_US_RC 0.0000 1 312
Sq_id = 0.01 0.0001 1 316
Snew_storage 0.0000 1 322
Sold_iteration 0.0000 1 333
MINLEN=6 6.0000 1 346
Sriview_elevation 0.0000 1 353
Suse_half_volume 0.0000 1 385
VERT_WALLS=ON 0.0000 1 389
Smin_is = 1.0 1.0000 1 407
Sdssign_restart = on 0.0000 1 412
Szero_value=1.e-05 0.0000 1 415
SUBCATCHMENT_RES=ON 0.0000 1 419
Srelax_depth = on 0.0000 1 427
Sseawallgate = on 0.0000 1 434
PUMP_NOHEAD=ON 0.0000 1 437
Schannel_geometry=1 0.0000 1 456
PROJUNITS = US 0.0000 1 462

The XPSWMM/XPSTORM engine internally uses object IDs
instead of full object names to represent objects.
Included below is a table of these IDs along with the
name of the object that ID corresponds to.

Table with 2 columns: Object ID Number, Object Name. Lists nodes 201-205 and link 205.

Number of Time history data points in Extran (NTVAL).... 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 27
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTOC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 48
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovyze

RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
For example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75

Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Rainage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments
A1
RUNOFF JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVPAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.0000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAV

Decay is read in for each subcatchment
REGEN = 0.01000

Raingage # 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 241
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0-Yes,1-No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 2.4900 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Channel or Inlet	Per-Width (ft)	Area (ac)	Deprs Imperv	Deprs cent	Deprs Slope	Prent "n" ft/impv	Prent "n" Storge	Deter "n" Strge	
1	Node40#1	Node40	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node36#1	Node36	1.0000	19.960	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node21#1	Node21	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node10#1	Node10	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node10#2	Node10	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node26#1	Node26	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node1#1	Node1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node29#1	Node29	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node9#1	Node9	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node23#1	Node23	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node24#1	Node24	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
14	Node20#1	Node20	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000
15	Node25#1	Node25	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
16	Node2#1	Node2	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000
17	Node28#1	Node28	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
18	Node12#1	Node12	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
19	Node11#1	Node11	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
20	Node37#1	Node37	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
21	Node38#1	Node38	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000
22	Node30#1	Node30	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
23	Node31#1	Node31	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
24	Node32#1	Node32	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
25	Node33#1	Node33	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000

Total Number of Subcatchments... 27
Total Tributary Area (acres).... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infil #
10 - 2nd infil 11 - 3rd infil #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node40 No Tributary Channel/Pipes
Node36 Tributary Subareas..... Node40#1
Node21 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node36#1
Node10 No Tributary Channel/Pipes
Node26 Tributary Subareas..... Node21#1 Node10#1 Node10#2
Node1 Tributary Subareas..... Node26#1
Node4 Tributary Subareas..... Node1#1
Node16 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node4#1

26 Node34#1 Node34 1.0000 3.3400 0.00 1.000 0.020 0.020 0.000 0.000 0.000
27 Node35#1 Node35 1.0000 7.6600 0.00 1.000 0.020 0.020 0.000 0.000 0.000

Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data #
Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8) #
SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
SBUH -> Comp CN Time Conc N/A #
Green Ampt -> Suction Hydr Cond Initial MD N/A #
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infil. Volume #
Proportional -> Constant N/A N/A N/A #
Initial/Cont Loss -> Initial Continuing N/A #
Initial/Proportional -> Initial Constant N/A #
Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
Rational Formula -> Tc Method Flow Path Length Flow Path Slope Roughness or Retardance #
(#1 - #4 is Impervious Data / #5 - #8 is Pervious Data) #
Rational Formula Tc Method: 1 = Constant #
2 = Friend's Equation #
3 = Kinematic Wave #
4 = Alameda Method #
5 = Izzard's Formula #
6 = Kerby's Equation #
7 = Kirpich's Equation #
8 = Bransby Williams Equation #
9 = Federal Aviation Authority Equation #
#####

Subcatchment Number	Name	Infil #1	Infil #2	Infil #3	Infil #4	Infil #5	Infil #6	Infil #7	Infil #8
1	Node40#1	84.000	0.838	484.000	0.200				
2	Node36#1	91.000	0.333	484.000	0.200				
3	Node21#1	88.000	0.333	484.000	0.200				
4	Node10#1	85.000	0.167	484.000	0.200				
5	Node10#2	74.000	0.333	484.000	0.200				
6	Node26#1	85.000	0.167	484.000	0.200				
7	Node1#1	88.000	0.333	484.000	0.200				
8	Node4#1	88.000	0.288	484.000	0.200				
9	Node16#1	91.000	0.322	484.000	0.200				
10	Node29#1	90.000	0.433	484.000	0.200				
11	Node9#1	86.000	0.212	484.000	0.200				
12	Node23#1	91.000	0.333	484.000	0.200				
13	Node24#1	85.000	0.167	484.000	0.200				
14	Node20#1	80.000	0.167	484.000	0.200				
15	Node25#1	88.000	0.258	484.000	0.200				
16	Node2#1	79.000	0.167	484.000	0.200				
17	Node28#1	88.000	0.312	484.000	0.200				
18	Node12#1	77.000	0.167	484.000	0.200				
19	Node11#1	89.000	0.320	484.000	0.200				
20	Node37#1	76.000	0.252	484.000	0.200				
21	Node38#1	91.000	0.617	484.000	0.200				
22	Node30#1	73.000	0.258	484.000	0.200				
23	Node31#1	72.000	0.333	484.000	0.200				
24	Node32#1	79.000	0.333	484.000	0.200				
25	Node33#1	70.000	0.333	484.000	0.200				
26	Node34#1	76.000	0.312	484.000	0.200				
27	Node35#1	74.000	0.433	484.000	0.200				

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Name	Gage	Infiltration	Routing
1	Node40#1	1	SCS Method	SCS curvilinear

Node29 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node29#1
Node23 No Tributary Channel/Pipes
Node24 Tributary Subareas..... Node9#1
Node20 No Tributary Channel/Pipes
Node25 Tributary Subareas..... Node23#1
Node2 Tributary Subareas..... Node24#1
Node28 Tributary Subareas..... Node20#1
Node12 Tributary Subareas..... Node25#1
Node11 Tributary Subareas..... Node2#1
Node37 Tributary Subareas..... Node28#1
Node38 Tributary Subareas..... Node12#1
Node30 Tributary Subareas..... Node11#1
Node31 Tributary Subareas..... Node37#1
Node32 Tributary Subareas..... Node38#1
Node30 No Tributary Channel/Pipes
Node31 Tributary Subareas..... Node30#1
Node32 Tributary Subareas..... Node31#1
Node33 Tributary Subareas..... Node32#1
Node34 Tributary Subareas..... Node33#1
Node35 No Tributary Channel/Pipes
Node35#1 Tributary Subareas..... Node34#1

* Hydrographs will be stored for the following 26 INLETS *

Node40	Node36	Node21
Node10	Node26	Node1
Node4	Node16	Node29
Node9	Node23	Node24
Node20	Node25	Node2
Node28	Node12	Node11
Node37	Node38	Node30
Node31	Node32	Node33
Node34	Node35	

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *
* Number of precipitation station..... 1 *

Location Station Number

1. 1

*** End of Header Section ***

Entry made to the HYDRAULIC Layer of XP-SWMM #
Last Updated in June, 2014 by Innovaze #

Entry made to the Runoff Layer(Block) of SWMM #
Last Updated June, 2014 by Innovaze #
#####

=====
| RUNOFF TABLES IN THE OUTPUT FILE |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| for example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Raingage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |
=====

A1

RUNOFF JOB CONTROL #

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most IO - METRIC..... 0
Runoff input print control..... 0
Runoff graph plot control..... 0
Runoff output print control..... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)..... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = 0.01000

Raingage #..... 1
KTYPE - Rainfall input type..... 0
NHSTO - Total number of rainfall values..... 241
KINC - Rainfall values(pairs) per line..... 10
KPRINT - Print rainfall(0-Yes,1-No)..... 0

SCS -> Comp CN Time Conc Shape Factor Depth or Fracton #
SBUH -> Comp CN Time Conc N/A N/A #
Green Ampt -> Hydr Cond Initial MD N/A #
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
Proportional -> Constant N/A N/A N/A #
Initial/Cont Loss -> Initial Continuing N/A N/A #
Initial/Proportional -> Initial Constant N/A N/A #
Laursen Parameters -> B Value Pervious "n" Impervious Cont Exponent #
Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance #
(#1 - #4 is Impervious Data / #5 - #8 is Pervious Data) #
Rational Formula To Method: 1 = Constant #
2 = Friend's Equation #
3 = Kinematic Wave #
4 = Alameda Method #
5 = Izzard's Formula #
6 = Kerby's Equation #
7 = Kirpich's Equation #
8 = Bransby Williams Equation #
9 = Federal Aviation Authority Equation #
#####

Subcatchment Number	Name	Infil #1	Infil #2	Infil #3	Infil #4	Infil #5	Infil #6	Infil #7	Infil #8
1	Node40#1	84.000	0.838	484.000	0.200				
2	Node36#1	91.000	0.333	484.000	0.200				
3	Node21#1	88.000	0.333	484.000	0.200				
4	Node10#1	85.000	0.167	484.000	0.200				
5	Node10#2	74.000	0.333	484.000	0.200				
6	Node26#1	85.000	0.167	484.000	0.200				
7	Node1#1	88.000	0.338	484.000	0.200				
8	Node4#1	88.000	0.288	484.000	0.200				
9	Node16#1	91.000	0.322	484.000	0.200				
10	Node29#1	90.000	0.433	484.000	0.200				
11	Node9#1	86.000	0.212	484.000	0.200				
12	Node23#1	91.000	0.333	484.000	0.200				
13	Node24#1	85.000	0.167	484.000	0.200				
14	Node20#1	80.000	0.167	484.000	0.200				
15	Node25#1	88.000	0.258	484.000	0.200				
16	Node2#1	79.000	0.167	484.000	0.200				
17	Node28#1	88.000	0.312	484.000	0.200				
18	Node12#1	77.000	0.167	484.000	0.200				
19	Node11#1	89.000	0.320	484.000	0.200				
20	Node37#1	76.000	0.252	484.000	0.200				
21	Node38#1	91.000	0.617	484.000	0.200				
22	Node30#1	73.000	0.258	484.000	0.200				
23	Node31#1	72.000	0.333	484.000	0.200				
24	Node32#1	79.000	0.333	484.000	0.200				
25	Node33#1	70.000	0.333	484.000	0.200				
26	Node34#1	76.000	0.312	484.000	0.200				
27	Node35#1	74.000	0.433	484.000	0.200				

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Name	Gage	Infiltration No	Routing Type
1	Node40#1	1	SCS Method	SCS curvilinear
2	Node36#1	1	SCS Method	SCS curvilinear
3	Node21#1	1	SCS Method	SCS curvilinear
4	Node10#1	1	SCS Method	SCS curvilinear
5	Node10#2	1	SCS Method	SCS curvilinear
6	Node26#1	1	SCS Method	SCS curvilinear
7	Node1#1	1	SCS Method	SCS curvilinear
8	Node4#1	1	SCS Method	SCS curvilinear
9	Node16#1	1	SCS Method	SCS curvilinear
10	Node29#1	1	SCS Method	SCS curvilinear

KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THSTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #

Total rainfall for gage # 1 is 2.4900 inches

Data Group F1 #
Evaporation Rate (in/day) #

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Per-Width (ft)	Area (ac)	Imperv	cent ft/ft	Deprs Slope	Deprs "n"	Prcnt "n" Storge	Prcnt "n" Strge	Prcnt "n" Deten
1	Node40#1	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node36#1	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node21#1	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node10#1	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node10#2	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node26#1	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node1#1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node4#1	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node16#1	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node29#1	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node9#1	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node23#1	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node24#1	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
14	Node20#1	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000
15	Node25#1	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
16	Node2#1	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000
17	Node28#1	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
18	Node12#1	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
19	Node11#1	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
20	Node37#1	1.0000	1.0000	0.00	1.000	0.020	0.020	0.000	0.000	0.000
21	Node38#1	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000
22	Node30#1	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
23	Node31#1	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
24	Node32#1	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
25	Node33#1	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
26	Node34#1	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
27	Node35#1	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000

Table R2. SUBCATCHMENT DATA #
Infiltration of Time of Concentration Data #

Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8)

Subcatchment Number	Name	Infil #1	Infil #2	Infil #3	Infil #4	Infil #5	Infil #6	Infil #7	Infil #8
11	Node9#1	1	SCS Method	SCS curvilinear					
12	Node23#1	1	SCS Method	SCS curvilinear					
13	Node24#1	1	SCS Method	SCS curvilinear					
14	Node20#1	1	SCS Method	SCS curvilinear					
15	Node25#1	1	SCS Method	SCS curvilinear					
16	Node2#1	1	SCS Method	SCS curvilinear					
17	Node28#1	1	SCS Method	SCS curvilinear					
18	Node12#1	1	SCS Method	SCS curvilinear					
19	Node11#1	1	SCS Method	SCS curvilinear					
20	Node37#1	1	SCS Method	SCS curvilinear					
21	Node38#1	1	SCS Method	SCS curvilinear					
22	Node30#1	1	SCS Method	SCS curvilinear					
23	Node31#1	1	SCS Method	SCS curvilinear					
24	Node32#1	1	SCS Method	SCS curvilinear					
25	Node33#1	1	SCS Method	SCS curvilinear					
26	Node34#1	1	SCS Method	SCS curvilinear					
27	Node35#1	1	SCS Method	SCS curvilinear					

Total Number of Subcatchments..... 27
Total Tributary Area (acres)..... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infil #
10 - 2nd infil 11 - 3rd infil #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node40 No Tributary Channel/Pipes
Node36 Tributary Subareas..... Node40#1
Node21 Tributary Subareas..... Node36#1
Node10 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node10#1 Node10#2
Node26 No Tributary Channel/Pipes
Node1 Tributary Subareas..... Node26#1
Node4 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node4#1
Node9 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node16#1
Node23 No Tributary Channel/Pipes
Node23 Tributary Subareas..... Node9#1
Node23 No Tributary Channel/Pipes
Node23 Tributary Subareas..... Node23#1
Node24 No Tributary Channel/Pipes
Node24 Tributary Subareas..... Node24#1
Node20 No Tributary Channel/Pipes

Tributary Subareas..... Node20#1
Node25 No Tributary Channel/Pipes
Tributary Subareas..... Node25#1
Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node28 No Tributary Channel/Pipes
Tributary Subareas..... Node28#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11 No Tributary Channel/Pipes
Tributary Subareas..... Node11#1
Node37 No Tributary Channel/Pipes
Tributary Subareas..... Node37#1
Node38 No Tributary Channel/Pipes
Tributary Subareas..... Node38#1
Node30 No Tributary Channel/Pipes
Tributary Subareas..... Node30#1
Node31 No Tributary Channel/Pipes
Tributary Subareas..... Node31#1
Node32 No Tributary Channel/Pipes
Tributary Subareas..... Node32#1
Node33 No Tributary Channel/Pipes
Tributary Subareas..... Node33#1
Node34 No Tributary Channel/Pipes
Tributary Subareas..... Node34#1
Node35 No Tributary Channel/Pipes
Tributary Subareas..... Node35#1

* Hydrographs will be stored for the following 26 INLETS *

Node40 Node36 Node21
Node10 Node26 Node1
Node4 Node16 Node29
Node9 Node23 Node24
Node20 Node25 Node2
Node28 Node12 Node11
Node37 Node38 Node30
Node31 Node32 Node33
Node34 Node35

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *

* Number of precipitation station 1 *

Location Station Number

1. 1

A1

HYDRAULICS TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
For example: search for Table E20 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait

Ponding Area Exponent..... 1.0000
Minimum Orifice Length..... 1000.00 feet
NUSW input hydrograph junction..... 0
or user defined hydrographs....

Input Information from Internal Rating Curve 21

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	5.400	0.000	0.000
3	2.000	8.400	0.000	0.000
4	3.000	21.600	0.000	0.000
5	4.000	55.000	0.000	0.000

Input Information from Internal Rating Curve 23

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	1.700	0.000	0.000
3	2.000	2.600	0.000	0.000
4	3.000	6.200	0.000	0.000
5	4.000	15.000	0.000	0.000

Input Information from Internal Rating Curve 25

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	16.500	0.000	0.000
3	2.000	24.000	0.000	0.000
4	3.000	55.500	0.000	0.000
5	4.000	131.100	0.000	0.000

Input Information from Internal Rating Curve 28

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	2.100	0.000	0.000
3	1.000	2.900	0.000	0.000
4	1.500	6.100	0.000	0.000
5	2.000	13.600	0.000	0.000

Input Information from Internal Rating Curve 29

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	3.300	0.000	0.000
3	1.000	4.700	0.000	0.000
4	1.500	10.700	0.000	0.000
5	2.000	25.000	0.000	0.000

mode, courier font, a size of 8 pt. and margins of 0.75 |

Table E1 - Basic Conduit Data	
Table E2 - Conduit Factor Data	
Table E3a - Junction Data	
Table E3b - Junction Data	
Table E4 - Conduit Connectivity Data	
Table E4a - Dry Weather Flow Data	
Table E4b - Real Time Control Data	
Table E5 - Junction Time Step Limitation Summary	
Table E5a - Conduit Explicit Condition Summary	
Table E6 - Final Model Condition	
Table E7 - Iteration Summary	
Table E8 - Junction Time Step Limitation Summary	
Table E9 - Junction Summary Statistics	
Table E10 - Conduit Summary Statistics	
Table E11 - Area assumptions used in the analysis	
Table E12 - Mean conduit information	
Table E13 - Channel losses(H) and culvert info	
Table E13a - Culvert Analysis Classification	
Table E14 - Natural Channel Overbank Flow Information	
Table E14a - Natural Channel Encroachment Information	
Table E14b - Floodplain Mapping	
Table E15 - Spreadsheet Info List	
Table E15a - Spreadsheet Reach List	
Table E16 - New Conduit Output Section	
Table E17 - Pump Operation	
Table E18 - Junction Continuity Error	
Table E19 - Junction Inflow & Outflow Listing	
Table E20 - Junction Flooding and Volume List	
Table E21 - Continuity balance at simulation end	
Table E22 - Model Judgement Section	

Time Control from Hydraulics Job Control

Year..... 2014 Month..... 1
Day..... 1 Hour..... 0
Minute..... 0 Second..... 0

Control information for simulation

Integration cycles..... 38880
Length of integration step is..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL). 0
Use U.S. customary units for I/O..... 0
Courant Time Step Factor..... 1.00000
Intermediate printout intervals of..... 500 cycles
Intermediate printout intervals of..... 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of..... 83.33 minutes
Hot start file parameter (REDO)..... 0
Initial time..... 0.00 hours

Iteration variables: Flow Tolerance. 0.00010

Head Tolerance. 0.00050
Minimum depth (m or ft)..... 0.00001
Underrelaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K. 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions..... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.00

Input Information from Internal Rating Curve 36

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	14.600	0.000	0.000
3	2.000	19.500	0.000	0.000
4	3.000	38.700	0.000	0.000
5	4.000	82.000	0.000	0.000

Table E1 - Conduit Data

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef.	Max Width (ft)	Depth (ft)	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	100.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	Link21	740.0000	Circular	9.6211	0.0130	3.5000	3.5000		
12	Link23	1065.0000	H Ellipse	5.1000	0.0130	3.1667	2.0000		
13	Link25	435.0000	Circular	1.7671	0.0130	1.5000	1.5000		
14	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
15	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
16	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
17	238.1	65.0000	Circular	1.7671	0.0130	1.5000	1.5000		
18	264.11	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		
19	263.11	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
20	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
21	250.21	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
22	21	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
23	23	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
24	25	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
25	28	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
26	29	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
27	36	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		

Total length of all conduits 9188.0000 feet

Table E2 - Conduit Factor Data

Conduit Name	Number	Entrance Loss	Exit Loss	Coef	Low Flow	Depth	Time	Coef	Exit Exp/Contc	Weighting	Roughness	Which	Sediment	Flow
Link2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link4	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link5	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link6	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link7	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link12	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link13	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link15	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link21	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link23	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
Link25	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
203.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
203.2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	
238.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	0.0000	0.0000	Standard	-	Dynamic Wave	

duration simulations. Please check your
 continuity errors and make adjustments to
 your model as required.

FREE OUTFALL DATA (DATA GROUP 1)
 BOUNDARY CONDITION ON DATA GROUP J1

Outfall at Junction...Node39 has boundary condition number... 1
 Outfall at Junction...Node41 has boundary condition number... 2

====> Warning !! Outfall Junction Node39 has two or more connecting conduits.

====> Warning !! Outfall Junction Node41 has two or more connecting conduits.

Weir Outfall Data
 Boundary Condition on data group J1

Weir Outfall at Junction... Node39 has boundary condition number... 1
 Weir Outfall at Junction... Node39 has boundary condition number... 1
 Weir Outfall at Junction... Node41 has boundary condition number... 2
 Weir Outfall at Junction... Node41 has boundary condition number... 2
 Weir Outfall at Junction... Node41 has boundary condition number... 2

INTERNAL CONNECTIVITY INFORMATION

CONDUIT	JUNCTION	JUNCTION
orifice 5	Node4	Node2
orifice	Node10	Node3
ori 1	Node16	Node18
Weir5	Node4	Node2
weir6	Node4	Node2
weir 1	Node10	Node3
weir 2	Node10	Node3
weir3	Node12	Node11
weir 4	Node2	Node12
weir8	Node16	Node17
weir9	Node16	Node18
lacy	Node11	Node37
bikepath	Node37	Node38
south	Node38	Node39
driveway	Node37	Node39
seminole	Node40	Node37
sem2	Node37	Node41
south1	Node40	Node41
dway 2	Node40	Node41
FREE# 1	Node41	BOUNDARY
FREE# 2	Node41	BOUNDARY

Boundary Condition Information
 Data Groups J1-J4

BC NUMBER... 1 has no control water surface.
 BC NUMBER... 2 has no control water surface.

====> WARNING ! Junction Node30 is not associated with any conduit.

====> WARNING ! Junction Node31 is not associated with any conduit.

Node11	100.00	100.00	0.0
Node12	100.00	100.00	0.0
Node13	100.00	100.00	0.0
Node15	100.00	100.00	0.0
Node16	100.00	100.00	0.0
Node17	100.00	100.00	0.0
Node18	11.02	27.54	0.0
Node20	100.00	100.00	0.0
Node21	100.00	100.00	0.0
Node22	100.00	100.00	0.0
Node23	100.00	100.00	0.0
Node24	100.00	100.00	0.0
Node25	100.00	100.00	0.0
Node26	36.10	90.25	0.0
Node28	100.00	100.00	0.0
Node29	100.00	100.00	0.0
Node30	100.00	100.00	0.0
Node31	100.00	100.00	0.0
Node32	100.00	100.00	0.0
Node33	100.00	100.00	0.0
Node34	100.00	100.00	0.0
Node35	100.00	100.00	0.0
Node36	100.00	100.00	0.0
Node37	100.00	100.00	0.0
Node38	100.00	100.00	0.0
Node39	100.00	100.00	0.0
Node40	100.00	100.00	0.0
Node41	100.00	100.00	0.0

The junction requiring the smallest time step was...Node1

Table E5a - Conduit Explicit Condition Summary
 Courant = Conduit Length / Time step
 Velocity + sqrt(g*depth)
 Conduit Implicit Condition Summary
 Courant = Conduit Length / Time step
 Velocity

The 3rd column is the Explicit time step times the
 minimum courant time step factor
 Minimum Conduit Time Step in seconds in the 4th column
 in the list. Maximum possible is 10 * maximum time step
 The 5th column is the maximum change at any time step
 during the simulation. The 6th column is the wobble
 value which is an indicator of the flow stability.

You should use this section to find those conduits that
 are slowing your model down. Use modify conduits to
 alter the length of the slow conduits to make your
 simulation faster, or change the conduit name to
 "CHIME?????" where "?????" are any characters, this will
 lengthen the conduit based on the model time step,
 not the value listed in modify conduits.

Conduit	Time(exp)	Exp[C]min	Time(mp)	Time(min)	Max Change	Wobble	Type of Soln
Link2	13.78	13.78	29.55	539.7	0.004	0.215	Normal Soln
Link4	2.84	2.84	5.28	0.0	0.003	0.126	Normal Soln
Link5	0.80	0.80	1.83	1177.3	-0.046	1.996	Normal Soln
Link6	4.44	4.44	11.33	0.0	0.002	0.285	Normal Soln
Link7	3.03	3.03	7.23	0.0	0.003	0.277	Normal Soln
Link9	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link12	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link13	18.81	18.81	100.00	0.0	-0.000	0.005	Normal Soln

====> WARNING ! Junction Node32 is not associated with any conduit.

====> WARNING ! Junction Node33 is not associated with any conduit.

====> WARNING ! Junction Node34 is not associated with any conduit.

====> WARNING ! Junction Node35 is not associated with any conduit.

Conduit Convergence Criteria

Conduit Name	Full Flow	Conduit Slope
Link2	73.8984	0.0048
Link4	62.4947	0.0232
Link5	26.8520	0.0043
Link6	29.7983	0.0053
Link7	28.4175	0.0048
Link9	10.0415	0.0000
Link12	6.2666	0.0309
Link13	4.6007	0.0051
Link15	25.1434	0.0124
Link16	7.4734	0.0440
Link21	134.5264	0.0179
Link23	33.6545	0.0064
Link25	11.2618	0.0115
203.1	5.4332	0.0233
203.2	19.8518	0.0350
ditch1	36.4193	0.0023
238.1	13.0290	0.0154
264.11	3.9404	0.0037
263.11	0.7414	0.0000
250.11	15.7704	0.0025
250.21	18.7101	0.0036
21	0.0000	0.0000
23	0.0000	0.0000
25	0.0000	0.0000
28	0.0000	0.0000
29	0.0000	0.0000
36	0.0000	0.0000
orifice 5	3.8094	0.0000
orifice	3.8094	0.0000
ori 1	0.5379	0.0000

Table E5 - Junction Time Limitation Summary

(0.10 or 0.25) Depth * Area
 Time step = Sum of Flow

The time this junction was the limiting junction
 is listed in the third column.

Junction	Time(.10)	Time(.25)	Time(sec)
Node1	100.00	100.00	388800.0
Node2	100.00	100.00	0.0
Node3	100.00	100.00	0.0
Node4	100.00	100.00	0.0
Node5	100.00	100.00	0.0
Node6	100.00	100.00	0.0
Node7	100.00	100.00	0.0
Node8	100.00	100.00	0.0
Node9	100.00	100.00	0.0
Node10	100.00	100.00	0.0

Link15	2.90	2.90	5.57	0.0	0.002	0.054	Normal Soln
Link16	1.53	1.53	2.21	12.0	0.002	0.880	Normal Soln
Link21	53.14	53.14	84.13	0.0	0.012	0.222	Normal Soln
Link23	100.00	100.00	100.00	0.0	0.008	0.270	Normal Soln
Link25	50.78	50.78	96.81	0.0	0.090	0.640	Normal Soln
203.1	5.47	5.47	9.04	0.0	0.038	1.241	Normal Soln
203.2	3.73	3.73	5.72	0.0	0.003	0.297	Normal Soln
ditch1	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
238.1	7.38	7.38	12.94	0.0	0.052	0.848	Normal Soln
264.11	3.71	3.71	9.72	0.0	0.007	2.799	Normal Soln
263.11	2.40	2.40	7.43	4549.3	-0.034	63.540	Normal Soln
250.11	4.63	4.63	11.83	0.0	0.018	2.952	Normal Soln
250.21	3.95	3.95	9.59	201.7	0.039	3.248	Normal Soln
21	100.00	100.00	100.00	0.0	6.131	0.000	Special Cnd
23	100.00	100.00	100.00	0.0	0.002	0.000	Special Cnd
25	100.00	100.00	100.00	0.0	0.026	0.000	Special Cnd
28	100.00	100.00	100.00	0.0	1.740	0.000	Special Cnd
29	100.00	100.00	100.00	0.0	0.003	0.000	Special Cnd
36	100.00	100.00	100.00	0.0	0.023	0.000	Special Cnd
orifice 5	94.27	94.27	100.00	0.0	0.002	1.597	Normal Soln
orifice	72.04	72.04	100.00	0.0	0.002	2.304	Normal Soln
ori 1	97.08	97.08	100.00	0.0	0.001	2.509	Normal Soln

The conduit with the smallest time step limitation was...263.11

The conduit with the largest wobble was...263.11

The conduit with the largest flow change in any
 consecutive time step.....21

* End of time step DO-loop in Runoff *

Final Date (Mo/Day/Year) = 1/4/2014
 Total number of time steps = 4340
 Final Julian Date = 2014004
 Final time of day = 0. seconds.
 Final time of day = 0.00 hours.
 Final running time = 72.0000 hours.
 Final running time = 3.0000 days.

Extrapolation Summary for Watersheds
 * Explains the number of time steps and iterations *
 * Used in the solution of the subcatchments. *
 * # Steps ==> Total Number of Extrapolated Steps *
 * # Calls ==> Total Number of OVERLAND Calls *

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node40#1	0	0	Node36#1	0	0	Node21#1	0	0
Node10#1	0	0	Node10#2	0	0	Node26#1	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node29#1	0	0	Node9#1	0	0	Node23#1	0	0
Node24#1	0	0	Node20#1	0	0	Node25#1	0	0
Node2#1	0	0	Node28#1	0	0	Node12#1	0	0
Node11#1	0	0	Node37#1	0	0	Node38#1	0	0
Node30#1	0	0	Node31#1	0	0	Node32#1	0	0
Node33#1	0	0	Node34#1	0	0	Node35#1	0	0

Rainfall input summary from Runoff Continuity Check

Total rainfall read for gage # 1 is 2.4900 in
 Total rainfall duration for gage # 1 is 1434.02 minutes

Table R5. CONTINUITY CHECK FOR SURFACE WATER
 * Any continuity error can be fixed by lowering the
 wet and transition time step. The transition time *

* should not be much greater than the wet time step. *

Table with 2 columns: Inches over, Total Basin. Rows include Total Precipitation (Rain plus Snow), Total Infiltration, Total Evaporation, Surface Runoff from Watersheds, Total Water remaining in Surface Storage, Infiltration over the Pervious Area, Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover, Total Precipitation + Initial Storage.

The error in continuity is calculated as

Continuity check table with 2 columns: Inches over, Total Basin. Rows include Precipitation + Initial Snow Cover, Infiltration, Evaporation - Snow removal, Surface Runoff from Watersheds, Water in Surface Storage, Water remaining in Snow Cover, Precipitation + Initial Snow Cover, Percent Continuity Error.

Table R6. Continuity Check for Channel/Pipes

Continuity check table for channel/pipes with 2 columns: Inches over, Total Basin. Rows include Initial Channel/Pipe Storage, Final Channel/Pipe Storage, Surface Runoff from Watersheds, Groundwater Subsurface Inflow or Diversion, Evaporation Loss from Channels, Groundwater Flow Diverted Out of Network, Channel/Pipe/Inlet Outflow, Initial Storage + Inflow, Final Storage + Outflow + Diverted GW, Final Storage + Outflow + Evaporation, Percent Continuity Error.

Table R9. Summary Statistics for Subcatchments

Summary statistics table for subcatchments with 6 columns: Node40#1, Node36#1, Node21#1, Node10#1, Node10#2, Area (acres), Percent Impervious.

Note: Total Runoff Depth includes pervious & impervious areas. Pervious and Impervious Runoff Depth is only the runoff from those two areas. For catchments receiving redirected flow, this flow will only be shown if the flow is not directed directly to the outlet. Flow that is getting redirected is also listed with the original subcatchment.

Rational Formula

Rational formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity. Rows include Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node69#1, Node23#1, Node24#1, Node20#1, Node25#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Rational Formula

Rational formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity. Rows include Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node2#1, Node28#1, Node12#1, Node11#1, Node37#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Table with 6 columns: Total Rainfall, Max Intensity. Rows include Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Rational Formula

Rational formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity. Rows include Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node26#1, Node1#1, Node4#1, Node16#1, Node29#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Runoff Depth table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Rational Formula

Rational formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity. Rows include Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node38#1, Node30#1, Node31#1, Node32#1, Node33#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate. Rows include Total Runoff Depth, Peak Runoff Rate.

Rational Formula

Rational formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity. Rows include Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Partial Area Tc..... 0.0000 0.0000 0.0000 0.0000 0.0000
 Partial Area Intensity. 0.0000 0.0000 0.0000 0.0000 0.0000

Subcatchment..... Node34#1 Node35#1
 Area (acres)..... 3.34000 7.66000
 Percent Impervious..... 0.00000 0.00000
 Total Rainfall (in)..... 2.49000 2.49000
 Max Intensity (in/hr).. 3.59729 3.59729

Pervious Area
 Total Runoff Depth (in) 0.62913 0.54760
 Peak Runoff Rate (cfs). 2.08459 3.32729

Total Impervious Area
 Total Runoff Depth (in) 0.00000 0.00000
 Peak Runoff Rate (cfs). 0.00000 0.00000

Impervious Area with depression storage
 Total Runoff Depth (in) 0.00000 0.00000
 Peak Runoff Rate (cfs). 0.00000 0.00000

Impervious Area without depression storage
 Total Runoff Depth (in) 0.00000 0.00000
 Peak Runoff Rate (cfs). 0.00000 0.00000

Total Area
 Total Runoff Depth (in) 0.62913 0.54760
 Peak Runoff Rate (cfs). 2.08459 3.32729

Rational Formula
 Perv. Tc. (mins).... 0.00000 0.00000
 Perv. Intensity (in/hr) 0.00000 0.00000
 Pervious C..... 0.00000 0.00000
 Impervious Tc. (mins).. 0.00000 0.00000
 Imp. Intensity (in/hr). 0.00000 0.00000
 Impervious C..... 0.00000 0.00000
 Partial Area (Ha)..... 0.00000 0.00000
 Partial Area Tc..... 0.00000 0.00000
 Partial Area Intensity. 0.00000 0.00000

====> Runoff simulation ended normally.

Table E6. Final Model Condition
 This table is used for steady state |
 flow comparison and is the information |
 saved to the hot-restart file. |
 Final Time = 108.000 hours |

Junction / Depth / Elevation ==> *** Junction is Surcharged.
 Node1/ 0.01 / 1025.01/ Node2/ 2.07 / 1017.07/ Node3/ 0.02 / 1018.02/
 Node4/ 0.15 / 1019.15/ Node5/ 0.00 / 1021.99/ Node6/ 0.00 / 1021.34/
 Node7/ 0.00 / 1021.31/ Node8/ 0.00 / 1021.12/ Node9/ 3.62 / 1018.62/
 Node10/ 0.08 / 1019.08/ Node11/ 0.00 / 1021.88/ Node12/ 0.46 / 1023.46/
 Node13/ 0.00 / 1021.92/ Node15/ 0.00 / 1023.15/ Node16/ 1.02 / 1023.02/
 Node17/ 0.00 / 1022.87/ Node18/ 1.00 / 1023.00/ Node20/ 0.00 / 1025.00/
 Node21/ 0.00 / 1022.00/ Node22/ 0.00 / 1034.34/ Node23/ 0.00 / 1040.00/
 Node24/ 0.00 / 1031.82/ Node25/ 1.07 / 1017.07/ Node26/ 0.00 / 1020.00/
 Node28/ 0.46 / 1023.46/ Node29/ 0.00 / 1023.00/ Node30/ 0.00 / 1016.00/
 Node31/ 0.00 / 1040.00/ Node32/ 0.00 / 1037.00/ Node33/ 0.00 / 1020.00/
 Node34/ 0.00 / 1023.00/ Node35/ 0.00 / 1023.00/ Node36/ 0.00 / 1037.00/
 Node37/ 4.56 / 1019.06/ Node38/ 4.56 / 1019.06/ Node39/ 0.00 / 1021.50/
 Node40/ 5.24 / 1019.06/ Node41/ 0.00 / 1019.80/

Node40/ 5.24 / Node41/ 3.20 /
 Junction/ Max Volume
 Node1/ 34064.13 / Node2/ 832083.98 / Node3/ 399.49 /
 Node4/ 149674.80 / Node5/ 6.38 / Node6/ 8.13 /
 Node7/ 9.47 / Node8/ 8.98 / Node9/ 133478.24 /
 Node10/ 94581.42 / Node11/ 5172.56 / Node12/ 10611.34 /
 Node13/ 0.84 / Node15/ 0.00 / Node16/ 11751.20 /
 Node17/ 5.86 / Node18/ 15.67 / Node20/ 6579.08 /
 Node21/ 41152.27 / Node22/ 10.27 / Node23/ 10352.91 /
 Node24/ 7.69 / Node25/ 61082.59 / Node26/ 8.47 /
 Node28/ 4412.00 / Node29/ 16273.45 / Node30/ 0.00 /
 Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
 Node34/ 0.00 / Node35/ 0.00 / Node36/ 30643.64 /
 Node37/ 316346.40 / Node38/ 1306969.61 / Node39/ 0.00 /
 Node40/ 176446.66 / Node41/ 0.00 /

Junction/Total Flgng
 Node1/ 0.00 / Node2/ 0.00 / Node3/ 0.00 /
 Node4/ 0.00 / Node5/ 0.00 / Node6/ 0.00 /
 Node7/ 0.00 / Node8/ 0.00 / Node9/ 0.00 /
 Node10/ 0.00 / Node11/ 0.00 / Node12/ 0.00 /
 Node13/ 0.00 / Node15/ 0.00 / Node16/ 0.00 /
 Node17/ 0.00 / Node18/ 0.00 / Node20/ 0.00 /
 Node21/ 0.00 / Node22/ 0.00 / Node23/ 0.00 /
 Node24/ 0.00 / Node25/ 0.00 / Node26/ 0.00 /
 Node28/ 0.00 / Node29/ 0.00 / Node30/ 0.00 /
 Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
 Node34/ 0.00 / Node35/ 0.00 / Node36/ 0.00 /
 Node37/ 0.00 / Node38/ 0.00 / Node39/ 0.00 /
 Node40/ 0.00 / Node41/ 0.00 /

Conduit/ Cross Sectional Area
 Link2/ 0.02 / Link4/ 0.00 / Link5/ 0.00 /
 Link6/ 0.00 / Link7/ 0.00 / Link9/ 0.00 /
 Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.00 /
 Link16/ 0.00 / Link21/ 0.00 / Link23/ 0.00 /
 Link25/ 0.18 / 203.1 / 0.00 / 203.2 / 0.00 /
 ditch1/ 0.00 / 238.1 / 0.00 / 264.11 / 0.00 /
 263.11 / 3.34 / 250.11 / 3.03 / 250.21 / 4.11 /
 21/ 1.00 / 23/ 1.00 / 25/ 1.00 /
 28/ 1.00 / 29/ 1.00 / 36/ 1.00 /
 orifice 5/ 0.07 / orifice/ 0.03 / ori 1/ 0.00 /

Conduit/ Final Volume
 Link2/ 2.34 / Link4/ 0.01 / Link5/ 0.01 /
 Link6/ 0.03 / Link7/ 0.02 / Link9/ 0.00 /
 Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.01 /
 Link16/ 0.00 / Link21/ 0.01 / Link23/ 0.05 /
 Link25/ 77.06 / 203.1 / 0.12 / 203.2 / 0.00 /
 ditch1/ 0.00 / 238.1 / 0.01 / 264.11 / 0.00 /
 263.11 / 150.18 / 250.11 / 202.76 / 250.21 / 287.72 /
 21/ 0.00 / 23/ 0.00 / 25/ 0.00 /
 28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
 orifice 5/ 66.95 / orifice/ 25.84 / ori 1/ 2.04 /

Conduit/ Hydraulic Radius
 Link2/ 0.02 / Link4/ 0.01 / Link5/ 0.01 /
 Link6/ 0.01 / Link7/ 0.01 / Link9/ 0.00 /
 Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.01 /
 Link16/ 0.00 / Link21/ 0.01 / Link23/ 0.01 /
 Link25/ 0.04 / 203.1 / 0.01 / 203.2 / 0.00 /
 ditch1/ 0.00 / 238.1 / 0.00 / 264.11 / 0.00 /
 263.11 / 0.49 / 250.11 / 0.66 / 250.21 / 0.55 /
 21/ 0.00 / 23/ 0.00 / 25/ 0.00 /
 28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
 orifice 5/ 0.09 / orifice/ 0.05 / ori 1/ 0.01 /

Conduit/ Upstream/ Downstream Elevation
 Link2/ 1018.02/ 1017.40 Link4/ 1021.99/ 1021.34 Link5/ 1021.34/ 1021.31/
 Link6/ 1021.31/ 1021.12 Link7/ 1021.12/ 1021.00 Link9/ 1017.07/ 1017.07/

Conduit/ Flow ==> *** Conduit uses the normal flow option.
 Link2/ 0.01 / Link4/ 0.00 / Link5/ 0.00 /
 Link6/ 0.00 / Link7/ 0.00 / Link9/ 0.00 /
 Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.00 /
 Link16/ 0.00 / Link21/ 0.00 / Link23/ 0.00 /
 Link25/ 0.00 / 203.1 / 0.00 / 203.2 / 0.00 /
 ditch1/ 0.00 / 238.1 / 0.00 / 264.11 / 0.00 /
 263.11/ -0.00 / 250.11/ 0.00 / 250.21/ -0.00 /
 21/ 0.00 / 23/ 0.00 / 25/ -0.00 /
 28/ -0.00 / 29/ 0.00 / 36/ 0.00 /
 orifice 5/ 0.04 / orifice/ 0.01 / ori 1/ 0.00 /
 weir5/ 0.00 / weir6/ 0.00 / weir 1/ 0.00 /
 weir 2/ 0.00 / weir3/ 0.00 / weir 4/ 0.00 /
 weir8/ 0.00 / weir9/ 0.00 / bcy 0.00 /
 bkpath/ 0.00 / south/ 0.00 / driveway/ 0.00 /
 seminote/ 0.00 / sem2/ 0.00 / south1/ 0.00 /
 dway 2/ 0.00 / FREE# 1/ 0.00 / FREE# 2/ 0.00 /

Conduit/ Velocity
 Link2/ 0.40 / Link4/ 0.54 / Link5/ 0.27 /
 Link6/ 0.30 / Link7/ 0.23 / Link9/ 0.00 /
 Link12/ 0.00 / Link13/ 0.00 / Link15/ 0.33 /
 Link16/ 0.00 / Link21/ 0.00 / Link23/ 0.00 /
 Link25/ 0.00 / 203.1 / 0.60 / 203.2 / 0.00 /
 ditch1/ 0.00 / 238.1 / 0.28 / 264.11 / 0.00 /
 263.11/ -0.00 / 250.11/ 0.00 / 250.21/ -0.00 /
 21/ 0.00 / 23/ 0.00 / 25/ 0.00 /
 28/ 0.50 / 29/ 0.00 / 36/ 0.00 /
 orifice 5/ 0.53 / orifice/ 0.29 / ori 1/ 0.11 /

Conduit/ Width
 Link2/ 1.73 / Link4/ 0.98 / Link5/ 0.98 /
 Link6/ 0.98 / Link7/ 0.98 / Link9/ 0.00 /
 Link12/ 0.00 / Link13/ 0.49 / Link15/ 0.78 /
 Link16/ 0.39 / Link21/ 1.37 / Link23/ 1.24 /
 Link25/ 0.53 / 203.1 / 0.39 / 203.2 / 0.59 /
 ditch1/ 0.00 / 238.1 / 0.59 / 264.11 / 0.49 /
 263.11/ 0.01 / 250.11/ 2.65 / 250.21/ 0.01 /
 21/ 0.00 / 23/ 0.00 / 25/ 0.00 /
 28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
 orifice 5/ 0.69 / orifice/ 0.52 / ori 1/ 0.18 /

Junction/ EGL
 Node1/ 0.01 / Node2/ 9.01 / Node3/ 1.02 /
 Node4/ 0.15 / Node5/ 0.80 / Node6/ 0.01 /
 Node7/ 0.00 / Node8/ 0.00 / Node9/ 6.00 /
 Node10/ 2.11 / Node11/ 0.00 / Node12/ 0.46 /
 Node13/ 0.00 / Node15/ 0.00 / Node16/ 1.02 /
 Node17/ 0.00 / Node18/ 1.00 / Node20/ 0.00 /
 Node21/ 0.00 / Node22/ 0.00 / Node23/ 0.00 /
 Node24/ 0.00 / Node25/ 1.07 / Node26/ 0.00 /
 Node28/ 0.46 / Node29/ 0.00 / Node30/ 0.00 /
 Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
 Node34/ 0.00 / Node35/ 0.00 / Node36/ 0.00 /
 Node37/ 7.32 / Node38/ 4.56 / Node39/ 0.00 /
 Node40/ 2.33 / Node41/ 0.00 /

Junction/ Freeboard
 Node1/ 2.99 / Node2/ 10.93 / Node3/ 6.98 /
 Node4/ 5.85 / Node5/ 4.01 / Node6/ 4.68 /
 Node7/ 4.87 / Node8/ 4.90 / Node9/ 7.38 /
 Node10/ 5.92 / Node11/ 3.02 / Node12/ 1.54 /
 Node13/ 3.81 / Node15/ 1.85 / Node16/ 2.98 /
 Node17/ 3.13 / Node18/ 3.00 / Node19/ 1.02 /
 Node21/ 4.00 / Node22/ 6.66 / Node23/ 4.00 /
 Node24/ 6.18 / Node25/ 2.93 / Node26/ 8.00 /
 Node28/ 1.54 / Node29/ 4.00 / Node30/ 4.00 /
 Node31/ 4.00 / Node32/ 4.00 / Node33/ 4.00 /
 Node34/ 2.00 / Node35/ 4.00 / Node36/ 4.00 /
 Node37/ 4.04 / Node38/ 3.94 / Node39/ 1.50 /

Link12/ 1021.92/ 1021.92 Link13/ 1021.34/ 1021.34 Link15/ 1023.00/ 1022.79/
 Link16/ 1022.87/ 1021.99 Link21/ 1034.34/ 1021.11 Link23/ 1031.82/ 1025.00/
 Link25/ 1020.00/ 1017.07 203.1 / 1025.01/ 1024.00 203.2 / 1017.07/ 1017.07/
 ditch1/ 1023.15/ 1023.15 238.1 / 1025.00/ 1024.00 264.11 / 1021.98/ 1021.82/
 263.11/ 1019.06/ 1019.06 250.11/ 1019.06/ 1019.06 250.21/ 1019.06/ 1019.06/
 21/ 1020.00/ 1019.08 23/ 1040.00/ 1031.82 25/ 1017.07/ 1017.07/
 28/ 1023.46/ 1023.46 29/ 1023.00/ 1023.87 36/ 1037.00/ 1034.34/
 orifice 5/ 1019.15/ 1019.07 orifice/ 1019.08/ 1019.02 ori 1/ 1023.02/ 1023.00/

Table E7 - Iteration Summary

Total number of time steps simulated..... 38880
 Total number of passes in the simulation..... 5161427
 Total number of time steps during simulation.... 135109
 Ratio of actual # of time steps / NTCCY..... 3.475
 Average number of iterations per time step..... 38.202
 Average time step size(seconds)..... 2.976
 Smallest time step size(seconds)..... 1.000
 Largest time step size(seconds)..... 10.000
 Average minimum Conduit Courant time step (sec). 4.064
 Average minimum implicit time step (sec)..... 2.976
 Average minimum junction time step (sec)..... 2.976
 Average Courant Factor Tl..... 2.976
 Number of times omega reduced..... 89969

Table E8 - Junction Time Step Limitation Summary

Not Conv = Number of times this junction did not converge during the simulation.
 Avg Conv = Average junction iterations.
 Conv err = Mean convergence error.
 Omega Cng = Change of omega during iterations
 Max Iter = Maximum number of iterations

Junction	Not Conv	Avg Conv	Conv Err	Total Iter	Omega Cng	Max Iter	Item >25	Item >40
Node1	20335	76.66	10357088	0	501	20453	20441	20439
Node2	20172	81.34	10989130	2461	501	24412	23684	23571
Node3	0	1.17	157913	0	6	0	0	0
Node4	0	1.02	138401	0	1	0	0	0
Node5	0	1.03	138982	0	5	0	0	0
Node6	4	8.55	1155689	4292	501	4220	3503	2258
Node7	0	25.23	3409127	8205	500	8155	8093	8010
Node8	0	1.08	145406	0	4	0	0	0
Node9	0	1.02	138072	0	4	0	0	0
Node10	16256	79.21	10701830	21211	501	21144	21115	21114
Node11	41	1.23	165766	21	501	47	43	43
Node12	1616	8.02	1084214	16539	501	2280	1660	1660
Node13	0	1.00	135125	0	2	0	0	0
Node15	0	1.00	135109	0	1	0	0	0
Node16	0	1.01	136105	0	4	0	0	0
Node17	0	1.08	145729	0	0	0	0	0
Node18	0	1.01	136481	0	4	0	0	0
Node20	417	2.79	376518	117	501	504	498	496
Node21	12247	47.31	6391907	18748	501	12485	12335	12335
Node22	0	1.09	146869	0	5	0	0	0
Node23	0	1.02	138424	0	4	0	0	0
Node24	0	1.05	141989	0	5	0	0	0
Node25	2011	8.83	1192555	2011	501	2011	2011	2011
Node26	21	1.12	150753	11	501	29	29	29
Node28	15358	58.64	7529215	16102	501	16041	16041	16041
Node29	0	1.04	139958	0	4	0	0	0
Node30	0	1.00	135109	0	1	0	0	0
Node31	0	1.00	135109	0	1	0	0	0
Node32	0	1.00	135109	0	1	0	0	0
Node33	0	1.00	135109	0	1	0	0	0

The total continuity error was 1.88031E+05 cubic feet
 The remaining total volume was 2.63231E+06 cubic feet
 Your mean node continuity error was Excellent
 Your worst node continuity error was Good

Table E19 - Junction Inflow & Outflow Listing
 Units are either ft³/s or m³/s depending on the units in your model.

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inflow to Node	Inflow through Outfall	RNF Layer Inflow to Node	Layer Inflow to Node	2D Layer Inflow from Node	Evaporation from Node	Basin Inflow from Node	Infl.
Node1	0.0000	0.0000	0.0000	0.0000	0.0000	69058.6274	0.0000	0.0000	0.0000	0.0000	0.00
Node2	0.0000	0.0000	0.0000	0.0000	0.0000	76375.4297	0.0000	0.0000	0.0000	0.0000	0.00
Node4	0.0000	0.0000	0.0000	0.0000	0.0000	218349.3975	0.0000	0.0000	0.0000	0.0000	0.00
Node9	0.0000	0.0000	0.0000	0.0000	0.0000	78154.6974	0.0000	0.0000	0.0000	0.0000	0.00
Node10	0.0000	0.0000	0.0000	0.0000	0.0000	53357.1756	0.0000	0.0000	0.0000	0.0000	0.00
Node11	0.0000	0.0000	0.0000	0.0000	0.0000	32168.2671	0.0000	0.0000	0.0000	0.0000	0.00
Node12	0.0000	0.0000	0.0000	0.0000	0.0000	3442.0610	0.0000	-0.0000	0.0000	0.0000	0.00
Node16	0.0000	0.0000	0.0000	0.0000	0.0000	19786.6223	0.0000	0.0000	0.0000	0.0000	0.00
Node20	0.0000	0.0000	0.0000	0.0000	0.0000	1684.0111	0.0000	0.0000	0.0000	0.0000	0.00
Node21	0.0000	0.0000	0.0000	0.0000	0.0000	77848.7153	0.0000	-15.1397	0.0000	0.0000	0.00
Node23	0.0000	0.0000	0.0000	0.0000	0.0000	23363.5486	0.0000	0.0000	0.0000	0.0000	0.00
Node24	0.0000	0.0000	0.0000	0.0000	0.0000	9827.9259	0.0000	0.0000	0.0000	0.0000	0.00
Node25	0.0000	0.0000	0.0000	0.0000	0.0000	151862.2699	0.0000	0.0000	0.0000	0.0000	0.00
Node26	0.0000	0.0000	0.0000	0.0000	0.0000	5112.1066	0.0000	0.0000	0.0000	0.0000	0.00
Node28	0.0000	0.0000	0.0000	0.0000	0.0000	15616.4624	0.0000	0.0000	0.0000	0.0000	0.00
Node29	0.0000	0.0000	0.0000	0.0000	0.0000	39856.8370	0.0000	-0.0171	0.0000	0.0000	0.00
Node30	0.0000	0.0000	0.0000	0.0000	0.0000	60049.8538	0.0000	0.0000	0.0000	0.0000	0.00
Node31	0.0000	0.0000	0.0000	0.0000	0.0000	7309.1615	0.0000	0.0000	0.0000	0.0000	0.00
Node32	0.0000	0.0000	0.0000	0.0000	0.0000	53748.9204	0.0000	0.0000	0.0000	0.0000	0.00
Node33	0.0000	0.0000	0.0000	0.0000	0.0000	24416.0073	0.0000	0.0000	0.0000	0.0000	0.00
Node34	0.0000	0.0000	0.0000	0.0000	0.0000	7627.5463	0.0000	0.0000	0.0000	0.0000	0.00
Node35	0.0000	0.0000	0.0000	0.0000	0.0000	15226.1444	0.0000	0.0000	0.0000	0.0000	0.00
Node36	0.0000	0.0000	0.0000	0.0000	0.0000	106178.0047	0.0000	0.0000	0.0000	0.0000	0.00
Node37	0.0000	0.0000	0.0000	0.0000	0.0000	14341.5301	0.0000	0.0000	0.0000	0.0000	0.00
Node38	0.0000	0.0000	0.0000	0.0000	0.0000	83086.8417	0.0000	0.0000	0.0000	0.0000	0.00
Node40	0.0000	0.0000	0.0000	0.0000	0.0000	691223.3333	0.0000	0.0000	0.0000	0.0000	0.00

Table E20 - Junction Flooding and Volume Listing
 The maximum volume is the total volume in the node including the volume in the flooded storage area. This is the maximum volume at any time. The volume in the flooded storage area is the total volume above the ground elevation, where the flooded pond storage area starts.
 The fourth column is instantaneous, the fifth is the sum of the flooded volume over the entire simulation
 Units are either ft³/s or m³/s depending on the units.

Junction Name	Out of 1D-System Surcharged Time (min)	Passed to 2D cell OR Flooding Volume (min)	Maximum Volume in all allowed Flood Pond of 1D-System
Node1	0.000	0.000	3.406E+04
Node2	0.000	0.000	8.321E+05
Node3	0.000	0.000	399.0000
Node4	0.000	0.000	1.497E+05
Node5	0.000	0.000	6.38.0000
Node6	0.000	0.000	8.13.0000
Node7	0.000	0.000	9.47.0000
Node8	0.000	0.000	8.98.0000
Node9	0.000	0.000	1.335E+05
Node10	0.000	0.000	9.456E+04

Node	Outflow Volume, ft³/s	Average Outflow, cfs
Node25	151876.0812	0.3906
Node26	5112.6385	0.0131
Node28	15617.6821	0.0402
Node29	39859.4347	0.1025
Node30	60052.6322	0.1545
Node31	7309.3641	0.0188
Node32	53751.5279	0.1382
Node33	24416.5336	0.0628
Node34	7627.8842	0.0196
Node35	15226.4376	0.0392
Node36	106187.6138	0.2731
Node37	14342.3624	0.0369
Node38	830726.9554	2.1366
Node40	691231.4183	1.7779

Initial system volume = 0.0000 Cu Ft
 Total system inflow volume = 2.68668E+06 Cu Ft
 Inflow + Initial volume = 2.68668E+06 Cu Ft
 Total system outflow = 0.0000 Cu Ft
 Volume left (Final volume) = 2.63231E+06 Cu Ft
 Evaporation = 0.0000 Cu Ft
 Basin Infiltration = 0.0000 Cu Ft
 Outflow + Final Volume = 2.63231E+06 Cu Ft

Total Model Continuity Error
 Error in Continuity, Percent = 2.0240
 Error in Continuity, ft³ = 54378.2253
 + Error means a continuity loss, - a gain

Table E22. Numerical Model judgement section

Overall error was (minimum of Table E18 & E21) 2.0240 percent
 Worst nodal error was in node Node30 with 100.0000 percent
 Of the total inflow this loss was 2.2352 percent
 Your overall continuity error was Good

Poor Efficiency
 Efficiency of the simulation 11.22
 Most Number of Non Convergences at one Node 20335.
 Total Number Non Convergences at all Nodes 88564.
 Total Number of Nodes with Non Convergences 12.

Table E23. New Basin Design Information
 Maximum Hydraulic Grade Line,
 Out Conduit Sizes and Maximum Flow

A) Resize d/s Pipes based on given HGL
 B) Resize Basin based on given HGL
 C) Resize d/s Pipes and Basin based on HGL and max discharge
 D) Resize d/s pipes based on given max discharge

Basin Name	Type	Max.HGL (ft)	Conduit (ft)	Depth (ft)	Width (ft)	Barrels	Max.Flow (ft³/s)
------------	------	--------------	--------------	------------	------------	---------	------------------

Hydraulic model simulation ended normally.

Node11	48.2	0.000	0.000	5.173E+03	0.000
Node12	0.000	0.000	0.000	1.061E+04	0.000
Node13	0.000	0.000	0.000	0.838	0.000
Node15	0.000	0.000	0.000	0.000	0.000
Node16	6.016E+03	0.000	0.000	1.175E+04	0.000
Node17	0.000	0.000	0.000	5.86	0.000
Node18	0.000	0.000	0.000	15.7	0.000
Node20	0.000	0.000	0.000	6.579E+03	0.000
Node21	0.000	0.000	0.000	4.115E+04	0.000
Node22	0.000	0.000	0.000	10.3	0.000
Node23	0.000	0.000	0.000	1.035E+04	0.000
Node24	0.000	0.000	0.000	7.69	0.000
Node25	0.000	0.000	0.000	6.108E+04	0.000
Node26	0.000	0.000	0.000	8.47	0.000
Node28	0.000	0.000	0.000	4.412E+03	0.000
Node29	0.000	0.000	0.000	1.627E+04	0.000
Node30	0.000	0.000	0.000	0.000	0.000
Node31	0.000	0.000	0.000	0.000	0.000
Node32	0.000	0.000	0.000	0.000	0.000
Node33	0.000	0.000	0.000	0.000	0.000
Node34	0.000	0.000	0.000	0.000	0.000
Node35	0.000	0.000	0.000	0.000	0.000
Node36	0.000	0.000	0.000	3.064E+04	0.000
Node37	0.000	0.000	0.000	3.163E+05	0.000
Node38	5.829E+03	0.000	0.000	1.307E+06	0.000
Node39	0.000	0.000	0.000	0.000	0.000
Node40	179.	0.000	0.000	1.764E+05	0.000
Node41	0.000	0.000	0.000	0.000	0.000

Simulation Specific Information
 Number of Input Conduits..... 27
 Number of Natural Channels..... 0
 Number of Storage Junctions..... 19
 Number of Orifices..... 3
 Number of Free Outfalls..... 2
 Number of Simulated Conduits..... 48
 Number of Junctions..... 38
 Number of Weirs..... 16
 Number of Pumps..... 0
 Number of Tide Gate Outfalls..... 0

Average % Change in Junction or Conduit is defined as:
 Conduit % Change ==> 100.0 (Q(n+1) - Q(n)) / Qfull
 Junction % Change ==> 100.0 (Y(n+1) - Y(n)) / Yfull

The Conduit with the largest average change was..... 21 with 1.407 percent
 The Junction with the largest average change was..... Node37 with 0.003 percent
 The Conduit with the largest sinosity was..... 263.11 with 63.540

Table E21. Continuity balance at the end of the simulation
 Junction Inflow, Outflow or Street Flooding
 Error = Inflow + Initial Volume - Outflow - Final Volume

Junction	Inflow Volume, ft³/s	Average Inflow, cfs
Node1	69063.6157	0.1776
Node2	76332.1649	0.1965
Node4	218367.6435	0.5616
Node9	78162.1930	0.2010
Node10	53361.0259	0.1372
Node11	32170.8772	0.0827
Node12	3442.3444	0.0089
Node16	19800.5061	0.0509
Node20	1684.1639	0.0043
Node21	77854.4217	0.2002
Node23	23365.8630	0.0601
Node24	9828.9445	0.0253

XP-SWMM Simulation ended normally.
 Your input file was named : C:\Temp\New folder (5)\1D\Ultimate Condition_1\Ultimate Condition_1.dat
 Your output file was named : C:\Temp\New folder (5)\1D\Ultimate Condition_1\Ultimate Condition_1.out

XP-SWMM\XPSTORM Simulation Date and Time Summary
 Starting Date... February 17, 2021 Time... 19:35:29.827
 Ending Date... February 17, 2021 Time... 19:39:37.243
 Elapsed Time... 4.11562 minutes or 246.93750 seconds

Current Directory: C:\Temp\New folder (5)\1D\Ultimate Condition_2
Executable Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe
Input File: C:\Temp\New folder (5)\1D\Ultimate Condition_2\Ultimate Condition_2.XP

xpswmm
Storm and Wastewater Management Model
Developed by Innovyze.
Last Update : May 21 2019
Interface Version: 2019.1
Engine Version : 12.0
Data File Version: 12.62

Engine Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe

Input and Output file names by Layer

Input File to Layer # 1 J:\JUS
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 J:\JUS
Output File to Layer # 2 C:\Temp\Proposed Condition.INT

Configuration Parameters
Configuration Parameters, both those that are hardwired
and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in
the engine as defaults. The remaining in UPPER CASE
have been added to the simulation in the Configuration->
Configuration Parameters dialog or as Engine Defaults in
the SWMM.INI file.
Consult the Help File for the specific meaning/purpose
of any particular parameter.

Powerstation 0.0000 1 2
Sperv 0.0000 0 4
Soldegg 0.0000 0 7
Sas 0.0000 0 11
Soflat 0.0000 0 21
Soldsoma 0.0000 1 24
Soldvol 0.0000 1 28
Simplicit 0.0000 1 29
Soldhot 0.0000 1 31
Soldsca 0.0000 0 33
Sflood 0.0000 1 40
Snokeys 0.0000 0 42
Spzéro 0.0000 0 55
Soldx2 0.0000 2 59
Sstorage2 0.0000 3 62
Soldhot1 0.0000 1 63
Spumpwt 0.0000 1 70
Sedscas 0.0000 1 77
Sexout 0.0000 0 97
Sspatial = 0.90 0.9000 5 124
Sdjref = -1.0 -0.1000 3 143
Sweirfen = 50 50.0000 1 153
Soldbrd 0.0000 1 154
Snoqretev 0.0000 1 161

210 Link4
212 Link5
214 Link6
216 Link7
219 Link9
225 Link12
226 Link13
231 Link15
233 Link16
242 Link21
246 Link23
250 Link25
C(203.1) 203.1
C(203.2) 203.2
C(229.1) ditch1
C(238.1) 238.1
C(266.1) 264.11
C(268.1) 263.11
C(273.1) 250.11
C(273.2) 250.21
O(207.2) orifice 5
O(218.2) orifice
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(266.1) lazy
W(268.1) bikepath
W(270.1) south
W(271.1) driveway
W(273.1) semivale
W(275.1) sem2
W(276.1) south1
W(276.2) dway 2
D(240.1) 21
D(245.1) 23
D(248.1) 25
D(254.1) 28
D(256.1) 29
D(264.1) 36

Parameter Values on the Tapes Common Block. These are the
values read from the data file and dynamically allocated
by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 27
Number of Channel/Pipes in the Runoff Block (NG).... 0
Runoff Water quality constituents (NRQ)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 48
Number of Groundwater Subcatchments in Runoff (NGW). 0
Number of Interface locations for all Blocks (NIE).... 48
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG).... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage junctions in Extran (NVSE)..... 19

Srncid 0.0000 0 164
Snew_nl_97 0.0000 2 290
SCSIADDEPTH=ON 0.0000 1 293
Sbst97 0.0000 1 294
Snewbound 0.0000 1 295
USE_US_RC 0.0000 1 312
Sq_id = 0.01 0.0001 1 316
Snew_storage 0.0000 1 322
Sold_iteration 0.0000 1 333
MINLEN=6 6.0000 1 346
Srivew_elevation 0.0000 1 353
Suse_half_volume 0.0000 1 385
VERT_WALLS=ON 0.0000 1 389
Smin_is = 1.0 1.0000 1 407
Sdsign_restart = on 0.0000 1 412
Szero_value=1.e-05 0.0000 1 415
SUBCATCHMENT_RES=ON 0.0000 1 419
Srelax_depth = on 0.0000 1 427
Sswallow = on 0.0000 1 434
PUMP_NOHEAD=ON 0.0000 1 437
Schannel_geometry=1 0.0000 1 456
PROJUNITS = US 0.0000 1 462

The XPSWMM/XPSTORM engine internally uses object IDs
instead of full object names to represent objects.
Included below is a table of these IDs along with the
name of the object that ID corresponds to.

Table with 2 columns: Object ID Number, Object Name. Lists nodes 201-205 and links 206-205.

Number of Time history data points in Extran (NTVAL). 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEI)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 27
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTOC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 48
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovyze

RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
For example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75
Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Rainage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments

Runoff JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVPAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.0000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds).... 60.0
Simulation length is.... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAV

Entry made to the HYDRAULIC Layer of XP-SWMM
Last Updated in June, 2014 by Innovize
Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovize

=====
| RUNOFF TABLES IN THE OUTPUT FILE |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| for example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Raingage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |
=====

A1

=====
RUNOFF JOB CONTROL #
=====

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time ZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC..... 0
Runoff input print control..... 0
Runoff graph plot control..... 0
Runoff output print control..... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)..... 60.0
Simulation length is..... 72.0 Hours

If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = 0.01000

Raingage #..... 1
KTYPE - Rainfall input type..... 0
NHSTO - Total number of rainfall values..... 241
KINC - Rainfall values(pairs) per line..... 10
KPRINT - Print rainfall(0=Yes,1=No)..... 0

SCS -> Comp CN Time Conc Shape Factor Depth or Fractio #
SBUH -> Comp CN Time Conc N/A N/A #
Green Ampt -> Hydr Cond Initial MD N/A #
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max Infiltr Volume #
Proportional -> Constant N/A N/A N/A #
Initial/Cont Loss -> Initial Continuing N/A N/A #
Initial/Proportional -> Initial Continuing N/A N/A #
Laurentson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
Rational Formula -> Tc Method Flow Path Length Flow Path Slope Roughness or Retardance #
(Rational Formula Tc Method: 1 = Constant # #
2 = Friend's Equation # #
3 = Kinematic Wave # #
4 = Alameda Method # #
5 = Izzard's Formula # #
6 = Kerby's Equation # #
7 = Kirpich's Equation # #
8 = Bransby Williams Equation # #
9 = Federal Aviation Authority Equation # #
=====

Subcatchment	Infl 1	Infl 2	Infl 3	Infl 4	Infl 5	Infl 6	Infl 7	Infl 8
Number Name	#1	#2	#3	#4	#5	#6	#7	#8
1 Node40#1	84.000	0.838	484.000	0.200				
2 Node36#1	91.000	0.333	484.000	0.200				
3 Node21#1	88.000	0.333	484.000	0.200				
4 Node10#1	85.000	0.167	484.000	0.200				
5 Node10#2	74.000	0.333	484.000	0.200				
6 Node26#1	85.000	0.167	484.000	0.200				
7 Node1#1	88.000	0.338	484.000	0.200				
8 Node4#1	88.000	0.288	484.000	0.200				
9 Node16#1	91.000	0.322	484.000	0.200				
10 Node29#1	90.000	0.433	484.000	0.200				
11 Node9#1	86.000	0.212	484.000	0.200				
12 Node23#1	91.000	0.333	484.000	0.200				
13 Node24#1	85.000	0.167	484.000	0.200				
14 Node20#1	80.000	0.167	484.000	0.200				
15 Node25#1	88.000	0.258	484.000	0.200				
16 Node21#1	79.000	0.167	484.000	0.200				
17 Node28#1	88.000	0.312	484.000	0.200				
18 Node12#1	77.000	0.167	484.000	0.200				
19 Node11#1	89.000	0.320	484.000	0.200				
20 Node37#1	76.000	0.252	484.000	0.200				
21 Node38#1	91.000	0.617	484.000	0.200				
22 Node30#1	73.000	0.258	484.000	0.200				
23 Node31#1	72.000	0.333	484.000	0.200				
24 Node32#1	79.000	0.333	484.000	0.200				
25 Node33#1	70.000	0.333	484.000	0.200				
26 Node34#1	76.000	0.312	484.000	0.200				
27 Node35#1	74.000	0.433	484.000	0.200				

=====
Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
=====

Subcatchment	Gage	Infiltration	Routing
Number	Name	No	Type
1	Node40#1	1	SCS Method SCS curvilinear
2	Node36#1	1	SCS Method SCS curvilinear
3	Node21#1	1	SCS Method SCS curvilinear
4	Node10#1	1	SCS Method SCS curvilinear
5	Node10#2	1	SCS Method SCS curvilinear
6	Node26#1	1	SCS Method SCS curvilinear
7	Node1#1	1	SCS Method SCS curvilinear
8	Node4#1	1	SCS Method SCS curvilinear
9	Node16#1	1	SCS Method SCS curvilinear
10	Node29#1	1	SCS Method SCS curvilinear

KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THSTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

=====
Rainfall input summary from Runoff #
=====

Total rainfall for gage # 1 is 2.8400 inches

=====
Data Group F1 #
Evaporation Rate (in/day) #
=====

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

=====
Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
=====

Subcatchment	Channel	Per-	Deptrs	Deprs	Prcnt						
Number	Name	Width	sion	sion	Zero						
		(ft)	ft/ft	n"	n"						
		(ac)	Imperv	Imperv	Imperv						
				Storge	Storge						
				Perv	Perv						
				Perv	Perv						
				-tion	-tion						
1	Node40#1	Node40	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node36#1	Node36	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node21#1	Node21	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node10#1	Node10	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node10#2	Node10	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node26#1	Node26	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node1#1	Node1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node29#1	Node29	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node9#1	Node9	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node23#1	Node23	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node24#1	Node24	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
14	Node20#1	Node20	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000
15	Node25#1	Node25	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
16	Node21#1	Node21	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000
17	Node28#1	Node28	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
18	Node12#1	Node12	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
19	Node11#1	Node11	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
20	Node37#1	Node37	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000
21	Node38#1	Node38	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000
22	Node30#1	Node30	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
23	Node31#1	Node31	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
24	Node32#1	Node32	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
25	Node33#1	Node33	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
26	Node34#1	Node34	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
27	Node35#1	Node35	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000

=====
Table R2. SUBCATCHMENT DATA #
Infiltration of Time of Concentration Data #
Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8) #
=====

Total Number of Subcatchments..... 27
Total Tributary Area (acres)..... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

=====
SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp 6 - perv 7 - n #
8 - imp ds 8 - perv ds 9 - 1st infl #
10 - 2nd infl 11 - 3rd infl #
=====

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

```
Inlet  
Node40 Tributary Subareas..... Node40#1  
Node36 Tributary Subareas..... Node36#1  
Node21 Tributary Subareas..... Node21#1  
Node10 Tributary Subareas..... Node10#1 Node10#2  
Node26 Tributary Subareas..... Node26#1  
Node1 Tributary Subareas..... Node1#1  
Node4 Tributary Subareas..... Node4#1  
Node16 Tributary Subareas..... Node16#1  
Node29 Tributary Subareas..... Node29#1  
Node9 Tributary Subareas..... Node9#1  
Node23 Tributary Subareas..... Node23#1  
Node24 Tributary Subareas..... Node24#1  
Node20 Tributary Subareas..... Node20#1  
Node25 Tributary Subareas..... Node25#1
```

Tributary Subareas..... Node20#1
No Tributary Channel/Pipes
Node25 Tributary Subareas..... Node25#1
No Tributary Channel/Pipes
Node2 Tributary Subareas..... Node2#1
No Tributary Channel/Pipes
Node28 Tributary Subareas..... Node2#1
No Tributary Channel/Pipes
Node12 Tributary Subareas..... Node29#1
No Tributary Channel/Pipes
Node11 Tributary Subareas..... Node12#1
No Tributary Channel/Pipes
Node37 Tributary Subareas..... Node11#1
No Tributary Channel/Pipes
Node38 Tributary Subareas..... Node37#1
No Tributary Channel/Pipes
Node30 Tributary Subareas..... Node39#1
No Tributary Channel/Pipes
Node31 Tributary Subareas..... Node30#1
No Tributary Channel/Pipes
Node32 Tributary Subareas..... Node31#1
No Tributary Channel/Pipes
Node33 Tributary Subareas..... Node32#1
No Tributary Channel/Pipes
Node34 Tributary Subareas..... Node33#1
No Tributary Channel/Pipes
Node35 Tributary Subareas..... Node34#1
No Tributary Channel/Pipes
Node35#1 Tributary Subareas..... Node35#1
No Tributary Channel/Pipes

* Hydrographs will be stored for the following 26 INLETS *

Node40	Node36	Node21
Node10	Node26	Node1
Node4	Node16	Node29
Node9	Node23	Node24
Node20	Node25	Node2
Node28	Node12	Node11
Node37	Node38	Node30
Node31	Node32	Node33
Node34	Node35	

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *

* Number of precipitation station 1 *

Location Station Number

1, 1

A1

HYDRAULICS TABLES IN THE OUTPUT FILE
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| For example: search for Table E20 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |

Ponding Area Exponent..... 1.0000
Minimum Orifice Length..... 1000.00 feet.
NUSW input hydrograph junction..... 0
or user defined hydrographs....

Input Information from Internal Rating Curve 21

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	5.400	0.000	0.000
3	2.000	8.400	0.000	0.000
4	3.000	21.600	0.000	0.000
5	4.000	55.000	0.000	0.000

Input Information from Internal Rating Curve 23

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	1.700	0.000	0.000
3	2.000	2.600	0.000	0.000
4	3.000	6.200	0.000	0.000
5	4.000	15.000	0.000	0.000

Input Information from Internal Rating Curve 25

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	16.500	0.000	0.000
3	2.000	24.000	0.000	0.000
4	3.000	55.500	0.000	0.000
5	4.000	131.100	0.000	0.000

Input Information from Internal Rating Curve 28

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	2.100	0.000	0.000
3	1.000	2.900	0.000	0.000
4	1.500	6.100	0.000	0.000
5	2.000	13.600	0.000	0.000

Input Information from Internal Rating Curve 29

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	3.300	0.000	0.000
3	1.000	4.700	0.000	0.000
4	1.500	10.700	0.000	0.000
5	2.000	25.000	0.000	0.000

| mode, courier font, a size of 8 pt. and margins of 0.75 |

Table E1 - Basic Conduit Data	
Table E2 - Conduit Factor Data	
Table E3a - Junction Data	
Table E3b - Junction Data	
Table E4 - Conduit Connectivity Data	
Table E4a - Dry Weather Flow Data	
Table E4b - Real Time Control Data	
Table E5 - Junction Time Step Limitation Summary	
Table E5a - Conduit Explicit Condition Summary	
Table E6 - Final Model Condition	
Table E7 - Iteration Summary	
Table E8 - Junction Time Step Limitation Summary	
Table E9 - Junction Summary Statistics	
Table E10 - Conduit Summary Statistics	
Table E11 - Area assumptions used in the analysis	
Table E12 - Mean conduit information	
Table E13 - Channel losses(H) and culvert info	
Table E13a - Culvert Analysis Classification	
Table E14 - Natural Channel Overbank Flow Information	
Table E14a - Natural Channel Encroachment Information	
Table E14b - Floodplain Mapping	
Table E15 - Spreadsheet Info List	
Table E15a - Spreadsheet Reach List	
Table E16 - New Conduit Output Section	
Table E17 - Pump Operation	
Table E18 - Junction Continuity Error	
Table E19 - Junction Inflow & Outflow Listing	
Table E20 - Junction Flooding and Volume List	
Table E21 - Continuity balance at simulation end	
Table E22 - Model Judgement Section	

Time Control from Hydraulics Job Control
Year..... 2014 Month..... 1
Day..... 1 Hour..... 0
Minute..... 0 Second..... 0

Control information for simulation

Integration cycles..... 38880
Length of integration step in..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL)..... 0
Use U.S. customary units for I/O..... 0
Courant Time Step Factor..... 1.00000
Intermediate printout intervals of..... 500 cycles
Intermediate printout intervals of..... 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of..... 83.33 minutes
Hot start file parameter (REDO)..... 0
Initial time..... 0.00 hours

Iteration variables: Flow Tolerance..... 0.00010
Head Tolerance..... 0.00050
Minimum depth (m or ft)..... 0.00001
Underretaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K..... 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions..... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.00

Input Information from Internal Rating Curve 36

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	14.600	0.000	0.000
3	2.000	19.500	0.000	0.000
4	3.000	38.700	0.000	0.000
5	4.000	82.000	0.000	0.000

| Table E1 - Conduit Data |

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft^2)	Manning Coef.	Max Width (ft)	Depth (ft)	Slopes	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333			
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000			
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000			
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000			
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000			
6	Link9	66.0000	Trapezoid	52.5000	0.0150	100.0000	0.5000	10.0000	10.0000	
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000			
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500			
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000			
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000			
11	Link21	740.0000	Circular	9.6211	0.0130	3.5000	3.5000			
12	Link23	1065.0000	H Ellipse	5.1000	0.0130	3.1667	2.0000			
13	Link25	435.0000	Circular	1.7671	0.0130	1.5000	1.5000			
14	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000			
15	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000			
16	di#1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000		4.0000	4.0000
17	238.1	65.0000	Circular	1.7671	0.0130	1.5000	1.5000			
18	264.11	43.0000	Circular	1.2272	0.0130	1.2500	1.2500			
19	263.11	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833			
20	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333			
21	250.21	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333			
22	21	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000			
23	23	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000			
24	25	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000			
25	28	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000			
26	29	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000			
27	36	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000			
Total length of all conduits 9188.0000 feet										

| Table E2 - Conduit Factor Data |

Time Low Flow Depth at										
Conduit Name	Number	Entrance Loss	Exit Exp/Cntc Coef	Conic Coef	Weighting Parameter	Which Factor n	Sediment Changes	Flow Depth	Routing	
Link2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link4	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link5	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link6	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link7	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link12	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link13	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link15	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link21	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link23	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
Link25	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
203.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
203.2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	
238.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave	

duration simulations. Please check your continuity errors and make adjustments to your model as required.

FREE OUTFALL DATA (DATA GROUP 1) BOUNDARY CONDITION ON DATA GROUP J1

Outfall at Junction...Node39 has boundary condition number... 1
Outfall at Junction...Node41 has boundary condition number... 2

Warning !! Outfall Junction Node39 has two or more connecting conduits.
Warning !! Outfall Junction Node41 has two or more connecting conduits.

Weir Outfall Data Boundary Condition on data group J1

Weir Outfall at Junction... Node39 has boundary condition number... 1
Weir Outfall at Junction... Node39 has boundary condition number... 1
Weir Outfall at Junction... Node41 has boundary condition number... 2
Weir Outfall at Junction... Node41 has boundary condition number... 2
Weir Outfall at Junction... Node41 has boundary condition number... 2

INTERNAL CONNECTIVITY INFORMATION

Table with columns CONDUIT, JUNCTION, JUNCTION. Lists connections between various conduits and junctions.

Boundary Condition Information Data Groups J1-J4

BC NUMBER... 1 has no control water surface.
BC NUMBER... 2 has no control water surface.
Warning ! Junction Node30 is not associated with any conduit.
Warning ! Junction Node31 is not associated with any conduit.

Table with columns NodeID, Time(10), Time(25), Time(sec). Lists time values for various nodes.

The junction requiring the smallest time step was...Node1

Table E5a - Conduit Explicit Condition Summary

Conduit Implicit Condition Summary

The 3rd column is the Explicit time step times the minimum courant time step factor
Minimum Conduit Time Step in seconds in the 4th column in the list. Maximum possible is 10 * maximum time step
The 5th column is the maximum change at any time step during the simulation. The 6th column is the wobble value which is an indicator of the flow stability.
You should use this section to find those conduits that are slowing your model down. Use modify conduits to alter the length of the slow conduits to make your simulation faster, or change the conduit name to "CHIME?????" where "?????" are any characters, this will lengthen the conduit based on the model time step, not the value listed in modify conduits.

Table with columns Conduit, Time(exp), Exp^Cmin, Time(imp), Time(min), Max Ochange, Wobble, Type of Soln. Lists conduit performance metrics.

Warning ! Junction Node32 is not associated with any conduit.
Warning ! Junction Node33 is not associated with any conduit.
Warning ! Junction Node34 is not associated with any conduit.
Warning ! Junction Node35 is not associated with any conduit.

Conduit Convergence Criteria

Table with columns Conduit Name, Full Flow, Conduit Slope. Lists conduit flow and slope data.

Table E5 - Junction Time Limitation Summary

(0.10 or 0.25) Depth * Area
Time step
Sum of Flow
The time this junction was the limiting junction is listed in the third column.

Table with columns Junction, Time(10), Time(25), Time(sec). Lists junction time limitation data.

Table with columns LinkID, Time(10), Time(25), Time(sec), and other metrics. Lists link performance data.

The conduit with the smallest time step limitation was...263.11
The conduit with the largest wobble was...263.11
The conduit with the largest flow change in any consecutive time step...21

End of time step DO-loop in Runoff

Final Date (Mo/Day/Year) = 1/4/2014
Total number of time steps = 4340
Final Julian Date = 2014004
Final time of day = 0. seconds.
Final time of day = 0.00 hours.
Final running time = 72.0000 hours.
Final running time = 3.0000 days.

Extrapolation Summary for Watersheds
Explains the number of time steps and iterations used in the solution of the subcatchments.
Steps => Total Number of Extrapolated Steps
Calls => Total Number of OVERLAND Calls

Table with columns Subcatchment, # Steps, # Calls. Lists subcatchment statistics.

Rainfall input summary from Runoff Continuity Check

Total rainfall read for gage # 1 is 2.8400 in
Total rainfall duration for gage # 1 is 1434.02 minutes

Table R5. CONTINUITY CHECK FOR SURFACE WATER
Any continuity error can be fixed by lowering the wet and transition time step. The transition time

Partial Area Tc..... 0.0000 0.0000 0.0000 0.0000 0.0000
Partial Area Intensity. 0.0000 0.0000 0.0000 0.0000 0.0000
Subcatchment..... Node34#1 Node35#1
Area (acres)..... 3.34000 7.66000
Percent Impervious..... 0.00000 0.00000
Total Rainfall (in)..... 2.84000 2.84000
Max Intensity (in/hr)..... 4.10293 4.10293
Pervious Area
Total Runoff Depth (in) 0.84433 0.74794
Peak Runoff Rate (cfs). 2.88636 4.76723
Total Impervious Area
Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs). 0.00000 0.00000
Impervious Area with depression storage
Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs). 0.00000 0.00000
Impervious Area without depression storage
Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs). 0.00000 0.00000
Total Area
Total Runoff Depth (in) 0.84433 0.74794
Peak Runoff Rate (cfs). 2.88636 4.76723
Rational Formula
Perv. Tc. (mins).... 0.00000 0.00000
Perv. Intensity (in/hr) 0.00000 0.00000
Pervious C..... 0.00000 0.00000
Impervious Tc. (mins)... 0.00000 0.00000
Imp. Intensity (in/hr)... 0.00000 0.00000
Impervious C..... 0.00000 0.00000
Partial Area (Ha)..... 0.00000 0.00000
Partial Area Tc..... 0.00000 0.00000
Partial Area Intensity. 0.00000 0.00000

=====> Runoff simulation ended normally.

Table E6. Final Model Condition
This table is used for steady state
flow comparison and is the information
saved to the hot-restart file.
Final Time = 108.000 hours

Junction / Depth / Elevation
Node1/ 0.01 / 1025.01/
Node4/ 0.15 / 1019.15/
Node7/ 0.00 / 1021.31/
Node10/ 0.08 / 1019.08/
Node13/ 0.00 / 1021.92/
Node17/ 0.00 / 1022.87/
Node21/ 0.00 / 1020.00/
Node24/ 0.00 / 1031.82/
Node28/ 0.55 / 1023.55/
Node31/ 0.00 / 1040.00/
Node34/ 0.00 / 1023.00/
Node37/ 4.97 / 1019.47/
Node40/ 2.74 / 1019.47/
Node2/ 2.32 / 1017.32/
Node5/ 0.00 / 1021.99/
Node8/ 0.00 / 1021.12/
Node11/ 0.00 / 1021.88/
Node15/ 0.00 / 1023.15/
Node18/ 1.00 / 1023.00/
Node22/ 0.00 / 1040.00/
Node25/ 1.32 / 1017.32/
Node29/ 0.00 / 1023.00/
Node32/ 0.00 / 1037.00/
Node35/ 0.00 / 1023.00/
Node38/ 4.97 / 1019.47/
Node41/ 0.00 / 1019.80/
Node6/ 0.02 / 1018.02/
Node9/ 0.00 / 1021.34/
Node12/ 0.55 / 1019.33/
Node16/ 0.00 / 1023.55/
Node20/ 1.02 / 1023.02/
Node23/ 0.00 / 1025.00/
Node26/ 0.00 / 1040.00/
Node30/ 0.00 / 1016.00/
Node33/ 0.00 / 1020.00/
Node36/ 0.00 / 1037.00/
Node39/ 0.00 / 1021.50/

Junction/ Max Volume
Node1/ 44011.96/
Node4/ 186498.02/
Node7/ 10.11/
Node10/ 103458.53/
Node13/ 1.32/
Node17/ 6.22/
Node21/ 47436.47/
Node24/ 8.43/
Node28/ 5705.30/
Node31/ 0.00/
Node34/ 0.00/
Node37/ 39216.19/
Node40/ 285035.19/
Node2/ 10217923.28/
Node5/ 6.82/
Node8/ 9.54/
Node11/ 7408.99/
Node15/ 0.00/
Node18/ 15.96/
Node22/ 10.72/
Node25/ 7490.21/
Node29/ 20320.05/
Node32/ 0.00/
Node35/ 0.00/
Node38/ 1587514.66/
Node41/ 0.00/
Node3/ 844.00/
Node6/ 8.61/
Node9/ 169848.30/
Node12/ 13702.26/
Node16/ 14344.11/
Node20/ 7626.85/
Node23/ 12713.18/
Node26/ 9.94/
Node30/ 0.00/
Node33/ 0.00/
Node36/ 38285.13/
Node39/ 0.00/

Junction/Total Flooding
Node1/ 0.00/
Node4/ 0.00/
Node7/ 0.00/
Node10/ 0.00/
Node13/ 0.00/
Node17/ 0.00/
Node21/ 0.00/
Node24/ 0.00/
Node28/ 0.00/
Node31/ 0.00/
Node34/ 0.00/
Node37/ 0.00/
Node40/ 0.00/
Node2/ 0.00/
Node5/ 0.00/
Node8/ 0.00/
Node11/ 0.00/
Node15/ 0.00/
Node18/ 0.00/
Node22/ 0.00/
Node25/ 0.00/
Node29/ 0.00/
Node32/ 0.00/
Node35/ 0.00/
Node38/ 0.00/
Node41/ 0.00/
Node3/ 0.00/
Node6/ 0.00/
Node9/ 0.00/
Node12/ 0.00/
Node16/ 0.00/
Node20/ 0.00/
Node23/ 0.00/
Node26/ 0.00/
Node30/ 0.00/
Node33/ 0.00/
Node36/ 0.00/
Node39/ 0.00/

Conduit/ Cross Sectional Area
Link2/ 0.02/
Link6/ 0.00/
Link12/ 0.00/
Link16/ 0.00/
Link25/ 0.18/
ditch1/ 0.00/
263.11/ 3.34/
21/ 1.00/
28/ 1.00/
office 5/ 0.00/
Link4/ 0.00/
Link7/ 0.00/
Link13/ 0.00/
Link21/ 0.00/
203.1/ 0.00/
238.1/ 0.00/
250.11/ 3.86/
23/ 1.00/
29/ 1.00/
office/ 0.03/
Link5/ 0.00/
Link9/ 0.00/
Link15/ 0.00/
Link23/ 0.00/
203.2/ 0.00/
264.11/ 0.00/
250.21/ 4.12/
25/ 1.00/
36/ 1.00/
ori 1/ 0.00/

Conduit/ Final Volume
Link2/ 2.36/
Link6/ 0.03/
Link12/ 0.00/
Link16/ 0.00/
Link25/ 77.14/
ditch1/ 0.00/
263.11/ 150.40/
21/ 0.00/
28/ 0.00/
office 5/ 69.44/
Link4/ 0.01/
Link7/ 0.02/
Link13/ 0.00/
Link21/ 0.01/
203.1/ 0.12/
238.1/ 0.01/
250.11/ 258.68/
23/ 0.00/
29/ 0.00/
office/ 26.00/
Link5/ 0.01/
Link9/ 0.00/
Link15/ 0.01/
Link23/ 0.05/
203.2/ 0.00/
264.11/ 0.00/
250.21/ 0.55/
36/ 0.00/
ori 1/ 0.01/

Conduit/ Hydraulic Radius
Link2/ 0.02/
Link6/ 0.01/
Link12/ 0.00/
Link16/ 0.00/
Link25/ 0.04/
ditch1/ 0.00/
263.11/ 0.49/
21/ 0.00/
28/ 0.00/
office 5/ 0.09/
Link4/ 0.01/
Link7/ 0.01/
Link13/ 0.00/
Link21/ 0.01/
203.1/ 0.01/
238.1/ 0.00/
250.11/ 0.69/
23/ 0.00/
29/ 0.00/
office/ 0.05/
Link5/ 0.01/
Link9/ 0.00/
Link15/ 0.01/
Link23/ 0.01/
203.2/ 0.00/
264.11/ 0.00/
250.21/ 0.55/
36/ 0.00/
ori 1/ 0.01/

Conduit/ Upstream/ Downstream Elevation
Link2/ 1018.02/ 1017.40
Link6/ 1021.31/ 1021.12
Link4/ 1021.99/ 1021.34
Link7/ 1021.12/ 1021.00
Link5/ 1021.34/ 1021.31/
Link9/ 1017.32/ 1017.32/

Conduit/ Flow
Link2/ 0.01/
Link6/ 0.00/
Link12/ 0.00/
Link16/ 0.00/
Link25/ 0.00/
ditch1/ 0.00/
263.11/ -0.00/
21/ 0.00/
28/ -0.00/
office 5/ 0.04/
Weir5/ 0.00/
weir 2/ 0.00/
weir3/ 0.00/
bkpeth/ 0.00/
seminote/ 0.00/
dway 2/ 0.00/
Flow ==> *** Conduit uses the normal flow option.
Link4/ 0.00/
Link7/ 0.00/
Link13/ 0.00/
Link21/ 0.00/
238.1/ 0.00/
250.11/ 0.00/
23/ 0.00/
29/ 0.00/
office/ 0.01/
weir6/ 0.00/
weir3/ 0.00/
weir3/ 0.00/
south/ 0.00/
sem2/ 0.00/
FREE# 1/ 0.00/
Link5/ 0.00/
Link9/ 0.00/
Link15/ 0.00/
Link23/ 0.00/
203.2/ 0.00/
264.11/ 0.00/
250.21/ -0.00/
25/ -0.00/
36/ 0.00/
ori 1/ 0.00/
weir 1/ 0.00/
weir 4/ 0.00/
bacy/ 0.00/
driveway/ 0.00/
south1/ 0.00/
FREE# 2/ 0.00/

Conduit/ Velocity
Link2/ 0.40/
Link6/ 0.30/
Link12/ 0.00/
Link16/ 0.00/
Link25/ 0.00/
ditch1/ 0.00/
263.11/ -0.00/
21/ 0.00/
28/ 0.50/
office 5/ 0.54/
Link4/ 0.54/
Link7/ 0.23/
Link13/ 0.00/
Link21/ 0.00/
203.1/ 0.60/
238.1/ 0.28/
250.11/ 0.00/
23/ 0.00/
29/ 0.00/
office/ 0.29/
Link5/ 0.27/
Link9/ 0.00/
Link15/ 0.33/
Link23/ 0.00/
203.2/ 0.00/
264.11/ 0.00/
250.21/ -0.00/
25/ 0.50/
36/ 0.00/
ori 1/ 0.11/

Conduit/ Width
Link2/ 1.73/
Link6/ 0.98/
Link12/ 0.00/
Link16/ 0.39/
Link25/ 0.53/
ditch1/ 0.00/
263.11/ 0.01/
21/ 0.00/
28/ 0.00/
office 5/ 0.69/
Link4/ 0.98/
Link7/ 0.98/
Link13/ 0.49/
Link21/ 1.37/
203.1/ 0.39/
238.1/ 0.59/
250.11/ 1.75/
23/ 0.00/
29/ 0.00/
office/ 0.52/
Link5/ 0.98/
Link9/ 0.00/
Link15/ 0.78/
Link23/ 1.24/
203.2/ 0.59/
264.11/ 0.49/
250.21/ 0.01/
25/ 0.00/
36/ 0.00/
ori 1/ 0.18/

Junction/ EGL
Node1/ 0.01/
Node4/ 0.15/
Node7/ 0.00/
Node10/ 2.11/
Node13/ 0.00/
Node17/ 0.00/
Node21/ 0.00/
Node24/ 0.00/
Node28/ 0.55/
Node31/ 0.00/
Node34/ 0.00/
Node37/ 7.32/
Node40/ 2.74/
Node2/ 9.01/
Node5/ 0.80/
Node8/ 0.00/
Node11/ 0.00/
Node15/ 0.00/
Node18/ 1.00/
Node22/ 0.00/
Node25/ 1.32/
Node29/ 0.00/
Node32/ 0.00/
Node35/ 0.00/
Node38/ 4.97/
Node41/ 0.00/
Node3/ 1.02/
Node6/ 0.01/
Node9/ 6.00/
Node12/ 0.55/
Node16/ 1.02/
Node20/ 0.00/
Node23/ 0.00/
Node26/ 0.00/
Node30/ 0.00/
Node33/ 0.00/
Node36/ 0.00/
Node39/ 0.00/

Junction/ Freeboard
Node1/ 2.99/
Node4/ 5.85/
Node7/ 4.87/
Node10/ 5.92/
Node13/ 3.81/
Node17/ 3.13/
Node21/ 4.00/
Node24/ 6.18/
Node28/ 1.45/
Node31/ 4.00/
Node34/ 2.00/
Node37/ 3.63/
Node2/ 10.68/
Node5/ 4.01/
Node8/ 4.50/
Node11/ 3.02/
Node15/ 1.85/
Node18/ 3.00/
Node22/ 6.66/
Node25/ 2.68/
Node29/ 4.00/
Node32/ 4.00/
Node35/ 4.00/
Node38/ 3.53/
Node3/ 6.98/
Node6/ 4.68/
Node9/ 6.67/
Node12/ 1.45/
Node16/ 2.98/
Node19/ 3.00/
Node23/ 4.00/
Node26/ 8.00/
Node30/ 4.00/
Node33/ 4.00/
Node36/ 4.00/
Node39/ 1.50/

Table E7 - Iteration Summary
Total number of time steps simulated..... 38880
Total number of passes in the simulation..... 5433902
Total number of time steps during simulation..... 138259
Ratio of actual # of time steps / NTCCY..... 3.556
Average number of iterations per time step..... 39.302
Average time step size(seconds)..... 2.812
Smallest time step size(seconds)..... 1.000
Largest time step size(seconds)..... 10.000
Average minimum Conduit Courant time step (sec)..... 3.858
Average minimum implicit time step (sec)..... 2.817
Average minimum junction time step (sec)..... 2.817
Average Courant Factor Tl..... 2.817
Number of times omega reduced..... 101913

Table E8 - Junction Time Step Limitation Summary
Not Conv = Number of times this junction did not
converge during the simulation.
Avg Conv = Average junction iterations.
Conv err = Mean convergence error.
Omega Cng = Change of omega during iterations.
Max Iter = Maximum number of iterations

Junction Not Conv Avg Conv Total Iter Omega Cng Max Iter Iter >10 Iter >25 Iter >40
Node1 21349 81.32 11242541 1495 501 23645 23483 23451
Node2 19118 79.50 10990942 8447 501 23648 26627 26310
Node3 0 1.24 171799 549 79 53 20 14
Node4 0 1.02 141527 0 4 0 0 0
Node5 0 1.03 142990 0 5 0 0 0
Node6 2 9.87 1365304 4506 501 4415 3737 2708
Node7 0 23.87 3305577 7942 499 7893 7819 7735
Node8 0 1.08 148657 0 4 0 0 0
Node9 0 1.02 141268 0 4 0 0 0
Node10 12170 64.33 8894764 17770 501 17498 17473 17473
Node11 32 1.19 164060 22 501 34 32 32
Node12 2027 9.29 1276063 17217 501 2324 2029 2029
Node13 0 1.00 138308 0 2 0 0 0
Node15 0 1.00 138259 0 1 0 0 0
Node16 0 1.01 139473 0 4 0 0 0
Node17 0 1.07 148613 0 4 0 0 0
Node18 0 1.01 139787 0 4 0 0 0
Node20 535 3.19 440521 115 501 621 615 615
Node21 12034 45.63 6308908 17807 501 12423 12161 12156
Node22 0 1.09 153080 0 5 0 0 0
Node23 0 1.02 141629 0 4 0 0 0
Node24 0 1.06 145881 0 5 0 0 0
Node25 8475 31.98 4421457 8486 501 8486 8486 8486
Node26 31 1.15 159635 10 501 38 38 35
Node28 16421 61.22 8464664 17231 501 17181 17181 17181
Node29 0 1.05 144520 0 4 0 0 0
Node30 0 1.00 138259 0 1 0 0 0
Node31 0 1.00 138259 0 1 0 0 0
Node32 0 1.00 138259 0 1 0 0 0
Node33 0 1.00 138259 0 1 0 0 0

The total continuity error was 2.49116E+05 cubic feet
The remaining total volume was 3.23496E+06 cubic feet
Your mean node continuity error was Excellent
Your worst node continuity error was Good

Table E19 - Junction Inflow & Outflow Listing
Units are either ft³ or m³ depending on the units in your model.

Table with 10 columns: Junction Name, Constant Inflow to Node, User Inflow to Node, Interface Inflow to Node, DWF Inflow to Node, Inflow through Outfall, RNF Layer Inflow to Node, Inflow from 2D Layer, Outflow from Node, Evaporation from Node, Basin Inflow to Node, Infil. Rows include Node1 through Node40.

Table E20 - Junction Flooding and Volume Listing

The maximum volume is the total volume in the node including the volume in the flooded storage area. This is the maximum volume at any time. The volume in the flooded storage area is the total volume above the ground elevation, where the flooded pond storage area starts. The fourth column is instantaneous, the fifth is the sum of the flooded volume over the entire simulation. Units are either ft³ or m³ depending on the units.

Table with 5 columns: Junction Name, Surcharged Time (min), 1D-System Time (min), Passed to 2D cell OR Flooded Volume, Maximum Volume in allowed Flood Pond of 1D-System. Rows include Node1 through Node40.

Table with 3 columns: Node, Inflow Volume, Average Inflow. Rows include Node1 through Node40.

Initial system volume = 0.0000 Cu Ft
Total system inflow volume = 3.34981E+06 Cu Ft
Inflow + Initial volume = 3.34981E+06 Cu Ft
Total system outflow = 0.0000 Cu Ft
Volume left (Final volume) = 3.23496E+06 Cu Ft
Evaporation = 0.0000 Cu Ft
Basin Infiltration = 0.0000 Cu Ft
Outflow + Final Volume = 3.23496E+06 Cu Ft

Total Model Continuity Error
Error in Continuity, Percent = 3.997
Error in Continuity, ft³ = 113849.5513
+ Error means a continuity loss, - a gain

Table E22. Numerical Model judgement section

Overall error was (minimum of Table E18 & E21) 3.997 percent
Worst nodal error was in node Node30 with 100.0000 percent
Of the total inflow this loss was 2.4725 percent
Your overall continuity error was Good
Efficiency of the simulation Poor Efficiency 11.58
Most Number of Non Convergences at one Node 21349.
Total Number Non Convergences at all Nodes 92295.
Total Number of Nodes with Non Convergences 12.

Table E23. New Basin Design Information

- A) Resize d/s Pipes based on given HGL
- B) Resize Basin based on given HGL
- C) Resize d/s Pipes and Basin based on HGL and max discharge
- D) Resize d/s pipes based on given max discharge

Table with 7 columns: Basin Name, Type, Max.HGL (ft), Conduit (ft), Depth (ft³/s), Width, Barrels, Max.Flow. Rows include Node1 through Node40.

Hydraulic model simulation ended normally.

Table with 5 columns: Node, Inflow, Outflow, Average Inflow, Average Outflow. Rows include Node11 through Node40.

Simulation Specific Information

Number of Input Conduits..... 27 Number of Simulated Conduits..... 48
Number of Natural Channels..... 0 Number of Junctions..... 38
Number of Storage Junctions..... 19 Number of Weirs..... 16
Number of Orifices..... 3 Number of Pumps..... 0
Number of Free Outfalls..... 2 Number of Tide Gate Outfalls..... 0

Average % Change in Junction or Conduit is defined as:
Conduit % Change ==> 100.0 (Q(n+1) - Q(n)) / Qfull
Junction % Change ==> 100.0 (Y(n+1) - Y(n)) / Yfull

The Conduit with the largest average change was..... 21 with 1.578 percent
The Junction with the largest average change was..... Node37 with 0.003 percent
The Conduit with the largest sinuosity was..... 263.11 with 69.035

Table E21. Continuity balance at the end of the simulation

Junction Inflow, Outflow or Street Flooding
Error = Inflow + Initial Volume - Outflow - Final Volume

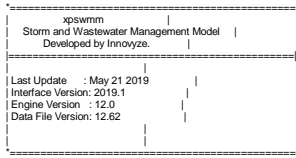
Table with 3 columns: Junction, Inflow Volume, Average Inflow. Rows include Node1 through Node40.

XP-SWMM Simulation ended normally.
Your input file was named : C:\Temp\New folder (5)\1D\Ultimate Condition_2\Ultimate Condition_2.dat
Your output file was named : C:\Temp\New folder (5)\1D\Ultimate Condition_2\Ultimate Condition_2.out

XP-SWMM\XPSTORM Simulation Date and Time Summary

Starting Date... February 17, 2021 Time... 19:35:30.400
Ending Date... February 17, 2021 Time... 19:39:52.671
Elapsed Time... 4.36172 minutes or 261.70312 seconds

Current Directory: C:\Temp\New folder (5)\1D\Ultimate Condition_10
Executable Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe
Input File: C:\Temp\New folder (5)\1D\Ultimate Condition_10\Ultimate Condition_10.XP



Engine Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe

Input and Output file names by Layer

Input File to Layer # 1 J:\JUS
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 J:\JUS
Output File to Layer # 2 C:\Temp\Proposed Condition.INT

Configuration Parameters
Configuration Parameters, both those that are hardwired and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in the engine as defaults. The remaining in UPPER CASE have been added to the simulation in the Configuration-> Configuration Parameters dialog or as Engine Defaults in the SWMM.INI file.

Table of Configuration Parameters with columns for parameter name, value, and unit. Examples include: \$powerstation (0.0000, 1, 2), \$pony (0.0000, 0, 4), \$soldegg (0.0000, 0, 7), \$sas (0.0000, 0, 11), \$noflat (0.0000, 0, 21), \$soldomega (0.0000, 0, 24), \$soldvol (0.0000, 1, 28), \$simplicit (0.0000, 1, 29), \$solshot (0.0000, 1, 31), \$soldscs (0.0000, 0, 33), \$flood (0.0000, 1, 40), \$snokeys (0.0000, 0, 42), \$pzero (0.0000, 0, 55), \$soldx2 (0.0000, 2, 59), \$storag2 (0.0000, 3, 62), \$solhot1 (0.0000, 1, 63), \$spumpwt (0.0000, 1, 70), \$soldscs (0.0000, 1, 77), \$sexout (0.0000, 0, 97), \$spatial = 0.90 (0.9000, 5, 124), \$djref = -1.0 (-1.0000, 3, 143), \$swetlen = 50 (50.0000, 1, 153), \$solbnd (0.0000, 1, 154), \$snogretev (0.0000, 1, 161).

Table of Link IDs and counts. Examples include: 210 Link4, 212 Link5, 214 Link6, 216 Link7, 219 Link9, 225 Link12, 226 Link13, 231 Link15, 233 Link16, 242 Link21, 246 Link23, 250 Link25, C(203.1) 203.1, C(203.2) 203.2, C(229.1) ditch1, C(238.1) 238.1, C(266.1) 264.11, C(268.1) 263.11, C(273.1) 250.11, C(273.2) 250.21, O(207.2) orifice 5, O(218.2) orifice, O(236.1) orifice, W(207.1) weir5, W(207.2) weir6, W(218.1) weir 1, W(218.2) weir 2, W(221.1) weir3, W(223.1) weir 4, W(234.1) weir8, W(236.1) weir9, W(266.1) lazy, W(268.1) bikepath, W(270.1) south, W(271.1) driveway, W(273.1) semicycle, W(275.1) sem2, W(276.1) south1, W(276.2) dway 2, D(240.1) 21, D(245.1) 23, D(248.1) 25, D(254.1) 28, D(256.1) 29, D(264.1) 36.

Parameter Values on the Tapes Common Block. These are the values read from the data file and dynamically allocated by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 27
Number of Channel/Pipes in the Runoff Block (NG).... 0
Runoff Water quality constituents (NRQ)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 48
Number of Groundwater Subcatchments in Runoff (NGW). 0
Number of Interface locations for all Blocks (NIE)... 48
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG)... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NRC)..... 0
Number of Storage junctions in Extran (NVSE)..... 19

Table of Object IDs and Names. Examples include: \$nrcid (0.0000, 0, 164), \$nrcid (0.0000, 2, 290), SCSIADEPTH=ON (0.0000, 1, 293), \$sbst97 (0.0000, 1, 294), \$newbound (0.0000, 1, 295), USE_US_RC (0.0000, 1, 312), \$q_id = 0.01 (0.0001, 1, 316), \$new_storage (0.0000, 1, 322), \$old_iteration (0.0000, 1, 333), MINLEN=6 (6.0000, 1, 346), \$riview_elevation (0.0000, 1, 353), \$use_half_volume (0.0000, 1, 385), VERT_WALLS=ON (0.0000, 1, 389), \$min_is = 1.0 (1.0000, 1, 407), \$dcsign_restart = on (0.0000, 1, 412), \$zero_value=1.e-05 (0.0000, 1, 415), SUBCATCHMENT_RES=ON (0.0000, 1, 419), \$relax_depth = on (0.0000, 1, 427), \$swetleng = on (0.0000, 1, 434), PUMP_NOHEAD=ON (0.0000, 1, 437), \$channel_geometry=1 (0.0000, 1, 456), PROJUNITS = US (0.0000, 1, 462).

The XPSWMM/XPSTORM engine internally uses object IDs instead of full object names to represent objects. Included below is a table of these IDs along with the name of the object that ID corresponds to.

Table of Object IDs and Names. Examples include: 201 Node1, 202 Node2, 204 Node3, 206 Node4, 208 Node5, 209 Node6, 211 Node7, 213 Node8, 215 Node9, 217 Node10, 220 Node11, 222 Node12, 224 Node13, 228 Node15, 230 Node16, 232 Node17, 235 Node18, 237 Node20, 239 Node21, 241 Node22, 243 Node23, 244 Node24, 247 Node25, 249 Node26, 253 Node28, 255 Node29, 257 Node30, 258 Node31, 259 Node32, 260 Node33, 261 Node34, 262 Node35, 263 Node36, 265 Node37, 267 Node38, 269 Node39, 272 Node40, 274 Node41, 205 Link2.

Number of Time history data points in Extran (NTVAL). 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEIH)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 27
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTOC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 48
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovyze

Table titled 'RUNOFF TABLES IN THE OUTPUT FILE'. It lists various tables such as Table R1 - Physical Hydrology Data, Table R2 - Infiltration data, Table R3 - Raingage and Infiltration Database Names, Table R4 - Groundwater Data, Table R5 - Continuity Check for Surface Water, Table R6 - Continuity Check for Channels/Pipes, Table R7 - Continuity Check for Subsurface Water, Table R8 - Infiltration/Inflow Continuity Check, Table R9 - Summary Statistics for Subcatchments, and Table R10 - Sensitivity analysis for Subcatchments.

RUNOFF JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVPAR..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAV

Decay is read in for each subcatchment
REGEN = 0.01000

Raingage #..... 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values... 241
KINC - Rainfall values(pairs) per line... 10
KPRINT - Print rainfall(0-Yes,1-No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 4.0900 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Channel or inlet	Per- Width (ft)	Area (ac)	Deprs Imperv	Deprs cent	Deprs Slope ft/ft	Prct "n" Imperv	Prct "n" Storge	Prct "n" Deter	
1	Node40#1	Node40	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node36#1	Node36	1.0000	19.960	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node21#1	Node21	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node10#1	Node10	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node10#2	Node10	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node26#1	Node26	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node1#1	Node1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node29#1	Node29	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node9#1	Node9	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node23#1	Node23	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node24#1	Node24	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
14	Node20#1	Node20	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000
15	Node25#1	Node25	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
16	Node2#1	Node2	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000
17	Node28#1	Node28	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
18	Node12#1	Node12	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
19	Node11#1	Node11	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
20	Node37#1	Node37	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
21	Node38#1	Node38	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000
22	Node30#1	Node30	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
23	Node31#1	Node31	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
24	Node32#1	Node32	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
25	Node33#1	Node33	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000

Total Number of Subcatchments... 27
Total Tributary Area (acres).... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infil #
10 - 2nd infil 11 - 3rd infil #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node40 No Tributary Channel/Pipes
Node36 Tributary Subareas..... Node40#1
Node21 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node36#1
Node10 No Tributary Channel/Pipes
Node26 Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Node4 Tributary Subareas..... Node1#1
Node16 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node16#1

26 Node34#1 Node34 1.0000 3.3400 0.00 1.000 0.020 0.020 0.000 0.000 0.000
27 Node35#1 Node35 1.0000 7.6600 0.00 1.000 0.020 0.020 0.000 0.000 0.000

Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data #
Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8) #
SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
SBUH -> Comp CN Time Conc N/A #
Green Ampt -> Suction Hydr Cond Initial MD N/A #
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infil. Volume #
Proportional -> Constant N/A N/A N/A #
Initial/Cont Loss -> Initial Continuing N/A #
Initial/Proportional -> Initial Constant N/A #
Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
Rational Formula -> Tc Method Flow Path Length Flow Path Slope Roughness or Retardance #
(#1 - #4 is Impervious Data / #5 - #8 is Pervious Data) #
Rational Formula Tc Method: 1 = Constant #
2 = Friend's Equation #
3 = Kinematic Wave #
4 = Alameda Method #
5 = Izzard's Formula #
6 = Kerby's Equation #
7 = Kirpich's Equation #
8 = Bransby Williams Equation #
9 = Federal Aviation Authority Equation #
#####

Subcatchment Number	Name	#1	#2	#3	#4	#5	#6	#7	#8
1	Node40#1	84.000	0.838	484.000	0.200				
2	Node36#1	91.000	0.333	484.000	0.200				
3	Node21#1	88.000	0.333	484.000	0.200				
4	Node10#1	85.000	0.167	484.000	0.200				
5	Node10#2	74.000	0.333	484.000	0.200				
6	Node26#1	85.000	0.167	484.000	0.200				
7	Node1#1	88.000	0.333	484.000	0.200				
8	Node4#1	88.000	0.288	484.000	0.200				
9	Node16#1	91.000	0.322	484.000	0.200				
10	Node29#1	90.000	0.433	484.000	0.200				
11	Node9#1	86.000	0.212	484.000	0.200				
12	Node23#1	91.000	0.333	484.000	0.200				
13	Node24#1	85.000	0.167	484.000	0.200				
14	Node20#1	80.000	0.167	484.000	0.200				
15	Node25#1	88.000	0.258	484.000	0.200				
16	Node2#1	79.000	0.167	484.000	0.200				
17	Node28#1	88.000	0.312	484.000	0.200				
18	Node12#1	77.000	0.167	484.000	0.200				
19	Node11#1	89.000	0.320	484.000	0.200				
20	Node37#1	76.000	0.252	484.000	0.200				
21	Node38#1	91.000	0.617	484.000	0.200				
22	Node30#1	73.000	0.258	484.000	0.200				
23	Node31#1	72.000	0.333	484.000	0.200				
24	Node32#1	79.000	0.333	484.000	0.200				
25	Node33#1	70.000	0.333	484.000	0.200				
26	Node34#1	76.000	0.312	484.000	0.200				
27	Node35#1	74.000	0.433	484.000	0.200				

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Name	Gage	Infiltration No	Routing Type
1	Node40#1	1	SCS Method	SCS curvilinear

Node29 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node29#1
Node9 No Tributary Channel/Pipes
Node23 Tributary Subareas..... Node9#1
Node23 No Tributary Channel/Pipes
Node24 Tributary Subareas..... Node23#1
Node24 No Tributary Channel/Pipes
Node20 Tributary Subareas..... Node24#1
Node20 No Tributary Channel/Pipes
Node25 Tributary Subareas..... Node20#1
Node25 No Tributary Channel/Pipes
Node2 Tributary Subareas..... Node25#1
Node2 No Tributary Channel/Pipes
Node12 Tributary Subareas..... Node2#1
Node12 No Tributary Channel/Pipes
Node11 Tributary Subareas..... Node12#1
Node11 No Tributary Channel/Pipes
Node37 Tributary Subareas..... Node11#1
Node37 No Tributary Channel/Pipes
Node38 Tributary Subareas..... Node37#1
Node38 No Tributary Channel/Pipes
Node30 Tributary Subareas..... Node38#1
Node30 No Tributary Channel/Pipes
Node31 Tributary Subareas..... Node30#1
Node31 No Tributary Channel/Pipes
Node32 Tributary Subareas..... Node31#1
Node32 No Tributary Channel/Pipes
Node33 Tributary Subareas..... Node32#1
Node33 No Tributary Channel/Pipes
Node34 Tributary Subareas..... Node33#1
Node34 No Tributary Channel/Pipes
Node35 Tributary Subareas..... Node34#1
Node35 No Tributary Channel/Pipes
Node35#1 Tributary Subareas..... Node35#1

* Hydrographs will be stored for the following 26 INLETS *

Node40	Node36	Node21
Node10	Node26	Node1
Node4	Node16	Node29
Node9	Node23	Node24
Node20	Node25	Node2
Node28	Node12	Node11
Node37	Node38	Node30
Node31	Node32	Node33
Node34	Node35	

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *
* Number of precipitation station..... 1 *

Location Station Number

1. 1

*** End of Header Section ***

Entry made to the HYDRAULIC Layer of XP-SWMM

Last Updated in June, 2014 by Innovye

Entry made to the Runoff Layer(Block) of SWMM

Last Updated June, 2014 by Innovye

=====
RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
For example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75
Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Raingage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments
=====

A1

#####
RUNOFF JOB CONTROL #
#####
Snowmelt parameter - ISNOW 0
Number of rain gages - NRAG 1
Quality is not simulated - KWALTY 0
Default evaporation rate used - IVAP 0
Hour of day at start of storm - NHR 0
Minute of hour at start of storm - NMN 0
Time TZERO at start of storm (hours) 0.000
Use U.S. Customary units for most I/O - METRIC 0
Runoff input print control 0
Runoff graph plot control 0
Runoff output print control 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is 1/1/2014
Wet time step length (seconds) 60.0
Dry time step length (seconds) 86400.0
Wet/Dry time step length (seconds) 60.0
Simulation length is 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = 0.01000

Raingage # 1
KTYPE - Rainfall input type 0
NHSTO - Total number of rainfall values 241
KINC - Rainfall values(pairs) per line 10
KPRINT - Print rainfall(0-Yes,1-No) 0

SCS -> Comp CN Time Conc Shape Factor Depth or Fracton
SBUH -> Comp CN Time Conc N/A N/A
Green Ampt -> Hydr Cond Initial MD N/A
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume
Proportional -> Constant N/A N/A
Initial/Cont Loss -> Initial Continuing N/A N/A
Initial/Proportional -> Initial Continuing N/A N/A
Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent
Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance
(#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)
Rational Formula To Method: 1 = Constant
2 = Friend's Equation
3 = Kinematic Wave
4 = Alameda Method
5 = Izzard's Formula
6 = Kerby's Equation
7 = Kirpich's Equation
8 = Bransby Williams Equation
9 = Federal Aviation Authority Equation

Table with columns: Subcatchment Number, Name, Infil #1, Infil #2, Infil #3, Infil #4, Infil #5, Infil #6, Infil #7, Infil #8. Rows include data for nodes 1 through 27.

#####
Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names
#####

Table with columns: Subcatchment Number, Name, Gage Infiltration No Type, Routing Type. Rows include data for nodes 1 through 10.

KTIME - Precipitation time units
0-> Minutes 1-> Hours 1
KPREP - Precipitation unit type
0-> Intensity 1-> Volume 1
KTHIS - Variable rainfall intervals
0-> No, >= 1-> Yes 0
THSTO - Rainfall time interval 0.10
TZRAN - Starting time(KTIME units) 0.00

#####
Rainfall input summary from Runoff #
#####
Total rainfall for gage # 1 is 4.0900 inches
#####

#####
Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

#####
Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data
#####

Table with columns: Subcatchment Number, Name, Channel or inlet, Per-Width (ft), Area (ac), Depn Imperv, Depn Slop ft/ft, Depn n, Prct n, Prct Storge, Prct Strge Deten. Rows include data for nodes 1 through 27.

#####
Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data
#####

Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8)

Total Number of Subcatchments..... 27
Total Tributary Area (acres)..... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

#####
SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data
Used with the calibrate node in the runoff.
1 - width 2 - area 3 - impervious %
4 - slope 5 - imp 6 - perv n
7 - imp ds 8 - perv ds 9 - 1st infil
10 - 2nd infil 11 - 3rd infil
#####

Column 1 2 3 4 5 6 7 8 9 10 11
Default 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Ratio 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Table showing arrangement of subcatchments and channel/pipes for nodes 1 through 10.

Tributary Subareas..... Node20#1
 Node25 No Tributary Channel/Pipes
 Tributary Subareas..... Node25#1
 Node2 No Tributary Channel/Pipes
 Tributary Subareas..... Node2#1
 Node28 No Tributary Channel/Pipes
 Tributary Subareas..... Node28#1
 Node12 No Tributary Channel/Pipes
 Tributary Subareas..... Node12#1
 Node11 No Tributary Channel/Pipes
 Tributary Subareas..... Node11#1
 Node37 No Tributary Channel/Pipes
 Tributary Subareas..... Node37#1
 Node38 No Tributary Channel/Pipes
 Tributary Subareas..... Node38#1
 Node30 No Tributary Channel/Pipes
 Tributary Subareas..... Node30#1
 Node31 No Tributary Channel/Pipes
 Tributary Subareas..... Node31#1
 Node32 No Tributary Channel/Pipes
 Tributary Subareas..... Node32#1
 Node33 No Tributary Channel/Pipes
 Tributary Subareas..... Node33#1
 Node34 No Tributary Channel/Pipes
 Tributary Subareas..... Node34#1
 Node35 No Tributary Channel/Pipes
 Tributary Subareas..... Node35#1

* Hydrographs will be stored for the following 26 INLETS *

Node40	Node36	Node21
Node10	Node26	Node1
Node4	Node16	Node29
Node9	Node23	Node24
Node20	Node25	Node2
Node28	Node12	Node11
Node37	Node38	Node30
Node31	Node32	Node33
Node34	Node35	

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *

* Number of precipitation station 1 *

Location Station Number

1, 1

A1

HYDRAULICS TABLES IN THE OUTPUT FILE
 | These are the more important tables in the output file. |
 | You can use your editor to find the table numbers. |
 | for example: search for Table E20 to check continuity. |
 | This output file can be imported into a Word Processor |
 | and printed on US letter or A4 paper using portrait |

Ponding Area Exponent..... 1.0000
 Minimum Orifice Length..... 1000.00 feet.
 NUSW input hydrograph junction..... 0
 or user defined hydrographs....

Input Information from Internal Rating Curve 21

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	5.400	0.000	0.000
3	2.000	8.400	0.000	0.000
4	3.000	21.600	0.000	0.000
5	4.000	55.000	0.000	0.000

Input Information from Internal Rating Curve 23

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	1.700	0.000	0.000
3	2.000	2.600	0.000	0.000
4	3.000	6.200	0.000	0.000
5	4.000	15.000	0.000	0.000

Input Information from Internal Rating Curve 25

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	16.500	0.000	0.000
3	2.000	24.000	0.000	0.000
4	3.000	55.500	0.000	0.000
5	4.000	131.100	0.000	0.000

Input Information from Internal Rating Curve 28

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	2.100	0.000	0.000
3	1.000	2.900	0.000	0.000
4	1.500	6.100	0.000	0.000
5	2.000	13.600	0.000	0.000

Input Information from Internal Rating Curve 29

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	3.300	0.000	0.000
3	1.000	4.700	0.000	0.000
4	1.500	10.700	0.000	0.000
5	2.000	25.000	0.000	0.000

| mode, courier font, a size of 8 pt. and margins of 0.75 |

Table E1 - Basic Conduit Data	
Table E2 - Conduit Factor Data	
Table E3a - Junction Data	
Table E3b - Junction Data	
Table E4 - Conduit Connectivity Data	
Table E4a - Dry Weather Flow Data	
Table E4b - Real Time Control Data	
Table E5 - Junction Time Step Limitation Summary	
Table E5a - Conduit Explicit Condition Summary	
Table E6 - Final Model Condition	
Table E7 - Iteration Summary	
Table E8 - Junction Time Step Limitation Summary	
Table E9 - Junction Summary Statistics	
Table E10 - Conduit Summary Statistics	
Table E11 - Area assumptions used in the analysis	
Table E12 - Mean conduit information	
Table E13 - Channel losses(H) and culvert info	
Table E13a - Culvert Analysis Classification	
Table E14 - Natural Channel Overbank Flow Information	
Table E14a - Natural Channel Encroachment Information	
Table E14b - Floodplain Mapping	
Table E15 - Spreadsheet Info List	
Table E15a - Spreadsheet Reach List	
Table E16 - New Conduit Output Section	
Table E17 - Pump Operation	
Table E18 - Junction Continuity Error	
Table E19 - Junction Inflow & Outflow Listing	
Table E20 - Junction Flooding and Volume List	
Table E21 - Continuity balance at simulation end	
Table E22 - Model Judgement Section	

Time Control from Hydraulics Job Control

Year..... 2014 Month..... 1
 Day..... 1 Hour..... 0
 Minute..... 0 Second..... 0

Control information for simulation

Integration cycles..... 38880
 Length of integration step in..... 10.00 seconds
 Simulation length..... 108.00 hours
 Do not create equiv. pipes(NEQUAL). 0
 Use U.S. customary units for I/O..... 0
 Courant Time Step Factor..... 1.00000
 Intermediate printout intervals of..... 500 cycles
 Intermediate printout intervals of..... 83.33 minutes
 Summary printout interval of..... 83.33 minutes
 Hot start file parameter (REDO)..... 0
 Initial time..... 0.00 hours

Iteration variables: Flow Tolerance. 0.00010

Head Tolerance. 0.00050
 Minimum depth (m or ft)..... 0.00001
 Underrelaxation parameter..... 0.85000
 Time weighting parameter..... 0.85000
 Conduit roughness factor..... 1.00000
 Flow adjustment factor..... 1.00000
 Initial Condition Smoothing..... 0
 Courant Time Step Factor..... 1.00000
 Default Expansion/Contraction K. 0.00000
 Default Entrance/Exit K..... 0.00000
 Routing Method..... Dynamic Wave
 Default surface area of junctions.... 12.57 square feet.
 Minimum Junction/Conduit Depth..... 0.00001 feet.
 Ponding Area Coefficient..... 5000.00

Input Information from Internal Rating Curve 36

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	14.600	0.000	0.000
3	2.000	19.500	0.000	0.000
4	3.000	38.700	0.000	0.000
5	4.000	82.000	0.000	0.000

Table E1 - Conduit Data

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef.	Max Width (ft)	Depth (ft)	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	100.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	Link21	740.0000	Circular	9.6211	0.0130	3.5000	3.5000		
12	Link23	1065.0000	H Ellipse	5.1000	0.0130	3.1667	2.0000		
13	Link25	435.0000	Circular	1.7671	0.0130	1.5000	1.5000		
14	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
15	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
16	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
17	238.1	65.0000	Circular	1.7671	0.0130	1.5000	1.5000		
18	264.11	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		
19	263.11	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
20	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
21	250.21	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
22	21	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
23	23	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
24	25	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
25	28	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
26	29	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
27	36	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		

Total length of all conduits 9188.0000 feet

Table E2 - Conduit Factor Data

Conduit Name	Number	Entrance Loss Coef	Exit Exp/Contc Weighting	Low Flow Depth at	Depth	Side Slopes	Williams c-factor	Flow Routing
Link2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link4	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link5	1.0000	-1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link6	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link7	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link12	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link13	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link15	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link21	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link23	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link25	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
203.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
203.2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
238.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave

264.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
263.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
250.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
250.21	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave

```

*****
If there are messages about (sqrt('d')/dt/dk), or
|the sqrt(wave celerity)*time step/conduit length |
|in the output file all it means is that the |
|program will lower the internal time step to |
|satisfy this condition (explicit condition). |
|You control the actual internal time step by |
|using the minimum courant time factor in the |
|HYDRAULICS job control. The message put in words |
|states that the smallest conduit with the fastest |
|velocity will control the time step selection. |
|You have further control by using the modify |
|conduit option in the HYDRAULICS Job Control. |
*****

```

Conduit Name	Courant Ratio
Link2	0.76
Link4	3.20 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link5	12.82 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link6	2.49 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link7	3.59 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link9	0.59
Link12	1.77 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link13	0.92
Link15	4.72 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link16	2.84 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link21	0.14
Link23	0.08
Link25	0.16
203.1	1.32 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
203.2	1.74 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
ditch1	0.38
238.1	1.07 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
264.11	1.48 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
263.11	1.59 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
250.11	1.15 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
250.21	1.10 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
21	0.00
23	0.00
25	0.00
28	0.00
29	0.00
36	0.00

Conduit Volume

Full pipe or full open conduit volume
Input full depth volume..... 2.239E+04 cubic feet

Table E3a - Junction Data

Imp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst	Inst Interface	Flow (%)
1	Node1	1028.0000	1026.9000	1025.0000	0.0000	0.0000	100.0000
2	Node2	1028.0000	1025.5000	1015.0000	0.0000	0.0000	100.0000
3	Node3	1028.0000	1020.8333	1018.0000	0.0000	0.0000	100.0000
4	Node4	1025.0000	1025.0000	1019.0000	0.0000	0.0000	100.0000

Table E4 - Conduit Connectivity

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation
1	Link2	Node3	Node2	1018.0000	1017.4000
2	Link4	Node5	Node6	1021.9900	1021.3400
3	Link5	Node6	Node7	1021.3400	1021.3100
4	Link6	Node7	Node8	1021.3100	1021.1200
5	Link7	Node8	Node9	1021.1200	1021.0000
6	Link9	Node10	Node2	1024.5000	1024.5000
7	Link12	Node15	Node13	1023.1500	1022.1600
8	Link13	Node13	Node6	1021.3200	1021.5700
9	Link15	Node18	Node5	1023.0000	1022.7900
10	Link16	Node17	Node5	1022.8700	1021.9900
11	Link21	Node22	Node10	1034.3400	1021.1100
12	Link23	Node24	Node20	1031.8160	1025.0000
13	Link25	Node26	Node2	1020.0000	1015.0000
14	203.1	Node1	Node2	1025.0000	1024.0000
15	203.2	Node1	Node2	1025.4000	1024.0000
16	ditch1	Node4	Node15	1023.5000	1023.1500
17	238.1	Node20	Node2	1025.0000	1024.0000
18	264.11	Node37	Node37	1021.9800	1021.8200
19	263.11	Node37	Node38	1014.5000	1014.5000
20	250.11	Node40	Node37	1017.8500	1017.6800
21	250.21	Node40	Node37	1016.7300	1016.4800
22	23	Node21	Node10	1020.0000	1020.0000
23	23	Node23	Node24	1040.0000	1040.0000
24	25	Node25	Node2	1016.0000	1016.0000
25	28	Node28	Node12	1023.0000	1023.0000
26	29	Node29	Node17	1023.0000	1023.0000
27	36	Node36	Node22	1037.0000	1037.0000

Storage Junction Data

STORAGE NUMBER OR NAME	JUNCTION TYPE	MAXIMUM OR CONSTANT SURFACE AREA (FT2)	PEAK OR CONSTANT SURFACE VOLUME (CUBIC FEET)	CROWN SURFACE ELEVATION (FT)	DEPTH CONSTANT VOLUME ELEVATION	STARTS
Node1	Stage/Area	2.052E+06	1.254E+06	1028.0000	1028.0000	Node Invert
Node2	Stage/Area	2.0052E+06	1.5507E+07	1028.0000	1028.0000	Node Invert
Node3	Stage/Area	1.045E+04	1.8334E+04	1025.0000	1025.0000	Node Invert
Node4	Stage/Area	2.1031E+05	8.1318E+05	1025.0000	1025.0000	Node Invert
Node9	Stage/Area	1.0411E+05	7.7337E+05	1025.0000	1025.0000	Node Invert
Node10	Stage/Area	7.1700E+04	3.2470E+05	1025.0000	1025.0000	Node Invert
Node11	Stage/Area	6.8302E+04	6.2617E+04	1025.0000	1025.0000	Node Invert
Node12	Stage/Area	1.1732E+05	1.2947E+05	1025.0000	1025.0000	Node Invert
Node16	Stage/Area	1.5987E+04	3.3342E+04	1026.0000	1026.0000	Node Invert
Node20	Stage/Area	1.5115E+04	3.5049E+04	1028.0000	1028.0000	Node Invert
Node21	Stage/Area	3.7026E+04	1.4462E+05	1024.0000	1024.0000	Node Invert
Node23	Stage/Area	1.1761E+04	4.3557E+04	1044.0000	1044.0000	Node Invert
Node25	Stage/Area	5.8370E+04	2.2999E+05	1020.0000	1020.0000	Node Invert
Node28	Stage/Area	1.045E+04	1.8717E+04	1025.0000	1025.0000	Node Invert
Node29	Stage/Area	3.4412E+04	1.3591E+05	1027.0000	1027.0000	Node Invert

5	Node5	1026.0000	1024.7900	1021.9900	0.0000	0.0000	100.0000
6	Node6	1026.0000	1023.8400	1021.3400	0.0000	0.0000	100.0000
7	Node7	1026.0000	1023.6200	1021.1200	0.0000	0.0000	100.0000
8	Node8	1026.0000	1023.5000	1021.0000	0.0000	0.0000	100.0000
9	Node9	1026.0000	1023.5000	1021.0000	0.0000	0.0000	100.0000
10	Node10	1025.0000	1025.0000	1019.0000	0.0000	0.0000	100.0000
11	Node11	1025.0000	1023.2300	1021.1000	0.0000	0.0000	100.0000
12	Node12	1025.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000
13	Node13	1025.7300	1023.1700	1021.9200	0.0000	0.0000	100.0000
14	Node15	1025.0000	1024.6500	1023.1500	0.0000	0.0000	100.0000
16	Node16	1026.0000	1022.0000	1022.0000	0.0000	0.0000	100.0000
17	Node17	1026.0000	1025.0000	1022.8700	0.0000	0.0000	100.0000
18	Node18	1026.0000	1025.0000	1022.0000	0.0000	0.0000	100.0000
19	Node20	1028.0000	1027.0000	1025.0000	0.0000	0.0000	100.0000
21	Node21	1024.0000	1024.0000	1020.0000	0.0000	0.0000	100.0000
22	Node22	1041.0000	1041.0000	1034.3400	0.0000	0.0000	100.0000
23	Node23	1044.0000	1044.0000	1040.0000	0.0000	0.0000	100.0000
24	Node24	1038.0000	1044.0000	1031.8160	0.0000	0.0000	100.0000
25	Node25	1020.0000	1020.0000	1016.0000	0.0000	0.0000	100.0000
26	Node26	1028.0000	1021.5000	1020.0000	0.0000	0.0000	100.0000
27	Node28	1025.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000
28	Node29	1027.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000
29	Node30	1020.0000	1016.0000	1016.0000	0.0000	0.0000	100.0000
30	Node31	1044.0000	1040.0000	1040.0000	0.0000	0.0000	100.0000
31	Node32	1041.0000	1037.0000	1037.0000	0.0000	0.0000	100.0000
32	Node33	1024.0000	1020.0000	1020.0000	0.0000	0.0000	100.0000
33	Node34	1025.0000	1023.0000	1023.0000	0.0000	0.0000	100.0000
34	Node35	1027.0000	1023.0000	1023.0000	0.0000	0.0000	100.0000
35	Node36	1041.0000	1041.0000	1037.0000	0.0000	0.0000	100.0000
36	Node37	1023.1000	1023.0700	1014.5000	0.0000	0.0000	100.0000
37	Node38	1023.0000	1016.0833	1014.5000	0.0000	0.0000	100.0000
38	Node40	1024.0000	1019.6833	1016.7300	0.0000	0.0000	100.0000
39	Node41	1023.0000	1019.8000	1019.8000	0.0000	0.0000	100.0000

Table E3b - Junction Data

Imp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Inlet Capacity	Pavement Shape	Slope
1	Node1	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
2	Node2	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
3	Node3	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
4	Node4	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
5	Node5	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
6	Node6	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
7	Node7	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
8	Node8	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
9	Node9	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
10	Node10	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
11	Node11	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
12	Node12	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
13	Node13	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
14	Node15	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
15	Node16	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
16	Node17	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
17	Node18	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
18	Node20	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
19	Node21	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
20	Node22	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
21	Node23	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
22	Node24	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
23	Node25	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
24	Node26	0.0000	0.0000	No Ponding	Normal	0.0000	0.00	0.00
25	Node28	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
26	Node29	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
27	Node38	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00
28	Node31	0.0000	0.0000	Flooded	Normal	0.0000	0.00	0.00

Node36	Stage/Area	3.0056E+04	1.1674E+05	1041.0000	Node Invert
Node37	Stage/Area	2.4472E+05	9.9641E+05	1023.0000	Node Invert
Node38	Stage/Area	1.0556E+06	4.3540E+06	1023.0000	Node Invert
Node40	Stage/Area	8.7207E+05	2.7123E+06	1024.0000	Node Invert

Variable storage data for node | Node1

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	ac-ft	ac-ft
1	1025.0000	0.0000	37287.3600	0.0000	0.8560	0.0000
2	1026.0000	1.0000	46086.4800	41608.9003	1.0580	0.9552
3	1027.0000	2.0000	56802.2400	92959.4902	1.3040	2.1341
4	1028.0000	3.0000	70610.7600	156540.2766	1.6210	3.5937

Variable storage data for node | Node2

Data Point	Elevation	Depth	Area	Volume	Area	Volume
	ft	ft	ft²	ft³	ac-ft	ac-ft</

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
4	1018.0000	3.0000	40946.4000	107335.2951	0.9400	2.4641
5	1019.0000	4.0000	44431.2000	150011.8103	1.0200	3.4438
6	1020.0000	5.0000	48824.8000	205196.2156	1.5800	4.7336
7	1021.0000	6.0000	54070.8000	282516.2478	1.9300	6.4857
8	1022.0000	7.0000	60140.4000	370047.8469	2.0900	8.4951
9	1023.0000	8.0000	67574.4000	484335.4357	2.2400	10.6997
10	1024.0000	9.0000	76118.4000	625158.1825	2.3900	12.9742
11	1025.0000	11.0000	104108.4000	773734.9825	2.3900	17.7542

Variable storage data for node | Node10

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1019.0000	0.0000	35849.8800	0.0000	0.8230	0.0000
2	1020.0000	1.0000	44344.0800	40021.3923	1.0180	0.9188
3	1021.0000	2.0000	49092.1200	86718.9061	1.1270	1.9908
4	1022.0000	3.0000	55234.0800	138551.3258	1.2680	3.1676
5	1023.0000	4.0000	61918.0400	196055.3676	1.3590	4.5008
6	1024.0000	5.0000	63249.1200	257267.1635	1.4520	5.9060
7	1025.0000	6.0000	71699.7600	324696.7868	1.6460	7.4540

Variable storage data for node | Node11

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1021.9800	0.0000	43.5600	0.0000	0.0010	0.0000
2	1022.5000	0.5200	261.3600	71.3467	0.0060	0.0016
3	1023.0000	1.0200	2178.0000	603.5493	0.0500	0.0139
4	1023.5000	1.5200	13634.2800	4147.2186	0.3130	0.0952
5	1024.0000	2.0200	29098.0800	14588.8602	0.6680	0.3349
6	1024.5000	2.5200	48046.6800	33677.9165	1.1030	0.7311
7	1025.0000	3.0200	68302.0800	62616.7572	1.5680	1.4375

Variable storage data for node | Node12

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1023.0000	0.0000	13734.9807	0.0000	0.3153	0.0000
2	1024.0000	1.0000	68517.9634	37643.0245	1.5730	0.8642
3	1025.0000	2.0000	117318.9719	129473.5655	2.6933	2.9723

Variable storage data for node | Node16

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1022.0000	0.0000	2962.0800	0.0000	0.0680	0.0000
2	1023.0000	1.0000	5401.4400	4121.1112	0.1240	0.0946
3	1024.0000	2.0000	7579.4400	10580.8162	0.1740	0.2429
4	1025.0000	3.0000	11107.8000	19863.3223	0.2550	0.3156
5	1026.0000	4.0000	15886.5200	33341.5384	0.3670	0.7654

Variable storage data for node | Node20

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1025.0000	0.0000	8624.8800	0.0000	0.1980	0.0000
2	1027.0000	2.0000	12675.9600	21171.0372	0.2910	0.4860
3	1028.0000	3.0000	15115.3200	35048.6612	0.3470	0.8046

Variable storage data for node | Node21

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1025.0000	0.0000	8624.8800	0.0000	0.1980	0.0000
2	1027.0000	2.0000	12675.9600	21171.0372	0.2910	0.4860
3	1028.0000	3.0000	15115.3200	35048.6612	0.3470	0.8046

Variable storage data for node | Node37

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	1855.2800	0.0000	0.0380	0.0000
2	1015.0000	0.5000	5270.7600	1646.6136	0.1210	0.0378
3	1015.5000	1.0000	7013.1600	4707.2128	0.1610	0.1081
4	1016.0000	1.5000	9060.4800	8714.6729	0.2080	0.2001
5	1016.5000	2.0000	11107.8000	13748.0107	0.2550	0.3156
6	1017.0000	2.5000	13274.9600	23369.1847	0.3030	0.5365
7	1017.5000	3.0000	15585.8800	36817.8487	0.3550	0.7654
8	1018.0000	3.5000	18122.1600	51570.7127	0.4140	1.0581
9	1018.5000	4.0000	20887.5200	68521.5828	0.4750	1.3675
10	1019.0000	4.5000	23847.2800	97963.3123	0.5390	1.7873
11	1019.5000	5.0000	26987.1600	130257.9162	0.6070	2.3225
12	1020.0000	5.5000	30384.3200	166414.3526	0.6800	2.7776
13	1020.5000	6.0000	34017.8800	205732.8060	0.7590	3.2497
14	1021.0000	6.5000	37908.1600	248454.8570	0.8440	3.7474
15	1021.5000	7.0000	42034.9200	294754.0328	0.9350	4.2704
16	1022.0000	7.5000	46409.8800	344982.7448	1.0320	4.8254
17	1023.0000	8.5000	51172.0800	409194.6208	1.1510	5.5725
18	1023.1000	8.6000	244720.0800	996406.6288	5.6180	22.8743

Variable storage data for node | Node38

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	43.5600	0.0000	0.0010	0.0000
2	1015.0000	0.5000	2178.0000	421.5917	0.0500	0.0097
3	1015.5000	1.0000	5706.3600	2323.1996	0.1310	0.0533
4	1016.0000	1.5000	8668.6800	5891.1560	0.1990	0.1352
5	1016.5000	2.0000	11790.9130	10120.1320	0.2670	0.4119
6	1017.0000	2.5000	13954.7680	113198.3905	0.3150	2.5987
7	1017.5000	3.0000	15831.4800	345717.7894	0.3610	7.9366
8	1018.0000	3.5000	17879.9200	628632.6452	0.4020	14.4314
9	1018.5000	4.0000	20074.1200	935768.1094	0.4570	21.4623
10	1019.0000	4.5000	22474.6800	1.26339E+06	0.5170	29.0035
11	1019.5000	5.0000	25090.2800	1.61102E+06	0.5810	36.9839
12	1020.0000	5.5000	27916.8800	1.97868E+06	0.6500	45.4242
13	1020.5000	6.0000	30985.0400	2.36933E+06	0.7240	54.3695
14	1021.0000	6.5000	34271.6800	2.77923E+06	0.8030	63.8923
15	1021.5000	7.0000	37803.3200	3.20814E+06	0.8870	73.6488
16	1022.0000	7.5000	41511.0800	3.65588E+06	0.9760	83.9275
17	1023.0000	8.5000	105545.9200	4.64088E+06	2.4230	106.5399

Variable storage data for node | Node40

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1016.7300	0.0000	43.5600	0.0000	0.0010	0.0000
2	1018.0000	1.2700	1924.8502	0.0130	0.0030	0.0000
3	1018.5000	1.7700	2657.1600	1066.3262	0.0610	0.0245
4	1019.0000	2.2700	4099.1200	11594.6474	0.1270	0.2622
5	1020.0000	3.2700	18879.0400	122977.4982	0.4340	2.8232
6	1020.5000	3.7700	29115.5600	230797.1919	0.6710	4.4430
7	1021.0000	4.2700	35780.1600	393562.2546	0.8140	5.3049
8	1021.5000	4.7700	44008.6800	592677.8695	1.0130	6.7060
9	1022.0000	5.2700	53936.8800	825950.1552	1.2180	8.0810
10	1023.0000	6.2700	87207.1200	1.58763E+06	2.0200	13.4470
11	1024.0000	7.2700	127201.2000	2.72133E+06	3.0200	19.8740

Office Data

Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
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Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1020.0000	0.0000	35283.6000	0.0000	0.8100	0.0000
2	1021.0000	1.0000	35719.2000	35500.8223	0.8200	0.8150
3	1022.0000	2.0000	36154.8000	71437.2429	0.8300	1.6400
4	1023.0000	3.0000	36590.4000	107809.2618	0.8400	2.4750
5	1024.0000	4.0000	37026.0000	144616.8790	0.8500	3.3199

Variable storage data for node | Node23

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1040.0000	0.0000	10018.8000	0.0000	0.2300	0.0000
2	1041.0000	1.0000	10454.4000	10235.7252	0.2400	0.2350
3	1042.0000	2.0000	10890.0000	20907.0776	0.2500	0.4800
4	1043.0000	3.0000	11326.6000	32014.0547	0.2600	0.7349
5	1044.0000	4.0000	11761.2000	43556.6543	0.2700	0.9999

Variable storage data for node | Node25

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1016.0000	0.0000	56628.0000	0.0000	1.3000	0.0000
2	1017.0000	1.0000	57063.6000	56845.0925	1.3100	1.3050
3	1018.0000	2.0000	57499.2000	114125.7816	1.3200	2.6200
4	1019.0000	3.0000	57934.8000	171842.9766	1.3300	3.9450
5	1020.0000	4.0000	58370.4000	229993.9500	1.3400	5.2799

Variable storage data for node | Node28

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1023.0000	0.0000	6969.6000	0.0000	0.1600	0.0000
2	1023.5000	0.5000	9147.6000	4016.9398	0.2100	0.0922
3	1024.0000	1.0000	9583.2000	8699.1708	0.2200	0.1997
4	1024.5000	1.5000	10018.8000	13599.2185	0.2300	0.3122
5	1025.0000	2.0000	10454.4000	18177.0911	0.2400	0.4297

Variable storage data for node | Node29

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1023.0000	0.0000	32870.0000	0.0000	0.7500	0.0000
2	1023.5000	0.5000	33105.6000	16443.6154	0.7600	0.3775
3	1024.0000	1.0000	33541.2000	33105.6000	0.7700	0.7600
4	1024.5000	1.5000	33976.8000	49984.2442	0.7800	1.1475
5	1025.0000	2.0000	34412.4000	67012.9700	0.7900	1.5450
6	1025.5000	2.5000	34848.0000	85306.0576	0.7900	2.0000

Variable storage data for node | Node36

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1037.0000	0.0000	28314.0000	0.0000	0.6500	0.0000
2	1038.0000	1.0000	28749.6000	28531.2376	0.6600	0.6550
3	1039.0000	2.0000	29185.2000	57498.0750	0.6700	1.3200
4	1040.0000	3.0000	29620.8000	86900.5121	0.6800	1.9950
5	1041.0000	4.0000	30056.4000	116738.5487	0.6900	2.6799

Conduit Name	From Junction	To Junction	Type	Area (ft²)	Depth (ft)	Discharge Coefficient	Height Above Junction (ft)
office 5	Node4	Node2	Circ Side	0.79	0.00	0.600	0.000
office ori 1	Node10	Node3	Circ Side	0.79	0.00	0.600	0.000

duration simulations. Please check your
continuity errors and make adjustments to
your model as required.

FREE OUTFALL DATA (DATA GROUP 1)
BOUNDARY CONDITION ON DATA GROUP J1

Outfall at Junction...Node39 has boundary condition number... 1
Outfall at Junction...Node41 has boundary condition number... 2

====> Warning !! Outfall Junction Node39 has two or more connecting conduits.
====> Warning !! Outfall Junction Node41 has two or more connecting conduits.

Weir Outfall Data
Boundary Condition on data group J1

Weir Outfall at Junction... Node39 has boundary condition number... 1
Weir Outfall at Junction... Node39 has boundary condition number... 1
Weir Outfall at Junction... Node41 has boundary condition number... 2
Weir Outfall at Junction... Node41 has boundary condition number... 2
Weir Outfall at Junction... Node41 has boundary condition number... 2

INTERNAL CONNECTIVITY INFORMATION

CONDUIT	JUNCTION	JUNCTION
orifice 5	Node4	Node2
orifice	Node10	Node3
or1	Node16	Node18
Weir5	Node4	Node2
weir6	Node4	Node2
weir 1	Node10	Node3
weir 2	Node10	Node3
weir3	Node12	Node11
weir 4	Node2	Node12
weir8	Node16	Node17
weir9	Node16	Node18
lacy	Node11	Node37
bikepath	Node37	Node38
south	Node38	Node39
driveway	Node37	Node39
seminole	Node40	Node37
sem2	Node37	Node41
south1	Node40	Node41
dway 2	Node40	Node41
FREE# 1	Node41	BOUNDARY
FREE# 2	Node41	BOUNDARY

Boundary Condition Information
Data Groups J1-J4

BC NUMBER... 1 has no control water surface.
BC NUMBER... 2 has no control water surface.

====> WARNING ! Junction Node30 is not associated with any conduit.
====> WARNING ! Junction Node31 is not associated with any conduit.

Node	Time(10)	Time(25)	Time(sec)
Node11	100.00	100.00	0.0
Node12	100.00	100.00	0.0
Node13	100.00	100.00	0.0
Node15	100.00	100.00	0.0
Node16	82.44	100.00	0.0
Node17	100.00	100.00	0.0
Node18	21.93	54.84	0.0
Node20	100.00	100.00	0.0
Node21	88.70	100.00	0.0
Node22	100.00	100.00	0.0
Node23	95.72	100.00	0.0
Node24	100.00	100.00	0.0
Node25	68.53	100.00	0.0
Node26	25.56	63.91	0.0
Node28	100.00	100.00	0.0
Node29	100.00	100.00	0.0
Node30	100.00	100.00	0.0
Node31	100.00	100.00	0.0
Node32	100.00	100.00	0.0
Node33	100.00	100.00	0.0
Node34	100.00	100.00	0.0
Node35	100.00	100.00	0.0
Node36	68.53	100.00	0.0
Node37	100.00	100.00	0.0
Node38	100.00	100.00	0.0
Node39	100.00	100.00	0.0
Node40	100.00	100.00	0.0
Node41	100.00	100.00	0.0

The junction requiring the smallest time step was...Node1

Table E5a - Conduit Explicit Condition Summary
Courant = Conduit Length
Time step = Velocity + sqrt(g*depth)
Conduit Implicit Condition Summary
Courant = Conduit Length
Time step = Velocity

The 3rd column is the Explicit time step times the minimum Courant time step factor

Minimum Conduit Time Step in seconds in the 4th column in the list. Maximum possible is 10 * maximum time step

The 5th column is the maximum change at any time step during the simulation. The 6th column is the wobble value which is an indicator of the flow stability.

You should use this section to find those conduits that are slowing your model down. Use modify conduits to alter the length of the slow conduits to make your simulation faster, or change the conduit name to "CHIME?????" where "?????" are any characters, this will lengthen the conduit based on the model time step, not the value listed in modify conduits.

Conduit	Time(exp)	ExpCmin	Time(mp)	Time(min)	Max Change	Wobble	Type of Soln
Link2	9.36	9.36	27.47	395.7	-2.628	1.417	Normal Soln
Link4	2.51	2.51	4.81	0.0	0.004	0.230	Normal Soln
Link5	0.68	0.68	1.56	1312.5	0.036	2.873	Normal Soln
Link6	3.80	3.80	9.94	0.0	0.005	0.501	Normal Soln
Link7	2.58	2.58	6.18	0.0	0.004	0.505	Normal Soln
Link9	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link12	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link13	15.05	15.05	100.00	0.0	-0.000	0.034	Normal Soln

====> WARNING ! Junction Node32 is not associated with any conduit.
====> WARNING ! Junction Node33 is not associated with any conduit.
====> WARNING ! Junction Node34 is not associated with any conduit.
====> WARNING ! Junction Node35 is not associated with any conduit.

Conduit Convergence Criteria

Conduit Name	Full Flow	Conduit Slope
Link2	73.8984	0.0048
Link4	62.4947	0.0232
Link5	26.8520	0.0043
Link6	29.7983	0.0053
Link7	28.4175	0.0048
Link9	10.0415	0.0000
Link12	6.2666	0.0309
Link13	4.6007	0.0051
Link15	25.1434	0.0124
Link16	7.4734	0.0440
Link21	134.5264	0.0179
Link23	33.6545	0.0064
Link25	11.2618	0.0115
203.1	5.4332	0.0233
203.2	19.8518	0.0350
ditch1	36.4193	0.0023
238.1	13.0290	0.0154
264.11	3.9404	0.0037
263.11	0.7414	0.0000
250.11	15.7704	0.0025
250.21	18.7101	0.0036
21	0.0000	0.0000
23	0.0000	0.0000
25	0.0000	0.0000
28	0.0000	0.0000
29	0.0000	0.0000
36	0.0000	0.0000
orifice 5	3.8094	0.0000
orifice	3.8094	0.0000
or1	0.5379	0.0000

Table E5 - Junction Time Limitation Summary

(0.10 or 0.25) Depth * Area
Time step = Sum of Flow
The time this junction was the limiting junction is listed in the third column.

Junction	Time(10)	Time(25)	Time(sec)
Node1	100.00	100.00	388800.0
Node2	100.00	100.00	0.0
Node3	51.82	100.00	0.0
Node4	84.37	100.00	0.0
Node5	100.00	100.00	0.0
Node6	100.00	100.00	0.0
Node7	100.00	100.00	0.0
Node8	100.00	100.00	0.0
Node9	88.42	100.00	0.0
Node10	83.47	100.00	0.0

Link	Time(10)	Time(25)	Time(sec)	Wobble	Type of Soln
Link15	2.29	2.29	4.43	0.0	0.001 0.134 Normal Soln
Link16	1.34	1.34	1.99	6.0	0.003 1.481 Normal Soln
Link21	46.28	46.28	73.33	0.0	0.015 0.377 Normal Soln
Link23	96.92	96.92	100.00	0.0	0.014 0.616 Normal Soln
Link25	44.84	44.84	92.44	0.0	0.113 1.176 Normal Soln
203.1	3.32	3.32	7.53	0.0	0.037 2.384 Normal Soln
203.2	3.68	3.68	5.65	0.0	0.110 0.860 Normal Soln
0	100.00	100.00	0.0	0.000	0.000 Normal Soln
ditch1	100.00	100.00	0.0	0.060	1.311 Normal Soln
264.11	3.13	3.13	7.79	0.0	0.019 3.513 Normal Soln
263.11	2.14	2.14	6.85	4633.7	-0.035 76.318 Normal Soln
250.11	3.62	3.62	8.65	16.8	0.012 4.156 Normal Soln
250.21	3.50	3.50	8.91	115.3	0.015 3.634 Normal Soln
21	100.00	100.00	100.00	0.0	6.391 0.000 Special Cnd
23	100.00	100.00	100.00	0.0	0.003 0.000 Special Cnd
25	100.00	100.00	100.00	0.0	-17.135 0.000 Special Cnd
28	100.00	100.00	100.00	0.0	-2.553 0.000 Special Cnd
29	100.00	100.00	100.00	0.0	0.001 0.000 Special Cnd
36	100.00	100.00	100.00	0.0	0.007 0.000 Special Cnd
orifice 5	62.80	62.80	100.00	0.0	0.003 2.725 Normal Soln
orifice	64.03	64.03	100.00	0.0	-0.018 3.919 Normal Soln
or1	65.05	65.05	100.00	0.0	0.001 4.217 Normal Soln

The conduit with the smallest time step limitation was...263.11
The conduit with the largest wobble was...263.11
The conduit with the largest flow change in any consecutive time step...25

* End of time step DO-loop in Runoff *

Final Date (Mo/Day/Year) = 1/4/2014
Total number of time steps = 4340
Final Julian Date = 2014004
Final time of day = 0. seconds.
Final time of day = 0.00 hours.
Final running time = 72.0000 hours.
Final running time = 3.0000 days.

* Extrapolation Summary for Watersheds *
* Explains the number of time steps and iterations *
* Used in the solution of the subcatchments. *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLAND Calls *

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node40#1	0	0	Node36#1	0	0	Node21#1	0	0
Node10#1	0	0	Node10#2	0	0	Node26#1	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node29#1	0	0	Node9#1	0	0	Node23#1	0	0
Node24#1	0	0	Node20#1	0	0	Node25#1	0	0
Node2#1	0	0	Node28#1	0	0	Node12#1	0	0
Node11#1	0	0	Node37#1	0	0	Node38#1	0	0
Node30#1	0	0	Node31#1	0	0	Node32#1	0	0
Node33#1	0	0	Node34#1	0	0	Node35#1	0	0

Rainfall input summary from Runoff Continuity Check

Total rainfall read for gage # 1 is 4.0900 in
Total rainfall duration for gage # 1 is 1434.02 minutes

Table B5 - CONTINUITY CHECK FOR SURFACE WATER
* Any continuity error can be fixed by lowering the wet and transition time step. The transition time *

* should not be much greater than the wet time step.*

		Inches over	
		cubic feet	Total Basin
Total Precipitation (Rain plus Snow)	9.692817E+06	4.090	
Total Infiltration	3.576382E+06	1.509	
Total Evaporation	2.360048E+05	0.100	
Surface Runoff from Watersheds	5.880011E+06	2.481	
Total Water remaining in Surface Storage	0.000000E+00	0.000	
Infiltration over the Pervious Area...	3.576382E+06	1.509	
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....			
		9.692398E+06	4.090
Total Precipitation + Initial Storage.....		9.692817E+06	4.090

The error in continuity is calculated as

		Inches over	
		cubic feet	Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000	
Final Channel/Pipe Storage.....	0.000000E+00	0.000	
Surface Runoff from Watersheds.....	5.880011E+06	2.481	
Groundwater Subsurface Inflow or Diversion...	0.000000E+00	0.000	
Evaporation Loss from Channels.....	0.000000E+00	0.000	
Groundwater Flow Diverted Out of Network.....	0.000000E+00	0.000	
Channel/Pipe/Inlet Outflow.....	5.880011E+06	2.481	
Initial Storage + Inflow.....	5.880011E+06	2.481	
Final Storage + Outflow + Diverted GW.....	5.880011E+06	2.481	
* Final Storage + Outflow + Evaporation - * Watershed Runoff - Groundwater Inflow - * Initial Channel/Pipe Storage * * * * *			
Percent Continuity Error.....		0.0043	

* Table R6. Continuity Check for Channel/Pipes *
* You should have zero continuity error *
* If you are not using runoff hydraulics *

		Inches over	
		cubic feet	Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000	
Final Channel/Pipe Storage.....	0.000000E+00	0.000	
Surface Runoff from Watersheds.....	5.880011E+06	2.481	
Groundwater Subsurface Inflow or Diversion...	0.000000E+00	0.000	
Evaporation Loss from Channels.....	0.000000E+00	0.000	
Groundwater Flow Diverted Out of Network.....	0.000000E+00	0.000	
Channel/Pipe/Inlet Outflow.....	5.880011E+06	2.481	
Initial Storage + Inflow.....	5.880011E+06	2.481	
Final Storage + Outflow + Diverted GW.....	5.880011E+06	2.481	
* Final Storage + Outflow + Evaporation - * Watershed Runoff - Groundwater Inflow - * Initial Channel/Pipe Storage * * * * *			
Percent Continuity Error.....		0.0000	

Table R9. Summary Statistics for Subcatchments #
#####

Note: Total Runoff Depth includes pervious & impervious areas.
Pervious and Impervious Runoff Depth is only the runoff from those two areas.
For catchments receiving redirected flow, this flow will only be shown if the flow is not directed directly to the outlet. Flow that is getting redirected is also listed with the original subcatchment.

Subcatchment.....	Node40#1	Node36#1	Node21#1	Node10#1	Node10#2
Area (acres).....	184.60000	19.36000	16.65000	7.38000	12.13000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000

Rational Formula

Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node9#1	Node23#1	Node24#1	Node20#1	Node25#1
Area (acres).....	18.65000	4.26000	2.48000	0.57000	32.48000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	4.09000	4.09000	4.09000	4.09000	4.09000
Max Intensity (in/hr)...	5.90880	5.90880	5.90880	5.90880	5.90880

Pervious Area

Total Runoff Depth (in)	2.53746	3.00795	2.44910	2.03364	2.71981
Peak Runoff Rate (cfs)	60.55057	12.91735	8.60178	1.65245	102.41839

Total Impervious Area

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area

Total Runoff Depth (in)	2.53746	3.00795	2.44910	2.03364	2.71981
Peak Runoff Rate (cfs)	60.55057	12.91735	8.60178	1.65245	102.41839

Rational Formula

Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node2#1	Node28#1	Node12#1	Node11#1	Node37#1
Area (acres).....	27.51000	3.34000	1.41000	6.52000	6.28000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	4.09000	4.09000	4.09000	4.09000	4.09000
Max Intensity (in/hr)...	5.90880	5.90880	5.90880	5.90880	5.90880

Pervious Area

Total Runoff Depth (in)	1.95560	2.71980	1.80437	2.81386	1.73108
Peak Runoff Rate (cfs)	76.67669	9.63265	6.23335	19.11065	12.85396

Total Rainfall (in)....	4.09000	4.09000	4.09000	4.09000	4.09000
Max Intensity (in/hr)...	5.90880	5.90880	5.90880	5.90880	5.90880

Pervious Area

Total Runoff Depth (in)	2.36249	3.00795	2.71980	2.44910	1.58917
Peak Runoff Rate (cfs)	267.31430	58.70421	46.43388	25.59723	19.62258

Total Impervious Area

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area

Total Runoff Depth (in)	2.36249	3.00795	2.71980	2.44910	1.58917
Peak Runoff Rate (cfs)	267.31430	58.70421	46.43388	25.59723	19.62258

Rational Formula

Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node26#1	Node1#1	Node4#1	Node16#1	Node29#1
Area (acres).....	1.29000	14.77000	46.70000	3.61000	7.66000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	4.09000	4.09000	4.09000	4.09000	4.09000
Max Intensity (in/hr)...	5.90880	5.90880	5.90880	5.90880	5.90880

Pervious Area

Total Runoff Depth (in)	2.44910	2.71980	2.71981	3.00795	2.90989
Peak Runoff Rate (cfs)	4.47431	40.89161	139.88128	11.14705	19.76196

Total Impervious Area

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area

Total Runoff Depth (in)	2.44910	2.71980	2.71981	3.00795	2.90989
Peak Runoff Rate (cfs)	4.47431	40.89161	139.88128	11.14705	19.76196

Total Runoff Depth (in)

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs)	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area

Total Runoff Depth (in)	1.95560	2.71980	1.80437	2.81386	1.73108
Peak Runoff Rate (cfs)	76.67669	9.63265	6.23335	19.11065	12.85396

Rational Formula

Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).....	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.....	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node38#1	Node30#1	Node31#1	Node32#1	Node33#1
Area (acres).....	151.46000	32.48000	4.26000	19.36000	16.65000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	4.09000	4.09000	4.09000	4.09000	4.09000
Max Intensity (in/hr)...	5.90880	5.90880	5.90880	5.90880	5.90880

Pervious Area

Total Runoff Depth (in)	3.007
-------------------------	-------

Partial Area Tc..... 0.0000 0.0000 0.0000 0.0000 0.0000
 Partial Area Intensity. 0.0000 0.0000 0.0000 0.0000 0.0000

Subcatchment..... Node34#1 Node35#1
 Area (acres)..... 3.34000 7.66000
 Percent Impervious..... 0.00000 0.00000
 Total Rainfall (in)..... 4.09000 4.09000
 Max Intensity (in/hr).. 5.90880 5.90880

Previous Area
 Total Runoff Depth (in) 1.73108 1.58916
 Peak Runoff Rate (cfs). 6.14290 10.75347

Total Impervious Area
 Total Runoff Depth (in) 0.00000 0.00000
 Peak Runoff Rate (cfs). 0.00000 0.00000

Impervious Area with depression storage

Total Runoff Depth (in) 0.00000 0.00000
 Peak Runoff Rate (cfs). 0.00000 0.00000

Impervious Area without depression storage

Total Runoff Depth (in) 0.00000 0.00000
 Peak Runoff Rate (cfs). 0.00000 0.00000

Total Area

Total Runoff Depth (in) 1.73108 1.58916
 Peak Runoff Rate (cfs). 6.14290 10.75347

Rational Formula

Perov. Tc. (mins)..... 0.00000 0.00000
 Perov. Intensity (in/hr) 0.00000 0.00000
 Previous C..... 0.00000 0.00000
 Impervious Tc. (mins)... 0.00000 0.00000
 Imp. Intensity (in/hr)... 0.00000 0.00000
 Impervious C..... 0.00000 0.00000
 Partial Area (Ha)..... 0.00000 0.00000
 Partial Area Tc..... 0.00000 0.00000
 Partial Area Intensity. 0.00000 0.00000

====> Runoff simulation ended normally.

Table E6. Final Model Condition
 This table is used for steady state
 flow comparison and is the information
 saved to the hok-restart file.
 Final Time = 108.0000 hours

Junction / Depth / Elevation ==>*** Junction is Surcharged.

Node1/ 0.01 / 1025.01/	Node2/ 3.15 / 1018.15/	Node3/ 0.15 / 1018.15/
Node4/ 0.16 / 1019.16/	Node5/ 0.00 / 1021.99/	Node6/ 0.00 / 1021.34/
Node7/ 0.00 / 1021.31/	Node8/ 0.00 / 1021.12/	Node9/ 6.06 / 1021.06/
Node10/ 0.08 / 1019.08/	Node11/ 0.00 / 1021.88/	Node12/ 0.80 / 1023.80/
Node13/ 0.00 / 1021.92/	Node15/ 0.00 / 1023.15/	Node16/ 1.02 / 1023.02/
Node17/ 0.00 / 1022.87/	Node18/ 1.00 / 1023.00/	Node20/ 0.00 / 1025.00/
Node21/ 0.00 / 1020.00/	Node22/ 0.00 / 1034.34/	Node23/ 0.00 / 1040.00/
Node24/ 0.00 / 1031.82/	Node25/ 2.15 / 1018.15/	Node26/ 0.00 / 1020.00/
Node28/ 0.80 / 1023.80/	Node29/ 0.00 / 1023.00/	Node30/ 0.00 / 1016.00/
Node31/ 0.00 / 1040.00/	Node32/ 0.00 / 1037.00/	Node33/ 0.00 / 1020.00/
Node34/ 0.00 / 1023.00/	Node35/ 0.00 / 1023.00/	Node36/ 0.00 / 1037.00/
Node37/ 6.20 / 1020.70/	Node38/ 6.20 / 1020.70/	Node39/ 0.00 / 1021.50/
Node40/ 3.60 / 1020.70/	Node41/ 0.00 / 1019.80/	

Junction/ Max Volume

Node1/ 73033.27 /	Node2/ 1692241.58 /	Node3/ 2264.01 /
Node4/ 312955.46 /	Node5/ 9.19 /	Node6/ 11.09 /
Node7/ 13.42 /	Node8/ 12.42 /	Node9/ 287771.82 /
Node10/ 12863.81 /	Node11/ 17203.17 /	Node12/ 25809.84 /
Node13/ 3.80 /	Node15/ 0.00 /	Node16/ 23521.57 /
Node17/ 8.22 /	Node18/ 17.57 /	Node20/ 11791.51 /
Node21/ 7727.82 /	Node22/ 13.58 /	Node23/ 21572.61 /
Node24/ 10.18 /	Node25/ 125820.88 /	Node26/ 14.77 /
Node28/ 10408.78 /	Node29/ 35433.58 /	Node30/ 0.00 /
Node31/ 0.00 /	Node32/ 0.00 /	Node33/ 0.00 /
Node34/ 0.00 /	Node35/ 0.00 /	Node36/ 6640.10 /
Node37/ 57636.75 /	Node38/ 2527375.05 /	Node39/ 0.00 /
Node40/ 854547.91 /	Node41/ 0.00 /	

Junction/Total Fliding

Node1/ 0.00 /	Node2/ 0.00 /	Node3/ 0.00 /
Node4/ 0.00 /	Node5/ 0.00 /	Node6/ 0.00 /
Node7/ 0.00 /	Node8/ 0.00 /	Node9/ 0.00 /
Node10/ 0.00 /	Node11/ 0.00 /	Node12/ 0.00 /
Node13/ 0.00 /	Node15/ 0.00 /	Node16/ 0.00 /
Node17/ 0.00 /	Node18/ 0.00 /	Node20/ 0.00 /
Node21/ 0.00 /	Node22/ 0.00 /	Node23/ 0.00 /
Node24/ 0.00 /	Node25/ 0.00 /	Node26/ 0.00 /
Node28/ 0.00 /	Node29/ 0.00 /	Node30/ 0.00 /
Node31/ 0.00 /	Node32/ 0.00 /	Node33/ 0.00 /
Node34/ 0.00 /	Node35/ 0.00 /	Node36/ 0.00 /
Node37/ 0.00 /	Node38/ 0.00 /	Node39/ 0.00 /
Node40/ 0.00 /	Node41/ 0.00 /	

Conduit/ Cross Sectional Area

Link2/ 0.41 /	Link4/ 0.00 /	Link5/ 0.00 /
Link6/ 0.00 /	Link7/ 0.00 /	Link9/ 0.00 /
Link12/ 0.00 /	Link13/ 0.00 /	Link15/ 0.00 /
Link16/ 0.00 /	Link21/ 0.00 /	Link23/ 0.00 /
Link25/ 0.18 /	203.1/ 0.00 /	203.2/ 0.00 /
ditch1/ 0.00 /	238.1/ 0.00 /	264.11/ 0.00 /
263.11/ 3.36 /	250.11/ 4.12 /	250.21/ 4.13 /
2/1 1.00 /	23/ 1.00 /	25/ 1.00 /
28/ 1.00 /	29/ 1.00 /	36/ 1.00 /
office 5/ 0.00 /	office/ 0.03 /	ori 1/ 0.00 /

Conduit/ Final Volume

Link2/ 51.68 /	Link4/ 0.01 /	Link5/ 0.01 /
Link6/ 0.03 /	Link7/ 0.00 /	Link9/ 0.00 /
Link12/ 0.00 /	Link13/ 0.00 /	Link15/ 0.01 /
Link16/ 0.00 /	Link21/ 0.01 /	Link23/ 0.05 /
Link25/ 77.41 /	203.1/ 0.12 /	203.2/ 0.00 /
ditch1/ 0.00 /	238.1/ 0.01 /	264.11/ 0.00 /
263.11/ 151.09 /	250.11/ 275.81 /	250.21/ 289.34 /
2/1 0.00 /	23/ 0.00 /	25/ 0.00 /
28/ 0.00 /	29/ 0.00 /	36/ 0.00 /
office 5/ 76.37 /	office/ 26.39 /	ori 1/ 2.08 /

Conduit/ Hydraulic Radius

Link2/ 0.14 /	Link4/ 0.01 /	Link5/ 0.01 /
Link6/ 0.01 /	Link7/ 0.01 /	Link9/ 0.00 /
Link12/ 0.00 /	Link13/ 0.00 /	Link15/ 0.01 /
Link16/ 0.00 /	Link21/ 0.01 /	Link23/ 0.01 /
Link25/ 0.04 /	203.1/ 0.01 /	203.2/ 0.00 /
ditch1/ 0.00 /	238.1/ 0.00 /	264.11/ 0.00 /
263.11/ 0.49 /	250.11/ 0.55 /	250.21/ 0.55 /
2/1 0.00 /	23/ 0.00 /	25/ 0.00 /
28/ 0.00 /	29/ 0.00 /	36/ 0.00 /
office 5/ 0.09 /	office/ 0.05 /	ori 1/ 0.01 /

Conduit/ Upstream/ Downstream Elevation

Link2/ 1018.15 / 1018.15	Link4/ 1021.99 / 1021.34	Link5/ 1021.34 / 1021.31/
Link6/ 1021.31 / 1021.12	Link7/ 1021.12 / 1021.06	Link9/ 1018.15 / 1018.15/

Conduit/ Flow ==>*** Conduit uses the normal flow option.
 Link2/ 0.01 /

Conduit/ Velocity
 Link2/ 0.02 /

Conduit/ Width
 Link2/ 2.16 /

Junction/ EGL
 Node1/ 0.01 /

Junction/ Freeboard
 Node1/ 2.99 /

Table E7 - Iteration Summary

Total number of time steps simulated..... 38880
 Total number of passes in the simulation..... 5279110
 Total number of time steps during simulation..... 174657
 Ratio of actual # of time steps / NTCCY..... 4.492
 Average number of iterations per time step..... 30.226
 Average time step size(seconds)..... 2.226
 Smallest time step size(seconds)..... 1.000
 Largest time step size(seconds)..... 10.000
 Average minimum Conduit Courant time step (sec)... 3.375
 Average minimum implicit time step (sec)..... 2.560
 Average minimum junction time step (sec)..... 2.560
 Average Courant Factor Tl..... 2.560
 Number of times omega reduced..... 139213

Table E8 - Junction Time Step Limitation Summary

Not Convr = Number of times this junction did not
 converge during the simulation.
 Avg Convr = Average junction iterations.
 Convr err = Mean convergence error.
 Omega Cng = Change of omega during iterations
 Max Iter = Maximum number of iterations

Junction Not Convr	Avg Convr	Total Iter	Omega Cng	Max Iter	Itern >10	Itern >25	Itern >40
Node1 20658	63.29	11054521	1291	501	23228	23098	23081
Node2 19998	68.54	11971601	9218	501	31867	26640	26464
Node3 0	1.24	216080	1182	87	37	17	11
Node4 0	1.03	179334	0	0	0	0	0
Node5 0	1.05	183330	0	5	0	0	0
Node6 0	9.69	1693281	4656	500	4549	3876	3372
Node7 0	21.01	3689225	8674	499	8599	8528	8434
Node8 0	1.08	189111	0	4	0	0	0
Node9 0	1.02	178278	0	4	0	0	0
Node10 8551	35.41	6185463	11895	501	11894	11881	11881
Node11 54	1.21	211538	9	501	54	54	54
Node12 26475	77.40	1351708	30949	501	30483	28526	28526
Node13 0	1.00	174775	0	2	0	0	0
Node15 0	1.00	174657	0	1	0	0	0
Node16 0	1.01	176737	0	5	0	0	0
Node17 0	1.06	184434	0	4	0	0	0
Node18 0	1.04	182379	0	51	1	1	1
Node20 534	2.73	475971	233	501	606	594	593
Node21 16317	48.48	8466603	20434	501	16812	16415	16411
Node22 0	1.09	189582	0	5	0	0	0
Node23 0	1.03	179825	0	4	0	0	0
Node24 0	1.05	183864	0	4	0	0	0
Node25 13311	39.34	6871234	13315	501	13315	13315	13315
Node26 35	1.15	200392	29	501	35	45	42
Node28 35307	103.33	18046516	36826	501	36826	35782	35782
Node29 0	1.06	185681	0	4	0	0	0
Node30 0	1.00	174657	0	1	0	0	0
Node31 0	1.00	174657	0	1	0	0	0
Node32 0	1.00	174657	0	1	0	0	0
Node33 0	1.00	174657	0	1	0	0	0

Node34 0 1.00 174657 0 1 0 0 0
Node35 0 1.00 174657 0 1 0 0 0
Node36 0 1.13 198600 0 4 0 0 0
Node37 94 1.48 259117 339 501 105 100 98
Node38 0 1.14 198688 1 34 1 1 0
Node39 0 1.00 174657 0 1 0 0 0
Node40 1.10 198600 0 6 2 6 5 1
Node41 0 1.07 186841 0 6 0 0 0
Total number of iterations for all junctions..... 87201284
Minimum number of possible iterations..... 6636966
Efficiency of the simulation..... 13.14
Poor Efficiency

Extran Efficiency is an indicator of the simulation. Ideal efficiency is one iteration per | time step. Altering the underrelaxation parameter, | lowering the time step, increasing the flow and head | tolerance are good ways of improving the efficiency. | and/or is lowering the internal time step. The lower the | efficiency generally the faster your model will run. | If your efficiency is less than 1.5 then you may try | increasing your time step so that your overall simulation | is faster. Ideal efficiency would be around 2.0 |
Good Efficiency < 1.5 mean iterations |
Excellent Efficiency < 2.5 and > 1.5 mean iterations |
Good Efficiency < 4.0 and > 1.5 mean iterations |
Fair Efficiency < 7.5 and > 4.0 mean iterations |
Poor Efficiency > 7.5 mean iterations |

Table E9 - JUNCTION SUMMARY STATISTICS |
The Maximum area is only the area of the node. It |
does not include the area of the surrounding conduits |

Junction Name	Upstream	Maximum	Time	Feet of	Maximum	Maximum	Maximum	Maximum
	Ground	Pipe/Crown	Conduit	Surcharge	Freeboard	Junction	Junction	Gutter
	Elevation	Elevation	Elevation	Occurrence	at Max of node	Area	Depth	Width
Name	feet	feet	feet	Hr. Min.	Elevation	feet	ft2	feet
Node1	1028.0000	1028.9000	1028.6362	12	49	0.0000	3.638	52774.412
Node2	1028.0000	1025.5000	1018.1534	108	0	0.0000	9.8466	856922.70
Node3	1025.0000	1020.8333	1020.4073	12	52	0.0000	4.5927	1476.6569
Node4	1025.0000	1025.0000	1021.7267	13	43	0.0000	3.2733	127926.81
Node5	1028.0000	1024.9000	1022.7222	12	56	0.0000	3.2790	12.5660
Node6	1026.0200	1023.8400	1022.2222	12	57	0.0000	3.7979	12.5660
Node7	1026.1800	1023.8100	1022.3777	12	57	0.0000	3.8023	12.5660
Node8	1026.0200	1023.6200	1022.1081	12	57	0.0000	3.9119	12.5660
Node9	1026.0000	1024.0000	1022.0623	108	0	0.0000	4.9377	84497.052
Node10	1025.0000	1025.0000	1021.7653	12	50	0.0000	3.2347	53760.172
Node11	1025.0000	1023.2300	1024.0856	12	39	0.0000	0.9144	32006.607
Node12	1025.0000	1025.0000	1023.8076	23	47	0.0000	1.924	54727.911
Node13	1025.7300	1023.1700	1022.2222	12	56	0.0000	3.5077	12.5660
Node14	1025.0000	1024.6500	1023.1500	0	0	0.0000	1.8500	12.5660
Node15	1026.0000	1022.0000	1022.3094	13	59	0.0000	3.3094	6.096
Node16	1026.0000	1025.0000	1023.5241	12	54	0.0000	2.4759	12.5660
Node17	1025.0000	1025.0000	1021.0623	13	0	0.0000	2.6015	12.5660
Node18	1028.0000	1027.0000	1026.2061	12	37	0.0000	1.7939	10974.882
Node19	1024.0000	1024.0000	1022.1629	12	49	0.0000	1.8371	36154.800
Node20	1041.0000	1041.0000	1035.4206	12	37	0.0000	5.5795	12.5660
Node21	1044.0000	1044.0000	1032.6263	12	12	0.0000	5.5737	12.5660
Node22	1028.0000	1025.0000	1021.1755	12	13	0.0000	6.8245	12.5660
Node23	1025.0000	1025.0000	1024.1770	12	35	0.0000	0.8230	9736.2743
Node24	1027.0000	1025.0000	1024.0634	12	54	0.0000	2.9306	33541.200
Node25	1020.0000	1020.0000	1018.2034	12	36	0.0000	1.7966	57499.200
Node26	1028.0000	1021.5000	1021.1755	12	13	0.0000	6.8245	12.5660
Node27	1025.0000	1025.0000	1024.1770	12	35	0.0000	0.8230	9736.2743
Node28	1027.0000	1025.0000	1024.0634	12	54	0.0000	2.9306	33541.200
Node29	1020.0000	1020.0000	1016.0000	0	0	0.0000	4.0000	12.5660

south1 Undefined Undefined Undefined 4.6481 13 51
dwa2 2 Undefined Undefined Undefined 0.0000 0 0
FREE1 1 Undefined Undefined Undefined 0.0000 0 0
FREE2 2 Undefined Undefined Undefined 4.6481 13 51

Table E11. Area assumptions used in the analysis |
Subcritical and Critical flow assumptions from |
Subroutine Head, See Figure 17-1 in the |
manual for further information. |

Conduit Name	Dry Flow (min)	Critical Flow (min)	Radius-m (ft)	Area(ft2)	Max. Vel' (ft/s)	Max. Depth (ft)	Max. Area(ft2)
Link2	481.79	4823.96	0.00	1174.25	1.104	7.287	8.879
Link4	395.87	6084.33	0.00	0.00	0.425	1.369	4.698
Link5	395.78	6084.22	0.00	0.00	0.494	1.770	4.386
Link6	406.17	6073.83	0.00	0.00	0.558	1.902	3.722
Link7	411.50	4809.54	0.00	1256.96	0.525	1.643	3.729
Link8	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
Link9	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
Link12	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
Link13	6256.47	223.53	0.00	0.00	0.306	0.421	0.013
Link15	709.39	0.00	0.00	5770.61	0.238	0.405	1.433
Link16	4752.04	172.98	0.00	0.00	0.290	0.579	0.948
Link21	351.50	0.00	0.00	6128.50	0.609	2.442	10.635
Link23	4425.04	2054.96	0.00	0.00	0.515	2.065	4.702
Link25	5335.36	1144.64	0.00	0.00	0.448	1.191	2.980
203.1	442.50	0.00	0.00	6037.50	0.294	0.676	6.616
203.2	5771.81	0.00	0.00	708.19	0.438	0.994	3.010
ditch1	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
238.1	439.11	0.00	0.00	6040.89	0.443	1.072	2.882
264.11	395.00	0.00	0.00	6091.00	0.375	1.162	6.662
263.11	341.50	6138.50	0.00	0.00	0.632	3.358	38.331
250.11	659.64	5691.25	0.00	129.11	0.693	4.123	21.135
250.21	496.79	5743.22	0.00	239.99	0.692	4.140	29.493
21	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
23	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
25	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
28	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
29	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
36	6480.00	0.00	0.00	0.00	0.000	0.000	0.000
office 5	437.33	0.00	0.00	6042.67	0.301	0.780	11.969
office 4	403.75	197.98	0.00	5878.27	0.301	0.813	11.766
ot1	692.75	5770.80	0.00	16.45	0.135	0.162	9.163

Table E12. Mean Conduit Flow Information |

Conduit Name	Mean Flow (cfs)	Total Flow (cfs)	Mean Flow Percent Change	Low Flow (cfs)	Mean Flow (cfs)	Mean Froude Number	Mean Hydraulic Radius (ft)	Mean Cross Area (ft2)	Mean Area Roughness
Link2	1.6451	639629.0	0.0001	0.0000	0.9783	0.4016	2.488	1.0492	0.0130
Link4	0.2984	116027.81	0.0001	0.9864	2.1553	0.0681	0.1311	0.0130	
Link5	0.2983	115987.08	0.0008	0.9864	2.1553	0.0683	0.1876	0.0130	
Link6	0.2984	115999.16	0.0001	0.9859	0.9267	0.0929	0.2177	0.0130	
Link7	0.2984	116003.74	0.0000	0.9855	0.5103	0.0225	0.2069	0.0130	
Link8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Link9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Link12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0130	
Link13	0.0000	0.1581	0.0000	0.0768	0.0010	0.0125	0.0161	0.0130	
Link15	0.0004	35150.00	0.0000	0.9308	0.1808	0.0465	0.0620	0.0130	
Link16	0.2080	80676.58	0.0001	0.9369	0.8280	0.0482	0.0575	0.0130	
Link21	0.5438	211432.79	0.0003	0.3720	1.0822	0.0702	0.1674	0.0130	
Link23	0.1766	68665.966	0.0001	0.4933	0.3462	0.0567	0.1335	0.0130	
Link25	0.0295	11482.394	0.0000	0.2020	0.1162	0.0569	0.1870	0.0130	
203.1	0.2312	89875.16	0.0000	0.9630	1.2998	0.0852	0.1439	0.0130	
203.2	0.1427	55498.852	0.0001	0.2304	0.3605	0.0438	0.0948	0.0130	

Node31 1044.0000 1040.0000 1040.0000 0 0 0.0000 4.0000 12.5660 0.0000 0.00 0.0000
Node32 1041.0000 1037.0000 1037.0000 0 0 0.0000 4.0000 12.5660 0.0000 0.00 0.0000
Node33 1024.0000 1020.0000 1020.0000 0 0 0.0000 4.0000 12.5660 0.0000 0.00 0.0000
Node34 1025.0000 1023.0000 1023.0000 0 0 0.0000 2.0000 12.5660 0.0000 0.00 0.0000
Node35 1027.0000 1023.0000 1023.0000 0 0 0.0000 4.0000 12.5660 0.0000 0.00 0.0000
Node36 1041.0000 1041.0000 1039.3050 12 36 0.0000 1.6950 29185.200 0.0000 0.00 0.0000
Node37 1023.0000 1023.0000 1020.1050 17 21 0.0000 1.9549 17789.74 0.0000 0.00 0.0000
Node38 1023.0000 1016.0833 1020.6929 29 35 4.6129 2.3038 817703.91 0.0000 0.00 0.0000
Node39 1023.0000 1021.5000 1021.5000 0 0 0.0000 1.5000 12.5660 0.0000 0.00 0.0000
Node40 1024.3000 1019.6833 1021.6342 13 51 1.9509 2.6658 481887.79 0.0000 0.00 0.0000
Node41 1023.0000 1019.8000 1019.8000 0 0 0.0000 3.2000 12.5660 0.0000 0.00 0.0000

Table E10 - CONDUIT SUMMARY STATISTICS |
Note: The peak friction loss may be less than the flow |
and the conduit may still surge because of the |
downstream boundary conditions. |
This denotes an open conduit that has been overtopped |
this is a potential source of severe errors |

Conduit Name	Flow Velocity (ft/s)	Depth (ft)	Friction Loss (ft)	Head Loss (ft)	Time (Hr.)	Volume (Min.)	Ratio of Max. Water to Elev. at Pipe Ends	Maximum Water Depth (ft)	Time Ratio (Min.)	Ratio of Maximum Water Depth to Max. Water Depth	US	DS		
Link2	73.8984	7.2449	34.0000	40.5668	12	52	4.5611	13	30	0.5489	1020.407	1018.890	8.850	0.528
Link6	26.8520	5.4702	30.0000	7.1730	12	57	4.9888	12	57	0.2671	1022.222	1022.378	3.503	0.427
Link9	10.0415	0.0000	6.0000	0.0000	0	0	0.0000	0	0	0.0000	1018.153	1018.153	0.000	0.000
Link12	6.2666	6.2666	12.0000	0.0000	0	0	0.0000	0	0	0.0000	1023.150	1022.222	0.000	0.000
Link13	4.6007	3.7490	15.0000	-0.0181	12	15	-0.0659	12	15	-0.0039	1022.222	1022.222	0.242	0.522
Link15	25.1434	8.0034	24.0000	1.6774	13	13	3.8385	13	13	0.0667	1023.399	1023.380	1.199	0.174
Link16	7.4734	9.5164	12.0000	5.5329	12	54	10.0584	12	49	0.7403	1023.524	1022.721	0.654	0.731
Link21	134.5254	13.9823	42.0000	25.3329	12	38	10.910	12	38	0.1883	1035.421	1022.137	0.309	0.294
Link23	33.6545	6.5989	24.0000	10.3624	12	13	5.6526	12	13	0.				

office 5.1030 0.0000 1.7455 0.9228 1.0029 1021.6121 1019.8693 Max Flow
on1 1.1321 0.0000 1.9259 0.6117 0.4583 1025.3079 1023.3944 Max Flow

Table E13a. CULVERT ANALYSIS CLASSIFICATION,

and the time the culvert was in a particular classification during the simulation. Time is in minutes. The Dynamic Wave Equation is used for all conduit analysis but the culvert flow classification is condition is based on the HW and TW depths.

Mid Slope Slope TW Slope TW Slug Flow Slope Slope
Critical D Control Insignif Outlet/ TW > D TW <= D
Conduit Name Control Control Control Control Control Control Control Control Control Control Control Configuration

Link2 119.0000 4488.0000 1238.0000 0.0000 0.0000 0.0000 269.0000 366.0000 Groove End with Headwall
Link4 0.0000 0.0000 6295.0000 0.0000 0.0000 0.0000 185.0000 0.0000 None
Link5 11.0000 5772.0000 395.0000 302.0000 0.0000 0.0000 0.0000 0.0000 None
Link6 5.0000 5205.0000 416.0000 0.0000 0.0000 0.0000 854.0000 0.0000 None
Link7 237.0000 5153.0000 411.0000 0.0000 0.0000 0.0000 679.0000 0.0000 None
Link9 0.0000 0.0000 6480.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
Link12 0.0000 0.0000 6480.0000 0.0000 0.0000 0.0000 0.0000 0.0000 Groove End with Headwall
Link13 0.0000 223.0000 6257.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
Link15 0.0000 0.0000 6018.0000 0.0000 0.0000 0.0000 462.0000 0.0000 None
Link16 0.0000 0.0000 6480.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
Link21 0.0000 0.0000 6480.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
Link23 241.0000 1073.0000 5166.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
Link25 0.0000 0.0000 6451.0000 0.0000 0.0000 0.0000 29.0000 0.0000 Groove End with Headwall
203.1 0.0000 0.0000 5606.0000 0.0000 0.0000 0.0000 874.0000 Groove End with Headwall
203.2 0.0000 0.0000 6235.0000 0.0000 0.0000 0.0000 0.0000 245.0000 Groove End with Headwall
ditch1 0.0000 0.0000 6480.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
238.1 0.0000 0.0000 6127.0000 0.0000 0.0000 0.0000 353.0000 Groove End with Headwall
264.11 161.0000 986.0000 5226.0000 0.0000 0.0000 0.0000 55.0000 70.0000 Groove End with Headwall
263.11 0.0000 180.0000 0.0000 341.0000 5959.0000 0.0000 0.0000 0.0000 Groove End with Headwall
250.11 17.0000 59.0000 659.0000 0.0000 38.0000 24.0000 Groove End with Headwall
250.21 20.0000 128.0000 496.0000 0.0000 5730.0000 0.0000 14.0000 92.0000 Groove End Projecting
21 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
23 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
25 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
28 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
29 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
36 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 None
office 5 273.0000 4810.0000 437.0000 0.0000 0.0000 0.0000 960.0000 0.0000 None
office 522.0000 4552.0000 404.0000 0.0000 63.0000 0.0000 929.0000 0.0000 None
on1 2074.0000 3150.0000 692.0000 0.0000 0.0000 0.0000 564.0000 0.0000 None

Kinematic Wave Approximations | Time in Minutes for Each Conduit |

Conduit Duration of Slope Super- Roll Name Normal Flow Criteria Critical Waves

Link2 0.0000 4798.0000 140.2083 0.0000
Link4 5149.0833 6046.3333 6046.3333 0.0000
Link5 1223.7917 1223.7917 0.0000 0.0000
Link6 5.1667 5445.7778 0.0000 0.0000
Link7 4616.8333 4682.3333 27.8333 0.0000
Link9 0.0000 0.0000 0.0000 0.0000
Link12 0.0000 0.0000 0.0000 0.0000
Link13 0.0000 5606.0000 0.0000 0.0000
Link15 0.0000 0.0000 5770.6111 0.0000
Link16 5490.6167 5765.0000 1681.5000 0.0000
Link21 0.0000 0.0000 6098.8333 0.0000
Link23 5744.4333 5746.6667 137.2815 0.0000
Link25 5848.7933 5884.2333 173.9102 0.0000
203.1 0.0000 0.0000 5276.4667 0.0000

south 0.0000 0.0000 0.0000 0.0000 ##
driveway 0.0000 0.0000 0.0000 0.0000 ##
semito 0.0000 0.0000 0.0000 0.0000 ##
sem2 0.0000 0.0000 0.0000 0.0000 ##
south1 4.6481 16955.5908 0.0000 0.0000 ##
dwy2 0.0000 0.0000 0.0000 0.0000 ##
FREE#1 0.0000 0.0000 0.0000 0.0000 ##
FREE#2 4.6481 16955.6408 0.0000 0.0000 ##

Table E15a. SPREADSHEET REACH LIST

Peak flow and Total Flow listed by Reach or those | conduits or diversions having the same | upstream and downstream nodes.

Table with 5 columns: Upstream Node, Downstream Node, Maximum Flow (cfs), Total Flow (ft^3/s). Rows include Node3, Node6, Node7, Node8, Node13, Node18, Node17, Node22, Node24, Node26, Node1, Node20, Node11, Node37, Node38, Node21, Node23, Node25, Node28, Node29, Node36, Node4, Node10, Node15, Node2, Node40.

Table E16. New Conduit Information Section

Conduit Invert (IE) Elevation and Conduit # Maximum Water Surface (WS) Elevations

Table with 7 columns: Conduit Name, Upstream Node, Downstream Node, IE Up, IE Dn, WS Up, WS Dn, Conduit Type. Rows include Link2, Link4, Link5, Link6, Link7, Link9, Link12, Link13, Link15, Link16, Link21, Link23, Link25, 203.1, 203.2.

Table with 4 columns: Node ID, Flow (cfs), Velocity (ft/s), Volume (ft^3/s). Rows include 203.2, ditch1, 238.1, 264.11, 263.11, 250.11, 250.21, 21, 23, 25, 28, 29, 36, office 5, office 522, on1.

Table E15. SPREADSHEET INFO LIST

Conduit Flow and Junction Depth Information for use in | spreadsheets. The maximum values in this table are the | true maximum values because they sample every time step. | The values in the review results may be the | maximum of a subset of all the time steps in the run. | Note: These flows are only the flows in a single barrel.

Table with 10 columns: Conduit Name, Maximum Flow (cfs), Total Flow (ft^3/s), Maximum Velocity (ft/s), Maximum Volume (ft^3/s), Junction Invert (ft), Junction Elevation (ft). Rows include Link2, Link4, Link5, Link6, Link7, Link9, Link12, Link13, Link15, Link16, Link21, Link23, Link25, 203.1, 203.2, ditch1, 238.1, 264.11, 263.11, 250.11, 250.21, 21, 23, 25, 28, 29, office 5, office 522, on1, weir6, weir 1, weir 2, weir 3, weir 4, weir 8, weir 9, lacy, bkpath.

Table with 7 columns: Node ID, Node4, Node5, Node15, Node24, Node25, Node28, Node29, Node36, Node4, Node10, Node16, Node18, Node23, Node25, Node28, Node36, office 5, office 522, on1.

Table E18 - Junction Continuity Error. Division by Volume added 11/96 |

Continuity Error = Net Flow + Beginning Volume - Ending Volume
Total Flow + (Beginning Volume + Ending Volume)/2
Net Flow = Node Inflow - Node Outflow
Total Flow = absolute (Inflow + Outflow)
Intermediate column is a judgement on the node continuity error.
Excellent < 1 percent Great 1 to 2 percent Good 2 to 5 percent
Fair 5 to 10 percent Poor 10 to 25 percent Bad 25 to 50 percent
Terrible > 50 percent

Table with 7 columns: Junction Name, Continuity Error, Remaining Volume % of Node % of Inflow, Beginning Volume, Net Flow, Total Flow, Junction Failed to Converge. Rows include Node2, Node3, Node4, Node6, Node7, Node8, Node9, Node11, Node12, Node13, Node15, Node16, Node17, Node18, Node20, Node21, Node22, Node23, Node24, Node26, Node29, Node30, Node32, Node33, Node34, Node35, Node36, Node37, Node39.

Node40 265.2552 0.0088 0.0045 293607.1684 0.0000 293872.4236 2872336.341 0
 Node41 -0.0475 -0.0001 0.0000 0.0000 0.0000 -0.0475 33911.2316 0
 The total continuity error was 5.40291E+06 cubic feet
 The remaining total volume was 5.48596E+06 cubic feet
 Your mean node continuity error was Excellent
 Your worst node continuity error was Good

Table E19 - Junction Inflow & Outflow Listing
 Units are either ft³/s or m³/s
 depending on the units in your model.

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF through Inflow to Node	Inflow from Inflow to Node	RNF Inflow from Inflow to Node	Evaporation from Node	Basin Inflow from Node	Inflow Infiltration
Node1	0.0000	0.0000	0.0000	0.0000	0.0000	145821.0794	0.0000	0.0000	0.0000
Node2	0.0000	0.0000	0.0000	0.0000	0.0000	185287.6469	0.0000	0.0000	0.0000
Node4	0.0000	0.0000	0.0000	0.0000	0.0000	461058.1288	0.0000	0.0000	0.0000
Node9	0.0000	0.0000	0.0000	0.0000	0.0000	171782.7680	0.0000	0.0000	0.0000
Node10	0.0000	0.0000	0.0000	0.0000	0.0000	135582.9310	0.0000	0.0000	0.0000
Node11	0.0000	0.0000	0.0000	0.0000	0.0000	66596.5782	0.0000	0.0000	0.0000
Node12	0.0000	0.0000	0.0000	0.0000	0.0000	3235.2174	0.0000	0.0000	0.0000
Node16	0.0000	0.0000	0.0000	0.0000	0.0000	39416.4897	0.0000	0.0000	0.0000
Node20	0.0000	0.0000	0.0000	0.0000	0.0000	4207.7622	0.0000	0.0000	0.0000
Node21	0.0000	0.0000	0.0000	0.0000	0.0000	164381.6133	0.0000	0.0000	0.0000
Node23	0.0000	0.0000	0.0000	0.0000	0.0000	46513.6465	0.0000	0.0000	0.0000
Node24	0.0000	0.0000	0.0000	0.0000	0.0000	22047.5670	0.0000	0.0000	0.0000
Node25	0.0000	0.0000	0.0000	0.0000	0.0000	320688.2527	0.0000	0.0000	0.0000
Node26	0.0000	0.0000	0.0000	0.0000	0.0000	11468.2909	0.0000	0.0000	0.0000
Node28	0.0000	0.0000	0.0000	0.0000	0.0000	32975.1061	0.0000	0.0000	0.0000
Node29	0.0000	0.0000	0.0000	0.0000	0.0000	80911.0240	0.0000	0.0000	0.0000
Node30	0.0000	0.0000	0.0000	0.0000	0.0000	179266.0987	0.0000	0.0000	0.0000
Node31	0.0000	0.0000	0.0000	0.0000	0.0000	22472.6767	0.0000	0.0000	0.0000
Node32	0.0000	0.0000	0.0000	0.0000	0.0000	137430.4069	0.0000	0.0000	0.0000
Node33	0.0000	0.0000	0.0000	0.0000	0.0000	79972.3136	0.0000	0.0000	0.0000
Node34	0.0000	0.0000	0.0000	0.0000	0.0000	20987.8147	0.0000	0.0000	0.0000
Node35	0.0000	0.0000	0.0000	0.0000	0.0000	44187.8627	0.0000	0.0000	0.0000
Node36	0.0000	0.0000	0.0000	0.0000	0.0000	211385.3615	0.0000	0.0000	0.0000
Node37	0.0000	0.0000	0.0000	0.0000	0.0000	39462.1478	0.0000	0.0000	0.0000
Node38	0.0000	0.0000	0.0000	0.0000	0.0000	1.654E+06	0.0000	0.0000	0.0000
Node40	0.0000	0.0000	0.0000	0.0000	0.0000	1.583E+06	0.0000	0.0000	0.0000
Node41	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	16955.6408	0.0000

Table E20 - Junction Flooding and Volume Listing.
 The maximum volume is the total volume in the node including the volume in the flooded storage area. This is the maximum volume at any time. The volume in the flooded storage area is the total volume above the ground elevation, where the flooded pond storage area starts.
 The fourth column is instantaneous, the fifth is the sum of the flooded volume over the entire simulation.
 Units are either ft³/s or m³/s depending on the units.

Junction Name	Out of 1D-System Surcharged Time (min)	Passed to 2D cell OR Flooding (Flooded Volume)	Maximum Volume in allowed Pond of 1D-System
Node1	0.000	0.000	7.303E+04
Node2	0.000	0.000	1.692E+06
Node3	0.000	0.000	2.264E+03
Node4	0.000	0.000	3.130E+05
Node5	0.000	0.000	9.19
Node6	0.000	0.000	11.1
Node7	0.000	0.000	13.4

Node21	164384.3501	0.4228
Node23	46514.7051	0.1196
Node24	22047.8937	0.0567
Node25	320673.5022	0.8248
Node26	11468.4608	0.0295
Node28	32975.8088	0.0848
Node29	80912.4328	0.2261
Node30	179266.7992	0.4611
Node31	22472.7307	0.0578
Node32	137431.3543	0.3535
Node33	79972.4162	0.2257
Node34	20987.9232	0.0540
Node35	44187.9801	0.1137
Node36	211390.7724	0.5437
Node37	39462.3846	0.1015
Node38	1.6538E+06	4.2536
Node40	1.5831E+06	4.0718
Node41	-16955.6408	-0.0436

Initial system volume = 0.0000 Cu Ft
 Total system inflow volume = 5.87997E+06 Cu Ft
 Inflow + Initial volume = 5.87997E+06 Cu Ft
 Total system outflow = 16955.6408 Cu Ft
 Volume left (Final volume) = 5.48596E+06 Cu Ft
 Evaporation = 0.0000 Cu Ft
 Basin Infiltration = 0.0000 Cu Ft
 Outflow + Final Volume = 5.50291E+06 Cu Ft

Total Model Continuity Error
 Error in Continuity, Percent = 6.4125
 Error in Continuity, ft³/s = 377055.2746
 + Error means a continuity loss, - a gain

Table E22. Numerical Model judgement section
 Overall error was (minimum of Table E18 & E21) 6.4125 percent
 Worst nodal error was in node Node30 with 100.0000 percent
 Of the total inflow this loss was 3.0488 percent
 Your overall continuity error was Fair
 Efficiency of the simulation 13.14
 Most Number of Non Convergences at one Node 35307.
 Total Number Non Convergences 14134.
 Total Number of Nodes with Non Convergences 11.

Table E23. New Basin Design Information
 Maximum Hydraulic Grade Line,
 Out Conduit Sizes and Maximum Flow

A) Resize d/s Pipes based on given HGL
 B) Resize Basin based on given HGL
 C) Resize d/s Pipes and Basin based on HGL and max discharge
 D) Resize d/s pipes based on given max discharge

Node8	0.000	0.000	0.000	12.4	0.000
Node9	0.000	0.000	0.000	2.878E+05	0.000
Node10	0.000	0.000	0.000	1.261E+05	0.000
Node11	114.	0.000	0.000	1.720E+04	0.000
Node12	0.000	0.000	0.000	2.581E+04	0.000
Node13	0.000	0.000	0.000	3.80	0.000
Node15	0.000	0.000	0.000	0.000	0.000
Node16	6.143E+03	0.000	0.000	2.352E+04	0.000
Node17	0.000	0.000	0.000	8.22	0.000
Node18	0.000	0.000	0.000	17.6	0.000
Node20	0.000	0.000	0.000	1.179E+04	0.000
Node21	0.000	0.000	0.000	7.733E+04	0.000
Node22	0.000	0.000	0.000	13.6	0.000
Node23	0.000	0.000	0.000	2.157E+04	0.000
Node24	0.000	0.000	0.000	10.2	0.000
Node25	0.000	0.000	0.000	1.258E+05	0.000
Node26	0.000	0.000	0.000	14.8	0.000
Node28	0.000	0.000	0.000	1.041E+04	0.000
Node29	0.000	0.000	0.000	3.543E+04	0.000
Node30	0.000	0.000	0.000	0.000	0.000
Node31	0.000	0.000	0.000	0.000	0.000
Node32	0.000	0.000	0.000	0.000	0.000
Node33	0.000	0.000	0.000	0.000	0.000
Node34	0.000	0.000	0.000	0.000	0.000
Node35	0.000	0.000	0.000	0.000	0.000
Node36	0.000	0.000	0.000	6.640E+04	0.000
Node37	0.000	0.000	0.000	5.769E+05	0.000
Node38	5.658E+03	0.000	0.000	2.527E+06	0.000
Node39	0.000	0.000	0.000	0.000	0.000
Node40	5.739E+03	0.000	0.000	6.545E+05	0.000
Node41	0.000	0.000	0.000	0.000	0.000

Simulation Specific Information
 Number of Input Conduits..... 27 Number of Simulated Conduits..... 48
 Number of Natural Channels..... 0 Number of Junctions..... 38
 Number of Storage Junctions..... 19 Number of Weirs..... 16
 Number of Orifices..... 3 Number of Pumps..... 0
 Number of Free Outfalls..... 2 Number of Tide Gate Outfalls..... 0

Average % Change in Junction or Conduit is defined as:
 Conduit % Change ==> 100.0 (Q(n+1) - Q(n)) / Q(n)
 Junction % Change ==> 100.0 (Y(n+1) - Y(n)) / Y(n)
 The Conduit with the largest average change was..... 21 with 1.14 percent
 The Junction with the largest average change was..... Node37 with 0.003 percent
 The Conduit with the largest sinuosity was..... 263.11 with 76.318

Table E21. Continuity balance at the end of the simulation
 Junction Inflow, Outflow or Street Flooding
 Error = Inflow + Initial Volume - Outflow - Final Volume

Junction Name	Inflow Volume, ft³/s	Average Inflow, cfs
Node1	145823.2273	0.3751
Node2	185289.5401	0.5023
Node4	461058.3773	1.1859
Node9	171785.3078	0.4418
Node10	135584.1605	0.3487
Node11	66597.7079	0.1713
Node12	9235.2932	0.0238
Node16	39417.3977	0.1014
Node20	4207.8061	0.0108

Hydraulic model simulation ended normally.
 XP-SWMM Simulation ended normally.
 Your input file was named C:\Temp\New folder (5)\1D\Ultimate Condition_10\Ultimate Condition_10.dat
 Your output file was named C:\Temp\New folder (5)\1D\Ultimate Condition_10\Ultimate Condition_10.out

XPSPWMM\XPSTORM Simulation Date and Time Summary
 Starting Date... February 17, 2021 Time... 19:35:30.990
 Ending Date... February 17, 2021 Time... 19:38:50.157
 Elapsed Time... 3.30885 minutes or 198.53125 seconds

Current Directory: C:\Temp\New folder (5)\1D\Ultimate Condition_100-Yr
Executable Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe
Input File: C:\Temp\New folder (5)\1D\Ultimate Condition_100-Yr\Ultimate Condition_100-Yr.XP

xpswmm
Storm and Wastewater Management Model
Developed by Innovyze.
Last Update : May 21 2019
Interface Version: 2019.1
Engine Version : 12.0
Data File Version: 12.62

Engine Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe

Input and Output file names by Layer

Input File to Layer # 1 J:\JUS
Output File to Layer # 1 C:\Temp\DATA.INT
Input File to Layer # 2 J:\JUS
Output File to Layer # 2 C:\Temp\Proposed Condition.INT

Configuration Parameters
Configuration Parameters, both those that are hardwired
and those added to the simulation are listed below.
Configuration Parameters that start with a \$ are set in
the engine as defaults. The remaining in UPPER CASE
have been added to the simulation in the Configuration->
Configuration Parameters dialog or as Engine Defaults in
the SWMM.INI file.
Consult the Help File for the specific meaning/purpose
of any particular parameter.

Powerstation 0.0000 1 2
Sperv 0.0000 0 4
Soldegg 0.0000 0 7
\$as 0.0000 0 11
\$noflat 0.0000 0 21
\$oldomega 0.0000 0 24
\$oldvol 0.0000 1 28
\$simplicit 0.0000 1 29
\$oldhot 0.0000 1 31
\$oldscs 0.0000 0 33
\$flood 0.0000 1 40
\$nokeys 0.0000 0 42
\$zzero 0.0000 0 55
\$oldx2 0.0000 2 59
\$storage2 0.0000 3 62
\$oldhot1 0.0000 1 63
\$spumpwt 0.0000 1 70
\$oldscs 0.0000 1 77
\$sexout 0.0000 0 97
\$spatial = 0.90 0.9000 5 124
\$djref = -1.0 -0.1000 3 143
\$weirlen = 50 50.0000 1 153
\$oldbrd 0.0000 1 154
\$noqretev 0.0000 1 161

210 Link4
212 Link5
214 Link6
216 Link7
219 Link9
225 Link12
226 Link13
231 Link15
233 Link16
242 Link21
246 Link23
250 Link25
C(203.1) 203.1
C(203.2) 203.2
C(229.1) ditch1
C(238.1) 238.1
C(266.1) 264.11
C(268.1) 263.11
C(273.1) 250.11
C(273.2) 250.21
O(207.2) orifice 5
O(218.2) orifice
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(266.1) lazy
W(268.1) bikepath
W(270.1) south
W(271.1) driveway
W(273.1) semivale
W(275.1) sem2
W(276.1) south1
W(276.2) dway 2
D(240.1) 21
D(245.1) 23
D(248.1) 25
D(254.1) 28
D(256.1) 29
D(264.1) 36

Parameter Values on the Tapes Common Block. These are the
values read from the data file and dynamically allocated
by the model for this simulation.

Number of Subcatchments in the Runoff Block (NW).... 27
Number of Channel/Pipes in the Runoff Block (NG).... 0
Runoff Water quality constituents (NRQ)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 48
Number of Groundwater Subcatchments in Runoff (NGW). 0
Number of Interface locations for all Blocks (NIE).... 48
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG).... 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage junctions in Extran (NVSE)..... 19

\$ncmid 0.0000 0 164
\$new_nl_97 0.0000 2 290
SCSIADDEPTH=ON 0.0000 1 293
\$best97 0.0000 1 294
\$newbound 0.0000 1 295
USE_US_RC 0.0000 1 312
\$sl_id = 0.01 0.0001 1 316
\$new_storage 0.0000 1 322
\$old_iteration 0.0000 1 333
MINLEN=6 6.0000 1 346
\$review_elevation 0.0000 1 353
\$use_half_volume 0.0000 1 385
VERT_WALLS=ON 0.0000 1 389
\$min_is = 1.0 1.0000 1 407
\$design_restart = on 0.0000 1 412
\$zero_value=1.e-05 0.0000 1 415
SUBCATCHMENT_RES=ON 0.0000 1 419
\$relax_depth = on 0.0000 1 427
\$swrealgate = on 0.0000 1 434
PUMP_NOHEAD=ON 0.0000 1 437
\$channel_geometry=1 0.0000 1 456
PROJUNITS = US 0.0000 1 462

The XPSWMM/XPSTORM engine internally uses object IDs
instead of full object names to represent objects.
Included below is a table of these IDs along with the
name of the object that ID corresponds to.

Table with 2 columns: Object ID Number, Object Name. Lists nodes 201-205 and links 206-209.

Number of Time history data points in Extran (NTVAL). 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 27
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTOC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 48
Number of Plugs in a Storage Treatment Unit..... 1

Entry made to the Runoff Layer(Block) of SWMM
Last Updated June, 2014 by Innovyze

RUNOFF TABLES IN THE OUTPUT FILE
These are the more important tables in the output file.
You can use your editor to find the table numbers.
For example: search for Table R3 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait
mode, courier font, a size of 8 pt. and margins of 0.75
Table R1 - Physical Hydrology Data
Table R2 - Infiltration data
Table R3 - Rainage and Infiltration Database Names
Table R4 - Groundwater Data
Table R5 - Continuity Check for Surface Water
Table R6 - Continuity Check for Channels/Pipes
Table R7 - Continuity Check for Subsurface Water
Table R8 - Infiltration/Inflow Continuity Check
Table R9 - Summary Statistics for Subcatchments
Table R10 - Sensitivity analysis for Subcatchments

A1
RUNOFF JOB CONTROL
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVPAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.0000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAY

Decay is read in for each subcatchment
REGEN = 0.01000

Raingage # 1
KTYPE - Rainfall input type..... 0
NHTSTO - Total number of rainfall values... 241
KINC - Rainfall values(pairs) per line... 10
KPRINT - Print rainfall(0-Yes,1-No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 6.6600 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Name	Channel or inlet	Per-Width (ft)	Area (ac)	Deprs Imperv	Deprs Slope	Deprs "n"	Prct "n"	Storge	Deter	
1	Node40#1	Node40	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node36#1	Node36	1.0000	19.960	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node21#1	Node21	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node10#1	Node10	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node10#2	Node10	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node26#1	Node26	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node1#1	Node1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node29#1	Node29	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node9#1	Node9	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node23#1	Node23	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node24#1	Node24	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
14	Node20#1	Node20	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000
15	Node25#1	Node25	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
16	Node2#1	Node2	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000
17	Node28#1	Node28	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
18	Node12#1	Node12	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
19	Node11#1	Node11	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
20	Node37#1	Node37	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
21	Node38#1	Node38	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000
22	Node30#1	Node30	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
23	Node31#1	Node31	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
24	Node32#1	Node32	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
25	Node33#1	Node33	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000

Total Number of Subcatchments... 27
Total Tributary Area (acres).... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infil #
10 - 2nd infil 11 - 3rd infil #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node40 No Tributary Channel/Pipes
Node36 Tributary Subareas..... Node40#1
Node21 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node36#1
Node26 No Tributary Channel/Pipes
Node1 Tributary Subareas..... Node21#1 Node10#1 Node10#2
Node4 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node4#1
Node16 Tributary Subareas..... Node16#1

26 Node34#1 Node34 1.0000 3.3400 0.00 1.000 0.020 0.020 0.000 0.000 0.000
27 Node35#1 Node35 1.0000 7.6600 0.00 1.000 0.020 0.020 0.000 0.000 0.000

Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data #
Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8) #
SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
SBUH -> Comp CN Time Conc N/A #
Green Ampt -> Suction Hydr Cond Initial MD N/A #
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infil. Volume #
Proportional -> Constant N/A N/A N/A #
Initial/Cont Loss -> Initial Continuing N/A #
Initial/Proportional -> Initial Constant N/A #
Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
Rational Formula -> Tc Method Flow Path Length Flow Path Slope Roughness or Retardance #
(#1 - #4 is Impervious Data / #5 - #8 is Pervious Data) #
Rational Formula Tc Method: 1 = Constant #
2 = Friend's Equation #
3 = Kinematic Wave #
4 = Alameda Method #
5 = Izzard's Formula #
6 = Kerby's Equation #
7 = Kirpich's Equation #
8 = Bransby Williams Equation #
9 = Federal Aviation Authority Equation #
#####

Subcatchment Number	Name	Infil #1	Infil #2	Infil #3	Infil #4	Infil #5	Infil #6	Infil #7	Infil #8
1	Node40#1	84.000	0.838	484.000	0.200				
2	Node36#1	91.000	0.333	484.000	0.200				
3	Node21#1	88.000	0.333	484.000	0.200				
4	Node10#1	85.000	0.167	484.000	0.200				
5	Node10#2	74.000	0.333	484.000	0.200				
6	Node26#1	85.000	0.167	484.000	0.200				
7	Node1#1	88.000	0.333	484.000	0.200				
8	Node4#1	88.000	0.288	484.000	0.200				
9	Node16#1	91.000	0.322	484.000	0.200				
10	Node29#1	90.000	0.433	484.000	0.200				
11	Node9#1	86.000	0.212	484.000	0.200				
12	Node23#1	91.000	0.333	484.000	0.200				
13	Node24#1	85.000	0.167	484.000	0.200				
14	Node20#1	80.000	0.167	484.000	0.200				
15	Node25#1	88.000	0.258	484.000	0.200				
16	Node2#1	79.000	0.167	484.000	0.200				
17	Node28#1	88.000	0.312	484.000	0.200				
18	Node12#1	77.000	0.167	484.000	0.200				
19	Node11#1	89.000	0.320	484.000	0.200				
20	Node37#1	76.000	0.252	484.000	0.200				
21	Node38#1	91.000	0.617	484.000	0.200				
22	Node30#1	73.000	0.258	484.000	0.200				
23	Node31#1	72.000	0.333	484.000	0.200				
24	Node32#1	79.000	0.333	484.000	0.200				
25	Node33#1	70.000	0.333	484.000	0.200				
26	Node34#1	76.000	0.312	484.000	0.200				
27	Node35#1	74.000	0.433	484.000	0.200				

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Name	Gage	Infiltration	Routing
1	Node40#1	1	SCS Method	SCS curvilinear

Node29 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node29#1
Node23 No Tributary Channel/Pipes
Node24 Tributary Subareas..... Node9#1
Node20 No Tributary Channel/Pipes
Node25 Tributary Subareas..... Node23#1
Node2 Tributary Subareas..... Node24#1
Node28 Tributary Subareas..... Node20#1
Node12 Tributary Subareas..... Node25#1
Node11 Tributary Subareas..... Node28#1
Node37 Tributary Subareas..... Node12#1
Node38 Tributary Subareas..... Node11#1
Node30 Tributary Subareas..... Node37#1
Node31 Tributary Subareas..... Node38#1
Node33 Tributary Subareas..... Node30#1
Node34 Tributary Subareas..... Node31#1
Node35 Tributary Subareas..... Node33#1

* Hydrographs will be stored for the following 26 INLETS *

Node40	Node36	Node21
Node10	Node26	Node1
Node4	Node16	Node29
Node9	Node23	Node24
Node20	Node25	Node2
Node28	Node12	Node11
Node37	Node38	Node30
Node31	Node33	Node34
Node34	Node35	

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *
* Number of precipitation station..... 1 *

Location Station Number
1. 1

*** End of Header Section ***

Entry made to the HYDRAULIC Layer of XP-SWMM #
 # Last Updated in June, 2014 by Innovize #
 #####
 # Entry made to the Runoff Layer(Block) of SWMM #
 # Last Updated June, 2014 by Innovize #
 #####

=====
 | RUNOFF TABLES IN THE OUTPUT FILE |
 | These are the more important tables in the output file. |
 | You can use your editor to find the table numbers. |
 | for example: search for Table R3 to check continuity. |
 | This output file can be imported into a Word Processor |
 | and printed on US letter or A4 paper using portrait |
 | mode, courier font, a size of 8 pt. and margins of 0.75 |
 | |
 | Table R1 - Physical Hydrology Data |
 | Table R2 - Infiltration data |
 | Table R3 - Raingage and Infiltration Database Names |
 | Table R4 - Groundwater Data |
 | Table R5 - Continuity Check for Surface Water |
 | Table R6 - Continuity Check for Channels/Pipes |
 | Table R7 - Continuity Check for Subsurface Water |
 | Table R8 - Infiltration/Inflow Continuity Check |
 | Table R9 - Summary Statistics for Subcatchments |
 | Table R10 - Sensitivity analysis for Subcatchments |
 | |
 =====

A1
 #####
 # RUNOFF JOB CONTROL #
 #####
 Snowmelt parameter - ISNOW..... 0
 Number of rain gages - NRGAG..... 1
 Quality is not simulated - KWALTY..... 0
 Default evaporation rate used - IVAP..... 0
 Hour of day at start of storm - NHR..... 0
 Minute of hour at start of storm - NMN..... 0
 Time TZERO at start of storm (hours)..... 0.000
 Use U.S. Customary units for most I/O - METRIC..... 0
 Runoff input print control..... 0
 Runoff graph plot control..... 0
 Runoff output print control..... 0
 Limit number of groundwater convergence messages to 10000
 Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
 Print land use load percentages - LANDUPR (0=no, 1=yes) 0
 Month, day, year of start of storm is 1/1/2014
 Wet time step length (seconds)..... 60.0
 Dry time step length (seconds)..... 86400.0
 Wet/Dry time step length (seconds)..... 60.0
 Simulation length is..... 72.0 Hours
 If Horton infiltration model is being used
 A mixture of infiltration options may be used in
 XP-SWMM as a watershed specific option.
 Rate for regeneration of infiltration = REGEN * DECAY
 Decay is read in for each subcatchment
 REGEN = 0.01000

Raingage #..... 1
 KTYPE - Rainfall input type..... 0
 NHSTO - Total number of rainfall values..... 241
 KING - Rainfall values(pairs) per line..... 10
 KPRINT - Print rainfall(0-Yes,1-No)..... 0

SCS -> Comp CN Time Conc Shape Factor Depth or Fracton #
 # SBUH -> Comp CN Time Conc N/A N/A #
 # Green Ampt -> Hydr Cond Initial MD N/A #
 # Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
 # Proportional -> Constant N/A N/A N/A #
 # Initial/Cont Loss -> Initial Continuing N/A N/A #
 # Initial/Proportional -> Initial Constant N/A N/A #
 # Laursen Parameters -> B Value Pervious "n" Impervious Cont Exponent #
 # Rational Formula -> To: Method Flow Path Length Flow Path Slope Roughness or Retardance #
 # (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)
 # Rational Formula To Method: 1 = Constant # #
 # 2 = Friend's Equation # #
 # 3 = Kinematic Wave # #
 # 4 = Alameda Method # #
 # 5 = Izzard's Formula # #
 # 6 = Kerby's Equation # #
 # 7 = Kirpich's Equation # #
 # 8 = Bransby Williams Equation # #
 # 9 = Federal Aviation Authority Equation # #
 #####

Subcatchment Number	Name	Infl #1	Infl #2	Infl #3	Infl #4	Infl #5	Infl #6	Infl #7	Infl #8
1	Node40#1	84.000	0.838	484.000	0.200				
2	Node36#1	91.000	0.333	484.000	0.200				
3	Node21#1	88.000	0.333	484.000	0.200				
4	Node10#1	85.000	0.167	484.000	0.200				
5	Node10#2	74.000	0.333	484.000	0.200				
6	Node26#1	85.000	0.167	484.000	0.200				
7	Node1#1	88.000	0.338	484.000	0.200				
8	Node4#1	89.000	0.288	484.000	0.200				
9	Node16#1	91.000	0.322	484.000	0.200				
10	Node29#1	90.000	0.433	484.000	0.200				
11	Node9#1	86.000	0.212	484.000	0.200				
12	Node23#1	91.000	0.333	484.000	0.200				
13	Node24#1	85.000	0.167	484.000	0.200				
14	Node20#1	80.000	0.167	484.000	0.200				
15	Node25#1	88.000	0.258	484.000	0.200				
16	Node2#1	79.000	0.167	484.000	0.200				
17	Node28#1	88.000	0.312	484.000	0.200				
18	Node12#1	77.000	0.167	484.000	0.200				
19	Node11#1	89.000	0.320	484.000	0.200				
20	Node37#1	76.000	0.252	484.000	0.200				
21	Node3#1	91.000	0.617	484.000	0.200				
22	Node30#1	73.000	0.258	484.000	0.200				
23	Node31#1	72.000	0.333	484.000	0.200				
24	Node32#1	79.000	0.333	484.000	0.200				
25	Node33#1	70.000	0.333	484.000	0.200				
26	Node34#1	76.000	0.312	484.000	0.200				
27	Node35#1	74.000	0.433	484.000	0.200				

 # Table R3. SUBCATCHMENT DATA #
 # Rainfall and Infiltration Database Names #
 #####

Subcatchment Number	Name	Gage	Infiltration No	Routing Type
1	Node40#1	1	SCS Method	SCS curvilinear
2	Node36#1	1	SCS Method	SCS curvilinear
3	Node21#1	1	SCS Method	SCS curvilinear
4	Node10#1	1	SCS Method	SCS curvilinear
5	Node10#2	1	SCS Method	SCS curvilinear
6	Node26#1	1	SCS Method	SCS curvilinear
7	Node1#1	1	SCS Method	SCS curvilinear
8	Node4#1	1	SCS Method	SCS curvilinear
9	Node16#1	1	SCS Method	SCS curvilinear
10	Node29#1	1	SCS Method	SCS curvilinear

KTIME - Precipitation time units
 0 -> Minutes 1 -> Hours..... 1
 KPREP - Precipitation unit type
 0 -> Intensity 1 -> Volume..... 1
 KTHIS - Variable rainfall intervals
 0 -> No, >= 1 -> Yes..... 0
 THSTO - Rainfall time interval..... 0.10
 TZRAIN - Starting time(KTIME units)..... 0.00

 # Rainfall input summary from Runoff #
 #####
 Total rainfall for gage # 1 is 6.6600 inches

 # Data Group F1 #
 # Evaporation Rate (in/day) #
 #####
 JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

 # Table R1. SUBCATCHMENT DATA #
 # Physical Hydrology Data #
 #####

Subcatchment Number	Channel Name	Channel or inlet	Per-Width (ft)	Area (ac)	Imperv	cent ft/ft	Deprs	Deprs	Prcnt	Storge	Storge	Deten
							ion	ion	Zero	Perv	Imprv	Perv
1	Node40#1	Node40	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
2	Node36#1	Node36	1.0000	19.960	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
3	Node21#1	Node21	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
4	Node10#1	Node10	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
5	Node10#2	Node10	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
6	Node26#1	Node26	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
7	Node1#1	Node1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
8	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
9	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
10	Node29#1	Node29	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
11	Node9#1	Node9	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
12	Node23#1	Node23	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
13	Node24#1	Node24	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
14	Node20#1	Node20	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
15	Node25#1	Node25	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
16	Node2#1	Node2	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
17	Node28#1	Node28	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
18	Node12#1	Node12	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
19	Node11#1	Node11	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
20	Node37#1	Node37	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
21	Node3#1	Node3	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
22	Node30#1	Node30	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
23	Node31#1	Node31	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
24	Node32#1	Node32	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
25	Node33#1	Node33	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
26	Node34#1	Node34	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
27	Node35#1	Node35	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000

 # Table R2. SUBCATCHMENT DATA #
 # Infiltration of Time of Concentration Data #
 #####
 # Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8) #

11 Node9#1 1 SCS Method SCS curvilinear
 12 Node23#1 1 SCS Method SCS curvilinear
 13 Node24#1 1 SCS Method SCS curvilinear
 14 Node20#1 1 SCS Method SCS curvilinear
 15 Node25#1 1 SCS Method SCS curvilinear
 16 Node2#1 1 SCS Method SCS curvilinear
 17 Node12#1 1 SCS Method SCS curvilinear
 18 Node11#1 1 SCS Method SCS curvilinear
 19 Node37#1 1 SCS Method SCS curvilinear
 20 Node3#1 1 SCS Method SCS curvilinear
 21 Node30#1 1 SCS Method SCS curvilinear
 22 Node31#1 1 SCS Method SCS curvilinear
 23 Node32#1 1 SCS Method SCS curvilinear
 24 Node33#1 1 SCS Method SCS curvilinear
 25 Node34#1 1 SCS Method SCS curvilinear
 26 Node35#1 1 SCS Method SCS curvilinear

Total Number of Subcatchments..... 27
 Total Tributary Area (acres)..... 652.86
 Impervious Area (acres)..... 0.00
 Pervious Area (acres)..... 652.86
 Total Width (feet)..... 27.00
 Impervious Area (%)..... 0.00

 # SUBCATCHMENT DATA #
 # Default, Ratio values for subcatchment data #
 # Used with the calibrate node in the runoff. #
 # 1 - width 2 - area 3 - impervious % #
 # 4 - slope 5 - imp 6 - perv 7 - #
 # 8 - imp ds 9 - perv ds 10 - 1st infl #
 # 11 - 2nd infl 12 - 3rd infl #
 #####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
 Node40 No Tributary Channel/Pipes
 Node36 Tributary Subareas..... Node40#1
 Node21 Tributary Subareas..... Node36#1
 Node10 No Tributary Channel/Pipes
 Node10 Tributary Subareas..... Node10#1 Node10#2
 Node26 No Tributary Channel/Pipes
 Node1 Tributary Subareas..... Node26#1
 Node4 No Tributary Channel/Pipes
 Node4 Tributary Subareas..... Node4#1
 Node16 No Tributary Channel/Pipes
 Node16 Tributary Subareas..... Node16#1
 Node29 No Tributary Channel/Pipes
 Node9 Tributary Subareas..... Node29#1
 Node9 No Tributary Channel/Pipes
 Node23 Tributary Subareas..... Node9#1
 Node23 No Tributary Channel/Pipes
 Node23 Tributary Subareas..... Node23#1
 Node24 No Tributary Channel/Pipes
 Node24 Tributary Subareas..... Node24#1
 Node20 No Tributary Channel/Pipes

Tributary Subareas..... Node20#1
 Node25 No Tributary Channel/Pipes
 Tributary Subareas..... Node25#1
 Node2 No Tributary Channel/Pipes
 Tributary Subareas..... Node2#1
 Node28 No Tributary Channel/Pipes
 Tributary Subareas..... Node28#1
 Node12 No Tributary Channel/Pipes
 Tributary Subareas..... Node12#1
 Node11 No Tributary Channel/Pipes
 Tributary Subareas..... Node11#1
 Node37 No Tributary Channel/Pipes
 Tributary Subareas..... Node37#1
 Node38 No Tributary Channel/Pipes
 Tributary Subareas..... Node38#1
 Node30 No Tributary Channel/Pipes
 Tributary Subareas..... Node30#1
 Node31 No Tributary Channel/Pipes
 Tributary Subareas..... Node31#1
 Node32 No Tributary Channel/Pipes
 Tributary Subareas..... Node32#1
 Node33 No Tributary Channel/Pipes
 Tributary Subareas..... Node33#1
 Node34 No Tributary Channel/Pipes
 Tributary Subareas..... Node34#1
 Node35 No Tributary Channel/Pipes
 Tributary Subareas..... Node35#1

* Hydrographs will be stored for the following 26 INLETS *

Node40	Node36	Node21
Node10	Node26	Node1
Node4	Node16	Node29
Node9	Node23	Node24
Node20	Node25	Node2
Node28	Node12	Node11
Node37	Node38	Node30
Node31	Node32	Node33
Node34	Node35	

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *

* Number of precipitation station 1 *

Location Station Number

1, 1

A1

HYDRAULICS TABLES IN THE OUTPUT FILE
 These are the more important tables in the output file.
 You can use your editor to find the table numbers.
 For example: search for Table E20 to check continuity.
 This output file can be imported into a Word Processor
 and printed on US letter or A4 paper using portrait

Ponding Area Exponent..... 1.0000
 Minimum Orifice Length..... 1000.00 feet.
 NUSW input hydrograph junction..... 0
 or user defined hydrographs....

Input Information from Internal Rating Curve 21

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	5.400	0.000	0.000
3	2.000	8.400	0.000	0.000
4	3.000	21.600	0.000	0.000
5	4.000	55.000	0.000	0.000

Input Information from Internal Rating Curve 23

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	1.700	0.000	0.000
3	2.000	2.600	0.000	0.000
4	3.000	6.200	0.000	0.000
5	4.000	15.000	0.000	0.000

Input Information from Internal Rating Curve 25

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	16.500	0.000	0.000
3	2.000	24.000	0.000	0.000
4	3.000	55.500	0.000	0.000
5	4.000	131.100	0.000	0.000

Input Information from Internal Rating Curve 28

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	2.100	0.000	0.000
3	1.000	2.900	0.000	0.000
4	1.500	6.100	0.000	0.000
5	2.000	13.600	0.000	0.000

Input Information from Internal Rating Curve 29

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	3.300	0.000	0.000
3	1.000	4.700	0.000	0.000
4	1.500	10.700	0.000	0.000
5	2.000	25.000	0.000	0.000

mode, courier font, a size of 8 pt. and margins of 0.75 |

Table E1 - Basic Conduit Data	
Table E2 - Conduit Factor Data	
Table E3a - Junction Data	
Table E3b - Junction Data	
Table E4 - Conduit Connectivity Data	
Table E4a - Dry Weather Flow Data	
Table E4b - Real Time Control Data	
Table E5 - Junction Time Step Limitation Summary	
Table E5a - Conduit Explicit Condition Summary	
Table E6 - Final Model Condition	
Table E7 - Iteration Summary	
Table E8 - Junction Time Step Limitation Summary	
Table E9 - Junction Summary Statistics	
Table E10 - Conduit Summary Statistics	
Table E11 - Area assumptions used in the analysis	
Table E12 - Mean conduit information	
Table E13 - Channel losses(H) and culvert info	
Table E13a - Culvert Analysis Classification	
Table E14 - Natural Channel Overbank Flow Information	
Table E14a - Natural Channel Encroachment Information	
Table E14b - Floodplain Mapping	
Table E15 - Spreadsheet Info List	
Table E15a - Spreadsheet Reach List	
Table E16 - New Conduit Output Section	
Table E17 - Pump Operation	
Table E18 - Junction Continuity Error	
Table E19 - Junction Inflow & Outflow Listing	
Table E20 - Junction Flooding and Volume List	
Table E21 - Continuity balance at simulation end	
Table E22 - Model Judgement Section	

Time Control from Hydraulics Job Control

Year..... 2014 Month..... 1
 Day..... 1 Hour..... 0
 Minute..... 0 Second..... 0

Control information for simulation

Integration cycles..... 38880
 Length of integration step is..... 10.00 seconds
 Simulation length..... 108.00 hours
 Do not create equiv. pipes(NEQUAL)..... 0
 Use U.S. customary units for I/O..... 0
 Courant Time Step Factor..... 1.00000
 Intermediate printout intervals of..... 500 cycles
 Intermediate printout intervals of..... 83.33 minutes
 Summary printout interval of..... 83.33 minutes
 Hot start file parameter (REDO)..... 0
 Initial time..... 0.00 hours

Iteration variables: Flow Tolerance..... 0.00010
 Head Tolerance..... 0.00050
 Minimum depth (m or ft)..... 0.00001
 Underrelaxation parameter..... 0.85000
 Time weighting parameter..... 0.85000
 Conduit roughness factor..... 1.00000
 Flow adjustment factor..... 1.00000
 Initial Condition Smoothing..... 0
 Courant Time Step Factor..... 1.00000
 Default Expansion/Contraction K..... 0.00000
 Default Entrance/Exit K..... 0.00000
 Routing Method..... Dynamic Wave
 Default surface area of junctions..... 12.57 square feet.
 Minimum Junction/Conduit Depth..... 0.00001 feet.
 Ponding Area Coefficient..... 5000.00

Input Information from Internal Rating Curve 36

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	14.600	0.000	0.000
3	2.000	19.500	0.000	0.000
4	3.000	38.700	0.000	0.000
5	4.000	82.000	0.000	0.000

Table E1 - Conduit Data

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef.	Max Width (ft)	Depth (ft)	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	100.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	Link21	740.0000	Circular	9.6211	0.0130	3.5000	3.5000		
12	Link23	1065.0000	H Ellipse	5.1000	0.0130	3.1667	2.0000		
13	Link25	435.0000	Circular	1.7671	0.0130	1.5000	1.5000		
14	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
15	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
16	di1h1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
17	238.1	65.0000	Circular	1.7671	0.0130	1.5000	1.5000		
18	264.11	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		
19	263.11	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
20	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
21	250.21	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
22	21	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
23	23	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
24	25	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
25	28	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
26	29	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
27	36	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		

Total length of all conduits 9188.0000 feet

Table E2 - Conduit Factor Data

Conduit Name	Number	Entrance Loss Coef	Exit Exp/Contc Weighting	Low Flow Depth at Parameter	Depth	Side Slopes	Williams c-factor	Flow Routing
Link2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link4	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link5	1.0000	-1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link6	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link7	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link12	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link13	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link15	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link21	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link23	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
Link25	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
203.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
203.2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave
238.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000 Standard - Dynamic Wave

264.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
263.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
250.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
250.21	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave

If there are messages about (sqrt('d')/dt/dx, or
| the sqrt(wave celerity)*time step/conduit length |
| in the output file all it means is that the |
| program will lower the internal time step to |
| satisfy this condition (explicit condition). |
| You control the actual internal time step by |
| using the minimum courant time step factor in the |
| HYDRAULICS job control. The message put in words |
| states that the smallest conduit with the fastest |
| velocity will control the time step selection. |
| You have further control by using the modify |
| conduit option in the HYDRAULICS Job Control. |

Conduit Name	Courant Ratio
Link2	0.76
Link4	3.20 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link5	12.82 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link6	2.49 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link7	3.59 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link9	0.59
Link12	1.77 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link13	0.92
Link15	4.72 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link16	2.84 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link21	0.14
Link23	0.08
Link25	0.16
203.1	1.32 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
203.2	1.74 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
ditch1	0.38
238.1	1.07 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
264.11	1.48 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
263.11	1.59 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
250.11	1.15 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
250.21	1.10 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
21	0.00
23	0.00
25	0.00
31	0.00
28	0.00
29	0.00
36	0.00

Conduit Volume |
=====

Full pipe or full open conduit volume
Input full depth volume..... 2.2392E+04 cubic feet

Table E3a - Junction Data

Imp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst	Inst Interface	Flow (%)
1	Node1	1028.0000	1026.9000	1025.0000	0.0000	0.0000	100.0000
2	Node2	1028.0000	1025.5000	1015.0000	0.0000	0.0000	100.0000
3	Node3	1028.0000	1020.8333	1018.0000	0.0000	0.0000	100.0000
4	Node4	1025.0000	1025.0000	1019.0000	0.0000	0.0000	100.0000

29	Node32	0.0000	0.0000	Flooded	Normal	0	0.00
30	Node33	0.0000	0.0000	Flooded	Normal	0	0.00
31	Node34	0.0000	0.0000	Flooded	Normal	0	0.00
32	Node35	0.0000	0.0000	Flooded	Normal	0	0.00
33	Node36	0.0000	0.0000	Flooded	Normal	0	0.00
34	Node37	0.0000	0.0000	No Ponding	Normal	0	0.00
35	Node38	0.0000	0.0000	No Ponding	Normal	0	0.00
36	Node39	0.0000	0.0000	No Ponding	Normal	0	0.00
37	Node40	0.0000	0.0000	No Ponding	Normal	0	0.00
38	Node41	0.0000	0.0000	No Ponding	Normal	0	0.00

Table E4 - Conduit Connectivity

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation	
1	Link2	Node3	Node2	1018.0000	1017.4000	No Design
2	Link4	Node5	Node6	1021.9900	1021.3400	No Design
3	Link5	Node6	Node7	1021.3400	1021.3100	No Design
4	Link6	Node7	Node8	1021.3100	1021.1200	No Design
5	Link7	Node8	Node5	1021.1200	1021.0000	No Design
6	Link9	Node10	Node2	1024.5000	1024.5000	No Design
7	Link12	Node15	Node13	1023.1500	1022.1600	No Design
8	Link13	Node13	Node6	1021.9200	1021.5700	No Design
9	Link15	Node18	Node5	1023.0000	1022.7900	No Design
10	Link16	Node17	Node5	1022.8700	1021.9900	No Design
11	Link21	Node22	Node10	1034.3400	1021.1100	No Design
12	Link23	Node24	Node20	1031.8160	1025.0000	No Design
13	Link25	Node26	Node2	1020.0000	1015.0000	No Design
14	203.1	Node1	Node2	1025.0000	1024.0000	No Design
15	203.2	Node1	Node2	1025.4000	1024.0000	No Design
16	ditch1	Node4	Node15	1023.5000	1023.1500	No Design
17	238.1	Node20	Node2	1025.0000	1024.0000	No Design
18	264.11	Node37	Node37	1021.9800	1021.8200	No Design
19	263.11	Node37	Node38	1014.5000	1014.5000	No Design
20	250.11	Node40	Node37	1017.8500	1017.6800	No Design
21	250.21	Node40	Node37	1016.7300	1016.4900	No Design
22	21	Node21	Node10	1020.0000	1020.0000	No Design
23	23	Node23	Node24	1040.0000	1040.0000	No Design
24	25	Node25	Node2	1016.0000	1016.0000	No Design
25	28	Node28	Node12	1023.0000	1023.0000	No Design
26	29	Node29	Node17	1023.0000	1023.0000	No Design
27	36	Node36	Node22	1037.0000	1037.0000	No Design

Storage Junction Data

STORAGE NUMBER OR NAME	JUNCTION TYPE	MAXIMUM OR CONSTANT SURFACE AREA (FT2)	PEAK OR CONSTANT SURFACE (CUBIC FEET)	CROWN CONSTANT VOLUME ELEVATION (FT)	DEPTH CONSTANT VOLUME ELEVATION STARTS FROM
Node1	Stage/Area	1.981E+04	1.265E+05	1028.	Node Invert
Node2	Stage/Area	2.0052E+06	1.5507E+07	1028.	Node Invert
Node3	Stage/Area	1.045E+04	1.8334E+04	1025.	Node Invert
Node4	Stage/Area	2.1031E+05	8.1318E+05	1025.	Node Invert
Node9	Stage/Area	1.0411E+05	7.7337E+05	1025.	Node Invert
Node10	Stage/Area	7.1700E+04	3.2470E+05	1025.	Node Invert
Node11	Stage/Area	6.8302E+04	6.2617E+04	1025.	Node Invert
Node12	Stage/Area	1.1732E+05	1.2947E+05	1025.	Node Invert
Node16	Stage/Area	1.5987E+04	3.3342E+04	1026.	Node Invert
Node20	Stage/Area	1.5115E+04	3.5049E+04	1028.	Node Invert
Node21	Stage/Area	3.7026E+04	1.4462E+05	1024.	Node Invert
Node23	Stage/Area	1.1761E+04	4.3557E+04	1044.	Node Invert
Node25	Stage/Area	5.8370E+04	2.2999E+05	1020.	Node Invert
Node28	Stage/Area	1.045E+04	1.8717E+04	1025.	Node Invert
Node29	Stage/Area	3.4412E+04	1.3591E+05	1027.	Node Invert

5	Node5	1026.0000	1024.7900	1021.9900	0.0000	0.0000	100.0000
6	Node6	1026.0200	1023.8400	1021.3400	0.0000	0.0000	100.0000
7	Node7	1026.1800	1023.8100	1021.3100	0.0000	0.0000	100.0000
8	Node8	1026.0200	1023.6200	1021.1200	0.0000	0.0000	100.0000
9	Node9	1026.0000	1023.5000	1015.0000	0.0000	0.0000	100.0000
10	Node10	1025.0000	1025.0000	1019.0000	0.0000	0.0000	100.0000
11	Node11	1025.0000	1023.2300	1021.9800	0.0000	0.0000	100.0000
12	Node12	1025.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000
13	Node13	1025.7300	1023.1700	1021.9200	0.0000	0.0000	100.0000
14	Node15	1025.0000	1024.6500	1023.1500	0.0000	0.0000	100.0000
16	Node16	1026.0000	1022.0000	1022.0000	0.0000	0.0000	100.0000
17	Node17	1026.0000	1025.0000	1022.8700	0.0000	0.0000	100.0000
18	Node18	1026.0000	1025.0000	1022.0000	0.0000	0.0000	100.0000
19	Node20	1028.0000	1027.0000	1025.0000	0.0000	0.0000	100.0000
21	Node21	1024.0000	1024.0000	1020.0000	0.0000	0.0000	100.0000
22	Node22	1041.0000	1041.0000	1034.3400	0.0000	0.0000	100.0000
23	Node23	1044.0000	1044.0000	1040.0000	0.0000	0.0000	100.0000
24	Node24	1038.0000	1044.0000	1031.8160	0.0000	0.0000	100.0000
25	Node25	1020.0000	1020.0000	1016.0000	0.0000	0.0000	100.0000
26	Node26	1028.0000	1021.5000	1020.0000	0.0000	0.0000	100.0000
27	Node28	1025.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000
28	Node29	1027.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000
29	Node30	1020.0000	1016.0000	1016.0000	0.0000	0.0000	100.0000
30	Node31	1044.0000	1040.0000	1040.0000	0.0000	0.0000	100.0000
31	Node32	1041.0000	1037.0000	1037.0000	0.0000	0.0000	100.0000
32	Node33	1024.0000	1020.0000	1020.0000	0.0000	0.0000	100.0000
33	Node34	1025.0000	1023.0000	1023.0000	0.0000	0.0000	100.0000
34	Node35	1027.0000	1023.0000	1023.0000	0.0000	0.0000	100.0000
35	Node36	1041.0000	1041.0000	1037.0000	0.0000	0.0000	100.0000
36	Node37	1023.1000	1023.0700	1014.5000	0.0000	0.0000	100.0000
37	Node38	1023.0000	1016.0833	1014.5000	0.0000	0.0000	100.0000
38	Node39	1023.0000	1021.5000	1021.5000	0.0000	0.0000	100.0000
39	Node40	1024.3000	1019.6833	1016.7300	0.0000	0.0000	100.0000
40	Node41	1023.0000	1019.8000	1019.8000	0.0000	0.0000	100.0000

Table E3b - Junction Data

Imp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Inlet Capacity	Shape	Pavement Slope
1	Node1	0.0000	0.0000	Flooded	Normal	0	0.00	
2	Node2	0.0000	0.0000	No Ponding	Normal	0	0.00	
3	Node3	0.0000	0.0000	No Ponding	Normal	0	0.00	
4	Node4	0.0000	0.0000	No Ponding	Normal	0	0.00	
5	Node5	0.0000	0.0000	Flooded	Normal	0	0.00	
6	Node6	0.0000	0.0000	Flooded	Normal	0	0.00	
7	Node7	0.0000	0.0000	Flooded	Normal	0	0.00	
8	Node8	0.0000	0.0000	Flooded	Normal	0	0.00	
9	Node9	0.0000	0.0000	Flooded	Normal	0	0.00	
10	Node10	0.0000	0.0000	No Ponding	Normal	0	0.00	
11	Node11	0.0000	0.0000	No Ponding	Normal	0	0.00	
12	Node12	0.0000	0.0000	No Ponding	Normal	0	0.00	
13	Node13	0.0000	0.0000	No Ponding	Normal	0	0.00	
14	Node15	0.0000	0.0000	No Ponding	Normal	0	0.00	
15	Node16	0.0000	0.0000	Flooded	Normal	0	0.00	
16	Node17	0.0000	0.0000	Flooded	Normal	0	0.00	
17	Node18	0.0000	0.0000	Flooded	Normal	0	0.00	
18	Node20	0.0000	0.0000	No Ponding	Normal	0	0.00	
19	Node21	0.0000	0.0000	Flooded	Normal	0	0.00	
20	Node22	0.0000	0.0000	Flooded	Normal	0	0.00	
21	Node23	0.0000	0.0000	Flooded	Normal	0	0.00	
22	Node24	0.0000	0.0000	No Ponding	Normal	0	0.00	
23	Node25	0.0000	0.0000	Flooded	Normal	0	0.00	
24	Node26	0.0000	0.0000	No Ponding	Normal	0	0.00	
25	Node28	0.0000	0.0000	Flooded	Normal	0	0.00	
26	Node29	0.0000	0.0000	Flooded	Normal	0	0.00	
27	Node30	0.0000	0.0000	Flooded	Normal	0	0.00	
28	Node31	0.0000	0.0000	Flooded	Normal	0	0.00	

Node36	Stage/Area	3.0056E+04	1.1674E+05	1041.	Node Invert
Node37	Stage/Area	2.4472E+05	9.9641E+05	1023.	Node Invert
Node38	Stage/Area	1.0552E+06	4.3540E+06	1023.	Node Invert
Node40	Stage/Area	8.7207E+05	2.7213E+06	1024.	Node Invert

Variable storage data for node | Node1

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	1025.00					

4	1018.0000	3.0000	40946.4000	107335.2951	0.9400	2.4641
5	1019.0000	4.0000	44431.2000	150011.8103	1.0200	3.4438
6	1020.0000	5.0000	48824.8000	205196.2156	1.5800	4.7336
7	1021.0000	6.0000	54070.8000	282516.2478	1.9300	6.4857
8	1022.0000	7.0000	61040.4000	370047.8469	2.0900	8.4951
9	1023.0000	8.0000	69754.4000	464355.4357	2.2400	10.6597
10	1024.0000	9.0000	80118.4000	565158.1825	2.3900	12.9742
11	1025.0000	11.0000	104108.4000	773734.9825	2.3900	17.7542

Variable storage data for node | Node10

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1019.0000	0.0000	35849.8800	0.0000	0.8230	0.0000
2	1020.0000	1.0000	44344.0800	40021.3923	1.0180	0.9188
3	1021.0000	2.0000	49092.1200	86718.9061	1.1270	1.9908
4	1022.0000	3.0000	55234.0800	138851.3258	1.2680	3.1676
5	1023.0000	4.0000	61998.0400	196055.3676	1.3590	4.5008
6	1024.0000	5.0000	63249.1200	257267.1635	1.4520	5.9060
7	1025.0000	6.0000	71699.7600	324696.7868	1.6460	7.4540

Variable storage data for node | Node11

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1021.9800	0.0000	43.5600	0.0000	0.0010	0.0000
2	1022.5000	0.5200	261.3600	71.3467	0.0060	0.0016
3	1023.0000	1.0200	2178.0000	603.5493	0.0500	0.0139
4	1023.5000	1.5200	13634.2800	4147.2186	0.3130	0.0952
5	1024.0000	2.0200	29098.0800	14588.8602	0.6680	0.3349
6	1024.5000	2.5200	48046.6800	33677.9165	1.1030	0.7311
7	1025.0000	3.0200	68302.0800	62616.7572	1.5680	1.4375

Variable storage data for node | Node12

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1023.0000	0.0000	13734.9807	0.0000	0.3153	0.0000
2	1024.0000	1.0000	68517.9634	37643.0245	1.5730	0.8642
3	1025.0000	2.0000	117318.9719	129473.5655	2.6933	2.9723

Variable storage data for node | Node16

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1022.0000	0.0000	2962.0800	0.0000	0.0680	0.0000
2	1023.0000	1.0000	5401.4400	4121.1112	0.1240	0.0946
3	1024.0000	2.0000	7579.4400	10580.8162	0.1740	0.2429
4	1025.0000	3.0000	11107.8000	19863.3223	0.2550	0.3156
5	1026.0000	4.0000	15886.5200	33341.5384	0.3670	0.7654

Variable storage data for node | Node20

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1025.0000	0.0000	8624.8800	0.0000	0.1980	0.0000
2	1027.0000	2.0000	12675.9600	21171.0372	0.2910	0.4860
3	1028.0000	3.0000	15115.3200	35048.6612	0.3470	0.8046

Variable storage data for node | Node21

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	1655.2800	0.0000	0.0380	0.0000
2	1015.0000	0.5000	5270.7600	1646.6136	0.1210	0.0378
3	1015.5000	1.0000	7013.1600	4707.2128	0.1610	0.1081
4	1016.0000	1.5000	9060.4800	8714.6729	0.2080	0.2001
5	1016.5000	2.0000	11107.8000	13748.0107	0.2550	0.3156
6	1017.0000	2.5000	12874.8000	23369.1847	0.6600	0.5365
7	1017.5000	3.0000	14655.8800	52630.8487	2.1730	1.2082
8	1018.0000	3.5000	16421.8400	105740.7127	2.7140	2.4275
9	1018.5000	4.0000	18187.8000	168121.5628	3.0770	3.8595
10	1019.0000	4.5000	142702.5600	236632.3123	3.2760	5.4323
11	1019.5000	5.0000	151850.1600	310257.9162	3.4860	7.1225
12	1020.0000	5.5000	161912.5200	388684.3526	3.7170	8.9230
13	1020.5000	6.0000	168707.8800	471332.8060	3.8730	10.8203
14	1021.0000	6.5000	173908.1600	557454.8570	4.0360	12.7874
15	1021.5000	7.0000	185434.9200	647754.0328	4.2570	14.8704
16	1022.0000	7.5000	207694.0800	745982.7448	4.7680	17.1254
17	1023.0000	8.5000	244720.0800	971934.6208	5.6180	22.3125
18	1023.1000	8.6000	244720.0800	996406.6288	5.6180	22.8743

Variable storage data for node | Node37

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	1655.2800	0.0000	0.0380	0.0000
2	1015.0000	0.5000	5270.7600	1646.6136	0.1210	0.0378
3	1015.5000	1.0000	7013.1600	4707.2128	0.1610	0.1081
4	1016.0000	1.5000	9060.4800	8714.6729	0.2080	0.2001
5	1016.5000	2.0000	11107.8000	13748.0107	0.2550	0.3156
6	1017.0000	2.5000	12874.8000	23369.1847	0.6600	0.5365
7	1017.5000	3.0000	14655.8800	52630.8487	2.1730	1.2082
8	1018.0000	3.5000	16421.8400	105740.7127	2.7140	2.4275
9	1018.5000	4.0000	18187.8000	168121.5628	3.0770	3.8595
10	1019.0000	4.5000	142702.5600	236632.3123	3.2760	5.4323
11	1019.5000	5.0000	151850.1600	310257.9162	3.4860	7.1225
12	1020.0000	5.5000	161912.5200	388684.3526	3.7170	8.9230
13	1020.5000	6.0000	168707.8800	471332.8060	3.8730	10.8203
14	1021.0000	6.5000	173908.1600	557454.8570	4.0360	12.7874
15	1021.5000	7.0000	185434.9200	647754.0328	4.2570	14.8704
16	1022.0000	7.5000	207694.0800	745982.7448	4.7680	17.1254
17	1023.0000	8.5000	244720.0800	971934.6208	5.6180	22.3125
18	1023.1000	8.6000	244720.0800	996406.6288	5.6180	22.8743

Variable storage data for node | Node38

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	43.5600	0.0000	0.0010	0.0000
2	1015.0000	0.5000	2178.0000	421.5917	0.0500	0.0097
3	1015.5000	1.0000	5706.3600	2323.1996	0.1310	0.0533
4	1016.0000	1.5000	8668.4800	5891.1560	0.1990	0.1352
5	1016.5000	2.0000	11790.9130	10120.3120	0.2690	0.4119
6	1017.0000	2.5000	139547.6800	113198.3905	9.0780	2.5987
7	1017.5000	3.0000	538314.4800	345717.7894	12.3580	7.9366
8	1018.0000	3.5000	593809.9200	628632.6452	13.6320	14.4314
9	1018.5000	4.0000	634974.1200	935768.1094	14.5770	21.4823
10	1019.0000	4.5000	675746.2800	1.26339E+06	15.5130	29.0035
11	1019.5000	5.0000	714950.2800	1.61102E+06	16.4130	36.9839
12	1020.0000	5.5000	755896.6800	1.97868E+06	17.3530	45.4242
13	1020.5000	6.0000	802985.0400	2.36833E+06	18.4340	54.3695
14	1021.0000	6.5000	840761.6000	2.77923E+06	19.3010	63.8923
15	1021.5000	7.0000	875033.2800	3.20814E+06	20.0880	73.6488
16	1022.0000	7.5000	916110.3600	3.65588E+06	21.0310	83.9275
17	1023.0000	8.5000	105545.9200	4.64088E+06	24.2320	106.5399

Variable storage data for node | Node40

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1016.7300	0.0000	43.5600	0.0000	0.0010	0.0000
2	1018.0000	1.2700	1264.8200	924.6502	0.0130	0.0075
3	1018.5000	1.7700	2657.1600	1066.3262	0.0610	0.0245
4	1019.0000	2.2700	49092.1200	11594.6474	1.1270	0.2862
5	1020.0000	3.2700	188789.0400	122977.4982	4.3340	2.8232
6	1020.5000	3.7700	293115.5600	192797.1919	6.2010	5.4430
7	1021.0000	4.2700	357801.8400	393562.2546	8.2140	9.0349
8	1021.5000	4.7700	440086.6800	592677.8695	10.1030	13.6060
9	1022.0000	5.2700	605396.8800	852590.1552	13.8880	19.5810
10	1023.0000	6.2700	872071.2000	1.58763E+06	20.0200	36.4470
11	1024.3000	7.5700	872071.2000	2.72133E+06	20.0200	62.4730

Office Data

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Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1020.0000	0.0000	35283.6000	0.0000	0.8100	0.0000
2	1021.0000	1.0000	35719.2000	35500.8223	0.8200	0.8150
3	1022.0000	2.0000	36154.8000	71437.2429	0.8300	1.6400
4	1023.0000	3.0000	36590.4000	107809.2618	0.8400	2.4750
5	1024.0000	4.0000	37026.0000	144616.8790	0.8500	3.3199

Variable storage data for node | Node23

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1040.0000	0.0000	10018.8000	0.0000	0.2300	0.0000
2	1041.0000	1.0000	10454.4000	10235.7252	0.2400	0.2350
3	1042.0000	2.0000	10890.0000	20807.0776	0.2500	0.4800
4	1043.0000	3.0000	11326.6000	32014.0547	0.2600	0.7349
5	1044.0000	4.0000	11761.2000	43556.6543	0.2700	0.9999

Variable storage data for node | Node25

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1016.0000	0.0000	56828.0000	0.0000	1.3000	0.0000
2	1017.0000	1.0000	57063.6000	56845.0925	1.3100	1.3050
3	1018.0000	2.0000	57499.2000	114125.7816	1.3200	2.6200
4	1019.0000	3.0000	57934.8000	171842.5676	1.3300	3.9450
5	1020.0000	4.0000	58370.4000	229993.9500	1.3400	5.2799

Variable storage data for node | Node28

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1023.0000	0.0000	6969.6000	0.0000	0.1600	0.0000
2	1023.5000	0.5000	9147.6000	4016.9398	0.2100	0.0922
3	1024.0000	1.0000	9583.2000	8699.1708	0.2200	0.1997
4	1024.5000	1.5000	10018.8000	13599.		

duration simulations. Please check your | continuity errors and make adjustments to | your model as required. |

FREE OUTFALL DATA (DATA GROUP 1) | BOUNDARY CONDITION ON DATA GROUP J1 |

Outfall at Junction...Node39 has boundary condition number... 1
Outfall at Junction...Node41 has boundary condition number... 2

====> Warning !! Outfall Junction Node39 has two or more connecting conduits.
====> Warning !! Outfall Junction Node41 has two or more connecting conduits.

Weir Outfall Data | Boundary Condition on data group J1 |

Weir Outfall at Junction... Node39 has boundary condition number... 1
Weir Outfall at Junction... Node39 has boundary condition number... 1
Weir Outfall at Junction... Node41 has boundary condition number... 2
Weir Outfall at Junction... Node41 has boundary condition number... 2
Weir Outfall at Junction... Node41 has boundary condition number... 2

INTERNAL CONNECTIVITY INFORMATION |

Table with 3 columns: CONDUIT, JUNCTION, JUNCTION. Lists various conduits like orifice 5, orifice, weir5, weir6, weir 1, weir 2, weir3, weir 4, weir8, weir9, lacy, bikpath, south, driveway, seminoie, sem2, south1, dway 2, FREE# 1, FREE# 2 and their connections to nodes.

Boundary Condition Information | Data Groups J1-J4 |

BC NUMBER... 1 has no control water surface.
BC NUMBER... 2 has no control water surface.

====> WARNING ! Junction Node30 is not associated with any conduit.
====> WARNING ! Junction Node31 is not associated with any conduit.

Table with 3 columns: Node, Time, Value. Lists nodes from Node11 to Node41 with their respective time and values.

The junction requiring the smallest time step was...Node17

Table E5a - Conduit Explicit Condition Summary | Courant = Conduit Length | Time step = Velocity + sqrt(g*depth) |

The 3rd column is the Explicit time step times the minimum Courant time step factor | Minimum Conduit Time Step in seconds in the 4th column | The 5th column is the maximum change at any time step during the simulation. The 6th column is the wobble value which is an indicator of the flow stability. | You should use this section to find those conduits that are slowing your model down. Use modify conduits to alter the length of the slow conduits to make your simulation faster, or change the conduit name to "CHIME?????" where "?????" are any characters, this will lengthen the conduit based on the model time step, not the value listed in modify conduits.

Table with 6 columns: Conduit, Time(exp), Exp(Cmin), Time(mp), Time(min), Max Change, Wobble, Type of Soln. Lists conduits Link2 through Link13 with their characteristics.

====> WARNING ! Junction Node32 is not associated with any conduit.
====> WARNING ! Junction Node33 is not associated with any conduit.
====> WARNING ! Junction Node34 is not associated with any conduit.
====> WARNING ! Junction Node35 is not associated with any conduit.

Conduit Convergence Criteria |

Table with 3 columns: Conduit Name, Full Flow, Conduit Slope. Lists conduits Link2 through Link25, 203.1, 203.2, ditch1, 238.1, 264.11, 263.11, 250.11, 250.21, 21, 23, 25, 28, 29, 36, orifice 5, orifice, and or1 with their flow and slope values.

Table E5 - Junction Time Limitation Summary | (0.10 or 0.25) Depth * Area | Time step = Sum of Flow | The time this junction was the limiting junction | is listed in the third column.

Table with 4 columns: Junction, Time(.10), Time(.25), Time(sec). Lists junctions Node1 through Node10 with their time values.

Table with 6 columns: Link, Time, Value, Time, Value, Type of Soln. Lists links Link15 through Link25, 203.1, 203.2, ditch1, 238.1, 264.11, 263.11, 250.11, 250.21, 21, 23, 25, 28, 29, 36, orifice 5, orifice, and or1 with their time and value data.

The conduit with the smallest time step limitation was...Link5
The conduit with the largest wobble was...Link5
The conduit with the largest flow change in any consecutive time step...25

* End of time step DO-loop in Runoff *

Final Date (Mo/Day/Year) = 1/4/2014
Total number of time steps = 4340
Final Julian Date = 2014004
Final time of day = 0. seconds.
Final time of day = 0.00 hours.
Final running time = 72.0000 hours.
Final running time = 3.0000 days.

* Extrapolation Summary for Watersheds *
* Explains the number of time steps and iterations *
* Used in the solution of the subcatchments. *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLAND Calls *

Table with 6 columns: Subcatchment, # Steps, # Calls, Subcatchment, # Steps, # Calls, Subcatchment, # Steps, # Calls. Lists subcatchments Node40#1 through Node35#1 with their step and call counts.

Rainfall input summary from Runoff Continuity Check #
#####

Total rainfall read for gage # 1 is 6.6600 in
Total rainfall duration for gage # 1 is 1434.02 minutes

Table RS: CONTINUITY CHECK FOR SURFACE WATER
* Any continuity error can be fixed by lowering the wet and transition time step. The transition time *

* should not be much greater than the wet time step. *

Table with 2 columns: Inches over, Total Basin. Rows include Total Precipitation (Rain plus Snow), Total Infiltration, Total Evaporation, Surface Runoff from Watersheds, Total Water remaining in Surface Storage, Infiltration over the Pervious Area, Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover, Total Precipitation + Initial Storage.

The error in continuity is calculated as

Continuity check table with 2 columns: Inches over, Total Basin. Rows include Precipitation + Initial Snow Cover, Infiltration, Evaporation - Snow removal, Surface Runoff from Watersheds, Water in Surface Storage, Water remaining in Snow Cover, Precipitation + Initial Snow Cover, Percent Continuity Error.

Table R6. Continuity Check for Channel/Pipes

Continuity check table for channel/pipes with 2 columns: Inches over, Total Basin. Rows include Initial Channel/Pipe Storage, Final Channel/Pipe Storage, Surface Runoff from Watersheds, Groundwater Subsurface Inflow or Diversion, Evaporation Loss from Channels, Groundwater Flow Diverted Out of Network, Channel/Pipe/Inlet Outflow, Initial Storage + Inflow, Final Storage + Outflow + Diverted GW, Final Storage + Outflow + Evaporation, Percent Continuity Error.

Table R9. Summary Statistics for Subcatchments

Note: Total Runoff Depth includes pervious & impervious areas. Pervious and Impervious Runoff Depth is only the runoff from those two areas. For catchments receiving redirected flow, this flow will only be shown if the flow is not directed directly to the outlet. Flow that is getting redirected is also listed with the original subcatchment.

Summary statistics table for subcatchments with 6 columns: Node40#1, Node36#1, Node21#1, Node10#1, Node10#2, Area (acres), Percent Impervious.

Rational Formula

Rational formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node6#1, Node23#1, Node24#1, Node20#1, Node25#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Rational Formula

Rational formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node2#1, Node28#1, Node12#1, Node11#1, Node37#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Summary statistics table with 6 columns: Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Rational Formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node26#1, Node1#1, Node4#1, Node16#1, Node29#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Runoff Depth table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Rational Formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node38#1, Node30#1, Node31#1, Node32#1, Node33#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Impervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area without depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Total Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Rational Formula table with 6 columns: Pervious Tc, Perv. Intensity, Impervious Tc, Impervious C, Partial Area, Partial Area Intensity.

Subcatchment summary table with 6 columns: Node2#1, Node28#1, Node12#1, Node11#1, Node37#1, Area (acres), Percent Impervious, Total Rainfall, Max Intensity.

Pervious Area table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Impervious Area with depression storage table with 6 columns: Total Runoff Depth, Peak Runoff Rate.

Partial Area Tc..... 0.00000 0.00000 0.00000 0.00000 0.00000
Partial Area Intensity. 0.00000 0.00000 0.00000 0.00000 0.00000

Subcatchment..... Node34#1 Node35#1
Area (acres)..... 3.34000 7.66000
Percent Impervious..... 0.00000 0.00000
Total Rainfall (in)..... 6.66000 6.66000
Max Intensity (in/hr)..... 9.62167 9.62167

Previous Area

Total Runoff Depth (in) 3.86812 3.66124
Peak Runoff Rate (cfs) 13.72573 25.08844

Total Impervious Area

Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000

Impervious Area with depression storage

Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000

Impervious Area without depression storage

Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000

Total Area

Total Runoff Depth (in) 3.86812 3.66124
Peak Runoff Rate (cfs) 13.72573 25.08844

Rational Formula

Pervious Tc (mins)..... 0.00000 0.00000
Perv. Intensity (in/hr) 0.00000 0.00000
Pervious C..... 0.00000 0.00000
Impervious Tc (mins)..... 0.00000 0.00000
Imp. Intensity (in/hr) 0.00000 0.00000
Impervious C..... 0.00000 0.00000
Partial Area (Ha)..... 0.00000 0.00000
Partial Area Tc..... 0.00000 0.00000
Partial Area Intensity. 0.00000 0.00000

====> Runoff simulation ended normally.

Table E6. Final Model Condition

This table is used for steady state flow comparison and is the information saved to the hot-restart file.
Final Time = 108.000 hours

Junction / Depth / Elevation ==> *** Junction is Surcharged.

Node1/ 0.01 / 1025.01/	Node2/ 4.83 / 1019.83/	Node3/ 1.83 / 1019.83/
Node4/ 0.83 / 1019.83/	Node5/ 1.50 / 1023.49/	Node6/ 2.15 / 1023.49/
Node7/ 2.18 / 1023.49/	Node8/ 2.37 / 1023.49/	Node9/ 8.49 / 1023.49/
Node10/ 0.83 / 1019.83/	Node11/ 0.00 / 1021.58/	Node12/ 0.80 / 1023.80/
Node13/ 1.57 / 1023.49/	Node15/ 0.17 / 1023.32/	Node16/ 1.49 / 1023.49/
Node17/ 0.62 / 1023.49/	Node18/ 1.49 / 1023.49/	Node20/ 0.00 / 1025.00/
Node21/ 0.00 / 1020.00/	Node22/ 0.00 / 1040.00/	Node23/ 0.00 / 1040.00/
Node24/ 0.00 / 1031.82/	Node25/ 3.83 / 1019.83/	Node26/ 0.00 / 1020.00/
Node28/ 0.80 / 1023.80/	Node29/ 0.48 / 1023.48/	Node30/ 0.00 / 1016.00/
Node31/ 0.00 / 1040.00/	Node32/ 0.00 / 1037.00/	Node33/ 0.00 / 1020.00/
Node34/ 0.00 / 1023.00/	Node35/ 0.00 / 1023.00/	Node36/ 0.00 / 1037.00/
Node37/ 7.00 / 1021.50/	Node38/ 7.00 / 1021.50/	Node39/ 0.00 / 1021.50/
Node40/ 4.77 / 1021.50/	Node41/ 0.00 / 1019.80/	

Conduit/ Flow ==> *** Conduit uses the normal flow option.

Link2/ -0.11 / Link4/ -0.05 / Link5/ 0.22 /
Link6/ 0.22 / Link7/ 0.22 / Link9/ 0.00 /
Link12/ 0.27 / Link13/ 0.27 / Link15/ -0.00 /
Link16/ -0.05 / Link21/ 0.00 / Link23/ 0.00 /
Link25/ 0.00 / 203.1 / 0.00 / 203.2 / 0.00 /
ditch1/ 0.00 / 238.1 / 0.00 / 264.11 / 0.00 /
263.11/ 0.00 / 250.11/ 0.00 / 250.21 / 0.00 /
2/1/ 0.00 / 23/ 0.00 / 25/ -0.00 /
28/ -0.00 / 29/ -0.05 / 36/ 0.00 /
office 5/ -0.00 / office/ -0.01 / ori 1/ 0.00 /
Weir5/ 0.00 / weir6/ 0.00 / weir 1/ 0.00 /
weir 2/ 0.00 / weir3/ 0.00 / weir 4/ -0.00 /
weir9/ 0.00 / weir9/ 0.00 / bcy/ 0.00 /
bikepath/ 0.00 / south/ 0.00 / driveway/ 0.00 /
seminole/ 0.00 / sem2/ 0.00 / south1/ 0.00 /
dway 2/ 0.00 / FREE# 1/ 0.00 / FREE# 2/ 0.00 /

Conduit/ Velocity

Link2/ -0.00 / Link4/ -0.01 / Link5/ 0.05 /
Link6/ 0.05 / Link7/ 0.04 / Link9/ 0.00 /
Link12/ 1.68 / Link13/ 0.22 / Link15/ -0.00 /
Link16/ 0.05 / Link21/ 0.00 / Link23/ 0.00 /
Link25/ 0.00 / 203.1 / 0.61 / 203.2 / 0.00 /
ditch1/ 0.00 / 238.1 / 0.28 / 264.11 / 0.00 /
263.11/ 0.00 / 250.11/ 0.00 / 250.21 / 0.00 /
2/1/ 0.00 / 23/ 0.00 / 25/ 0.50 /
28/ 0.50 / 29/ 0.48 / 36/ 0.00 /
office 5/ -0.00 / office/ -0.01 / ori 1/ 0.02 /

Conduit/ Width

Link2/ 3.19 / Link4/ 1.80 / Link5/ 1.73 /
Link6/ 1.61 / Link7/ 1.09 / Link9/ 0.00 /
Link12/ 0.68 / Link13/ 0.01 / Link15/ 1.89 /
Link16/ 0.10 / Link21/ 1.37 / Link23/ 1.24 /
Link25/ 0.53 / 203.1 / 0.39 / 203.2 / 0.59 /
ditch1/ 6.28 / 238.1 / 0.59 / 264.11 / 0.49 /
263.11/ 0.01 / 250.11/ 0.01 / 250.21 / 0.01 /
2/1/ 0.00 / 23/ 0.00 / 25/ 0.00 /
28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
office 5/ 0.74 / office/ 0.74 / ori 1/ 0.17 /

Junction/ EGL

Node1/ 0.01 / Node2/ 9.01 / Node3/ 1.83 /
Node4/ 0.83 / Node5/ 1.50 / Node6/ 2.15 /
Node7/ 2.18 / Node8/ 2.37 / Node9/ 8.49 /
Node10/ 2.11 / Node11/ 0.00 / Node12/ 0.80 /
Node13/ 1.61 / Node15/ 0.17 / Node16/ 1.49 /
Node17/ 0.62 / Node18/ 1.49 / Node20/ 0.00 /
Node21/ 0.00 / Node22/ 0.00 / Node23/ 0.00 /
Node24/ 0.00 / Node25/ 3.83 / Node26/ 0.00 /
Node28/ 0.80 / Node29/ 0.48 / Node30/ 0.00 /
Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
Node34/ 0.00 / Node35/ 0.00 / Node36/ 0.00 /
Node37/ 7.32 / Node38/ 7.00 / Node39/ 0.00 /
Node40/ 4.77 / Node41/ 0.00 /

Junction/ Freeboard

Node1/ 2.99 / Node2/ 8.17 / Node3/ 5.17 /
Node4/ 5.17 / Node5/ 2.51 / Node6/ 2.53 /
Node7/ 2.69 / Node8/ 2.53 / Node9/ 2.51 /
Node10/ 5.17 / Node11/ 3.02 / Node12/ 1.20 /
Node13/ 2.24 / Node15/ 1.68 / Node16/ 2.51 /
Node17/ 2.51 / Node18/ 2.11 / Node20/ 3.00 /
Node21/ 4.00 / Node22/ 6.66 / Node23/ 4.00 /
Node24/ 6.18 / Node25/ 0.17 / Node26/ 8.00 /
Node28/ 1.20 / Node29/ 3.52 / Node30/ 4.00 /
Node31/ 4.00 / Node32/ 4.00 / Node33/ 4.00 /
Node34/ 2.00 / Node35/ 4.00 / Node36/ 4.00 /
Node37/ 1.60 / Node38/ 1.50 / Node39/ 1.50 /

Node40/ 2.80 / Node41/ 3.20 /

Junction/ Max Volume

Node1/ 134859.46 / Node2/ 3196681.52 / Node3/ 7935.97 /
Node4/ 465955.14 / Node5/ 20.99 / Node6/ 29.14 /
Node7/ 29.51 / Node8/ 31.87 / Node9/ 529650.37 /
Node10/ 268615.21 / Node11/ 38696.82 / Node12/ 33929.73 /
Node13/ 21.82 / Node15/ 6.34 / Node16/ 29309.17 /
Node17/ 24.92 / Node18/ 28.94 / Node20/ 23208.98 /
Node21/ 127899.44 / Node22/ 23.34 / Node23/ 35279.11 /
Node24/ 13.46 / Node25/ 22025.37 / Node26/ 22.62 /
Node28/ 16942.78 / Node29/ 59418.73 / Node30/ 0.00 /
Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
Node34/ 0.00 / Node35/ 0.00 / Node36/ 104559.00 /
Node37/ 815914.46 / Node38/ 3314628.33 / Node39/ 0.00 /
Node40/ 1065579.29 / Node41/ 0.00 /

Junction/Total Fldng

Node1/ 0.00 / Node2/ 0.00 / Node3/ 0.00 /
Node4/ 0.00 / Node5/ 0.00 / Node6/ 0.00 /
Node7/ 0.00 / Node8/ 0.00 / Node9/ 0.00 /
Node10/ 0.00 / Node11/ 0.00 / Node12/ 0.00 /
Node13/ 0.00 / Node15/ 0.00 / Node16/ 0.00 /
Node17/ 0.00 / Node18/ 0.00 / Node20/ 0.00 /
Node21/ 0.00 / Node22/ 0.00 / Node23/ 0.00 /
Node24/ 0.00 / Node25/ 0.00 / Node26/ 0.00 /
Node28/ 0.00 / Node29/ 0.00 / Node30/ 0.00 /
Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
Node34/ 0.00 / Node35/ 0.00 / Node36/ 0.00 /
Node37/ 0.00 / Node38/ 0.00 / Node39/ 0.00 /
Node40/ 0.00 / Node41/ 0.00 /

Conduit/ Cross Sectional Area

Link2/ 9.16 / Link4/ 4.34 / Link5/ 4.49 /
Link6/ 4.56 / Link7/ 4.82 / Link9/ 0.00 /
Link12/ 0.16 / Link13/ 0.25 / Link15/ 0.94 /
Link16/ 0.76 / Link21/ 0.00 / Link23/ 0.00 /
Link25/ 0.18 / 203.1 / 0.00 / 203.2 / 0.00 /
ditch1/ 0.00 / 238.1 / 0.00 / 264.11 / 0.00 /
263.11/ 3.37 / 250.11/ 4.13 / 250.21/ 4.14 /
2/1/ 1.00 / 23/ 1.00 / 25/ 1.00 /
28/ 1.00 / 29/ 1.00 / 36/ 1.00 /
office 5/ 707.01 / office/ 0.71 / ori 1/ 0.17 /

Conduit/ Final Volume

Link2/ 1144.45 / Link4/ 121.63 / Link5/ 31.44 /
Link6/ 164.32 / Link7/ 120.39 / Link9/ 0.00 /
Link12/ 5.10 / Link13/ 84.83 / Link15/ 15.97 /
Link16/ 15.20 / Link21/ 0.01 / Link23/ 0.05 /
Link25/ 77.96 / 203.1 / 0.12 / 203.2 / 0.00 /
ditch1/ 0.72 / 238.1 / 0.11 / 264.11 / 0.00 /
263.11/ 151.55 / 250.11/ 276.44 / 250.21/ 289.94 /
2/1/ 0.00 / 23/ 0.00 / 25/ 0.00 /
28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
office 5/ 707.01 / office/ 706.96 / ori 1/ 170.03 /

Conduit/ Hydraulic Radius

Link2/ 1.11 / Link4/ 0.75 / Link5/ 0.76 /
Link6/ 0.75 / Link7/ 0.71 / Link9/ 0.00 /
Link12/ 0.12 / Link13/ 0.31 / Link15/ 0.38 /
Link16/ 0.25 / Link21/ 0.01 / Link23/ 0.01 /
Link25/ 0.04 / 203.1 / 0.01 / 203.2 / 0.00 /
ditch1/ 0.15 / 238.1 / 0.00 / 264.11 / 0.00 /
263.11/ 0.49 / 250.11/ 0.55 / 250.21/ 0.55 /
2/1/ 0.00 / 23/ 0.00 / 25/ 0.00 /
28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
office 5/ 0.30 / office/ 0.30 / ori 1/ 0.11 /

Conduit/ Upstream/ Downstream Elevation

Link2/ 1019.83/ 1019.83 / Link4/ 1023.49/ 1023.49 / Link5/ 1023.49/ 1023.49 /
Link6/ 1023.49/ 1023.49 / Link7/ 1023.49/ 1023.49 / Link9/ 1019.83/ 1019.83/

Table E7 - Iteration Summary

Total number of time steps simulated..... 38880
Total number of passes in the simulation..... 5942667
Total number of time steps during simulation.... 363804
Ratio of actual # of time steps / NTCCY..... 9.357
Average number of iterations per time step..... 16.335
Average time step size(seconds)..... 1.069
Smallest time step size(seconds)..... 1.000
Largest time step size(seconds)..... 10.000
Average minimum Conduit Courant time step (sec)..... 1.488
Average minimum implicit time step (sec)..... 1.000
Average minimum junction time step (sec)..... 0.853
Average Courant Factor Tl..... 0.853
Number of times omega reduced..... 210892

Table E8 - Junction Time Step Limitation Summary

Not Conv = Number of times this junction did not converge during the simulation.
Avg Conv = Average junction iterations.
Conv err = Mean convergence error.
Omega Cng = Change of omega during iterations
Max Iter = Maximum number of iterations

Junction Not Conv Avg Conv Total Iter Omega Cng Max Iter >25 Iter >40

Node1 22443 33.11 12045136 1749 501 25406 25158 25039
Node2 21401 34.88 12688962 15043 501 39173 28986 28100
Node3 0 1.16 420555 441 467 46 23 14
Node4 0 1.02 372781 0 13 0 0 0
Node5 1 1.93 700788 910 501 1092 200 193
Node6 5 5.59 2032328 7999 501 4521 2801 2579
Node7 0 5.34 1944074 7388 500 4023 2932 2777
Node8 0 1.98 718645 239 20 103 0 0
Node9 0 1.52 551690 0 19 49 0 0
Node10 7973 15.99 5815526 10832 501 10629 10616 10615
Node11 72 1.13 411153 18 501 79 72 72
Node12 38778 57.79 21024567 42156 501 41589 41249 41249
Node13 1167 3.37 1227675 128 501 1499 1167 1167
Node15 597 2.26 821213 0 501 648 597 597
Node16 0 1.01 367574 0 8 0 0 0
Node17 17989 29.25 10640788 23300 501 21635 20538 20390
Node18 0 1.41 511466 0 86 329 1 1
Node20 546 1.89 687186 344 501 664 651 650
Node21 24243 34.96 12719860 28278 501 25261 24552 24537
Node22 0 1.05 381962 0 6 0 0 0
Node23 0 1.04 376543 0 5 0 0 0
Node24 0 1.04 377048 0 5 0 0 0
Node25 17268 24.85 9040244 17293 501 17293 17278 17277
Node26 42 1.10 388867 92 501 62 56 55
Node28 46849 68.21 24815135 53538 501 53186 48664 48664
Node29 89 1.54 559300 334 501 101 97 97
Node30 0 1.00 363804 0 1 0 0 0
Node31 0 1.00 363804 0 1 0 0 0
Node32 0 1.00 363804 0 1 0 0 0
Node33 0 1.00 363804 0 1 0 0 0

Node34	0	1.00	363804	0	1	0	0	0	0
Node35	0	1.00	363804	0	1	0	0	0	0
Node36	0	1.08	391537	0	5	0	0	0	0
Node37	202	1.47	534241	514	501	228	211	208	
Node38	0	1.05	381001	0	7	0	0	0	0
Node39	0	1.06	394762	0	51	2	2	1	
Node40	1	1.02	424062	281	83	41	3	2	
Node41	0	1.10	399500	5	37	5	1	0	

Total number of iterations for all junctions..... 126348563

Minimum number of possible iterations..... 13824552

Efficiency of the simulation..... 9.14

Table E9 - CONDUIT SUMMARY STATISTICS

Extran Efficiency is an indicator of the simulation. Ideal efficiency is one iteration per time step. Altering the underrelaxation parameter, lowering the time step, increasing the flow and head tolerance are good ways of improving the efficiency, and/or lowering the internal time step. The lower the efficiency generally the faster your model will run. If your efficiency is less than 1.5 then you may try increasing your time step so that your overall simulation is faster. Ideal efficiency would be around 2.0

Good Efficiency < 1.5 mean iterations |
 Excellent Efficiency < 2.5 and > 1.5 mean iterations |
 Fair Efficiency < 4.0 and > 2.5 mean iterations |
 Fair Efficiency < 7.5 and > 4.0 mean iterations |
 Poor Efficiency > 7.5 mean iterations |

Table E9 - CONDUIT SUMMARY STATISTICS

Junction Name	Upstream Elevation	Maximum Pipe Crown Elevation	Downstream Elevation	Time of Occurrence	Feet of Surge	Maximum Freeboard	Maximum Junction Area	Maximum Gutter Depth	Maximum Gutter Width	Maximum Gutter Velocity	
Name	feet	feet	feet	Hr. Min.	ft	sq ft	feet	feet	ft/s	ft/s	
Node1	1028.0000	1028.9000	1027.6827	12	47	0.7827	0.1373	66066.220	0.0000	0.00	0.0000
Node2	1028.0000	1025.5000	1019.8317	107	9	0.0000	8.1683	923553.16	0.0000	0.00	0.0000
Node3	1025.0000	1020.8333	1022.9893	12	45	2.1560	2.0107	3063.6794	0.0000	0.00	0.0000
Node4	1025.0000	1025.0000	1022.8747	12	38	0.0000	2.1253	138538.92	0.0000	0.00	0.0000
Node5	1028.0000	1028.9000	1023.6861	25	51	0.0000	2.3399	12.5680	0.0000	0.00	0.0000
Node6	1026.0200	1023.8400	1023.6587	25	51	0.0000	2.3613	12.5660	0.0000	0.00	0.0000
Node7	1026.1800	1023.8100	1023.6582	25	52	0.0000	2.5218	12.5660	0.0000	0.00	0.0000
Node8	1026.0200	1023.8200	1023.6583	25	52	0.0363	2.3637	12.5660	0.0000	0.00	0.0000
Node9	1026.0000	1024.6000	1023.6562	25	51	0.4862	2.0738	12.5660	0.0000	0.00	0.0000
Node10	1025.0000	1025.0000	1023.1806	12	45	0.0000	1.8194	59919.853	0.0000	0.00	0.0000
Node11	1025.0000	1023.2300	1024.4985	12	31	1.2885	0.5015	4793.292	0.0000	0.00	0.0000
Node12	1025.0000	1025.0000	1023.9441	12	48	0.0000	1.0559	64352.051	0.0000	0.00	0.0000
Node13	1025.7300	1023.1700	1023.6562	25	51	0.0000	0.7133	11449.643	0.0000	0.00	0.0000
Node14	1025.0000	1024.6500	1023.6542	25	4	0.0000	1.3458	12.5660	0.0000	0.00	0.0000
Node15	1025.0000	1022.0000	1025.7363	12	27	3.7363	0.2637	14614.233	0.0000	0.00	0.0000
Node16	1026.0000	1025.0000	1024.8531	12	46	0.0000	1.1489	12.5660	0.0000	0.00	0.0000
Node17	1025.0000	1025.0000	1023.6561	12	28	0.0000	1.6971	12.5660	0.0000	0.00	0.0000
Node18	1028.0000	1027.0000	1027.1584	12	46	0.1584	0.8416	13048.139	0.0000	0.00	0.0000
Node19	1024.0000	1024.0000	1023.5490	12	35	0.0000	0.4510	36590.400	0.0000	0.00	0.0000
Node20	1041.0000	1041.0000	1036.1971	12	30	0.0000	4.8029	12.5660	0.0000	0.00	0.0000
Node21	1044.0000	1044.0000	1034.3029	12	29	0.0000	0.7133	11449.643	0.0000	0.00	0.0000
Node22	1038.0000	1044.0000	1032.8870	12	13	0.0000	5.1130	12.5660	0.0000	0.00	0.0000
Node23	1020.0000	1020.0000	1019.8317	107	39	0.0000	0.1683	57934.800	0.0000	0.00	0.0000
Node24	1028.0000	1021.5000	1021.8000	12	12	0.3000	6.2000	12.5660	0.0000	0.00	0.0000
Node25	1025.0000	1025.0000	1024.8290	12	29	0.0000	0.7133	11449.643	0.0000	0.00	0.0000
Node26	1027.0000	1025.0000	1024.7777	12	45	0.0000	2.2223	33976.800	0.0000	0.00	0.0000
Node30	1020.0000	1016.0000	1016.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000

south1	Undeinf	Undeinf	Undeinf	Undeinf	71.3357	13	46
dway2	Undeinf	Undeinf	Undeinf	Undeinf	24.1592	13	46
FREE#1	Undeinf	Undeinf	Undeinf	Undeinf	4.4489	13	46
FREE#2	Undeinf	Undeinf	Undeinf	Undeinf	95.4949	13	46

Table E11. Area assumptions used in the Subcritical and Critical flow assumptions from Subroutine Head. See Figure 17-1 in the manual for further information.

Conduit Name	Duration Dry	Duration Critical	Duration of Critical	Duration of Hydraulic	Maximum X-Section	Maximum Area	Maximum Vel'D	
Name	Flow(min)	Flow(min)	Flow(min)	Flow(min)	Radius-m	Area(ft ²)	(ft ² /s)	
Link2	363.86	5598.65	0.00	527.39	1.12	9.918	37.471	
Link4	290.67	6189.33	0.00	0.00	0.759	4.089	10.621	
Link5	290.78	6189.22	0.00	0.00	0.761	4.764	11.214	
Link6	299.33	6180.67	0.00	0.00	0.760	4.863	9.673	
Link7	304.17	5634.87	0.00	540.97	0.760	4.997	9.498	
Link8	6480.00	0.00	0.00	0.00	0.000	0.000	0.000	
Link12	1031.85	5448.15	0.00	0.00	0.250	0.581	2.185	
Link13	713.17	5786.83	0.00	0.00	0.377	1.259	1.369	
Link15	625.96	5467.22	0.00	386.82	0.570	1.920	7.680	
Link16	289.50	6190.00	0.00	0.00	0.761	4.997	10.673	
Link21	256.17	65.12	0.00	0.00	0.158	0.723	23.241	
Link23	4267.43	2212.57	0.00	0.00	0.659	3.581	8.436	
Link25	5292.96	187.04	0.00	0.00	0.455	1.758	7.126	
203.1	325.11	0.00	0.00	6154.89	0.294	0.790	14.920	
203.2	5627.13	0.00	0.00	852.87	0.438	1.359	10.359	
ditch1	2494.53	0.00	0.00	3985.47	0.00	0.048	1.522	0.044
238.1	328.50	0.00	0.00	6151.50	0.443	1.527	9.847	
264.11	284.33	0.00	0.00	6195.67	0.375	1.190	11.445	
263.11	247.83	6232.17	0.00	0.00	0.632	3.371	50.543	
250.11	564.14	5733.82	0.00	182.04	0.693	4.139	25.173	
250.21	367.96	5830.52	0.00	281.52	0.692	4.165	33.854	
21	6480.00	0.00	0.00	0.00	0.000	0.000	0.000	
23	6480.00	0.00	0.00	0.00	0.000	0.000	0.000	
25	6480.00	0.00	0.00	0.00	0.000	0.000	0.000	
28	6480.00	0.00	0.00	0.00	0.000	0.000	0.000	
29	6480.00	0.00	0.00	0.00	0.000	0.000	0.000	
36	6480.00	0.00	0.00	0.00	0.000	0.000	0.000	
office 5	321.17	5424.87	0.00	733.97	0.305	0.797	19.859	
office 6	299.58	5756.58	0.00	423.83	0.305	0.813	13.369	
o#1	600.94	5854.30	0.00	24.77	0.134	0.173	11.665	

Table E12. Mean Conduit Flow Information

Conduit Name	Mean Flow (cfs)	Total Flow (cfs)	Percent Change	Flow Weighting	Mean Froude Number	Mean Hydraulic Radius	Mean Cross Section Area	Mean Roughness
Link2	2.7547	071012.0	0.0001	0.9917	2.1119	0.9951	7.4025	0.1330
Link4	0.4832	187899.91	0.0018	0.9952	0.1252	0.6929	3.8881	0.0130
Link5	0.4589	178252.09	0.0157	0.9952	0.7219	0.7083	4.2995	0.0130
Link6	0.4589	178402.43	0.0058	0.9950	0.0617	0.6847	4.4742	0.0130
Link7	0.4584	178207.39	0.0003	0.9948	0.0652	0.6217	4.0714	0.0130
Link8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0150
Link12	-0.0246	-9548.291	0.0007	0.8978	0.1222	0.2103	0.5875	0.0130
Link13	-0.0248	-9638.593	0.0012	0.9502	0.0162	0.2970	1.1507	0.0130
Link15	-0.1669	-64900.713	0.0000	0.9641	0.021	0.3278	0.7794	0.0130
Link16	0.3165	123059.11	0.0014	0.9952	0.2584	0.2474	0.7080	0.0130
Link21	0.9922	385752.80	0.0003	0.2492	0.9757	0.0517	1.3037	0.0130
Link23	0.3310	128698.89	0.0001	0.3370	0.2453	0.0422	0.1046	0.0130
Link25	0.0380	22356.28	0.0000	0.1781	0.8906	0.0529	0.1904	0.0130
203.1	1.8626	14939.23	0.0000	0.9401	1.3699	0.0638	0.1013	0.0130
203.2	0.3487	135579.49	0.0001	0.1405	0.2122	0.0308	0.0852	0.0130

Node31	1044.0000	1040.0000	1040.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node32	1041.0000	1037.0000	1037.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node33	1024.0000	1020.0000	1020.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node34	1025.0000	1023.0000	1023.0000	0	0	0.0000	2.0000	12.5660	0.0000	0.00	0.0000
Node35	1027.0000	1023.0000	1023.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node36	1041.0000	1041.0000	1040.5961	12	30	0.0000	4.0399	29620.800	0.0000	0.00	0.0000
Node37	1023.0000	1020.0000	1020.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node38	1023.0000	1016.0833	1021.6210	20	9	5.5376	1.3790	884885.66	0.0000	0.00	0.0000
Node39	1023.0000	1021.5000	1021.5000	0	0	0.0000	1.5000	12.5660	0.0000	0.00	0.0000
Node40	1024.3000	1019.6833	1022.3291	13	46	2.6457	1.9709	887790.00	0.0000	0.00	0.0000
Node41	1023.0000	1019.8000	1019.8000	0	0	0.0000	3.2000	12.5660	0.0000	0.00	0.0000

Table E10 - CONDUIT SUMMARY STATISTICS

Note: The peak hydraulic flow in the conduit may still surcharge because of the downstream boundary conditions.

Conduit Name	Flow Velocity (ft/s)	Depth (ft)	Time of Occurrence (Hr. Min.)	Maximum Velocity (ft/s)	Time of Occurrence (Hr. Min.)	Ratio Max to Elev at Pipe Ends (ft)	Maximum Water Depth (ft)	Time of Occurrence (Hr. Min.)	Ratio Max to Elev at Pipe Ends (ft)
--------------	----------------------	------------	-------------------------------	-------------------------	-------------------------------	-------------------------------------	--------------------------	-------------------------------	-------------------------------------

Link2	73.8984	7.2449	34.0000	101.6422	12	45	9.9824	12	45	1.3754	1022.989	1019.918	1.761	0.889
Link4	62.4947	12.7313	30.0000	21.3602	12	28	6.7474	12	31	0.3418	1023.660	1023.659	0.668	0.927
Link5	26.8520	5.4702	30.0000	21.3295	12	29	6.8713	15	27	0.7943	1023.659	1023.658	0.927	0.939
Link6	29.7983	6.0705	30.0000	21.3178	12	28	4.8846							

office 5.1044 0.0000 1.7393 0.9228 1.0029 1021.6896 1019.9046 Max Flow
or1 1.1312 0.0000 1.9118 0.8111 0.4583 1025.3034 1023.3916 Max Flow

Table E13a. CULVERT ANALYSIS CLASSIFICATION,
and the time the culvert was in a particular
classification during the simulation. Time is
in minutes. The Dynamic Wave Equation is used for
all conduit analysis but the culvert flow classification
condition is based on the HW and TW depths.

Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope	Mid Slope
--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Link#	216.0000	4483.0000	457.0000	996.0000	0.0000	0.0000	6.0000	322.0000	Groove End with Headwall
-------	----------	-----------	----------	----------	--------	--------	--------	----------	--------------------------

Kinematic Wave Approximations
Time in Minutes for Each Condition

Conduit Name	Duration	Slope	Super- Critical	Roll Waves
--------------	----------	-------	--------------------	---------------

Location	Flow	Criteria	Waves
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Table E15a. SPREADSHEET REACH LIST
Peak flow and Total Flow listed by Reach or those
conduits or diversions having the same
upstream and downstream nodes.

Upstream Node	Downstream Node	Maximum Flow (cfs)	Total Flow (ft³/s)
---------------	-----------------	--------------------	--------------------

Table E16. New Conduit Information Section
Conduit Inlet/Outlet #
Maximum Water Surface (WS) Elevations

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
--------------	---------------	-----------------	-------	-------	-------	-------	--------------

Node	Flow	Velocity	Volume	Junction	Invert	Maximum
------	------	----------	--------	----------	--------	---------

Table E15. SPREADSHEET INFO LIST
Conduit Flow and Junction Depth Information for use in
spreadsheets. The maximum values in this table are the
true maximum values because they sample every time step.
The values in the review results may only be the
maximum of a subset of all the time steps in the run.
Note: These flows are only the flows in a single barrel.

Conduit Name	Maximum Flow (cfs)	Total Flow (ft³/s)	Maximum Velocity (ft/s)	Maximum Volume (#)	Junction Name	Invert (ft)	Maximum Elevation (ft)
--------------	--------------------	--------------------	-------------------------	--------------------	---------------	-------------	------------------------

Node	Flow	Velocity	Volume	Junction	Invert	Maximum
------	------	----------	--------	----------	--------	---------

Table E18 - Junction Continuity Error. Division by Volume added 1/196

Continuity Error = Net Flow + Beginning Volume - Ending Volume
Total Flow + (Beginning Volume + Ending Volume)/2
Net Flow = Node Inflow - Node Outflow
Total Flow = absolute (Inflow + Outflow)
Intermediate column is a judgement on the node continuity error.
Excellent < 1 percent Great 1 to 2 percent Good 2 to 5 percent
Fair 5 to 10 percent Poor 10 to 25 percent Bad 25 to 50 percent
Terrible > 50 percent

Junction Name	Volume % of Node	% of Inflow	Volume	Thru	Node	Flow	Failed to Converge
---------------	------------------	-------------	--------	------	------	------	--------------------

Node34	46897.7709	100.0000	0.4082	0.0000	0.0000	46897.7709	46897.7709	0
Node35	101803.6020	100.0000	0.8862	0.0000	0.0000	101803.6020	101803.6020	0
Node36	8.2635	0.0000	0.0001	0.0000	0.0000	8.2635	73913.0143	0
Node37	55167.1501	2.2522	0.4802	648258.5424	0.0000	703425.6926	2155123.810	202
Node38	-126.1016	-0.0022	0.0011	3208578.339	0.0000	3208452.237	4251028.676	0
Node39	-12.3597	-0.0011	0.0001	0.0000	0.0000	-12.3597	1089306.449	0
Node40	114.4951	0.0000	0.0010	593148.1105	0.0000	593148.1105	67548.676	0
Node41	-20.0560	-0.0007	0.0002	0.0000	0.0000	-20.0560	271132.188	0

The total continuity error was 1.20060E+06 cubic feet
The remaining total volume was 8.56108E+06 cubic feet
Your mean node continuity error was Excellent
Your worst node continuity error was Good

Table E19 - Junction Inflow & Outflow Listing
Units are either ft³/s or m³/s
depending on the units in your model.

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inflow to Node	Inflow through Outfall	RNF Layer Inflow from 2D Layer	Evaporation from Node	Basin Inflow
Node1	0.0000	0.0000	0.0000	0.0000	0.0000	277012.1030	0.0000	0.0000
Node2	0.0000	0.0000	0.0000	0.0000	0.0000	417791.2074	0.0000	0.0000
Node4	0.0000	0.0000	0.0000	0.0000	0.0000	875861.1848	0.0000	0.0000
Node9	0.0000	0.0000	0.0000	0.0000	0.0000	334860.0462	0.0000	0.0000
Node10	0.0000	0.0000	0.0000	0.0000	0.0000	236886.9969	0.0000	0.0000
Node11	0.0000	0.0000	0.0000	0.0000	0.0000	124946.1805	0.0000	0.0000
Node12	0.0000	0.0000	0.0000	0.0000	0.0000	20333.2769	0.0000	0.0000
Node16	0.0000	0.0000	0.0000	0.0000	0.0000	72155.8378	0.0000	0.0000
Node20	0.0000	0.0000	0.0000	0.0000	0.0000	8876.9508	0.0000	0.0000
Node21	0.0000	0.0000	0.0000	0.0000	0.0000	312273.5993	0.0000	0.0000
Node23	0.0000	0.0000	0.0000	0.0000	0.0000	85146.9743	0.0000	0.0000
Node24	0.0000	0.0000	0.0000	0.0000	0.0000	43509.6051	0.0000	0.0000
Node25	0.0000	0.0000	0.0000	0.0000	0.0000	609164.7469	0.0000	0.0000
Node26	0.0000	0.0000	0.0000	0.0000	0.0000	22632.0123	0.0000	0.0000
Node28	0.0000	0.0000	0.0000	0.0000	0.0000	62641.8754	0.0000	0.0000
Node29	0.0000	0.0000	0.0000	0.0000	0.0000	149939.6971	0.0000	0.0000
Node30	0.0000	0.0000	0.0000	0.0000	0.0000	419597.7719	0.0000	0.0000
Node31	0.0000	0.0000	0.0000	0.0000	0.0000	53461.3967	0.0000	0.0000
Node32	0.0000	0.0000	0.0000	0.0000	0.0000	294013.0338	0.0000	0.0000
Node33	0.0000	0.0000	0.0000	0.0000	0.0000	196795.3744	0.0000	0.0000
Node34	0.0000	0.0000	0.0000	0.0000	0.0000	46897.6851	0.0000	0.0000
Node35	0.0000	0.0000	0.0000	0.0000	0.0000	101803.6020	0.0000	0.0000
Node36	0.0000	0.0000	0.0000	0.0000	0.0000	386959.0195	0.0000	0.0000
Node37	0.0000	0.0000	0.0000	0.0000	0.0000	88179.9966	0.0000	0.0000
Node38	0.0000	0.0000	0.0000	0.0000	0.0000	3.027E+06	0.0000	0.0000
Node39	0.0000	0.0000	0.0000	0.0000	0.0000	544660.6206	0.0000	0.0000
Node40	0.0000	0.0000	0.0000	0.0000	0.0000	3.165E+06	0.0000	0.0000
Node41	0.0000	0.0000	0.0000	0.0000	0.0000	1.356E+06	0.0000	0.0000

Table E20 - Junction Flooding and Volume Listing
The maximum volume is the total volume in the node including the volume in the flooded storage area. This is the maximum volume at any time. The volume in the flooded storage area is the total volume above the ground elevation, where the flooded pond storage area starts.
The fourth column is instantaneous, the fifth is the sum of the flooded volume over the entire simulation.
Units are either ft³/s or m³/s depending on the units.

Junction Name	Surcharged Time (min)	Out of 1D System Flooded Volume	Passed to 2D cell OR Volume Stored Maximum in allowed Flood Pond of 1D System
Node4	875866.3325	2.2527	
Node9	334861.5736	0.8608	
Node10	236887.7619	0.7477	
Node11	124947.0385	0.3214	
Node12	20333.3121	0.0523	
Node16	72155.8378	0.1856	
Node20	8877.0123	0.0228	
Node21	312273.4127	0.8032	
Node23	85147.8799	0.2190	
Node24	43509.7801	0.1119	
Node25	609168.3518	1.5668	
Node26	22632.1034	0.0582	
Node28	62642.2414	0.1611	
Node29	149940.8984	0.3857	
Node30	419598.2335	1.0792	
Node31	53461.4593	0.1375	
Node32	294013.7637	0.7562	
Node33	196795.5435	0.5062	
Node34	46897.7709	0.1206	
Node35	101803.6020	0.2618	
Node36	386963.1350	0.9953	
Node37	88179.1499	0.2268	
Node38	3.027E+06	7.7864	
Node40	3.165E+06	-1.4009	
Node39	544660.6206	-3.4868	
Node41	-1.356E+06	-3.4868	

Junction Name	Inflow Volume, ft³/s	Average Outflow, cfs
Node39	544660.6206	1.4009
Node41	1.3557E+06	3.4868

Initial system volume = 0.0000 Cu Ft
Total system inflow volume = 11.48765E+06 Cu Ft
Inflow + Initial volume = 11.48765E+06 Cu Ft
Total system outflow = 1.90032E+06 Cu Ft
Volume left (Final volume) = 8.56108E+06 Cu Ft
Evaporation = 0.0000 Cu Ft
Basin Infiltration = 0.0000 Cu Ft
Outflow + Final Volume = 10.46140E+06 Cu Ft

Total Model Continuity Error
Error in Continuity Percent = 8.9335
Error in Continuity, ft³/s = 1.02625E+06
+ Error means a continuity loss, - a gain

Table E22: Numerical Model Judgement section
Overall error was (minimum of Table E18 & E21) 8.9335 percent
Worst nodal error was in node Node30 with 100.0000 percent
Of the total inflow this loss was 3.6526 percent
Your overall continuity error was Fair
Efficiency of the simulation 9.14
Most Number of Non Convergences at all Nodes 46849
Total Number Non Convergences at all Nodes 199665
Total Number of Nodes with Non Convergences 17

Table E23: New Basin Design Information

Node1	130.	0.000	0.000	1.349E+05	0.000
Node2	0.000	0.000	0.000	3.197E+06	0.000
Node3	87.5	0.000	0.000	7.536E+03	0.000
Node4	0.000	0.000	0.000	4.660E+05	0.000
Node5	0.000	0.000	0.000	21.0	0.000
Node6	0.000	0.000	0.000	29.1	0.000
Node7	0.000	0.000	0.000	29.5	0.000
Node8	798.	0.000	0.000	31.9	0.000
Node9	4.707E+03	0.000	0.000	5.297E+05	0.000
Node10	0.000	0.000	0.000	2.068E+05	0.000
Node11	190.	0.000	0.000	3.361E+04	0.000
Node12	0.000	0.000	0.000	3.353E+04	0.000
Node13	5.442E+03	0.000	0.000	21.8	0.000
Node15	0.000	0.000	0.000	6.34	0.000
Node16	6.237E+03	0.000	0.000	2.931E+04	0.000
Node17	0.000	0.000	0.000	24.9	0.000
Node18	0.000	0.000	0.000	28.9	0.000
Node20	44.0	0.000	0.000	2.321E+04	0.000
Node21	0.000	0.000	0.000	1.279E+05	0.000
Node22	0.000	0.000	0.000	23.3	0.000
Node23	0.000	0.000	0.000	3.528E+04	0.000
Node24	0.000	0.000	0.000	13.5	0.000
Node25	0.000	0.000	0.000	2.200E+05	0.000
Node26	9.42	0.000	0.000	22.6	0.000
Node28	0.000	0.000	0.000	1.694E+04	0.000
Node29	0.000	0.000	0.000	5.942E+04	0.000
Node30	0.000	0.000	0.000	0.000	0.000
Node31	0.000	0.000	0.000	0.000	0.000
Node32	0.000	0.000	0.000	0.000	0.000
Node33	0.000	0.000	0.000	0.000	0.000
Node34	0.000	0.000	0.000	0.000	0.000
Node35	0.000	0.000	0.000	0.000	0.000
Node36	0.000	0.000	0.000	1.048E+05	0.000
Node37	0.000	0.000	0.000	8.159E+05	0.000
Node38	6.087E+03	0.000	0.000	3.315E+06	0.000
Node39	0.000	0.000	0.000	0.000	0.000
Node40	5.763E+03	0.000	0.000	1.066E+06	0.000
Node41	0.000	0.000	0.000	0.000	0.000

Simulation Specific Information
Number of Input Conduits..... 27
Number of Natural Channels..... 0
Number of Storage Junctions..... 18
Number of Orifices..... 3
Number of Free Outfalls..... 2
Number of Simulated Conduits..... 48
Number of Junctions..... 38
Number of Weirs..... 16
Number of Pumps..... 0
Number of Tide Gate Outfalls..... 0

Average % Change in Junction or Conduit is defined as:
Conduit % Change = 100.0 * (Q(n+1) - Q(n)) / Q(n)
Junction % Change = 100.0 * (Y(n+1) - Y(n)) / Y(n)

The Conduit with the largest average change was..... 21 with 0.538 percent
The Junction with the largest average change was..... Node17 with 0.188 percent
The Conduit with the largest sinuosity was..... Link5 with 198.743

Table E21: Continuity balance at the end of the simulation
Junction Inflow, Outflow or Street Flooding
Error = Inflow + Initial Volume - Outflow - Final Volume

Junction Name	Inflow Volume, ft³/s	Average Outflow, cfs
Node1	277012.7091	0.7125
Node2	417792.1196	1.0746

Hydraulic model simulation ended normally.
XP-SWMM Simulation ended normally.
Your input file was named : C:\Temp\New folder (5)\1D\Ultimate Condition_100-Yr\Ultimate Condition_100-Yr.dat
Your output file was named : C:\Temp\New folder (5)\1D\Ultimate Condition_100-Yr\Ultimate Condition_100-Yr.out

XPSWMM\XPSTORM Simulation Date and Time Summary
Starting Date... February 17, 2021 Time... 19:35:32.268
Ending Date... February 17, 2021 Time... 19:39:32.005
Elapsed Time... 3.68984 minutes or 229.3902 seconds

Basin Name	Type	Max.HGL (ft)	Conduit (ft)	Depth (ft)	Width (ft)	Barrels	Max.Flow (ft³/s)
Node1							
Node2							

Current Directory: C:\Temp\New folder (5)\1D\Ultimate Condition_100 B-B
 Executable Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe
 Input File: C:\Temp\New folder (5)\1D\Ultimate Condition_100 B-B\Ultimate Condition_100 B-B.XP

```

=====
|                               |
|   xpswmm                       |
| Storm and Wastewater Management Model |
|   Developed by Innovyze.         |
|                               |
|-----|-----|
| Last Update   : May 21 2019    |
| Interface Version: 2019.1      |
| Engine Version : 12.0          |
| Data File Version: 12.62       |
|                               |
|-----|-----|
    
```

Engine Name: C:\Program Files\Innovyze\swmm2019.1_x64\engine\swmmengw2D64.exe

```

=====
| Input and Output file names by Layer |
|-----|-----|
    
```

Input File to Layer # 1 J:\JUS
 Output File to Layer # 1 C:\Temp\DATA.INT
 Input File to Layer # 2 J:\JUS
 Output File to Layer # 2 C:\Temp\Proposed Condition.INT

```

=====
| Configuration Parameters |
| Configuration Parameters, both those that are hardwired |
| and those added to the simulation are listed below. |
| Configuration Parameters that start with a $ are set in |
| the engine as defaults. The remaining in UPPER CASE |
| have been added to the simulation in the Configuration-> |
| Configuration Parameters dialog or as Engine Defaults in |
| the SWMM.INI file. |
| Consult the Help File for the specific meaning/purpose |
| of any particular parameter. |
| Note: |
| The second column denotes the value of the parameter. |
|-----|-----|
    
```

```

Powerstation      0.0000  1  2
Sperv             0.0000  0  4
Soldegg          0.0000  0  7
$as              0.0000  0  11
$noflat          0.0000  0  21
$oldomega        0.0000  0  24
$oldvol          0.0000  1  28
$simplic         0.0000  1  29
$oldhot          0.0000  1  31
$oldscs          0.0000  0  33
$flood           0.0000  1  40
$nokeys          0.0000  0  42
$zzero          0.0000  0  55
$oldx2           0.0000  2  59
$storage2        0.0000  3  62
$oldhot1         0.0000  1  63
$spumpwt         0.0000  1  70
$oldscs          0.0000  1  77
$sexout          0.0000  0  97
$spatial = 0.90  0.9000  5  124
$djref = -1.0   -0.1000  3  143
$weirlen = 50   50.0000  1  153
$oldbrd          0.0000  1  154
$noegrev         0.0000  1  161
    
```

```

210 Link4
212 Link5
214 Link6
216 Link7
219 Link9
225 Link12
226 Link13
231 Link15
233 Link16
242 Link21
246 Link23
250 Link25
C(203.1) 203.1
C(203.2) 203.2
C(229.1) ditch1
C(238.1) 238.1
C(266.1) 264.11
C(268.1) 263.11
C(273.1) 250.11
C(273.2) 250.21
O(207.2) orifice 5
O(218.2) orifice
O(236.1) on 1
W(207.1) weir5
W(207.2) weir6
W(218.1) weir 1
W(218.2) weir 2
W(221.1) weir3
W(223.1) weir 4
W(234.1) weir8
W(236.1) weir9
W(266.1) lazy
W(268.1) bikepath
W(270.1) south
W(271.1) driveway
W(273.1) semivale
W(275.1) sem2
W(276.1) south1
W(276.2) dway 2
D(240.1) 21
D(245.1) 23
D(248.1) 25
D(254.1) 28
D(256.1) 29
D(264.1) 36
    
```

```

=====
| Parameter Values on the Tapes Common Block. These are the |
| values read from the data file and dynamically allocated |
| by the model for this simulation. |
|-----|-----|
    
```

```

Number of Subcatchments in the Runoff Block (NW).... 27
Number of Channel/Pipes in the Runoff Block (NG).... 0
Runoff Water quality constituents (NRQ)..... 0
Runoff Land Uses per Subcatchment (NLU)..... 0
Number of Elements in the Transport Block (NET).... 0
Number of Storage Junctions in Transport (NTSE).... 0
Number of Input Hydrographs in Transport (NTH).... 0
Number of Elements in the Extran Block (NEE)..... 48
Number of Groundwater Subcatchments in Runoff (NGW). 0
Number of Interface locations for all Blocks (NIE). 48
Number of Pumps in Extran (NEP)..... 0
Number of Orifices in Extran (NEO)..... 3
Number of Tide Gates/Free Outfalls in Extran (NTG). 2
Number of Extran Weirs (NEW)..... 16
Number of scs hydrograph points..... 4339
Number of Extran printout locations (NPO)..... 0
Number of Tide elements in Extran (NTE)..... 2
Number of Natural channels (NNC)..... 0
Number of Storage junctions in Extran (NVSE)..... 19
    
```

```

$rcmid           0.0000  0  164
$new_n1_97       0.0000  2  290
SCSIDEPTH=ON    0.0000  1  293
$best97          0.0000  1  294
$newbound        0.0000  1  295
USE_US_RC        0.0000  1  312
$ql_01 = 0.01   0.0001  1  316
$new_storage     0.0000  1  322
$old_iteration   0.0000  1  333
MINLEN=6        6.0000  1  346
$renew_elevation 0.0000  1  353
$use_half_volume 0.0000  1  385
VERT_WALLS=ON   0.0000  1  389
$min_is = 1.0   1.0000  1  407
$oldsign_restart = on 0.0000  1  412
$zero_value=1.e-05 0.0000  1  415
SUBCATCHMENT_RES=ON 0.0000  1  419
$relax_depth = on 0.0000  1  427
$seawallgate = on 0.0000  1  434
PUMP_NOHEAD=ON 0.0000  1  437
$channel_geometry=1 0.0000  1  456
PROJUNITS = US  0.0000  1  462
    
```

```

=====
| The XPSWMM/XPSTORM engine internally uses object IDs |
| instead of full object names to represent objects. |
| Included below is a table of these IDs along with the |
| name of the object that ID corresponds to. |
|-----|-----|
    
```

Object ID Number	Object Name
201	Node1
202	Node2
204	Node3
206	Node4
208	Node5
209	Node6
211	Node7
213	Node8
215	Node9
217	Node10
220	Node11
222	Node12
224	Node13
228	Node15
230	Node16
232	Node17
235	Node18
237	Node20
239	Node21
241	Node22
243	Node23
244	Node24
247	Node25
249	Node26
253	Node28
255	Node29
257	Node30
258	Node31
259	Node32
260	Node33
261	Node34
262	Node35
263	Node36
265	Node37
267	Node38
269	Node39
272	Node40
274	Node41
205	Link2

```

Number of Time history data points in Extran (NTVAL). 0
Number of Variable storage elements in Extran (NVST) 17
Number of Input Hydrographs in Extran (NEH)..... 0
Number of Particle sizes in Transport Block (NPS).... 0
Number of User defined conduits (NHW)..... 27
Number of Connecting conduits in Extran (NECC)..... 20
Number of Upstream elements in Transport (NTOC).... 10
Number of Storage/treatment plants (NSTU)..... 1
Number of Values for R1 lines in Transport (NR1).... 0
Number of Nodes to be allowed for (NNOD)..... 48
Number of Plugs in a Storage Treatment Unit..... 1
    
```

```

=====
# Entry made to the Runoff Layer(Block) of SWMM #
# Last Updated June, 2014 by Innovyze #
=====
    
```

```

=====
| RUNOFF TABLES IN THE OUTPUT FILE |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| For example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Rainage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |
|-----|-----|
    
```

```

A1
=====
# RUNOFF JOB CONTROL #
=====
Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVPAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAV
    
```

Decay is read in for each subcatchment
REGEN = 0.01000

Raingage # 1
KTYPE - Rainfall input type..... 0
NHISTO - Total number of rainfall values.. 482
KINC - Rainfall values(pairs) per line.. 10
KPRINT - Print rainfall(0-Yes,1-No)..... 0
KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THISTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 13.3200 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Channel or inlet	Per-Width (ft)	Area (ac)	Deprs Imperv	Deprs cent	Deprs Slope	Prent "n" ft/impv	Prent "n" Storge	Deter "n" Strge	
1	Node40#1	Node40	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000
2	Node36#1	Node36	1.0000	19.960	0.00	1.000	0.020	0.020	0.000	0.000	0.000
3	Node21#1	Node21	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
4	Node10#1	Node10	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
5	Node10#2	Node10	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000
6	Node26#1	Node26	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000
7	Node1#1	Node1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000
8	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000
9	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
10	Node29#1	Node29	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
11	Node9#1	Node9	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000
12	Node23#1	Node23	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
13	Node24#1	Node24	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
14	Node20#1	Node20	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000
15	Node25#1	Node25	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
16	Node2#1	Node2	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000
17	Node28#1	Node28	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000
18	Node12#1	Node12	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000
19	Node11#1	Node11	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000
20	Node37#1	Node37	1.0000	6.2800	0.00	1.000	0.020	0.020	0.000	0.000	0.000
21	Node38#1	Node38	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000
22	Node30#1	Node30	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000
23	Node31#1	Node31	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000
24	Node32#1	Node32	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000
25	Node33#1	Node33	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000

Total Number of Subcatchments... 27
Total Tributary Area (acres).... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infil #
10 - 2nd infil 11 - 3rd infil #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node40 No Tributary Channel/Pipes
Node36 Tributary Subareas..... Node40#1
Node21 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node36#1
Node10 No Tributary Channel/Pipes
Node26 Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Node4 Tributary Subareas..... Node1#1
Node16 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node16#1

26 Node34#1 Node34 1.0000 3.3400 0.00 1.000 0.020 0.020 0.000 0.000 0.000
27 Node35#1 Node35 1.0000 7.6600 0.00 1.000 0.020 0.020 0.000 0.000 0.000

Table R2. SUBCATCHMENT DATA #
Infiltration or Time of Concentration Data #
Infiltration Type Infil #1(#5) Infil #2(#6) Infil #3(#7) Infil #4(#8) #
SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
SBUH -> Comp CN Time Conc N/A #
Green Ampt -> Suction Hydr Cond Initial MD N/A #
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infil. Volume #
Proportional -> Infil N/A N/A N/A #
Initial/Cont Loss -> Initial Continuing N/A #
Initial/Proportional -> Infil Constant N/A #
Laurentson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
Rational Formula -> Tc Method Flow Path Length Flow Path Slope Roughness or Retardance #
(#1 - #4 is Impervious Data / #5 - #8 is Pervious Data) #
Rational Formula Tc Method: 1 = Constant #
2 = Friend's Equation #
3 = Kinematic Wave #
4 = Alameda Method #
5 = Izzard's Formula #
6 = Kerby's Equation #
7 = Kirpich's Equation #
8 = Bransby Williams Equation #
9 = Federal Aviation Authority Equation #
#####

Subcatchment Number	Name	Infil #1	Infil #2	Infil #3	Infil #4	Infil #5	Infil #6	Infil #7	Infil #8
1	Node40#1	84.000	0.838	484.000	0.200				
2	Node36#1	91.000	0.333	484.000	0.200				
3	Node21#1	88.000	0.333	484.000	0.200				
4	Node10#1	85.000	0.167	484.000	0.200				
5	Node10#2	74.000	0.333	484.000	0.200				
6	Node26#1	85.000	0.167	484.000	0.200				
7	Node1#1	88.000	0.333	484.000	0.200				
8	Node4#1	88.000	0.288	484.000	0.200				
9	Node16#1	91.000	0.322	484.000	0.200				
10	Node29#1	90.000	0.433	484.000	0.200				
11	Node9#1	86.000	0.212	484.000	0.200				
12	Node23#1	91.000	0.333	484.000	0.200				
13	Node24#1	85.000	0.167	484.000	0.200				
14	Node20#1	80.000	0.167	484.000	0.200				
15	Node25#1	88.000	0.258	484.000	0.200				
16	Node2#1	79.000	0.167	484.000	0.200				
17	Node28#1	88.000	0.312	484.000	0.200				
18	Node12#1	77.000	0.167	484.000	0.200				
19	Node11#1	89.000	0.320	484.000	0.200				
20	Node37#1	76.000	0.252	484.000	0.200				
21	Node38#1	91.000	0.617	484.000	0.200				
22	Node30#1	73.000	0.258	484.000	0.200				
23	Node31#1	72.000	0.333	484.000	0.200				
24	Node32#1	79.000	0.333	484.000	0.200				
25	Node33#1	70.000	0.333	484.000	0.200				
26	Node34#1	76.000	0.312	484.000	0.200				
27	Node35#1	74.000	0.433	484.000	0.200				

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Name	Gage	Infiltration	Routing
1	Node40#1	1	SCS Method	SCS curvilinear

Node29 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node29#1
Node69 No Tributary Channel/Pipes
Node23 Tributary Subareas..... Node9#1
Node24 No Tributary Channel/Pipes
Node20 Tributary Subareas..... Node23#1
Node25 No Tributary Channel/Pipes
Node2 Tributary Subareas..... Node20#1
Node28 No Tributary Channel/Pipes
Node12 No Tributary Channel/Pipes
Node11 Tributary Subareas..... Node12#1
Node37 No Tributary Channel/Pipes
Node37 Tributary Subareas..... Node11#1
Node38 No Tributary Channel/Pipes
Node30 Tributary Subareas..... Node37#1
Node31 Tributary Subareas..... Node38#1
Node30 No Tributary Channel/Pipes
Node31 Tributary Subareas..... Node30#1
Node32 Tributary Subareas..... Node31#1
Node33 Tributary Subareas..... Node32#1
Node34 No Tributary Channel/Pipes
Node34 Tributary Subareas..... Node33#1
Node35 No Tributary Channel/Pipes
Node35 Tributary Subareas..... Node34#1

* Hydrographs will be stored for the following 26 INLETS *

Node40	Node36	Node21
Node10	Node26	Node1
Node4	Node16	Node29
Node9	Node23	Node24
Node20	Node25	Node2
Node28	Node12	Node11
Node37	Node38	Node30
Node31	Node32	Node33
Node34	Node35	

* Quality Simulation not included in this run *

* Precipitation Interface File Summary *
* Number of precipitation station..... 1 *

Location Station Number

1. 1

*** End of Header Section ***

Entry made to the HYDRAULIC Layer of XP-SWMM #
Last Updated in June, 2014 by Innovye #

Entry made to the Runoff Layer(Block) of SWMM #
Last Updated June, 2014 by Innovye #
#####

=====
| RUNOFF TABLES IN THE OUTPUT FILE |
| These are the more important tables in the output file. |
| You can use your editor to find the table numbers. |
| for example: search for Table R3 to check continuity. |
| This output file can be imported into a Word Processor |
| and printed on US letter or A4 paper using portrait |
| mode, courier font, a size of 8 pt. and margins of 0.75 |
| |
| Table R1 - Physical Hydrology Data |
| Table R2 - Infiltration data |
| Table R3 - Raingage and Infiltration Database Names |
| Table R4 - Groundwater Data |
| Table R5 - Continuity Check for Surface Water |
| Table R6 - Continuity Check for Channels/Pipes |
| Table R7 - Continuity Check for Subsurface Water |
| Table R8 - Infiltration/Inflow Continuity Check |
| Table R9 - Summary Statistics for Subcatchments |
| Table R10 - Sensitivity analysis for Subcatchments |
=====

A1

RUNOFF JOB CONTROL #

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most IO - METRIC..... 0
Runoff input print control..... 0
Runoff graph plot control..... 0
Runoff output print control..... 0
Limit number of groundwater convergence messages to 10000
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages - LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is 1/1/2014
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)..... 60.0
Simulation length is..... 72.0 Hours
If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = 0.01000

Raingage #..... 1
KTYPE - Rainfall input type..... 0
NHSTO - Total number of rainfall values..... 482
KINC - Rainfall values(pairs) per line..... 10
KPRINT - Print rainfall(0-Yes,1-No)..... 0

SCS -> Comp CN Time Conc Shape Factor Depth or Fracton #
SBUH -> Comp CN Time Conc N/A N/A #
Green Ampt -> Hydr Cond Initial MD N/A #
Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
Proportional -> Constant N/A N/A N/A #
Initial/Cont Loss -> Initial Continuing N/A N/A #
Initial/Proportional -> Initial Constant N/A N/A #
Laursen Parameters -> B Value Pervious "n" Impervious Cont Exponent #
Rational Formula -> To Method Flow Path Length Flow Path Slope Roughness or Retardance #
(#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)
Rational Formula To Method: 1 = Constant # #
2 = Friend's Equation # #
3 = Kinematic Wave # #
4 = Alameda Method # #
5 = Izzard's Formula # #
6 = Kerby's Equation # #
7 = Kirpich's Equation # #
8 = Bransby Williams Equation # #
9 = Federal Aviation Authority Equation # #
#####

Subcatchment Number	Name	Infl #1	Infl #2	Infl #3	Infl #4	Infl #5	Infl #6	Infl #7	Infl #8
1	Node40#1	84.000	0.838	484.000	0.200				
2	Node36#1	91.000	0.333	484.000	0.200				
3	Node21#1	88.000	0.333	484.000	0.200				
4	Node10#1	85.000	0.167	484.000	0.200				
5	Node10#2	74.000	0.333	484.000	0.200				
6	Node26#1	85.000	0.167	484.000	0.200				
7	Node1#1	88.000	0.338	484.000	0.200				
8	Node4#1	88.000	0.288	484.000	0.200				
9	Node16#1	91.000	0.322	484.000	0.200				
10	Node29#1	90.000	0.433	484.000	0.200				
11	Node9#1	86.000	0.212	484.000	0.200				
12	Node23#1	91.000	0.333	484.000	0.200				
13	Node24#1	85.000	0.167	484.000	0.200				
14	Node20#1	80.000	0.167	484.000	0.200				
15	Node25#1	88.000	0.258	484.000	0.200				
16	Node2#1	79.000	0.167	484.000	0.200				
17	Node28#1	88.000	0.312	484.000	0.200				
18	Node12#1	77.000	0.167	484.000	0.200				
19	Node11#1	89.000	0.320	484.000	0.200				
20	Node37#1	76.000	0.252	484.000	0.200				
21	Node3#1	91.000	0.617	484.000	0.200				
22	Node30#1	73.000	0.258	484.000	0.200				
23	Node31#1	72.000	0.333	484.000	0.200				
24	Node32#1	79.000	0.333	484.000	0.200				
25	Node33#1	70.000	0.333	484.000	0.200				
26	Node34#1	76.000	0.312	484.000	0.200				
27	Node35#1	74.000	0.433	484.000	0.200				

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Name	Gage	Infiltration Type	Routing Type
1	Node40#1	1	SCS Method	SCS curvilinear
2	Node36#1	1	SCS Method	SCS curvilinear
3	Node21#1	1	SCS Method	SCS curvilinear
4	Node10#1	1	SCS Method	SCS curvilinear
5	Node10#2	1	SCS Method	SCS curvilinear
6	Node26#1	1	SCS Method	SCS curvilinear
7	Node1#1	1	SCS Method	SCS curvilinear
8	Node4#1	1	SCS Method	SCS curvilinear
9	Node16#1	1	SCS Method	SCS curvilinear
10	Node29#1	1	SCS Method	SCS curvilinear

KTIME - Precipitation time units
0 -> Minutes 1 -> Hours..... 1
KPREP - Precipitation unit type
0 -> Intensity 1 -> Volume..... 1
KTHIS - Variable rainfall intervals
0 -> No, >= 1 -> Yes..... 0
THSTO - Rainfall time interval..... 0.10
TZRAIN - Starting time(KTIME units)..... 0.00

Rainfall input summary from Runoff #

Total rainfall for gage # 1 is 13.3200 inches

Data Group F1 #
Evaporation Rate (in/day) #
#####

JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100

Table R1. SUBCATCHMENT DATA #
Physical Hydrology Data #
#####

Subcatchment Number	Channel Name	Per-Width (ft)	Area (ac)	Imperv	Cent Slope	ft/ft	Depn-sion	Deprs	Prcnt	Storge	Strge	Deten
					"n"		Impv	"n"	Impv	Perv	Impv	-tion
1	Node40#1	Node40	1.0000	184.60	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
2	Node36#1	Node36	1.0000	19.960	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
3	Node21#1	Node21	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
4	Node10#1	Node10	1.0000	7.3800	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
5	Node10#2	Node10	1.0000	12.130	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
6	Node26#1	Node26	1.0000	1.2900	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
7	Node1#1	Node1	1.0000	14.770	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
8	Node4#1	Node4	1.0000	46.700	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
9	Node16#1	Node16	1.0000	3.6100	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
10	Node29#1	Node29	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
11	Node9#1	Node9	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
12	Node23#1	Node23	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
13	Node24#1	Node24	1.0000	2.4800	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
14	Node20#1	Node20	1.0000	0.57000	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
15	Node25#1	Node25	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
16	Node2#1	Node2	1.0000	27.510	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
17	Node28#1	Node28	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
18	Node12#1	Node12	1.0000	1.4100	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
19	Node11#1	Node11	1.0000	6.5200	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
20	Node37#1	Node37	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
21	Node3#1	Node3	1.0000	151.46	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
22	Node30#1	Node30	1.0000	32.480	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
23	Node31#1	Node31	1.0000	4.2600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
24	Node32#1	Node32	1.0000	19.360	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
25	Node33#1	Node33	1.0000	16.650	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
26	Node34#1	Node34	1.0000	3.3400	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000
27	Node35#1	Node35	1.0000	7.6600	0.00	1.000	0.020	0.020	0.000	0.000	0.000	0.000

Table R2. SUBCATCHMENT DATA #
Infiltration of Time of Concentration Data #
#####

Infiltration Type	Infl #1(#5)	Infl #2(#6)	Infl #3(#7)	Infl #4(#8)
11	Node9#1	1	SCS Method	SCS curvilinear
12	Node23#1	1	SCS Method	SCS curvilinear
13	Node24#1	1	SCS Method	SCS curvilinear
14	Node20#1	1	SCS Method	SCS curvilinear
15	Node25#1	1	SCS Method	SCS curvilinear
16	Node2#1	1	SCS Method	SCS curvilinear
17	Node28#1	1	SCS Method	SCS curvilinear
18	Node12#1	1	SCS Method	SCS curvilinear
19	Node11#1	1	SCS Method	SCS curvilinear
20	Node37#1	1	SCS Method	SCS curvilinear
21	Node3#1	1	SCS Method	SCS curvilinear
22	Node30#1	1	SCS Method	SCS curvilinear
23	Node31#1	1	SCS Method	SCS curvilinear
24	Node32#1	1	SCS Method	SCS curvilinear
25	Node33#1	1	SCS Method	SCS curvilinear
26	Node34#1	1	SCS Method	SCS curvilinear
27	Node35#1	1	SCS Method	SCS curvilinear

Total Number of Subcatchments..... 27
Total Tributary Area (acres)..... 652.86
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 652.86
Total Width (feet)..... 27.00
Impervious Area (%)..... 0.00

SUBCATCHMENT DATA #
Default, Ratio values for subcatchment data #
Used with the calibrate node in the runoff. #
1 - width 2 - area 3 - impervious % #
4 - slope 5 - imp "n" 6 - perv "n" #
7 - imp ds 8 - perv ds 9 - 1st infl #
10 - 2nd infl 11 - 3rd infl #
#####

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Arrangement of Subcatchments and Channel/Pipes *

Inlet
Node40 No Tributary Channel/Pipes
Node36 Tributary Subareas..... Node40#1
Node21 Tributary Subareas..... Node36#1
Node10 No Tributary Channel/Pipes
Node10 Tributary Subareas..... Node21#1
Node10 No Tributary Channel/Pipes
Node26 Tributary Subareas..... Node10#1 Node10#2
Node1 No Tributary Channel/Pipes
Node4 Tributary Subareas..... Node1#1
Node16 No Tributary Channel/Pipes
Node16 Tributary Subareas..... Node16#1
Node29 No Tributary Channel/Pipes
Node29 Tributary Subareas..... Node29#1
Node9 No Tributary Channel/Pipes
Node9 Tributary Subareas..... Node9#1
Node23 No Tributary Channel/Pipes
Node23 Tributary Subareas..... Node23#1
Node24 No Tributary Channel/Pipes
Node24 Tributary Subareas..... Node24#1
Node20 No Tributary Channel/Pipes

Tributary Subareas..... Node20#1
Node25 No Tributary Channel/Pipes
Tributary Subareas..... Node25#1
Node2 No Tributary Channel/Pipes
Tributary Subareas..... Node2#1
Node28 No Tributary Channel/Pipes
Tributary Subareas..... Node28#1
Node12 No Tributary Channel/Pipes
Tributary Subareas..... Node12#1
Node11 No Tributary Channel/Pipes
Tributary Subareas..... Node11#1
Node37 No Tributary Channel/Pipes
Tributary Subareas..... Node37#1
Node38 No Tributary Channel/Pipes
Tributary Subareas..... Node38#1
Node30 No Tributary Channel/Pipes
Tributary Subareas..... Node30#1
Node31 No Tributary Channel/Pipes
Tributary Subareas..... Node31#1
Node32 No Tributary Channel/Pipes
Tributary Subareas..... Node32#1
Node33 No Tributary Channel/Pipes
Tributary Subareas..... Node33#1
Node34 No Tributary Channel/Pipes
Tributary Subareas..... Node34#1
Node35 No Tributary Channel/Pipes
Tributary Subareas..... Node35#1

Hydrographs will be stored for the following 26 INLETS *

Node40 Node36 Node21
Node10 Node26 Node1
Node4 Node16 Node29
Node9 Node23 Node24
Node20 Node25 Node2
Node28 Node12 Node11
Node37 Node38 Node30
Node31 Node32 Node33
Node34 Node35

* Quality Simulation not included in this run *

Precipitation Interface File Summary *

* Number of precipitation station 1 *

Location Station Number

1. 1

A1

HYDRAULICS TABLES IN THE OUTPUT FILE

These are the more important tables in the output file.
You can use your editor to find the table numbers.
For example: search for Table E20 to check continuity.
This output file can be imported into a Word Processor
and printed on US letter or A4 paper using portrait

Ponding Area Exponent..... 1.0000
Minimum Orifice Length..... 1000.00 feet.
NUSW input hydrograph junction..... 0
or user defined hydrographs....

Input Information from Internal Rating Curve 21

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	5.400	0.000	0.000
3	2.000	8.400	0.000	0.000
4	3.000	21.600	0.000	0.000
5	4.000	55.000	0.000	0.000

Input Information from Internal Rating Curve 23

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	1.700	0.000	0.000
3	2.000	2.600	0.000	0.000
4	3.000	6.200	0.000	0.000
5	4.000	15.000	0.000	0.000

Input Information from Internal Rating Curve 25

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	16.500	0.000	0.000
3	2.000	24.000	0.000	0.000
4	3.000	55.500	0.000	0.000
5	4.000	131.100	0.000	0.000

Input Information from Internal Rating Curve 28

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	2.100	0.000	0.000
3	1.000	2.900	0.000	0.000
4	1.500	6.100	0.000	0.000
5	2.000	13.600	0.000	0.000

Input Information from Internal Rating Curve 29

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	0.500	3.300	0.000	0.000
3	1.000	4.700	0.000	0.000
4	1.500	10.700	0.000	0.000
5	2.000	25.000	0.000	0.000

mode, courier font, a size of 8 pt. and margins of 0.75 |

Table E1 - Basic Conduit Data
Table E2 - Conduit Factor Data
Table E3a - Junction Data
Table E3b - Junction Data
Table E4 - Conduit Connectivity Data
Table E4a - Dry Weather Flow Data
Table E4b - Real Time Control Data
Table E5 - Junction Time Step Limitation Summary
Table E5a - Conduit Explicit Condition Summary
Table E6 - Final Model Condition
Table E7 - Iteration Summary
Table E8 - Junction Time Step Limitation Summary
Table E9 - Junction Summary Statistics
Table E10 - Conduit Summary Statistics
Table E11 - Area assumptions used in the analysis
Table E12 - Mean conduit information
Table E13 - Channel losses(H) and culvert info
Table E13a - Culvert Analysis Classification
Table E14 - Natural Channel Overbank Flow Information
Table E14a - Natural Channel Encroachment Information
Table E14b - Floodplain Mapping
Table E15 - Spreadsheet Info List
Table E15a - Spreadsheet Reach List
Table E16 - New Conduit Output Section
Table E17 - Pump Operation
Table E18 - Junction Continuity Error
Table E19 - Junction Inflow & Outflow Listing
Table E20 - Junction Flooding and Volume List
Table E21 - Continuity balance at simulation end
Table E22 - Model Judgement Section

Time Control from Hydraulics Job Control

Year..... 2014 Month..... 1
Day..... 1 Hour..... 0
Minute..... 0 Second..... 0

Control information for simulation

Integration cycles..... 38880
Length of integration step is..... 10.00 seconds
Simulation length..... 108.00 hours
Do not create equiv. pipes(NEQUAL)..... 0
Use U.S. customary units for I/O..... 0
Courant Time Step Factor..... 1.00000
Intermediate printout intervals of..... 500 cycles
Intermediate printout intervals of..... 83.33 minutes
Summary printout intervals of..... 500 cycles
Summary printout time interval of..... 83.33 minutes
Hot start file parameter (REDO)..... 0
Initial time..... 0.00 hours

Iteration variables: Flow Tolerance..... 0.00010

Head Tolerance..... 0.00050
Minimum depth (m or ft)..... 0.00001
Underretaxation parameter..... 0.85000
Time weighting parameter..... 0.85000
Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K..... 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions..... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 5000.00

Input Information from Internal Rating Curve 36

Point No.	Data Column #1	Data Column #2	Data Column #3	Data Column #4
1	0.000	0.000	0.000	0.000
2	1.000	14.600	0.000	0.000
3	2.000	19.500	0.000	0.000
4	3.000	38.700	0.000	0.000
5	4.000	82.000	0.000	0.000

Table E1 - Conduit Data

Imp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft ²)	Manning Coef.	Max Width (ft)	Depth (ft)	Side Slopes	Williams c-factor
1	Link2	125.0000	H Ellipse	10.2000	0.0130	4.4167	2.8333		
2	Link4	28.0000	Circular	4.9087	0.0130	2.5000	2.5000		
3	Link5	7.0000	Circular	4.9087	0.0130	2.5000	2.5000		
4	Link6	36.0000	Circular	4.9087	0.0130	2.5000	2.5000		
5	Link7	25.0000	Circular	4.9087	0.0130	2.5000	2.5000		
6	Link9	66.0000	Trapezoid	52.5000	0.0150	100.0000	0.5000	10.0000	10.0000
7	Link12	32.0000	Circular	0.7854	0.0130	1.0000	1.0000		
8	Link13	69.0000	Circular	1.2272	0.0130	1.2500	1.2500		
9	Link15	17.0000	Circular	3.1416	0.0130	2.0000	2.0000		
10	Link16	20.0000	Circular	0.7854	0.0130	1.0000	1.0000		
11	Link21	740.0000	Circular	9.6211	0.0130	3.5000	3.5000		
12	Link23	1065.0000	H Ellipse	5.1000	0.0130	3.1667	2.0000		
13	Link25	435.0000	Circular	1.7671	0.0130	1.5000	1.5000		
14	203.1	43.0000	Circular	0.7854	0.0130	1.0000	1.0000		
15	203.2	40.0000	Circular	1.7671	0.0130	1.5000	1.5000		
16	ditch1	150.0000	Trapezoid	18.0000	0.0350	6.0000	1.5000	4.0000	4.0000
17	238.1	65.0000	Circular	1.7671	0.0130	1.5000	1.5000		
18	264.11	43.0000	Circular	1.2272	0.0130	1.2500	1.2500		
19	263.11	45.0000	H Ellipse	3.3000	0.0130	2.5000	1.5833		
20	250.1	67.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
21	250.21	70.0000	H Ellipse	4.1000	0.0130	2.8333	1.8333		
22	21	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
23	23	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
24	25	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
25	28	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
26	29	1000.0000	Closed Cnd	0.0000	0.0140	2.0000	2.0000		
27	36	1000.0000	Closed Cnd	0.0000	0.0140	4.0000	4.0000		
Total length of all conduits		9188.0000	feet						

Table E2 - Conduit Factor Data

Conduit Name	Number	Entrance Loss Coef	Exit Exp/Contc Weighting	Low Flow Depth at Parameter	Depth	Flow Roughness	Which Factor n	Sediment Changes	Flow Depth Routing
Link2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link4	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link5	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link6	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link7	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link12	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link13	1.0000	0.8000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link15	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link21	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link23	1.0000	1.0000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
Link25	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
203.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
203.2	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
238.1	1.0000	0.5000	0.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave

264.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
263.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
250.11	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave
250.21	1.0000	0.5000	1.0000	0.0000	0.8500	1.0000	0.0000	0.0000	Standard - Dynamic Wave

```

=====
If there are messages about (sqrt("d")/dt/dx, or
| the (sqrt(wave celerity)*time step/conduit length) |
| in the output file all it means is that the |
| program will lower the internal time step to |
| satisfy this condition (explicit condition). |
| You control the actual internal time step by |
| using the minimum courant time step factor in the |
| HYDRAULICS job control. The message put in words |
| states that the smallest conduit with the fastest |
| velocity will control the time step selection. |
| You have further control by using the modify |
| conduit option in the HYDRAULICS Job Control. |
=====

```

Conduit Name	Courant Ratio
Link2	0.76
Link4	3.20 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link5	12.82 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link6	2.49 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link7	3.59 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link9	0.59
Link12	1.77 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link13	0.92
Link15	4.72 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link16	2.84 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
Link21	0.14
Link23	0.08
Link25	0.16
203.1	1.32 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
203.2	1.74 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
ditch1	0.38
238.1	1.07 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
264.11	1.48 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
263.11	1.59 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
250.11	1.15 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
250.21	1.10 ==> Warning ! (sqrt(wave celerity)*time step/conduit length)
21	0.00
23	0.00
25	0.00
31	0.00
28	0.00
29	0.00
36	0.00

```

=====
| Conduit Volume |
=====
Full pipe or full open conduit volume
Input full depth volume..... 2.2392E+04 cubic feet

```

Table E3a - Junction Data

Imp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst	Inst Interface	Flow (%)
1	Node1	1028.0000	1026.9000	1025.0000	0.0000	0.0000	100.0000
2	Node2	1028.0000	1025.5000	1015.0000	0.0000	0.0000	100.0000
3	Node3	1028.0000	1020.8333	1018.0000	0.0000	0.0000	100.0000
4	Node4	1025.0000	1025.0000	1019.0000	0.0000	0.0000	100.0000

Imp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst	Inst Interface	Flow (%)
29	Node32	0.0000	0.0000	Flooded	Normal	0	0.00
30	Node33	0.0000	0.0000	Flooded	Normal	0	0.00
31	Node34	0.0000	0.0000	Flooded	Normal	0	0.00
32	Node35	0.0000	0.0000	Flooded	Normal	0	0.00
33	Node36	0.0000	0.0000	Flooded	Normal	0	0.00
34	Node37	0.0000	0.0000	No Ponding	Normal	0	0.00
35	Node38	0.0000	0.0000	No Ponding	Normal	0	0.00
36	Node39	0.0000	0.0000	No Ponding	Normal	0	0.00
37	Node40	0.0000	0.0000	No Ponding	Normal	0	0.00
38	Node41	0.0000	0.0000	No Ponding	Normal	0	0.00

Table E4 - Conduit Connectivity

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation	
1	Link2	Node3	Node2	1018.0000	1017.4000	No Design
2	Link4	Node5	Node6	1021.9900	1021.3400	No Design
3	Link5	Node6	Node7	1021.3400	1021.3100	No Design
4	Link6	Node7	Node8	1021.3100	1021.1200	No Design
5	Link7	Node8	Node9	1021.1200	1021.0000	No Design
6	Link9	Node10	Node2	1024.5000	1024.5000	No Design
7	Link12	Node15	Node13	1023.1500	1022.1600	No Design
8	Link13	Node13	Node6	1021.9200	1021.5700	No Design
9	Link15	Node18	Node5	1023.0000	1022.7900	No Design
10	Link16	Node17	Node5	1022.8700	1021.9900	No Design
11	Link21	Node22	Node10	1034.3400	1021.1100	No Design
12	Link23	Node24	Node20	1031.8160	1025.0000	No Design
13	Link25	Node26	Node2	1020.0000	1015.0000	No Design
14	203.1	Node1	Node2	1025.0000	1024.0000	No Design
15	203.2	Node1	Node2	1025.4000	1024.0000	No Design
16	ditch1	Node4	Node15	1023.5000	1023.1500	No Design
17	238.1	Node20	Node2	1025.0000	1024.0000	No Design
18	264.11	Node37	Node37	1021.9800	1021.8200	No Design
19	263.11	Node37	Node38	1014.5000	1014.5000	No Design
20	250.11	Node40	Node37	1017.8500	1017.6800	No Design
21	250.21	Node40	Node37	1016.7300	1016.4800	No Design
22	21	Node21	Node10	1020.0000	1020.0000	No Design
23	23	Node23	Node24	1040.0000	1040.0000	No Design
24	25	Node25	Node2	1016.0000	1016.0000	No Design
25	28	Node28	Node12	1023.0000	1023.0000	No Design
26	29	Node29	Node17	1023.0000	1023.0000	No Design
27	36	Node36	Node22	1037.0000	1037.0000	No Design

Storage Junction Data

STORAGE NUMBER OR NAME	JUNCTION TYPE	MAXIMUM OR CONSTANT SURFACE AREA (FT2)	PEAK OR CONSTANT SURFACE (CUBIC FEET)	CROWN CONSTANT SURFACE VOLUME (FT)	DEPTH CONSTANT SURFACE VOLUME ELEVATION STARTS FROM
Node1	Stage/Area	2.981E+04	1.265E+05	1028.	Node Invert
Node2	Stage/Area	2.0052E+06	1.5507E+07	1028.	Node Invert
Node3	Stage/Area	1.0454E+04	1.8334E+04	1025.	Node Invert
Node4	Stage/Area	2.1031E+05	8.1318E+05	1025.	Node Invert
Node9	Stage/Area	1.0411E+05	7.7337E+05	1025.	Node Invert
Node10	Stage/Area	7.1700E+04	3.2470E+05	1025.	Node Invert
Node11	Stage/Area	6.8302E+04	6.2617E+04	1025.	Node Invert
Node12	Stage/Area	1.1732E+05	1.2947E+05	1025.	Node Invert
Node16	Stage/Area	1.5987E+04	3.3342E+04	1026.	Node Invert
Node20	Stage/Area	1.5115E+04	3.5049E+04	1028.	Node Invert
Node21	Stage/Area	3.7026E+04	1.4462E+05	1024.	Node Invert
Node23	Stage/Area	1.1761E+04	4.3557E+04	1044.	Node Invert
Node25	Stage/Area	5.8370E+04	2.2999E+05	1020.	Node Invert
Node28	Stage/Area	1.0454E+04	1.8717E+04	1025.	Node Invert
Node29	Stage/Area	3.4412E+04	1.3591E+05	1027.	Node Invert

Imp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Inlet Capacity	Pavement Shape	Shape Slope
5	Node5	1026.0000	1024.7900	1021.9900	0.0000	0.0000	100.0000	
6	Node6	1026.0200	1023.8400	1021.3400	0.0000	0.0000	100.0000	
7	Node7	1026.1800	1023.8100	1021.3100	0.0000	0.0000	100.0000	
8	Node8	1026.0200	1023.6200	1021.1200	0.0000	0.0000	100.0000	
9	Node9	1026.0000	1023.5000	1015.0000	0.0000	0.0000	100.0000	
10	Node10	1025.0000	1025.0000	1019.0000	0.0000	0.0000	100.0000	
11	Node11	1025.0000	1023.2300	1021.9800	0.0000	0.0000	100.0000	
12	Node12	1025.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000	
13	Node13	1025.7300	1023.1700	1021.9200	0.0000	0.0000	100.0000	
14	Node15	1025.0000	1024.6500	1023.1500	0.0000	0.0000	100.0000	
16	Node16	1026.0000	1022.0000	1022.0000	0.0000	0.0000	100.0000	
17	Node17	1026.0000	1025.0000	1022.8700	0.0000	0.0000	100.0000	
18	Node18	1026.0000	1025.0000	1022.0000	0.0000	0.0000	100.0000	
19	Node20	1028.0000	1027.0000	1025.0000	0.0000	0.0000	100.0000	
21	Node21	1024.0000	1024.0000	1020.0000	0.0000	0.0000	100.0000	
22	Node22	1041.0000	1041.0000	1034.3400	0.0000	0.0000	100.0000	
23	Node23	1044.0000	1044.0000	1040.0000	0.0000	0.0000	100.0000	
24	Node24	1038.0000	1044.0000	1031.8160	0.0000	0.0000	100.0000	
25	Node25	1020.0000	1020.0000	1016.0000	0.0000	0.0000	100.0000	
26	Node26	1028.0000	1021.5000	1020.0000	0.0000	0.0000	100.0000	
27	Node28	1025.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000	
28	Node29	1027.0000	1025.0000	1023.0000	0.0000	0.0000	100.0000	
29	Node30	1020.0000	1016.0000	1016.0000	0.0000	0.0000	100.0000	
30	Node31	1044.0000	1040.0000	1040.0000	0.0000	0.0000	100.0000	
31	Node32	1041.0000	1037.0000	1037.0000	0.0000	0.0000	100.0000	
32	Node33	1024.0000	1020.0000	1020.0000	0.0000	0.0000	100.0000	
33	Node34	1025.0000	1023.0000	1023.0000	0.0000	0.0000	100.0000	
34	Node35	1027.0000	1023.0000	1023.0000	0.0000	0.0000	100.0000	
35	Node36	1041.0000	1041.0000	1037.0000	0.0000	0.0000	100.0000	
36	Node37	1023.1000	1023.0700	1014.5000	0.0000	0.0000	100.0000	
37	Node38	1023.0000	1016.0833	1014.5000	0.0000	0.0000	100.0000	
38	Node40	1024.3000	1019.6833	1016.7300	0.0000	0.0000	100.0000	
38	Node41	1023.0000	1019.8000	1019.8000	0.0000	0.0000	100.0000	

Table E3b - Junction Data

Imp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Inlet Capacity	Pavement Shape	Shape Slope
1	Node1	0.0000	0.0000	Flooded	Normal	0	0.00	
2	Node2	0.0000	0.0000	No Ponding	Normal	0	0.00	
3	Node3	0.0000	0.0000	No Ponding	Normal	0	0.00	
4	Node4	0.0000	0.0000	No Ponding	Normal	0	0.00	
5	Node5	0.0000	0.0000	Flooded	Normal	0	0.00	
6	Node6	0.0000	0.0000	Flooded	Normal	0	0.00	
7	Node7	0.0000	0.0000	Flooded	Normal	0	0.00	
8	Node8	0.0000	0.0000	Flooded	Normal	0	0.00	
9	Node9	0.0000	0.0000	Flooded	Normal	0	0.00	
10	Node10	0.0000	0.0000	No Ponding	Normal	0	0.00	
11	Node11	0.0000	0.0000	No Ponding	Normal	0	0.00	
12	Node12	0.0000	0.0000	No Ponding	Normal	0	0.00	
13	Node13	0.0000	0.0000	No Ponding	Normal	0	0.00	
14	Node15	0.0000	0.0000	No Ponding	Normal	0	0.00	
15	Node16	0.0000	0.0000	Flooded	Normal	0	0.00	
16	Node17	0.0000	0.0000	Flooded	Normal	0	0.00	
17	Node18	0.0000	0.0000	Flooded	Normal	0	0.00	
18	Node20	0.0000	0.0000	No Ponding	Normal	0	0.00	
19	Node21	0.0000	0.0000	Flooded	Normal	0	0.00	
20	Node22	0.0000	0.0000	Flooded	Normal	0	0.00	
21	Node23	0.0000	0.0000	Flooded	Normal	0	0.00	
22	Node24	0.0000	0.0000	No Ponding	Normal	0	0.00	
23	Node25	0.0000	0.0000	Flooded	Normal	0	0.00	
24	Node26	0.0000	0.0000	No Ponding	Normal	0	0.00	
25	Node28	0.0000	0.0000	Flooded	Normal	0	0.00	
26	Node29	0.0000	0.0000	Flooded	Normal	0	0.00	
27	Node30	0.0000	0.0000	Flooded	Normal	0	0.00	
28	Node31	0.0000	0.0000	Flooded	Normal	0	0.00	

Node	Stage/Area	Volume	Area	ac-ft	
Node36	Stage/Area	3.0056E+04	1.1674E+05	1041.	Node Invert
Node37	Stage/Area	2.4472E+05	9.9641E+05	1023.	Node Invert
Node38	Stage/Area	1.0556E+06	4.3540E+06	1023.	Node Invert
Node40	Stage/Area	8.7207E+05			

4	1018.0000	3.0000	40946.4000	107335.2951	0.9400	2.4641
5	1019.0000	4.0000	44431.2000	150011.8103	1.0200	3.4438
6	1020.0000	5.0000	68624.8000	205196.2156	1.5800	4.7336
7	1021.0000	6.0000	84070.8000	282516.2478	1.9300	6.4857
8	1022.0000	7.0000	91040.4000	370047.8469	2.0900	8.4951
9	1023.0000	8.0000	97574.4000	464335.4357	2.2400	10.6597
10	1024.0000	9.0000	104108.4000	565158.1825	2.3900	12.9742
11	1025.0000	11.0000	104108.4000	773734.9825	2.3900	17.7542

Variable storage data for node | Node10

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1019.0000	0.0000	35849.8800	0.0000	0.8230	0.0000
2	1020.0000	1.0000	44344.0800	40021.3923	1.0180	0.9188
3	1021.0000	2.0000	49092.1200	86718.9061	1.1270	1.9908
4	1022.0000	3.0000	55234.0800	138851.3258	1.2690	3.1676
5	1023.0000	4.0000	59198.0400	196055.3676	1.3590	4.5008
6	1024.0000	5.0000	63249.1200	257267.1635	1.4520	5.9060
7	1025.0000	6.0000	71699.7600	324696.7868	1.6460	7.4540

Variable storage data for node | Node11

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1021.9800	0.0000	43.5600	0.0000	0.0010	0.0000
2	1022.5000	0.5200	261.3600	71.3467	0.0060	0.0016
3	1023.0000	1.0200	2178.0000	603.5493	0.0500	0.0139
4	1023.5000	1.5200	13634.2800	4147.2186	0.3130	0.0952
5	1024.0000	2.0200	29098.0800	14588.8602	0.6680	0.3349
6	1024.5000	2.5200	48046.6800	33677.9165	1.1030	0.7311
7	1025.0000	3.0200	68302.0800	62616.7572	1.5680	1.4375

Variable storage data for node | Node12

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1023.0000	0.0000	13734.9807	0.0000	0.3153	0.0000
2	1024.0000	1.0000	68517.9634	37643.0245	1.5730	0.8642
3	1025.0000	2.0000	117318.9719	129473.5655	2.6933	2.9723

Variable storage data for node | Node16

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1022.0000	0.0000	2962.0800	0.0000	0.0680	0.0000
2	1023.0000	1.0000	5401.4400	4121.1112	0.1240	0.0946
3	1024.0000	2.0000	7579.4400	10580.8162	0.1740	0.2429
4	1025.0000	3.0000	11107.8000	19863.3223	0.2550	0.3156
5	1026.0000	4.0000	15886.5200	33341.5384	0.3670	0.7654

Variable storage data for node | Node20

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1025.0000	0.0000	8624.8800	0.0000	0.1980	0.0000
2	1027.0000	2.0000	12675.9600	21171.0372	0.2910	0.4860
3	1028.0000	3.0000	15115.3200	35048.6612	0.3470	0.8046

Variable storage data for node | Node21

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1025.0000	0.0000	8624.8800	0.0000	0.1980	0.0000
2	1027.0000	2.0000	12675.9600	21171.0372	0.2910	0.4860
3	1028.0000	3.0000	15115.3200	35048.6612	0.3470	0.8046

Variable storage data for node | Node37

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	1655.2800	0.0000	0.0380	0.0000
2	1015.0000	0.5000	5270.7600	1646.6136	0.1210	0.0378
3	1015.5000	1.0000	7013.1600	4707.2128	0.1610	0.1081
4	1016.0000	1.5000	9060.4800	8714.6729	0.2080	0.2001
5	1016.5000	2.0000	11107.8000	13748.0107	0.2550	0.3156
6	1017.0000	2.5000	12874.8000	23369.1847	0.6600	0.5365
7	1017.5000	3.0000	14655.8800	52630.8487	2.1730	1.2082
8	1018.0000	3.5000	18221.8400	105740.7127	2.7140	2.4275
9	1018.5000	4.0000	131420.5200	168121.5828	3.0170	3.8595
10	1019.0000	4.5000	142702.5600	236632.3123	3.2760	5.4323
11	1019.5000	5.0000	151850.1600	310257.9162	3.4860	7.1225
12	1020.0000	5.5000	161912.5200	388684.3526	3.7170	8.9230
13	1020.5000	6.0000	169707.8800	471332.8060	3.8730	10.8203
14	1021.0000	6.5000	173908.1600	557454.8570	4.0360	12.7874
15	1021.5000	7.0000	185434.9200	647754.0328	4.2570	14.8704
16	1022.0000	7.5000	207694.0800	745982.7448	4.7680	17.1254
17	1023.0000	8.5000	244720.0800	971934.6208	5.6180	22.3125
18	1023.1000	8.6000	244720.0800	996406.6288	5.6180	22.8743

Variable storage data for node | Node38

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	43.5600	0.0000	0.0010	0.0000
2	1015.0000	0.5000	2178.0000	421.5917	0.0500	0.0097
3	1015.5000	1.0000	5706.3600	2323.1996	0.1310	0.0533
4	1016.0000	1.5000	8668.4800	5891.1560	0.1990	0.1352
5	1016.5000	2.0000	11790.9120	17940.9130	0.2620	0.4119
6	1017.0000	2.5000	139547.6800	113198.3905	9.0780	2.5987
7	1017.5000	3.0000	538314.4800	345717.7894	12.3580	7.9366
8	1018.0000	3.5000	593809.9200	628632.6452	13.6320	14.4314
9	1018.5000	4.0000	634974.1200	935768.1094	14.5770	21.4823
10	1019.0000	4.5000	675746.2800	1.26339E+06	15.5130	29.0035
11	1019.5000	5.0000	714950.2800	1.61102E+06	16.4130	36.9839
12	1020.0000	5.5000	755896.6800	1.97868E+06	17.3530	45.4242
13	1020.5000	6.0000	802985.0400	2.36833E+06	18.4340	54.3695
14	1021.0000	6.5000	840751.6800	2.77923E+06	19.3010	63.8923
15	1021.5000	7.0000	875033.2800	3.20814E+06	20.0880	73.6488
16	1022.0000	7.5000	916110.3600	3.65588E+06	21.0310	83.9275
17	1023.0000	8.5000	105545.9200	4.64088E+06	24.2320	106.5399

Variable storage data for node | Node40

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1016.7300	0.0000	43.5600	0.0000	0.0010	0.0000
2	1018.0000	1.2700	456.2800	924.6502	0.0130	0.0075
3	1018.5000	1.7700	2657.1600	1066.3262	0.0610	0.0245
4	1019.0000	2.2700	49092.1200	11594.6474	1.1270	0.2862
5	1020.0000	3.2700	188789.0400	122977.4982	4.3340	2.8232
6	1020.5000	3.7700	293115.5600	237097.1919	6.2010	5.4430
7	1021.0000	4.2700	357801.8400	393562.2546	8.2140	9.0349
8	1021.5000	4.7700	440086.6800	592677.8695	10.1030	13.6060
9	1022.0000	5.2700	605396.8800	852590.1552	13.8880	19.5810
10	1023.0000	6.2700	872071.2000	1.58763E+06	20.0200	36.4470
11	1024.3000	7.5700	872071.2000	2.72133E+06	20.0200	62.4730

Office Data

Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1014.5000	0.0000	1655.2800	0.0000	0.0380	0.0000
2	1015.0000	0.5000	5270.7600	1646.6136	0.1210	0.0378
3	1015.5000	1.0000	7013.1600	4707.2128	0.1610	0.1081
4	1016.0000	1.5000	9060.4800	8714.6729	0.2080	0.2001
5	1016.5000	2.0000	11107.8000	13748.0107	0.2550	0.3156
6	1017.0000	2.5000	12874.8000	23369.1847	0.6600	0.5365
7	1017.5000	3.0000	14655.8800	52630.8487	2.1730	1.2082
8	1018.0000	3.5000	18221.8400	105740.7127	2.7140	2.4275
9	1018.5000	4.0000	131420.5200	168121.5828	3.0170	3.8595
10	1019.0000	4.5000	142702.5600	236632.3123	3.2760	5.4323
11	1019.5000	5.0000	151850.1600	310257.9162	3.4860	7.1225
12	1020.0000	5.5000	161912.5200	388684.3526	3.7170	8.9230
13	1020.5000	6.0000	169707.8800	471332.8060	3.8730	10.8203
14	1021.0000	6.5000	173908.1600	557454.8570	4.0360	12.7874
15	1021.5000	7.0000	185434.9200	647754.0328	4.2570	14.8704
16	1022.0000	7.5000	207694.0800	745982.7448	4.7680	17.1254
17	1023.0000	8.5000	244720.0800	971934.6208	5.6180	22.3125
18	1023.1000	8.6000	244720.0800	996406.6288	5.6180	22.8743

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1020.0000	0.0000	35283.6000	0.0000	0.8100	0.0000
2	1021.0000	1.0000	35719.2000	35500.8223	0.8200	0.8150
3	1022.0000	2.0000	36154.8000	71437.2429	0.8300	1.6400
4	1023.0000	3.0000	36590.4000	107809.2618	0.8400	2.4750
5	1024.0000	4.0000	37026.0000	144616.8790	0.8500	3.3199

Variable storage data for node | Node23

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1040.0000	0.0000	10018.8000	0.0000	0.2300	0.0000
2	1041.0000	1.0000	10454.4000	10235.7252	0.2400	0.2350
3	1042.0000	2.0000	10890.0000	20907.0776	0.2500	0.4800
4	1043.0000	3.0000	11326.6000	32014.0547	0.2600	0.7349
5	1044.0000	4.0000	11761.2000	43556.6543	0.2700	0.9999

Variable storage data for node | Node25

Data Point	Elevation ft	Depth ft	Area ft²	Volume ft³	Area acres	Volume ac-ft
1	1016.0000	0.0000	56828.0000	0.0000	1.3000	0.0000
2	1017.0000	1.0000	57063.6000	56845.0925	1.3100	1.3050
3	1018.0000	2.0000	57499.2000	114125.7816	1.3200	2.6200
4	1019.0000	3.0000	57934.8000	171842.6766	1.3300	3.9450
5	1020.0000	4.0000	58370.4000	229993.9500	1.3400	5.2799

Variable storage data for node | Node28</

duration simulations. Please check your |
 continuity errors and make adjustments to |
 your model as required. |

===== |
 FREE OUTFALL DATA (DATA GROUP 1) |
 BOUNDARY CONDITION ON DATA GROUP J1 |
 =====

Outfall at Junction...Node39 has boundary condition number... 1
 Outfall at Junction...Node41 has boundary condition number... 2

=====> Warning !! Outfall Junction Node39 has two or more connecting conduits.
 =====> Warning !! Outfall Junction Node41 has two or more connecting conduits.

===== |
 Weir Outfall Data |
 Boundary Condition on data group J1 |
 =====

Weir Outfall at Junction... Node39 has boundary condition number... 1
 Weir Outfall at Junction... Node39 has boundary condition number... 1
 Weir Outfall at Junction... Node41 has boundary condition number... 2
 Weir Outfall at Junction... Node41 has boundary condition number... 2
 Weir Outfall at Junction... Node41 has boundary condition number... 2

===== |
 INTERNAL CONNECTIVITY INFORMATION |
 =====

CONDUIT	JUNCTION	JUNCTION
orifice 5	Node4	Node2
orifice	Node10	Node3
or1	Node16	Node18
Weir5	Node4	Node2
weir6	Node4	Node2
weir 1	Node10	Node3
weir 2	Node10	Node3
weir3	Node12	Node11
weir 4	Node2	Node12
weir8	Node16	Node17
weir9	Node16	Node18
lacy	Node11	Node37
bikepath	Node37	Node38
south	Node38	Node39
driveway	Node37	Node39
seminole	Node40	Node37
sem2	Node37	Node41
south1	Node40	Node41
dway 2	Node40	Node41
FREE# 1	Node39	BOUNDARY
FREE# 2	Node41	BOUNDARY

===== |
 Boundary Condition Information |
 Data Groups J1-J4 |
 =====

BC NUMBER... 1 has no control water surface.
 BC NUMBER... 2 has no control water surface.

=====> WARNING ! Junction Node30 is not associated with any conduit.
 =====> WARNING ! Junction Node31 is not associated with any conduit.

Node12	100.00	100.00	0.0
Node13	0.83	2.09	24820.0
Node15	22.74	56.84	0.0
Node16	70.55	100.00	0.0
Node17	0.21	0.52	284560.0
Node18	11.48	28.71	0.0
Node20	74.31	100.00	0.0
Node21	51.84	100.00	0.0
Node22	59.36	100.00	0.0
Node23	56.57	100.00	0.0
Node24	100.00	100.00	0.0
Node25	39.46	98.66	0.0
Node26	8.36	20.91	1520.0
Node28	79.35	100.00	0.0
Node29	88.17	100.00	0.0
Node30	100.00	100.00	0.0
Node31	100.00	100.00	0.0
Node32	100.00	100.00	0.0
Node33	100.00	100.00	0.0
Node34	100.00	100.00	0.0
Node35	100.00	100.00	0.0
Node36	39.77	99.43	0.0
Node37	63.78	100.00	0.0
Node38	100.00	100.00	0.0
Node39	100.00	100.00	0.0
Node40	93.17	100.00	0.0
Node41	100.00	100.00	0.0

The junction requiring the smallest time step was...Node17

===== |
 Table E5a - Conduit Explicit Condition Summary |
 Courant = Conduit Length |
 Time step = ----- |
 Velocity + sqrt(g*depth) |
 ===== |
 Conduit Implicit Condition Summary |
 Courant = Conduit Length |
 Time step = ----- |
 Velocity |
 =====

The 3rd column is the Explicit time step times the
 minimum courant time step factor |
 Minimum Conduit Time Step in seconds in the 4th column |
 in the list. Maximum possible is 10 * maximum time step |
 The 5th column is the maximum change at any time step |
 during the simulation. The 6th column is the wobble |
 value which is an indicator of the flow stability. |
 You should use this section to find those conduits that |
 are slowing your model down. Use modify conduits to |
 alter the length of the slow conduits to make your |
 simulation faster, or change the conduit name to |
 'CHME?????' where ????? are any characters, this will |
 lengthen the conduit based on the model time step, |
 not the value listed in modify conduits. |
 =====

Conduit	Time(s)	Exp/Cmin	Time(m)	Time(min)	Max Qchange	Wobble	Type of Soln
Link2	5.05	5.05	11.28	290.7	0.109	5.955	Normal Soln
Link4	1.61	1.61	4.13	0.0	4.353	381.537	Normal Soln
Link5	0.09	0.09	0.11	6140.0	964.142	27101.261	Normal Soln
Link6	0.91	0.91	1.37	0.0	23.271	875.510	Normal Soln
Link7	1.57	1.57	4.50	4.7	0.468	169.822	Normal Soln
Link9	100.00	100.00	100.00	0.0	0.000	0.000	Normal Soln
Link12	1.74	1.74	4.00	0.0	0.088	55.286	Normal Soln
Link13	3.77	3.77	13.02	0.0	0.519	232.657	Normal Soln
Link15	1.28	1.28	2.61	14.0	0.525	218.135	Normal Soln

=====> WARNING ! Junction Node32 is not associated with any conduit.
 =====> WARNING ! Junction Node33 is not associated with any conduit.
 =====> WARNING ! Junction Node34 is not associated with any conduit.
 =====> WARNING ! Junction Node35 is not associated with any conduit.

===== |
 Conduit Convergence Criteria |
 =====

Conduit Name	Full Flow	Conduit Slope
Link2	73.8984	0.0048
Link4	62.4947	0.0232
Link5	26.8520	0.0043
Link6	29.7983	0.0053
Link7	28.4175	0.0048
Link9	10.0415	0.0000
Link12	6.2666	0.0309
Link13	4.6007	0.0051
Link15	25.1434	0.0124
Link16	7.4734	0.0440
Link21	134.5264	0.0179
Link23	33.6545	0.0064
Link25	11.2618	0.0115
203.1	5.4332	0.0233
203.2	19.8518	0.0350
ditch1	36.4193	0.0023
238.1	13.0290	0.0154
264.11	3.9404	0.0037
263.11	0.7414	0.0000
250.11	15.7704	0.0025
250.21	18.7101	0.0036
21	0.0000	0.0000
23	0.0000	0.0000
25	0.0000	0.0000
28	0.0000	0.0000
29	0.0000	0.0000
36	0.0000	0.0000
orifice 5	3.8094	0.0000
orifice	3.8094	0.0000
or1	0.5379	0.0000

===== |
 Table E5 - Junction Time Limitation Summary |
 (0.10 or 0.25) * Depth * Area |
 Time step = ----- |
 Sum of Flow |
 =====

The time this junction was the limiting junction |
 is listed in the third column. |
 =====

Junction	Time(.10)	Time(.25)	Time(sec)
Node1	85.58	100.00	44590.0
Node2	100.00	100.00	0.0
Node3	39.39	98.47	0.0
Node4	52.24	100.00	0.0
Node5	10.21	25.52	0.0
Node6	0.09	0.22	5960.0
Node7	0.00	0.01	27220.0
Node8	6.46	16.15	130.0
Node9	37.23	93.07	0.0
Node10	77.39	100.00	0.0
Node11	100.00	100.00	0.0

Link16	0.99	0.99	1.58	15.0	-0.178	253.074	Normal Soln
Link21	33.77	33.77	57.88	0.0	0.100	2.022	Normal Soln
Link23	74.22	74.22	100.00	0.0	0.030	2.380	Normal Soln
Link25	22.89	22.89	80.97	0.0	0.048	4.997	Normal Soln
203.1	2.31	2.31	4.92	0.0	0.104	6.246	Normal Soln
203.2	2.40	2.40	5.34	0.0	0.173	3.521	Normal Soln
ditch1	21.39	21.39	97.46	0.0	-14.136	2.359	Normal Soln
238.1	4.03	4.03	9.15	0.0	-1.200	4.897	Normal Soln
264.11	2.79	2.79	6.76	0.0	0.012	8.346	Normal Soln
263.11	1.94	1.94	6.11	15.7	0.021	128.374	Normal Soln
250.11	3.45	3.45	8.49	0.0	-0.041	5.358	Normal Soln
250.21	3.36	3.36	8.95	0.0	-0.041	4.597	Normal Soln
21	100.00	100.00	100.00	0.0	52.528	0.000	Special Cnd
23	100.00	100.00	100.00	0.0	0.017	0.000	Special Cnd
25	100.00	100.00	100.00	0.0	-131.114	0.000	Special Cnd
28	100.00	100.00	100.00	0.0	2.853	0.000	Special Cnd
29	100.00	100.00	100.00	0.0	27.905	0.000	Special Cnd
36	100.00	100.00	100.00	0.0	0.204	0.000	Special Cnd
orifice 5	50.41	50.41	100.00	0.0	-0.016	4.611	Normal Soln
orifice	63.43	63.43	100.00	0.0	-0.016	5.195	Normal Soln
or1	64.44	64.44	100.00	0.0	-0.012	11.833	Normal Soln

The conduit with the smallest time step limitation was Link5
 The conduit with the largest wobble was Link5
 The conduit with the largest flow change in any
 consecutive time step.....Link5

===== |
 * End of time step DO-loop in Runoff *
 =====

Final Date (Mo/Day/Year) = 1/4/2014
 Total number of time steps = 4340
 Final Julian Date = 2014004
 Final time of day = 0. seconds.
 Final time of day = 0.00 hours.
 Final running time = 72.0000 hours.
 Final running time = 3.0000 days.

===== |
 * Extrapolation Summary for Watersheds *
 * Explains the number of time steps and iterations *
 * used in the solution of the subcatchments. *
 * # Steps ==> Total Number of Extrapolated Steps *
 * # Calls ==> Total Number of OVERLND Calls *
 =====

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
Node40#1	0	0	Node36#1	0	0	Node21#1	0	0
Node10#1	0	0	Node10#2	0	0	Node26#1	0	0
Node1#1	0	0	Node4#1	0	0	Node16#1	0	0
Node29#1	0	0	Node6#1	0	0	Node23#1	0	0
Node24#1	0	0	Node20#1	0	0	Node25#1	0	0
Node2#1	0	0	Node28#1	0	0	Node12#1	0	0
Node11#1	0	0	Node37#1	0	0	Node38#1	0	0
Node30#1	0	0	Node31#1	0	0	Node32#1	0	0
Node33#1	0	0	Node34#1	0	0	Node35#1	0	0

===== |
 # Rainfall input summary from Runoff Continuity Check *
 =====

Total rainfall read for gage # 1 is 13.3200 in
 Total rainfall duration for gage # 1 is 2868.05 minutes

===== |
 * Table R5. CONTINUITY CHECK FOR SURFACE WATER *
 * Any continuity error can be fixed by lowering the
 wet and transition time step. The transition time *
 * should not be much greater than the wet time step. *
 =====

	Inches over	
	cubic feet	Total Basin
Total Precipitation (Rain plus Snow)	3.156683E+07	13.320
Total Infiltration	4.542970E+06	1.917
Total Evaporation	4.720097E+05	0.199
Surface Runoff from Watersheds	2.654996E+07	11.203
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Pervious Area...	4.542970E+06	1.917
Infiltration + Evaporation +		
Surface Runoff + Snow removal +		
Water remaining in Surface Storage +		
Water remaining in Snow Cover.....	3.156494E+07	13.319
Total Precipitation + Initial Storage.	3.156683E+07	13.320

The error in continuity is calculated as

* Precipitation + Initial Snow Cover *	
- Infiltration -	
*Evaporation - Snow removal -	
*Surface Runoff from Watersheds - *	
*Water in Surface Storage -	
*Water remaining in Snow Cover *	

* Precipitation + Initial Snow Cover *	

Percent Continuity Error.....	0.0060

	Inches over	
	cubic feet	Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	2.654996E+07	11.203
Groundwater Subsurface Inflow or Diversion..	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Groundwater Flow Diverted Out of Network....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	2.654996E+07	11.203
Initial Storage + Inflow.....	2.654996E+07	11.203
Final Storage + Outflow + Diverted GW.....	2.654996E+07	11.203

* Final Storage + Outflow + Evaporation - *		
* Watershed Runoff - Groundwater Inflow - *		
* Initial Channel/Pipe Storage *		

* Final Storage + Outflow + Evaporation *		

Percent Continuity Error.....	0.0000	

 # Table R9. Summary Statistics for Subcatchments #

Note: Total Runoff Depth includes pervious & impervious areas.
 Pervious and Impervious Runoff Depth is only the runoff from those two areas.
 For catchments receiving redirected flow, this flow will only be shown if the flow is not directed directly to the outlet. Flow that is getting redirected is also listed with the original subcatchment.

Subcatchment.....	Node40#1	Node36#1	Node21#1	Node10#1	Node10#2
Area (acres).....	184.60000	19.30000	16.65000	7.30000	12.13000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	13.32000	13.32000	13.32000	13.32000	13.32000

Subcatchment.....	Node69#1	Node23#1	Node24#1	Node20#1	Node25#1
Area (acres).....	18.65000	4.26000	2.48000	0.57000	32.48000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	13.32000	13.32000	13.32000	13.32000	13.32000
Max Intensity (in/hr)..	9.62167	9.62167	9.62167	9.62167	9.62167

Rational Formula					
Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins)..	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)..	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node69#1	Node23#1	Node24#1	Node20#1	Node25#1
Area (acres).....	18.65000	4.26000	2.48000	0.57000	32.48000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	13.32000	13.32000	13.32000	13.32000	13.32000
Max Intensity (in/hr)..	9.62167	9.62167	9.62167	9.62167	9.62167

Pervious Area					
Total Runoff Depth (in)	11.35032	12.00346	11.21685	10.53359	11.61449
Peak Runoff Rate (cfs).	127.18298	24.02436	18.53980	4.17506	204.56120
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area					
Total Runoff Depth (in)	11.35032	12.00346	11.21685	10.53359	11.61449
Peak Runoff Rate (cfs).	127.18298	24.02436	18.53980	4.17506	204.56120
Rational Formula					
Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins)..	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)..	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node2#1	Node28#1	Node12#1	Node11#1	Node37#1
Area (acres).....	27.51000	3.34000	1.41000	6.52000	6.28000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	13.32000	13.32000	13.32000	13.32000	13.32000
Max Intensity (in/hr)..	9.62167	9.62167	9.62167	9.62167	9.62167

Pervious Area					
Total Runoff Depth (in)	10.39382	11.61448	10.11110	11.74511	9.96798
Peak Runoff Rate (cfs).	200.51133	19.30027	10.16707	37.33555	38.05328
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000

	9.62167	9.62167	9.62167	9.62167	9.62167
Max Intensity (in/hr)..	9.62167	9.62167	9.62167	9.62167	9.62167
Pervious Area					
Total Runoff Depth (in)	11.08206	12.00346	11.61447	11.21685	9.67878
Peak Runoff Rate (cfs).	617.53278	109.18114	93.23758	55.17087	63.64733
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000
Total Area					
Total Runoff Depth (in)	11.08206	12.00346	11.61447	11.21685	9.67878
Peak Runoff Rate (cfs).	617.53278	109.18114	93.23758	55.17087	63.64733
Rational Formula					
Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins)..	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)..	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node26#1	Node1#1	Node4#1	Node16#1	Node29#1
Area (acres).....	1.29000	14.77000	46.70000	3.61000	7.66000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	13.32000	13.32000	13.32000	13.32000	13.32000
Max Intensity (in/hr)..	9.62167	9.62167	9.62167	9.62167	9.62167

Pervious Area					
Total Runoff Depth (in)	11.21685	11.61447	11.61448	12.00346	11.87476
Peak Runoff Rate (cfs).	9.64369	82.05286	279.77673	20.71548	37.79763
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000

Total Area					
Total Runoff Depth (in)	11.21685	11.61447	11.61448	12.00346	11.87476
Peak Runoff Rate (cfs).	9.64369	82.05286	279.77673	20.71548	37.79763

Rational Formula					
Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins)..	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr)..	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	Node69#1	Node23#1	Node24#1	Node20#1	Node25#1
Area (acres).....	18.65000	4.26000	2.48000	0.57000	32.48000
Percent Impervious.....	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	13.32000	13.32000	13.32000	13.32000	13.32000
Max Intensity (in/hr)..	9.62167	9.62167	9.62167	9.62167	9.62167

Pervious Area					
Total Runoff Depth (in)	10.39382	11.61448	10.11110	11.74511	9.96798
Peak Runoff Rate (cfs).	200.51133	19.30027	10.16707	37.33555	38.05328
Total Impervious Area					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area with depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area without depression storage					
Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.0

Partial Area Intensity, 0.00000 0.00000 0.00000 0.00000 0.00000

Subcatchment..... Node34#1 Node35#1
Area (acres)..... 3.34000 7.66000
Percent Impervious..... 0.00000 0.00000
Total Rainfall (in)..... 13.32000 13.32000
Max Intensity (in/hr)..... 9.62167 9.62167

PerVIOUS Area
Total Runoff Depth (in) 9.96796 9.67877
Peak Runoff Rate (cfs) 18.31970 35.22980

Total Impervious Area
Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000

Impervious Area with depression storage
Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000

Impervious Area without depression storage
Total Runoff Depth (in) 0.00000 0.00000
Peak Runoff Rate (cfs) 0.00000 0.00000

Total Area
Total Runoff Depth (in) 9.96796 9.67877
Peak Runoff Rate (cfs) 18.31970 35.22980

Rational Formula
Pervious Tc (mins)..... 0.00000 0.00000
Perv. Intensity (in/hr) 0.00000 0.00000
Pervious C 0.00000 0.00000
Impervious Tc (mins)..... 0.00000 0.00000
Imp. Intensity (in/hr) 0.00000 0.00000
Impervious C 0.00000 0.00000
Partial Area (Ha)..... 0.00000 0.00000
Partial Area Tc..... 0.00000 0.00000
Partial Area Intensity. 0.00000 0.00000

====> Runoff simulation ended normally.

Table E6. Final Model Condition
This table is used for steady state flow comparison and is the information saved to the hok-restart file.
Final Time = 108.000 hours

Junction / Depth / Elevation
Node1/ 0.02 / 1025.02/
Node2/ 8.55 / 1023.55/
Node3/ 5.55 / 1023.55/
Node4/ 4.55 / 1023.55/
Node5/ 1.56 / 1023.55/
Node6/ 2.21 / 1023.55/
Node7/ 2.24 / 1023.55/
Node8/ 2.43 / 1023.55/
Node9/ 8.55 / 1023.55/
Node10/ 4.55 / 1023.55/
Node11/ 0.00 / 1021.98/
Node12/ 0.80 / 1023.80/
Node13/ 1.63/ 1023.55/
Node14/ 0.40 / 1023.55/
Node15/ 1.55 / 1023.55/
Node16/ 0.68 / 1023.55/
Node17/ 0.68 / 1023.55/
Node18/ 1.55 / 1023.55/
Node19/ 3.55 / 1023.55/
Node20/ 0.00 / 1034.34/
Node21/ 0.00 / 1023.55/
Node22/ 7.57 / 1023.55/
Node23/ 3.55 / 1023.55/
Node24/ 0.00 / 1023.80/
Node25/ 0.55 / 1023.55/
Node26/ 0.00 / 1016.00/
Node27/ 0.00 / 1037.00/
Node28/ 0.00 / 1023.00/
Node29/ 0.00 / 1037.00/
Node30/ 7.00 / 1021.50/
Node31/ 0.00 / 1021.50/
Node32/ 0.00 / 1019.80/
Node33/ 5.55 / 1023.55/
Node34/ 8.55 / 1023.55/
Node35/ 1.56 / 1023.55/
Node36/ 2.21 / 1023.55/
Node37/ 2.24 / 1023.55/
Node38/ 2.43 / 1023.55/
Node39/ 8.55 / 1023.55/
Node40/ 4.55 / 1023.55/
Node41/ 0.00 / 1021.98/
Node42/ 0.80 / 1023.80/
Node43/ 1.63 / 1023.55/
Node44/ 0.40 / 1023.55/
Node45/ 1.55 / 1023.55/
Node46/ 0.68 / 1023.55/
Node47/ 0.68 / 1023.55/
Node48/ 1.55 / 1023.55/
Node49/ 3.55 / 1023.55/
Node50/ 0.00 / 1034.34/
Node51/ 0.00 / 1023.55/
Node52/ 7.57 / 1023.55/
Node53/ 3.55 / 1023.55/
Node54/ 0.00 / 1023.80/
Node55/ 0.55 / 1023.55/
Node56/ 0.00 / 1016.00/
Node57/ 0.00 / 1037.00/
Node58/ 0.00 / 1023.00/
Node59/ 0.00 / 1037.00/
Node60/ 7.00 / 1021.50/
Node61/ 0.00 / 1021.50/
Node62/ 0.00 / 1019.80/

Conduit/ Flow
Link2/ -0.00 / Link4/ -0.00 / Link5/ -0.00 /
Link6/ -0.00 / Link7/ -0.00 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ -0.00 /
Link16/ -0.00 / Link21/ 0.00/ Link23/ 0.00/
Link25/ 0.00 / 203.1/ 0.00 / 203.2/ 0.00 /
ditch1/ 0.00 / 238.1/ 0.00 / 264.11/ 0.00 /
263.11/ 0.00 / 250.11/ 0.00 / 250.21/ 0.00 /
21/ -0.00 / 23/ 0.00 / 25/ -0.00 /
28/ -0.00 / 29/ -0.00 / 36/ 0.00 /
office 5/ -0.00 / office/ -0.00 / ori 1/ -0.00 /
Weir5/ 0.00 / weir6/ 0.00 / weir 1/ 0.00 /
weir 2/ 0.00 / weir3/ 0.00 / weir 4/ -0.00 /
weir8/ 0.00 / weir9/ 0.00 / lacy/ 0.00 /
bikepath/ 0.00 / south/ 0.01 / driveway/ 0.00 /
seminole/ 0.00 / sem2/ 0.00 / south1/ 0.00 /
dway 2/ 0.00 / FREE# 1/ 0.01 / FREE# 2/ 0.00 /

Conduit/ Velocity
Link2/ -0.00 / Link4/ -0.00 / Link5/ -0.00 /
Link6/ -0.00 / Link7/ -0.00 / Link9/ 0.00 /
Link12/ 0.00 / Link13/ 0.00 / Link15/ -0.00 /
Link16/ -0.00 / Link21/ 0.00 / Link23/ 0.00 /
Link25/ 0.68 / Node16/ 1.56 / Node20/ 0.00 /
ditch1/ 0.00 / 238.1/ 0.30 / 264.11/ 0.00 /
263.11/ 0.00 / 250.11/ 0.00 / 250.21/ 0.00 /
21/ 0.50 / 23/ 0.00 / 25/ 0.50 /
28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
office 5/ -0.01 / office/ -0.00 / ori 1/ -0.01 /

Conduit/ Width
Link2/ 0.02 / Link4/ 1.67 / Link5/ 1.52 /
Link6/ 1.03 / Link7/ 0.97 / Link9/ 0.00 /
Link12/ 0.88 / Link13/ 0.01 / Link15/ 1.93 /
Link16/ 0.10 / Link21/ 1.56 / Link23/ 1.24 /
Link25/ 0.01 / 203.1/ 0.39 / 203.2/ 0.59 /
ditch1/ 6.70 / 238.1/ 0.59 / 264.11/ 0.49 /
263.11/ 0.01 / 250.11/ 0.01 / 250.21/ 0.01 /
21/ 0.00 / 23/ 0.00 / 25/ 0.00 /
28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
office 5/ 0.01 / office/ 0.01 / ori 1/ 0.03 /

Junction/ EGL
Node1/ 0.02 / Node2/ 9.02 / Node3/ 5.55 /
Node4/ 4.55 / Node5/ 1.56 / Node6/ 2.21 /
Node7/ 2.24 / Node8/ 2.43 / Node9/ 8.55 /
Node10/ 4.55 / Node11/ 0.00 / Node12/ 0.80 /
Node13/ 1.63 / Node15/ 0.40 / Node16/ 1.55 /
Node17/ 0.68 / Node18/ 1.55 / Node20/ 0.00 /
Node21/ 3.55 / Node22/ 0.00 / Node23/ 0.00 /
Node24/ 0.00 / Node25/ 7.55 / Node26/ 3.55 /
Node28/ 0.00 / Node29/ 0.55 / Node30/ 0.00 /
Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
Node34/ 0.00 / Node35/ 0.00 / Node36/ 0.00 /
Node37/ 7.32 / Node38/ 7.00 / Node39/ 0.00 /
Node40/ 4.77 / Node41/ 0.00 /

Junction/ Freeboard
Node1/ 2.98 / Node2/ 4.45 / Node3/ 1.45 /
Node4/ 1.45 / Node5/ 2.45 / Node6/ 2.47 /
Node7/ 2.63 / Node8/ 2.47 / Node9/ 2.45 /
Node10/ 1.45 / Node11/ 3.02 / Node12/ 1.20 /
Node13/ 2.18 / Node15/ 1.45 / Node16/ 2.45 /
Node17/ 2.45 / Node18/ 2.45 / Node20/ 3.00 /
Node21/ 0.45 / Node22/ 6.05 / Node23/ 4.00 /
Node24/ 6.18 / Node25/ -3.55 / Node26/ 4.45 /
Node28/ 1.20 / Node29/ 3.45 / Node30/ 4.00 /
Node31/ 4.00 / Node32/ 4.00 / Node33/ 4.00 /
Node34/ 2.00 / Node35/ 4.00 / Node36/ 4.00 /
Node37/ 1.60 / Node38/ 1.50 / Node39/ 1.50 /
Node40/ 2.80 / Node41/ 3.20 /

Junction/ Max Volume
Node1/ 195641.84 / Node2/ 6918713.38 / Node3/ 10792.26 /
Node4/ 586784.11 / Node5/ 4266.21 / Node6/ 6231.36 /
Node7/ 4484.26 / Node8/ 5181.98 / Node9/ 77380.63 /
Node10/ 25326.40 / Node11/ 34738.69 / Node12/ 39999.89 /
Node13/ 47.98 / Node15/ 20.37 / Node16/ 3341.87 /
Node17/ 3829.77 / Node18/ 3895.02 / Node20/ 28279.54 /
Node21/ 143476.22 / Node22/ 24.20 / Node23/ 37535.04 /
Node24/ 14.45 / Node25/ 22996.25 / Node26/ 57.14 /
Node28/ 18717.27 / Node29/ 12096.54 / Node30/ 0.00 /
Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
Node34/ 0.00 / Node35/ 0.00 / Node36/ 109411.85 /
Node37/ 902993.73 / Node38/ 415438.43 / Node39/ 0.00 /
Node40/ 1588432.49 / Node41/ 0.00 /

Junction/ Total Fldng
Node1/ 0.00 / Node2/ 0.00 / Node3/ 0.00 /
Node4/ 0.00 / Node5/ 215090.03 / Node6/ 110292.40 /
Node7/ 1106556.54 / Node8/ 17577.22 / Node9/ 0.00 /
Node10/ 0.00 / Node11/ 0.00 / Node12/ 0.00 /
Node13/ 0.00 / Node15/ 0.00 / Node16/ 0.00 /
Node17/ 42607.43 / Node18/ 37812.64 / Node20/ 0.00 /
Node21/ 0.00 / Node22/ 0.00 / Node23/ 0.00 /
Node24/ 0.00 / Node25/ 0.00 / Node26/ 0.00 /
Node28/ 0.00 / Node29/ 0.00 / Node30/ 0.00 /
Node31/ 0.00 / Node32/ 0.00 / Node33/ 0.00 /
Node34/ 0.00 / Node35/ 0.00 / Node36/ 0.00 /
Node37/ 0.00 / Node38/ 0.00 / Node39/ 0.00 /
Node40/ 0.00 / Node41/ 0.00 /

Conduit/ Cross Sectional Area
Link2/ 10.27 / Link4/ 4.46 / Link5/ 4.63 /
Link6/ 4.84 / Link7/ 4.95 / Link9/ 0.00 /
Link12/ 0.35 / Link13/ 1.23 / Link15/ 1.06 /
Link16/ 0.77 / Link21/ 0.72 / Link23/ 0.00 /
Link25/ 1.79 / 203.1/ 0.00 / 203.2/ 0.00 /
ditch1/ 0.60 / 238.1/ 0.00 / 264.11/ 0.00 /
263.11/ 3.37 / 250.11/ 4.13 / 250.21/ 4.14 /
21/ 1.00 / 23/ 1.00 / 25/ 1.00 /
28/ 1.00 / 29/ 1.00 / 36/ 1.00 /
office 5/ 0.81 / office/ 0.81 / ori 1/ 0.17 /

Conduit/ Final Volume
Link2/ 1284.00 / Link4/ 124.81 / Link5/ 32.44 /
Link6/ 174.32 / Link7/ 123.77 / Link9/ 0.00 /
Link12/ 11.05 / Link13/ 84.86 / Link15/ 18.06 /
Link16/ 15.33 / Link21/ 530.48 / Link23/ 6.13 /
Link25/ 777.04 / 203.1/ 0.18 / 203.2/ 0.00 /
ditch1/ 90.39 / 238.1/ 0.03 / 264.11/ 0.00 /
263.11/ 151.55 / 250.11/ 276.44 / 250.21/ 289.94 /
21/ 0.00 / 23/ 0.00 / 25/ 0.00 /
28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
office 5/ 807.85 / office/ 807.85 / ori 1/ 168.57 /

Conduit/ Hydraulic Radius
Link2/ 0.88 / Link4/ 0.75 / Link5/ 0.75 /
Link6/ 0.69 / Link7/ 0.63 / Link9/ 0.00 /
Link12/ 0.22 / Link13/ 0.31 / Link15/ 0.40 /
Link16/ 0.25 / Link21/ 0.11 / Link23/ 0.01 /
Link25/ 0.38 / 203.1/ 0.01 / 203.2/ 0.00 /
ditch1/ 0.08 / 238.1/ 0.00 / 264.11/ 0.00 /
263.11/ 0.49 / 250.11/ 0.55 / 250.21/ 0.55 /
21/ 0.00 / 23/ 0.00 / 25/ 0.00 /
28/ 0.00 / 29/ 0.00 / 36/ 0.00 /
office 5/ 0.25 / office/ 0.25 / ori 1/ 0.11 /

Conduit/ Upstream/ Downstream Elevation
Link2/ 1023.55/ 1023.55 / Link4/ 1023.55/ 1023.55 /
Link6/ 1023.55/ 1023.55 / Link7/ 1023.55/ 1023.55 /
Link12/ 1023.55/ 1023.55 / Link13/ 1023.55/ 1023.55 /

Link16/ 1023.55/ 1023.55 / Link21/ 1034.34/ 1023.55 / Link23/ 1031.82/ 1025.00 /
Link25/ 1023.55/ 1023.55 / 203.1/ 1025.02/ 1024.01 / 203.2/ 1023.55/ 1023.55 /
ditch1/ 1023.55/ 1023.55 / 238.1/ 1025.00/ 1024.00 / 264.11/ 1021.98/ 1021.82/
263.11/ 1021.50/ 1021.50 / 250.11/ 1021.50/ 1021.50 / 250.21/ 1021.50/ 1021.50 /
21/ 1023.55/ 1023.55 / 23/ 1040.00/ 1031.82 / 25/ 1023.55/ 1023.55 /
28/ 1023.80/ 1023.80 / 29/ 1023.55/ 1023.55 / 36/ 1037.00/ 1034.34 /
office 5/ 1023.55/ 1023.55 / office/ 1023.55/ 1023.55 / ori 1/ 1023.55/ 1023.55 /

Table E7 - Iteration Summary

Total number of time steps simulated..... 38880
Total number of passes in the simulation..... 13923002
Total number of time steps during simulation..... 363500
Ratio of actual # of time steps / NTCYC..... 9.349
Average number of iterations per time step..... 38.304
Average time step size(seconds)..... 1.070
Smallest time step size(seconds)..... 1.000
Largest time step size(seconds)..... 10.000
Average minimum Conduit Courant time step (sec)..... 1.489
Average minimum implicit time step (sec)..... 0.736
Average minimum junction time step (sec)..... 0.736
Average Courant Factor Tl..... 0.736
Number of times omega reduced..... 598176

Table E8 - Junction Time Step Limitation Summary

Not Conv = Number of times this junction did not converge during the simulation.
Avg Conv = Average junction iterations.
Conv err = Mean convergence error.
Omega Cng = Change of omega during iterations
Max Iter = Maximum number of iterations

Junction Not Conv Avg Conv Total Iter Omega Cng Max Iter Iter >10 Iter >25 Iter >40
Node1 53882 81.04 29459195 3672 501 63975 63390 63085
Node2 44968 74.13 26947694 41133 501 96696 64954 61352
Node3 0 1.72 623798 443 499 66 25 16
Node4 0 1.61 584604 3 72 12 1 1
Node5 1 2.50 909300 1922 501 1563 463 194
Node6 14265 25.80 9377162 28002 501 21799 18209 17111
Node7 14310 25.52 9277578 28209 501 21554 18353 17489
Node8 0 2.11 768683 319 78 897 256 31
Node9 0 1.59 576294 0 24 89 0 0
Node10 39085 61.21 22249646 57890 501 55064 42989 42988
Node11 337 1.53 555057 62 501 363 340 339
Node12 89997 131.80 47836106 95827 501 95262 94871 94871
Node13 19 1.47 355198 4 501 139 19 19
Node15 15 1.18 430016 1 501 21 15 15
Node16 2 1.51 547676 34 501 1492 733 495
Node17 58196 87.27 31720934 72355 501 72222 63450 63121
Node18 3 2.15 780037 764 501 2028 611 480
Node20 1061 2.72 989017 687 501 1283 1261 1257
Node21 69139 97.00 35260587 74036 501 69866 69712 69697
Node22 0 1.10 398624 0 6 0 0 0
Node23 0 1.07 389417 0 5 0 0 0
Node24 0 1.08 391780 3 55 3 3 2
Node25 61002 85.14 30949345 61216 501 61216 61199 61198
Node26 42 1.24 452527 266 501 235 222 215
Node28 9363 141.23 5133819 107805 501 107248 101595 101595
Node29 18319 27.20 9887143 22636 501 22365 18532 18532
Node30 0 1.00 363500 0 1 0 0 0
Node31 0 1.00 363500 0 1 0 0 0
Node32 0 1.00 363500 0 1 0 0 0
Node33 0 1.00 363500 0 1 0 0 0
Node34 0 1.00 363500 0 1 0 0 0

Node35	0	1.00	363500	0	1	0	0	0	0
Node36	0	1.13	409978	0	5	0	0	0	0
Node37	85	2.73	622692	0	101	2067	133	1237	0
Node38	0	1.05	382918	0	7	0	0	0	0
Node39	0	1.13	410673	0	55	3	3	2	0
Node40	0	1.46	529748	291	131	1165	486	341	0
Node41	0	1.17	459999	0	37	5	1	0	0

Total number of iterations for all junctions.....31859920
Minimum number of possible iterations.....13813000
Efficiency of the simulation.....23.06
Poor Efficiency

Extran Efficiency is an indicator of the efficiency of the simulation. Ideal efficiency is 1.0. A value of 0.5 indicates that the simulation is taking twice as long to run as it should. Altering the underrelaxation parameter, lowering the time step, increasing the flow and head, tolerance are good ways of improving the efficiency, and another is lowering the internal time step. The lower the efficiency generally the faster your model will run. If your efficiency is less than 1.5 then you may try increasing your time step so that your overall simulation is faster. Ideal efficiency would be around 2.0

Good Efficiency < 1.5 mean iterations
Excellent Efficiency < 2.5 and > 1.5 mean iterations
Good Efficiency < 4.0 and > 2.5 mean iterations
Fair Efficiency > 4.0 and < 7.5 mean iterations
Poor Efficiency > 7.5 mean iterations

Table E9 - JUNCTION SUMMARY STATISTICS

Junction Name	Elevation	Flow	Time	Surcharge	Freeboard	Junction	Gutter	Gutter	Gutter	Area	Depth	Width	Velocity
Name	feet	feet	feet	feet	feet	ft	ft	ft	ft	sq ft	ft	ft	ft/s
Node1	1028.000	1028.000	1028.0123	36	46	1.1123	0.0000	70610.760	0.0000	0.00	0.0000	0.00	0.0000
Node2	1028.000	1025.000	1023.5531	37	21	0.0000	4.4469	139666.1	0.0000	0.00	0.0000	0.00	0.0000
Node3	1025.000	1020.8333	1023.8310	36	50	2.9977	1.1690	374.2412	0.0000	0.00	0.0000	0.00	0.0000
Node4	1025.000	1020.000	1023.7118	36	29	0.0000	1.2882	150895.10	0.0000	0.00	0.0000	0.00	0.0000
Node5	1026.000	1024.7900	1026.6115	39	5	1.6215	0.0000	9215.8245	0.0000	0.00	0.0000	0.00	0.0000
Node6	1028.000	1028.8400	1028.8240	36	50	2.9840	0.0000	11172.553	0.0000	0.00	0.0000	0.00	0.0000
Node7	1026.1800	1023.8100	1026.8137	39	15	3.0037	0.0000	9423.0658	0.0000	0.00	0.0000	0.00	0.0000
Node8	1026.0200	1023.6200	1026.7251	39	7	3.1051	0.0000	10120.404	0.0000	0.00	0.0000	0.00	0.0000
Node9	1026.0000	1023.5000	1026.7030	39	16	3.2030	0.0000	104108.40	0.0000	0.00	0.0000	0.00	0.0000
Node10	1025.0000	1024.8500	1024.7709	40	7	0.1209	0.2291	12.5660	0.0000	0.00	0.0000	0.00	0.0000
Node11	1025.0000	1023.2300	1024.5219	36	28	1.2919	0.4781	48858.939	0.0000	0.00	0.0000	0.00	0.0000
Node12	1025.0000	1025.0000	1024.0340	36	32	0.0000	0.9660	69964.424	0.0000	0.00	0.0000	0.00	0.0000
Node13	1025.7300	1023.1700	1025.7300	36	47	2.5600	0.0000	12.5660	0.0000	0.00	0.0000	0.00	0.0000
Node15	1025.0000	1024.8500	1024.7709	40	7	0.1209	0.2291	12.5660	0.0000	0.00	0.0000	0.00	0.0000
Node16	1026.0000	1022.0000	1026.5667	39	7	4.5667	0.0000	15986.520	0.0000	0.00	0.0000	0.00	0.0000
Node17	1026.0000	1025.0000	1026.5642	39	7	1.5642	0.0000	8790.4356	0.0000	0.00	0.0000	0.00	0.0000
Node18	1026.0000	1025.0000	1026.5704	39	6	1.5704	0.0000	8844.7531	0.0000	0.00	0.0000	0.00	0.0000
Node20	1028.0000	1028.0000	1028.0000	36	45	0.5341	0.4659	13952.128	0.0000	0.00	0.0000	0.00	0.0000
Node21	1024.0000	1024.0000	1023.9747	36	31	0.0000	0.0253	36590.400	0.0000	0.00	0.0000	0.00	0.0000
Node22	1041.0000	1041.0000	1036.2655	36	29	0.0000	4.7345	12.5660	0.0000	0.00	0.0000	0.00	0.0000
Node23	1044.0000	1044.0000	1043.4830	36	36	0.0000	0.5170	11534.965	0.0000	0.00	0.0000	0.00	0.0000
Node24	1038.0000	1024.0000	1032.9556	36	13	0.0000	6.5044	12.5660	0.0000	0.00	0.0000	0.00	0.0000
Node25	1020.0000	1020.0000	1023.5531	37	57	3.5531	0.0000	58370.400	0.0000	0.00	0.0000	0.00	0.0000
Node26	1028.0000	1021.5000	1024.5474	36	12	3.0474	3.4526	12.5660	0.0000	0.00	0.0000	0.00	0.0000
Node28	1025.0000	1025.0000	1025.0222	36	26	0.0222	0.0000	10454.400	0.0000	0.00	0.0000	0.00	0.0000
Node29	1027.0000	1025.0000	1026.5642	39	7	1.5642	4.3558	34412.400	0.0000	0.00	0.0000	0.00	0.0000
Node30	1020.0000	1016.0000	1016.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000	0.00	0.0000
Node31	1044.0000	1040.0000	1040.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000	0.00	0.0000

dryway 2 Undefined Undefined Undefined 198.0622 36 49
FREEE 1 Undefined Undefined Undefined 548.5182 36 51
FREEE 2 Undefined Undefined Undefined 394.2983 36 49

Table E11. Area assumptions used in the analysis

Conduit Name	Dry	Critical	Critical	Normal	X-Section	Verd
Name	Flow(min)	Flow(min)	Flow(min)	Flow(min)	Radius-m	Area(ft ²)
Link2	363.96	5588.65	0.00	527.39	1.105	10.267 54.720
Link4	290.67	6188.33	0.00	0.00	0.751	5.033 21.123
Link5	290.78	6189.67	0.00	0.00	0.766	5.145 288.669
Link6	299.33	6180.67	0.00	0.00	0.760	5.123 72.111
Link7	304.17	5634.87	0.00	540.97	0.760	5.136 13.381
Link9	6480.00	0.00	0.00	0.00	0.000	0.000 0.000
Link10	1031.65	5448.15	0.00	0.00	0.255	8.110 17.681
Link13	713.17	5766.83	0.00	0.00	0.377	1.259 23.970
Link15	625.96	5467.22	0.00	386.82	0.607	3.273 8.898
Link16	289.50	6190.50	0.00	0.00	0.304	8.007 19.673
Link21	3448.20	1192.12	0.00	1942.68	0.838	6.603 26.847
Link23	2826.00	3654.00	0.00	0.00	0.690	4.017 9.752
Link25	349.62	6130.37	0.00	0.00	0.455	1.829 27.700
203.1	325.11	0.00	0.00	6154.89	0.294	0.790 17.540
203.2	4193.68	0.00	0.00	2292.32	0.438	1.413 13.094
ditch1	1217.47	1255.47	4007.07	0.00	0.964	13.588 1.594
238.1	328.50	0.00	0.00	6151.50	0.443	1.624 13.147
264.11	284.33	0.00	0.00	6195.67	0.375	1.191 11.606
263.11	247.83	6232.17	0.00	0.00	0.632	3.382 50.543
250.11	564.14	5733.82	0.00	182.04	0.693	4.144 25.173
250.21	367.96	5830.52	0.00	281.52	0.692	4.161 33.854
21	6480.00	0.00	0.00	0.00	0.000	0.000 0.000
23	6480.00	0.00	0.00	0.00	0.000	0.000 0.000
25	6480.00	0.00	0.00	0.00	0.000	0.000 0.000
28	6480.00	0.00	0.00	0.00	0.000	0.000 0.000
29	6480.00	0.00	0.00	0.00	0.000	0.000 0.000
36	6480.00	0.00	0.00	0.00	0.000	0.000 0.000
office 5	321.17	5424.87	0.00	0.00	0.733	6.813 26.233
office 5	299.58	5756.58	0.00	423.83	0.301	0.813 13.369
or1	600.94	5854.30	0.00	24.77	0.134	0.172 11.665

Table E12. Mean Conduit Flow Information

Conduit Name	Mean Flow (cfs)	Total Flow (ft ³ /s)	Mean Change (%)	Low Flow Weighting	Mean Number	Mean Radius	Mean Area	Mean Roughness
Link2	5.3332	207358.7	0.0011	0.9917	0.1379	0.8526	8.8629	0.0130
Link4	0.9274	36082.73	0.0517	0.9522	0.1431	0.6521	4.0723	0.0130
Link5	-0.6658	-258849.6	2.0679	0.9952	0.1882	0.6448	4.4836	0.0130
Link6	-0.6383	-248182.8	0.7377	0.9950	0.0879	0.6314	4.5645	0.0130
Link7	-0.6406	-249064.1	0.0134	0.9948	0.0833	0.6134	4.6253	0.0130
Link9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Link12	-1.4293	-555706.8	0.0010	0.8977	0.3231	0.2203	0.6288	0.0130
Link13	-1.4607	-567930.8	0.0029	0.9502	0.1287	0.2970	1.1552	0.0130
Link15	0.4819	187358.79	0.0153	0.9641	0.1171	0.4185	1.6707	0.0130
Link21	2.9465	173603.15	0.0217	0.9952	0.2686	0.2451	0.7293	0.0130
Link21	2.1651	841784.98	0.0007	0.4698	0.5744	0.1745	0.7632	0.0130
Link23	0.7372	286604.62	0.0002	0.5747	0.4520	0.0868	0.2331	0.0130
Link25	0.1341	52144.287	0.0001	0.9277	0.1147	0.3009	1.3594	0.0130
203.1	0.7945	308966.61	0.0001	0.9940	1.2053	0.1213	0.2240	0.0130
203.2	0.8054	313115.61	0.0002	0.7183	0.6018	0.1780	0.1893	0.0130
ditch1	-1.4282	-555282.1	0.0006	0.8671	0.2328	0.2037	2.0941	0.0350

Node32	1041.0000	1037.0000	1037.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node33	1024.0000	1020.0000	1020.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node34	1025.0000	1023.0000	1023.0000	0	0	0.0000	2.0000	12.5660	0.0000	0.00	0.0000
Node35	1027.0000	1023.0000	1023.0000	0	0	0.0000	4.0000	12.5660	0.0000	0.00	0.0000
Node36	1041.0000	1041.0000	1040.7600	36	29	0.0000	0.2400	29620.800	0.0000	0.00	0.0000
Node37	1023.1000	1023.0700	1022.7118	36	49	0.0000	0.3882	23378.10	0.0000	0.00	0.0000
Node38	1023.0000	1016.0000	1016.0000	0	0	6.4211	0.4455	98523.33	0.0000	0.00	0.0000
Node39	1023.0000	1021.5000	1021.5000	0	0	0.0000	1.5000	12.5660	0.0000	0.00	0.0000
Node40	1024.3000	1019.6833	1022.7427	36	49	3.0414	1.5753	79381.58	0.0000	0.00	0.0000
Node41	1023.0000	1019.8000	1019.8000	0	0	0.0000	3.2000	12.5660	0.0000	0.00	0.0000

Table E10 - CONDUIT SUMMARY STATISTICS

Note: The peak flow may be less than the design flow and the conduit may still be large because of the downstream boundary conditions.
* denotes an open conduit that has been overtopped
| this is a potential source of severe errors

Conduit Name	Flow (cfs)	Velocity (ft/s)	Depth (ft)	Time Occurrence	Maximum Time (Hr. Min.)	Time Ratio	Maximum Water to Elv at Pipe Ends (ft)	Ratio						
Link2	73.8984	7.2448	34.0000	113.7024	36	36	11.7799	36	36	1.5386	1023.831	1023.553	2.058	2.172
Link4	82.4497	4.5	4.7843	12	31	0.3447	1028.612	1025.000	3.012	1.000	1028.824	1026.814	1.949	2.104
Link5	26.8520	5.4702	30.0000	999.333	48	6	0.7728	48	6	0.3723	1026.814	1026.814	2.194	2.201
Link6	29.7983	6.0705	30.0000	-40.6178	39	55	26.2354	42	1					

ori 1 1.1312 0.0000 1.9118 0.6111 0.4583 1025.3034 1023.3916 Max Flow

Table E13a. CULVERT ANALYSIS CLASSIFICATION, and the time the culvert was in a particular classification during the simulation. The time is in minutes. The Dynamic Wave Equation is used on all conduit analysis but the culvert flow classification condition is based on the HW and TW depths.

Mild Slope Slope TW Slope TW Slug Flow Slope Slope Critical D Control Insignif Outlet/ TW > D TW <= D Conduit Outlet Outlet Entrance Entrance Outlet Outlet Inlet Inlet Name Control Control Control Control Control Control Control Control Configuration

Table with columns for Link ID, Max Flow, and Classification. Rows include Link4 through Link23, ditch1, and office 5.

Kinematic Wave Approximations Time in Minutes for Each Condition

Table with columns for Conduit Name, Duration, Slope Criteria, and Roll Waves. Rows include Link2 through Link23 and office 5.

Table with columns for Name, Flow, and Classification. Rows include driveway, seminole, sem2, south1, dway 2, FREEP 1, and FREEP 2.

Table E15a - SPREADSHEET REACH LIST Peak flow and Total Flow listed by Reach or those conduits or diversions having the same upstream and downstream nodes.

Table with columns for Upstream Node, Downstream Node, Maximum Flow, and Total Flow. Rows include Node3 through Node41.

Table E16. New Conduit Information Section Conduit Invert (IE) Elevation and Conduit # Maximum Water Surface (WS) Elevation

Table with columns for Conduit Name, Upstream Node, Downstream Node, IE Up, IE Dn, WS Up, WS Dn, Conduit Type. Rows include Link2 through Link9.

Table with columns for Node ID, Maximum Flow, Total Flow, Maximum Volume, and Junction Invert. Rows include Node1 through Node21 and office 5.

Table E15 - SPREADSHEET INFO LIST Conduit Flow and Junction Depth information for use in spreadsheets. The maximum values in this table are the true maximum values because they sample every time step.

Table with columns for Conduit Name, Maximum Flow, Total Flow, Maximum Volume, Junction Invert, and Maximum Elevation. Rows include Link2 through Link23, ditch1, and office 5.

Table with columns for Node ID, Node Name, and Conduit Name. Rows include Link12 through Link23, ditch1, and office 5.

Table E18 - Junction Continuity Error. Division by Volume added 11/96 Continuity Error = Net Flow + Beginning Volume - Ending Volume

Table with columns for Junction Name, Continuity Error, Remaining Volume, Beginning Volume, Net Flow, Total Flow, and Failed to Converge. Rows include Node3 through Node30.

Node31 145130.4276 100.0000 0.5466 0.0000 0.0000 145130.4276 145130.4276 0
Node32 730430.2349 100.0000 2.7512 0.0000 0.0000 730430.2349 730430.2349 0
Node33 549222.4039 100.0000 0.6686 0.0000 0.0000 549222.4039 549222.4039 0
Node34 120853.2784 100.0000 0.4552 0.0000 0.0000 120853.2784 120853.2784 0
Node35 269125.5704 100.0000 1.0137 0.0000 0.0000 269125.5704 269125.5704 0
Node36 8.7162 0.0005 0.0000 0.0000 0.0000 8.7162 1687112.571 0
Node37 56935.7183 1.0000 0.7144 649305.2927 0.0000 705241.0710 4919814.738 891
Node38 -1182.4650 -0.0080 0.0045 3208798.914 0.0000 3207616.449 13224271.17 0
Node39 -37.3033 -0.0004 0.0001 0.0000 0.0000 -37.3033 10595703.98 0
Node40 -35.8250 -0.0002 0.0001 593259.0722 0.0000 593223.2472 14258136.36 0
Node41 -31.4917 -0.0001 0.0000 0.0000 0.0000 -31.4917 9451515.030 0
The total continuity error was 3.22488E+06 cubic feet
The remaining total volume was 1.31140E+07 cubic feet
Your mean node continuity error was Excellent
Your worst node continuity error was Good

Table E19 - Junction Inflow & Outflow Listing
Units are either ft³/s or m³/s depending on the units in your model.

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inflow through Node	RNF Layer Inflow to Node	Evaporation from Node	Basin Inflow from Node	Outflow from Node	Evaporation from Node	Basin Inflow from Node	Infl.
Node1	0.0000	0.0000	0.0000	0.0000	0.0000	622708.7739	0.0000	0.0000	0.0000	0.0000	0.00
Node2	0.0000	0.0000	0.0000	0.0000	1.038E+06	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
Node4	0.0000	0.0000	0.0000	0.0000	0.0000	1.969E+06	0.0000	0.0000	0.0000	0.0000	0.00
Node9	0.0000	0.0000	0.0000	0.0000	0.0000	788408.1311	0.0000	0.0000	0.0000	0.0000	0.00
Node10	0.0000	0.0000	0.0000	0.0000	0.0000	728665.6470	0.0000	0.0000	0.0000	0.0000	0.00
Node11	0.0000	0.0000	0.0000	0.0000	0.0000	277977.3263	0.0000	0.0000	0.0000	0.0000	0.00
Node12	0.0000	0.0000	0.0000	0.0000	0.0000	51751.5116	0.0000	0.0000	0.0000	0.0000	0.00
Node13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	12172.7940	0.0000	0.0000	0.0000	0.00
Node16	0.0000	0.0000	0.0000	0.0000	0.0000	157296.2012	0.0000	0.0000	0.0000	0.0000	0.00
Node20	0.0000	0.0000	0.0000	0.0000	0.0000	21794.9992	0.0000	0.0000	0.0000	0.0000	0.00
Node21	0.0000	0.0000	0.0000	0.0000	0.0000	701970.2917	0.0000	1.0898	0.0000	0.0000	0.00
Node23	0.0000	0.0000	0.0000	0.0000	0.0000	185618.2240	0.0000	0.0000	0.0000	0.0000	0.00
Node24	0.0000	0.0000	0.0000	0.0000	0.0000	100978.3270	0.0000	0.0000	0.0000	0.0000	0.00
Node25	0.0000	0.0000	0.0000	0.0000	0.0000	1.369E+06	0.0000	0.0000	0.0000	0.0000	0.00
Node26	0.0000	0.0000	0.0000	0.0000	0.0000	52525.0169	0.0000	0.0000	0.0000	0.0000	0.00
Node28	0.0000	0.0000	0.0000	0.0000	0.0000	140815.6796	0.0000	0.0000	0.0000	0.0000	0.00
Node29	0.0000	0.0000	0.0000	0.0000	0.0000	330186.0094	0.0000	0.0000	0.0000	0.0000	0.00
Node30	0.0000	0.0000	0.0000	0.0000	0.0000	1.124E+06	0.0000	0.0000	0.0000	0.0000	0.00
Node31	0.0000	0.0000	0.0000	0.0000	0.0000	145130.4119	0.0000	0.0000	0.0000	0.0000	0.00
Node32	0.0000	0.0000	0.0000	0.0000	0.0000	730429.7287	0.0000	0.0000	0.0000	0.0000	0.00
Node33	0.0000	0.0000	0.0000	0.0000	0.0000	549222.4148	0.0000	0.0000	0.0000	0.0000	0.00
Node34	0.0000	0.0000	0.0000	0.0000	0.0000	120853.2347	0.0000	0.0000	0.0000	0.0000	0.00
Node35	0.0000	0.0000	0.0000	0.0000	0.0000	269125.4540	0.0000	0.0000	0.0000	0.0000	0.00
Node36	0.0000	0.0000	0.0000	0.0000	0.0000	843560.7549	0.0000	0.0000	0.0000	0.0000	0.00
Node37	0.0000	0.0000	0.0000	0.0000	0.0000	227233.3547	0.0000	0.0000	0.0000	0.0000	0.00
Node38	0.0000	0.0000	0.0000	0.0000	0.0000	6.599E+06	0.0000	0.0000	0.0000	0.0000	0.00
Node39	0.0000	0.0000	0.0000	0.0000	0.0000	5.298E+06	0.0000	0.0000	0.0000	0.0000	0.00
Node40	0.0000	0.0000	0.0000	0.0000	0.0000	7.426E+06	0.0000	0.0000	0.0000	0.0000	0.00
Node41	0.0000	0.0000	0.0000	0.0000	0.0000	4.726E+06	0.0000	4.726E+06	0.0000	0.0000	0.00

Table E20 - Junction Flooding and Volume Listing
The maximum volume is the total volume in the node including the volume in the flooded storage area. This is the maximum volume at any time. The volume in the flooded storage area is the total volume above the ground elevation, where the flooded pond storage area starts.
The fourth column is instantaneous, the fifth is the sum of the flooded volume over the entire simulation.
Units are either ft³/s or m³/s depending on the units.

Out of	Passed to 2D cell
Node1	1.6016
Node2	2.6696
Node4	5.0640
Node9	1.9764
Node10	1.8690
Node11	0.7150
Node12	0.1331
Node16	0.4046
Node20	0.0051
Node21	1.8055
Node23	0.4774
Node24	0.2597
Node25	3.5221
Node26	0.1351
Node28	0.3622
Node29	0.8492
Node30	2.8907
Node31	0.3733
Node32	1.8787
Node33	1.4126
Node34	0.3108
Node35	0.6222
Node36	2.1697
Node37	0.5844
Node38	16.9740
Node40	19.1000
Node13	-0.0313
Node21	-0.0000
Node39	-13.6262
Node41	-12.1548

Junction	Volume, ft³	Inflow, cfs
Node1	622710.2071	1.6016
Node2	1.0379E+06	2.6696
Node4	1.9689E+06	5.0640
Node9	788409.3335	1.9764
Node10	728665.1250	1.8690
Node11	277978.1003	0.7150
Node12	51751.5189	0.1331
Node16	157296.9267	0.4046
Node20	21794.9992	0.0051
Node21	701971.9048	1.8055
Node23	185619.0779	0.4774
Node24	100978.4512	0.2597
Node25	1.3694E+06	3.5221
Node26	52525.0814	0.1351
Node28	140816.0010	0.3622
Node29	330187.1661	0.8492
Node30	1.1239E+06	2.8907
Node31	145130.4276	0.3733
Node32	730430.2349	1.8787
Node33	549222.4039	1.4126
Node34	120853.2784	0.3108
Node35	269125.5704	0.6222
Node36	843564.6356	2.1697
Node37	227233.4122	0.5844
Node38	6.5995E+06	16.9740
Node40	7.4251E+06	19.1000
Node13	-12172.7940	-0.0313
Node21	-1.0898	-0.0000
Node39	-5.298E+06	-13.6262
Node41	-4.726E+06	-12.1548

Outflow Junction	Volume, ft³	Average Outflow, cfs
Node13	12172.7940	0.0313
Node21	1.0898	0.0000
Node39	5.2979E+06	13.6262
Node41	4.7258E+06	12.1548

Initial system volume = 0.0000 Cu Ft
Total system inflow volume = 26.54990E+06 Cu Ft
Inflow + Initial volume = 26.54990E+06 Cu Ft
Total system outflow = 10.03681E+06 Cu Ft
Volume left (Final volume) = 13.11401E+06 Cu Ft
Evaporation = 0.0000 Cu Ft
Basin Infiltration = 0.0000 Cu Ft
Outflow + Final Volume = 23.14982E+06 Cu Ft

Total Model Continuity Error
Error in Continuity, Percent = 12.86 %
Error in Continuity, ft³/s = 3.40008E+06
+ Error means a continuity loss, - a gain

Table E22. Numerical Model judgement section
Overall error was (minimum of Table E18 & E21) 12.1465 percent
Worst nodal error was in node Node30 with 100.0000 percent
Of the total inflow this loss was 4.2332 percent
Your overall continuity error was Poor
Poor Efficiency

Junction Name	Surcharged	Flooded	(Flooded) Volume	Maximum in allowed Flood	Pond of 1D-System
Node1	289.	0.000	0.000	1.565E+05	0.000
Node2	0.000	0.000	0.000	6.919E+06	0.000
Node3	4.408E+03	0.000	0.000	1.078E+04	0.000
Node4	0.000	0.000	0.000	5.868E+05	0.000
Node5	1.548E+03	822.	0.000	4.266E+03	2.151E+05
Node6	2.888E+03	801.	0.000	6.231E+03	1.106E+06
Node7	2.360E+03	727.	0.000	4.484E+03	1.107E+06
Node8	3.765E+03	808.	0.000	5.182E+03	1.758E+05
Node9	5.274E+03	0.000	0.000	7.734E+05	0.000
Node10	0.000	0.000	0.000	2.530E+05	0.000
Node11	397.	0.000	0.000	3.474E+04	0.000
Node12	0.000	0.000	0.000	4.000E+04	0.000
Node13	5.442E+03	398.	1.217E+04	47.9	0.000
Node15	993.	0.000	0.000	20.4	0.000
Node16	6.237E+03	0.000	0.000	3.334E+04	0.000
Node17	1.383E+03	826.	0.000	3.830E+03	4.261E+04
Node18	1.386E+03	823.	0.000	3.895E+03	3.781E+04
Node20	118.	0.000	0.000	2.828E+04	0.000
Node21	0.000	0.000	0.000	1.435E+05	0.000
Node22	0.000	0.000	0.000	24.2	0.000
Node23	0.000	0.000	0.000	3.754E+04	0.000
Node24	0.000	0.000	0.000	14.4	0.000
Node25	4.500E+03	0.000	0.000	2.900E+05	0.000
Node26	0.000	0.000	0.000	1.435E+05	0.000
Node28	6.17	0.000	0.000	1.872E+04	0.000
Node29	1.376E+03	0.000	0.000	1.209E+05	0.000
Node30	0.000	0.000	0.000	0.000	0.000
Node31	0.000	0.000	0.000	0.000	0.000
Node32	0.000	0.000	0.000	0.000	0.000
Node33	0.000	0.000	0.000	0.000	0.000
Node34	0.000	0.000	0.000	0.000	0.000
Node35	0.000	0.000	0.000	0.000	0.000
Node36	0.000	0.000	0.000	1.094E+05	0.000
Node37	0.000	0.000	0.000	9.030E+05	0.000
Node38	6.087E+03	0.000	0.000	4.135E+06	0.000
Node39	0.000	0.000	0.000	0.000	0.000
Node40	5.763E+03	0.000	0.000	1.358E+06	0.000
Node41	0.000	0.000	0.000	0.000	0.000

Simulation Specific Information
Number of Input Conduits..... 27
Number of Natural Channels..... 0
Number of Storage Junctions..... 19
Number of Orifices..... 3
Number of Free Outfalls..... 2
Number of Simulated Conduits..... 48
Number of Junctions..... 38
Number of Weirs..... 16
Number of Pumps..... 0
Number of Tide Gate Outfalls..... 0

Average % Change in Junction or Conduit is defined as:
Conduit % Change = 100.0 * (Q(n+1) - Q(n)) / Q(n)
Junction % Change = 100.0 * (Y(n+1) - Y(n)) / Y(n)

The Conduit with the largest average change was... Link5 with 2.068 percent
The Junction with the largest average change was... Node7 with 0.531 percent
The Conduit with the largest sinuosity was... Link5 with 27101.261

Table E21. Continuity balance at the end of the simulation
Junction Inflow, Outflow or Street Flooding
Error = Inflow + Initial Volume - Outflow - Final Volume

Inflow	Outflow	Average
Node1	1.6016	1.6016
Node2	2.6696	2.6696
Node4	5.0640	5.0640
Node9	1.9764	1.9764
Node10	1.8690	1.8690
Node11	0.7150	0.7150
Node12	0.1331	0.1331
Node16	0.4046	0.4046
Node20	0.0051	0.0051
Node21	1.8055	1.8055
Node23	0.4774	0.4774
Node24	0.2597	0.2597
Node25	3.5221	3.5221
Node26	0.1351	0.1351
Node28	0.3622	0.3622
Node29	0.8492	0.8492
Node30	2.8907	2.8907
Node31	0.3733	0.3733
Node32	1.8787	1.8787
Node33	1.4126	1.4126
Node34	0.3108	0.3108
Node35	0.6222	0.6222
Node36	2.1697	2.1697
Node37	0.5844	0.5844
Node38	16.9740	16.9740
Node40	19.1000	19.1000
Node13	-0.0313	-0.0313
Node21	-0.0000	-0.0000
Node39	-13.6262	-13.6262
Node41	-12.1548	-12.1548

Efficiency of the simulation 23.06
Most Number of Non Convergences at one Node 99363.
Total Number Non Convergences at all Nodes 564897.
Total Number of Nodes with Non Convergences 20.

Table E23. New Basin Design Information
Maximum Hydraulic Grade Line
Out Conduit Sizes and Maximum Flow

A) Resize d/s Pipes based on given HGL
B) Resize Basin based on given HGL
C) Resize d/s Pipes and Basin based on HGL and max discharge
D) Resize d/s pipes based on given max discharge

Basin Name	Type	Max.HGL (ft)	Conduit (ft)	Depth (ft)	Width (ft)	Barrels	Max.Flow (ft³
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APPENDIX E
GROUNDWATER MOUNDING CALCULATIONS

Alternative A1

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated. Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. **The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed** otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		use consistent units (e.g. feet & days or inches & hours)		Conversion Table	
		inch/hour	feet/day	inch/hour	feet/day
7.1500	R		0.67	1.33	
0.220	Sy				
2.64	K	2.00	4.00		
311.000	x				
35.000	y				
0.062	t	hours	days		
9.000	hi(0)		36	1.50	
10.999	h(max)				
1.999	Δh(max)				
Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet				
1.999	0				
1.999	20				
1.999	40				
1.999	50				
1.999	60				
1.999	70				
1.999	80				
1.999	90				
1.999	100				
1.999	120				

Hydraulic Conductivity (K) Estimated From Grain Size Data			
D ₁₀	= 0.086	mm	
D ₆₀	= 0.2726	mm	
C _u	= 3.17	[-]	
n	= 0.25	[-]	
g	= 9.8	m/s ²	
v	= 1.20E-6	m ² /s	
Method	K (m/s)	K (cm/s)	K (ft/d)
Hazen ¹ (K _H)	n/a	n/a	n/a
Kozeny-Carmen ² (K _{KC})	9.32E-6	9.32E-4	2.64
Beyer ³ (K _B)	1.83E-4	0.0183	52.0
Wang et al. ⁴ (K _W)	8.19E-5	0.00819	23.2
Average	9.15E-5	0.00915	25.9
Minimum	9.32E-6	9.32E-4	2.64
Maximum	1.83E-4	0.0183	52.0
Max/Min	19.7	19.7	19.7

¹0.1 mm ≤ D₁₀ ≤ 3 mm; C_u ≤ 5
²silts, sands and gravelly sands
³0.06 mm ≤ D₁₀ ≤ 0.6 mm; 1 ≤ C_u ≤ 20
⁴0.05 mm ≤ D₁₀ ≤ 0.83 mm; 0.09 mm ≤ D₆₀ ≤ 4.29 mm; 1.3 ≤ C_u ≤ 18.3

Heath (1983) reports the following values (in percent by volume) for porosity, specific yield and specific retention:

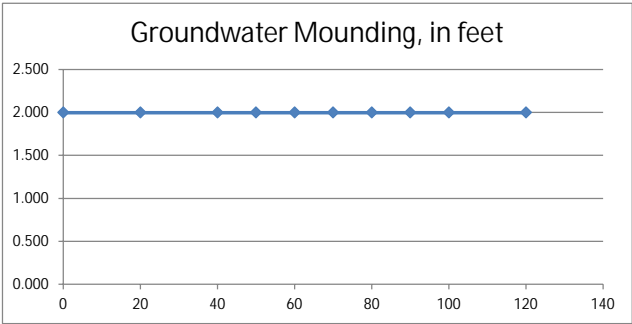
Material	Porosity (%)	Specific Yield (%)	Specific Retention (%)
Soil	55	40	15
Clay	50	2	48
Sand	25	22	3
Gravel	20	19	1
Limestone	20	18	2
Sandstone (unconsolidated)	11	6	5
Granite	0.1	0.09	0.01
Basalt (young)	11	8	3

Assumes a 1.0 acre rectangular site.

Top Elev. of Infiltration Basin 1019
 Bottom Elev. of Infiltration Basin 1017
 Groundwater Elevation 1015

Using the volume of runoff from a 1.5-inch rainfall amount, a 1.0 acre basin bottom area, and 3.6-inches per hour infiltration rate the groundwater mounding will just get to elevation 1017.

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Alternative A2

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated. Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. **The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed** otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values

1.8800	R	Recharge (infiltration) rate (feet/day)
0.220	Sy	Specific yield, Sy (dimensionless, between 0 and 1)
2.64	K	Horizontal hydraulic conductivity, Kh (feet/day)*
60.000	x	1/2 length of basin (x direction, in feet)
180.000	y	1/2 width of basin (y direction, in feet)
0.500	t	duration of infiltration period (days)
6.000	hi(0)	initial thickness of saturated zone (feet)

use consistent units (e.g. feet & days or inches & hours)

Conversion Table	
inch/hour	feet/day
0.67	1.33
2.00	4.00
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

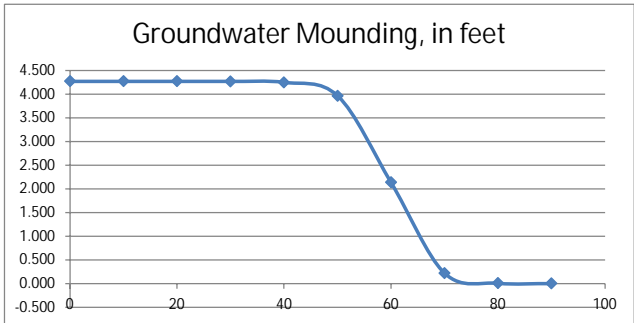
10.273	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
4.273	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water center of basin Mounding, in x direction, in feet

4.273	0
4.273	10
4.273	20
4.272	30
4.250	40
3.966	50
2.137	60
0.221	70
0.010	80
0.002	90



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Hydraulic Conductivity (K) Estimated From Grain Size Data			
D ₁₀	= 0.086	mm	
D ₆₀	= 0.2726	mm	
C _u	= 3.17	[-]	
n	= 0.25	[-]	
g	= 9.8	m/s ²	
v	= 1.20E-6	m ² /s	
Method	K (m/s)	K (cm/s)	K (ft/d)
Hazen ¹ (K _H)	n/a	n/a	n/a
Kozeny-Carmen ² (K _{KC})	9.32E-6	9.32E-4	2.64
Beyer ³ (K _B)	1.83E-4	0.0183	52.0
Wang et al. ⁴ (K _W)	8.19E-5	0.00819	23.2
Average	9.15E-5	0.00915	25.9
Minimum	9.32E-6	9.32E-4	2.64
Maximum	1.83E-4	0.0183	52.0
Max/Min	19.7	19.7	19.7

¹0.1 mm ≤ D₁₀ ≤ 3 mm; C_u ≤ 5
²silts, sands and gravelly sands
³0.06 mm ≤ D₁₀ ≤ 0.6 mm; 1 ≤ C_u ≤ 20
⁴0.05 mm ≤ D₁₀ ≤ 0.83 mm; 0.09 mm ≤ D₆₀ ≤ 4.29 mm; 1.3 ≤ C_u ≤ 18.3

Heath (1983) reports the following values (in percent by volume) for porosity, specific yield and specific retention:

Material	Porosity (%)	Specific Yield (%)	Specific Retention (%)
Soil	55	40	15
Clay	50	2	48
Sand	25	22	3
Gravel	20	19	1
Limestone	20	18	2
Sandstone (unconsolidated)	11	6	5
Granite	0.1	0.09	0.01
Basalt (young)	11	8	3

Assumes a 1 acre rectangular site.

Top Elev. of Infiltration Basin 1023.5
 Bottom Elev. of Infiltration Basin 1020
 Groundwater Elevation 1015

Based on Hantush 1967 we will assumed the decay rate is equal to the percolation rate meaning the time to decay is equal to the duration of the infiltration period.

APPENDIX F
DETAILED OPINION OF PROBABLE CONSTRUCTION COSTS

City of Fitchburg
Infiltration Within The Footprint Of The Sub-Zero Kettle (A1)

	Quantity	Unit	Unit Price	Total
Sub Zero Kettle				
Excavation	6323	CY	\$ 20	\$ 126,460
Sand Backfill	4300	CY	\$ 15	\$ 64,500
Compost	540	CY	\$ 45	\$ 24,300
Embankment Fill	1789	CY	\$ 25	\$ 44,725
Infiltration Trenching System	964	LF	\$ 67	\$ 64,588
6-inch PVC Pipe with cap	150	LF	\$ 30	\$ 4,500
Dewatering	1	LS	\$ 30,000	\$ 30,000
Restoration				
Erosion Control	1	LS	\$ 25,000	\$ 25,000
Seeding	8419	SY	\$ 5	\$ 42,095
Riprap at Existing Outfalls	610	SY	\$ 65	\$ 39,650
Turf Reinforcemnet Mat	2440	SY	\$ 25	\$ 61,000
Erosion Control Mat	8419	SY	\$ 3	\$ 21,048
Subtotal			\$	\$ 547,866
Geotechnical			\$	\$ 15,000
Total Construction Cost			\$	\$ 562,866
Contingency				35%
Contingencies and Engineering (35%)			\$	\$ 197,000
Total Capital Costs			\$	\$ 759,866

City of Fitchburg
A New Infiltration Basin Outside Of The Sub-Zero Kettle (A2)

	Quantity	Unit	Unit Price	Total
Infiltration Basin				
Excavation	14540	CY	\$ 20	\$ 290,800
Sand Backfill	4300	CY	\$ 15	\$ 64,500
Compost	540	CY	\$ 45	\$ 24,300
Topsail (Reuse from site)	2100	SY	\$ 3	\$ 6,300
Infiltration Trenching System	600	LF	\$ 67	\$ 40,200
FORCE MAIN				
8" Ductile Iron	900	LF	\$ 100	\$ 90,000
Piping/Mechanical	1	LS	\$ 10,000	\$ 10,000
Infiltration Basin Outfall	1	LS	\$ 15,000	\$ 15,000
Restoration				
Erosion Control	1	LS	\$ 15,000	\$ 15,000
Seeding	6900	SY	\$ 5	\$ 34,500
Erosion Control Mat	6900	SY	\$ 3	\$ 20,700
Riprap	20	SY	\$ 50	\$ 1,000
Subtotal			\$	612,300
Geotechnical			\$	15,000
Total Construction Cost			\$	627,300
Contingency				35%
Contingencies and Engineering (35%)			\$	220,000
Total Capital Costs			\$	847,300

City of Fitchburg
Fixed Pumping Station (B1)

	Quantity	Unit	Unit Price	Total
PUMPING STATION				
15" RCP Storm Sewer	100	LF	\$ 100	\$ 10,000
Precast 8-FT Diameter Wetwell	1	EA	\$ 25,000	\$ 25,000
Precast 8-FT Diameter Wetwell Lid with Access Hatch	1	EA	\$ 15,000	\$ 15,000
Submersible Pumps and Appurtenances	2	EA	\$ 49,275	\$ 98,550
Piping/Mechanical	1	LS	\$ 20,000	\$ 20,000
Electrical	1	LS	\$ 75,000	\$ 75,000
Dewatering	1	LS	\$ 20,000	\$ 20,000
FORCE MAIN				
8" Ductile Iron	1700	LF	\$ 100	\$ 170,000
Street/Path Crossing	1	LS	\$ 15,000	\$ 15,000
Pond Outfall	1	EA	\$ 15,000	\$ 15,000
MISCELLANEOUS				
Class III - 15" Perforated RCP Storm Sewer with Tie Downs	500	LF	\$ 125	\$ 62,500
Erosion Control/Site Restoration	1	LS	\$ 15,000	\$ 15,000
Riprap	20	SY	\$ 65	\$ 1,300
Sub-Zero Kettle Dredge	450	CY	\$ 25	\$ 11,250
Sitework (Lift Station)	1	LS	\$ 5,000	\$ 5,000
Electrical Allowance	1	LS	\$ 5,000	\$ 5,000
Subtotal			\$	563,600
Geotechnical			\$	15,000
Contractor's General Conditions (10%)			\$	56,000
Total Construction Costs			\$	634,600
Contingencies and Engineering (35%)			\$	222,000
Total Capital Costs			\$	856,600

**City of Fitchburg
Mobile Pumping Station (B2)**

	Quantity	Unit	Unit Price	Total
PUMPING STATION				
15" RCP Storm Sewer	100	LF	\$ 100	\$ 10,000
Precast 8-FT Diameter Wetwell	1	EA	\$ 25,000	\$ 25,000
Precast 8-FT Diameter Wetwell Lid with Access Hatch	1	EA	\$ 15,000	\$ 15,000
Piping/Mechanical	1	LS	\$ 10,000	\$ 10,000
Dewatering	1	LS	\$ 20,000	\$ 20,000
FORCE MAIN				
8" Ductile Iron	1700	LF	\$ 100	\$ 170,000
Street/Path Crossing	1	LS	\$ 15,000	\$ 15,000
Pond Outfall	1	EA	\$ 15,000	\$ 15,000
MISCELLANEOUS				
Erosion Control/Site Restoration	1	LS	\$ 15,000	\$ 15,000
Class III - 15" Perforated RCP Storm Sewer with Tie Downs	500	LF	\$ 125	\$ 62,500
Sitework (Lift Station)	1	LS	\$ 10,000	\$ 10,000
Riprap	20	SY	\$ 65	\$ 1,300
Subtotal			\$	368,800
Geotechnical			\$	15,000
Contractor's General Conditions (10%)			\$	37,000
Total Construction Costs			\$	420,800
Contingencies and Engineering (35%)			\$	147,000
Total Capital Costs			\$	567,800

City of Fitchburg
Low FLOW Gravity Pipe to Seminole Village Pond (B3)

	Quantity	Unit	Unit Price	Total
STORM SEWER				
Class III - 15" Perforated RCP Storm Sewer with Tie Downs	500	LF	\$ 125	\$ 62,500
Class V - 15" RCP Storm Sewer	4600	LF	\$ 185	\$ 851,000
Precast 5-FT Diameter Control Structure with Manual Control Gate	1	EA	\$ 12,500	\$ 12,500
Precast 5-FT Diameter 3-FT Sump Cleanout Structure	1	EA	\$ 7,500	\$ 7,500
Precast 4-FT Diameter Manhole	15	EA	\$ 6,000	\$ 90,000
Granular Trench Backfill	17500	T	\$ 9	\$ 148,750
Dewatering	1	LS	\$ 150,000	\$ 150,000
Connection to Existing Storm Sewer	1	EA	\$ 5,000	\$ 5,000
MISCELLANEOUS				
Public Utility Protection/Adjustment in Intersections	6	EA	\$ 10,000	\$ 60,000
Spot Storm Sewer Replacement	1	LS	\$ 25,000	\$ 25,000
Spot Roadway and Curb Replacement	1	LS	\$ 30,000	\$ 30,000
Spot Replace Sidewalk	3150	SF	\$ 5	\$ 15,750
Spot Replace Asphalt Trail	260	T	\$ 100	\$ 26,000
Erosion Control	1	LS	\$ 15,000	\$ 15,000
Clearing and Grubbing	1	LS	\$ 50,000	\$ 50,000
Seeding	7000	SY	\$ 5	\$ 35,000
Erosion Control Mat	7000	SY	\$ 3	\$ 21,000
Traffic Control	1	LS	\$ 75,000	\$ 75,000
Subtotal			\$	1,680,000
Geotechnical			\$	15,000
Total Construction Cost			\$	1,695,000
Contingency				35%
Contingencies and Engineering (35%)			\$	593,000
Total Capital Costs			\$	2,288,000

City of Fitchburg

Low FLOW Gravity Pipe From Kettle South of Lacy Road to Sub Zero Kettle Pump Station (C1)

	Quantity	Unit	Unit Price	Total
STORM SEWER				
Class V - 15" RCP Storm Sewer	2080	LF	\$ 120	\$ 249,600
Precast 5-FT Diameter Control Structure with Manual Control Gate	1	EA	\$ 12,500	\$ 12,500
Inlet Structure	1	EA	\$ 5,000	\$ 5,000
Precast 4-FT Diameter Manhole	8	EA	\$ 4,500	\$ 36,000
Granular Trench Backfill	7700	T	\$ 9	\$ 65,450
Dewatering	1	LS	\$ 35,000	\$ 35,000
MISCELLANEOUS				
Street/Path Crossing	1	LS	\$ 15,000	\$ 15,000
Erosion Control	1	LS	\$ 15,000	\$ 15,000
Seeding	3450	SY	\$ 5	\$ 17,250
Erosion Control Mat	3450	SY	\$ 3	\$ 10,350
Traffic Control	1	LS	\$ 10,000	\$ 10,000
Subtotal				\$ 471,150
Geotechnical				\$ 10,000
Total Construction Cost				\$ 481,150
Contingency				35%
Contingencies and Engineering (35%)				\$ 168,000
Total Capital Costs				\$ 649,150

**APPENDIX G–PRESENTATION TO CITY OF FITCHBURG
COMMITTEE OF THE WHOLE INCLUDING QUESTIONS AND ANSWERS**

Sub-Zero/Stoner Prairie Area Watershed Study

Final Presentation

February 24, 2020



1

TEAM INTRODUCTIONS

- Mike Williams, PE | Strand Associates, Project Manager
- Claudia Guy, PE | City of Fitchburg, Environmental Engineer

2

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Presentation Outline

- Project Background
- Watershed Description
- Hydrology and Hydraulics
- Alternatives Analysis
- Alternative Recommendations
- Next Steps
- Questions

3

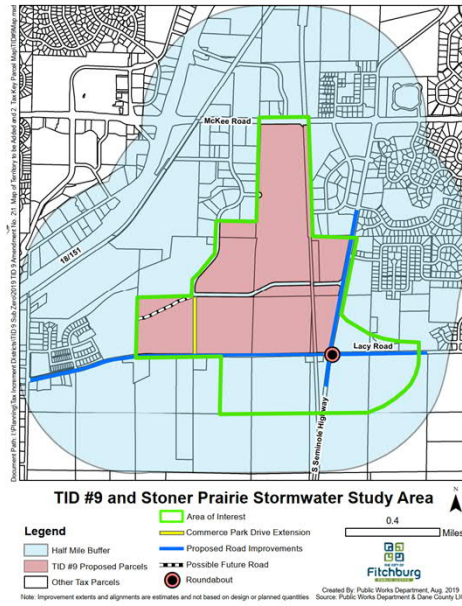
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Background Information

4

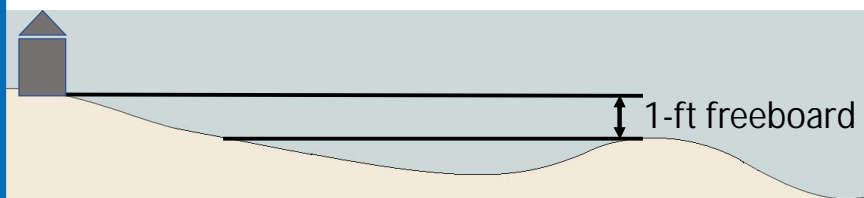
Project Goal

- To develop alternatives to reduce the flooding potential within the Stoner Prairie Stormwater Study Area



Overland Flow Route

How do we normally mitigate flood potential?



Typical Strategy: Safely pass storm events in excess of the 100-year, 24-hour storm event by providing freeboard between the building and the overland flow elevation.

Underlying assumption for this method: There is a viable overland flow route.

Why can't
we do
that here?

Kettle Hydrology

- A kettle is a low-lying area in the landscape that does not have a natural surface water outlet
- During normal precipitation years, water exits the kettle via infiltration, evaporation, and evapotranspiration
- During very wet years, water levels may get high enough that it finds an overland flow route

7

7

The natural overflow route would involve flooding parts of Sub Zero Parkway and Lacy Road, and “kettle hopping” through agricultural land for 5+ miles to the south prior to entering a navigable waterway.



Sources:

<https://www.nytimes.com/2019/11/21/climate/farms-climate-change-crops.html>

<https://www.grandforksherald.com/business/agriculture/5029224-Rural-road-flooding-causes-headaches-for-farmers>

8

8

How are we mitigating flood potential here?

- Recommendations From North Stoner Prairie Neighborhood Plan:
 - Establish a flood protection elevation of approximately 1022.6 ft for the closed depression west of the Badger State Trail, based on the predicted water surface for back-to-back 100 year runoff events. This extreme weather scenario is recommended for flood protection because there is no surface outlet for this watershed.



- Develop an emergency pumping plan and install infrastructure to mitigate flooding.
- Require stormwater runoff volume control practices within the watershed

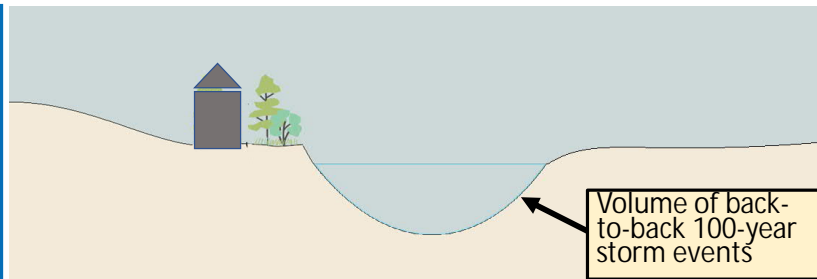
Published – 2013
Amended - 2017

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Flood Protection Zone

How are we mitigating flood potential here?



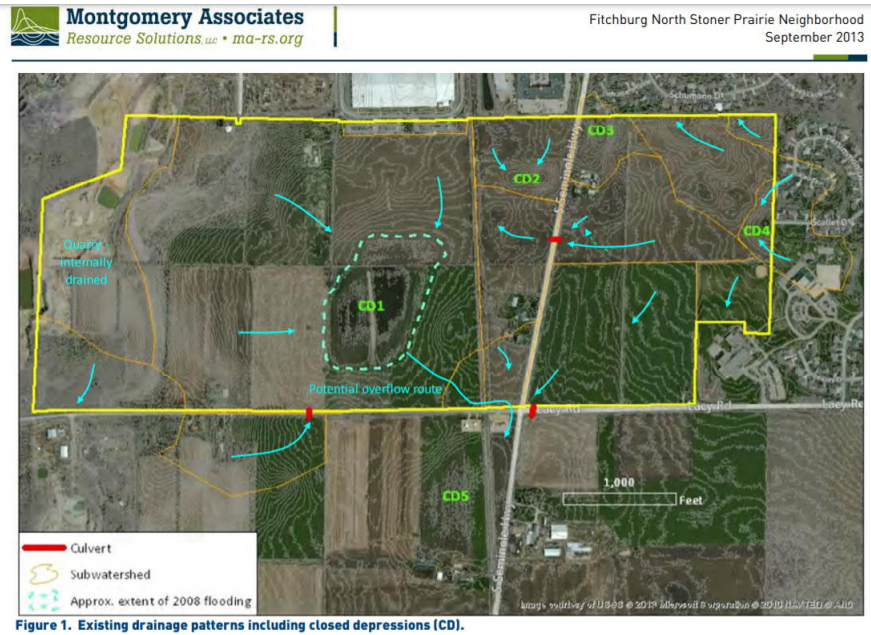
NSPN Strategy: Establish a flood protection zone and pumping plan.

Underlying assumption for this method: This assumes that the kettle is dry prior to the start of the back-to-back 100-year storm events.

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- Development is occurring within the Kettle "CD5" area. So, we also looked at potential alternatives to mitigate flood potential in this area as well.



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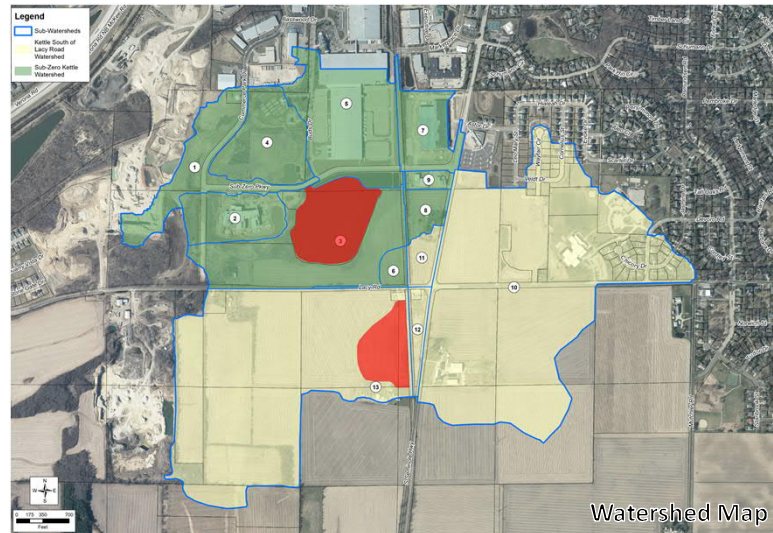
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Watershed Description

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Watershed Areas

- Sub-Zero Kettle Watershed (Green) Area – 220 acres
- Kettle South of Lacy Road Watershed (Yellow) Area – 349 acres

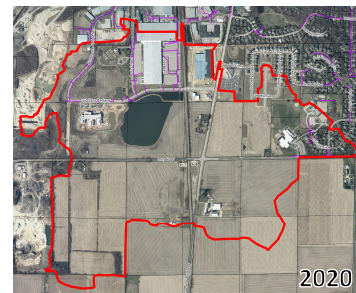
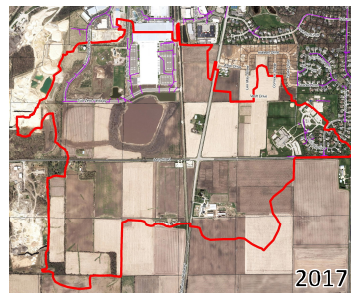
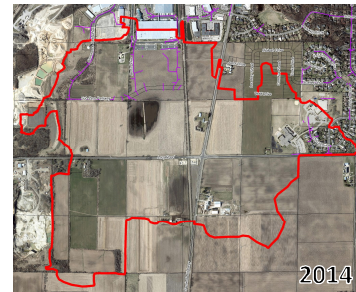
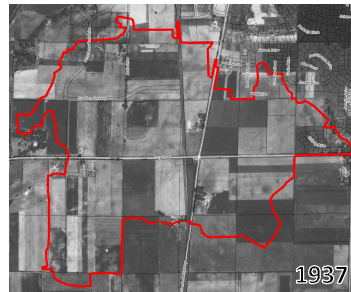


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Historical Aerial Imagery

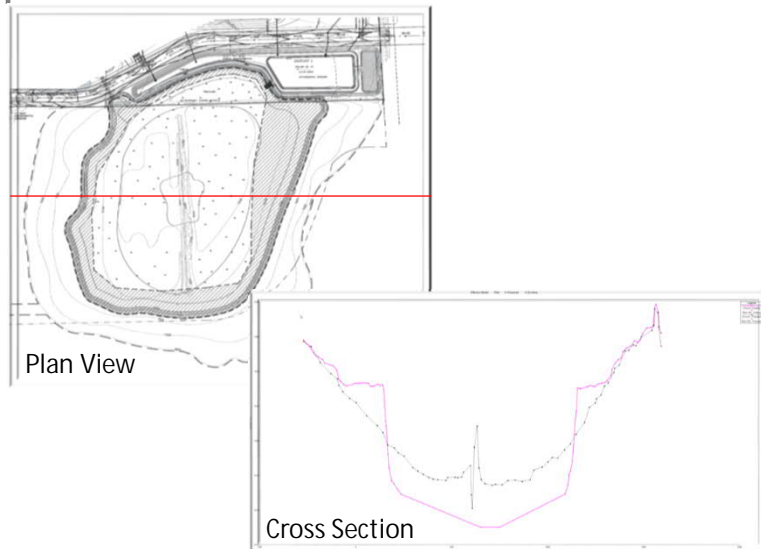
- Kettle areas were historically wet
- Previous owner pumped kettle to make it viable farmland
- Wetland scrape completed during Sub-Zero Parkway construction in 2016



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Wetland Scrape 2016

- Restores 14 acre-feet storage volume filled in during the Sub-Zero Parkway project.
- Lowers kettle bottom by approximately 3 feet.
- Wetland Scrape was approved by WDNR

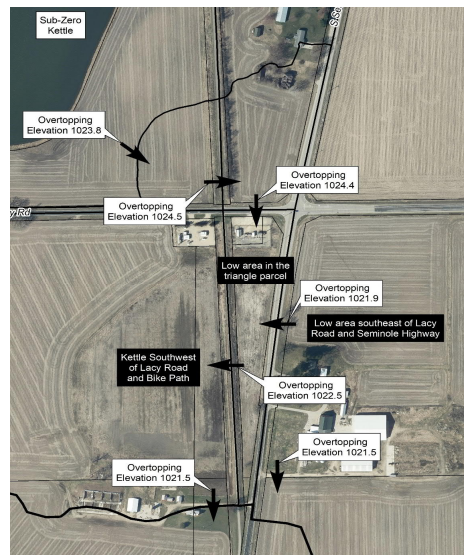


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Overland Flow Routes

- Sub-Zero Kettle overtopping elevation of 1024.5
- Kettle South of Lacy Road overtopping elevation of 1021.5
- These overland flow routes need to be protected to provide system resiliency



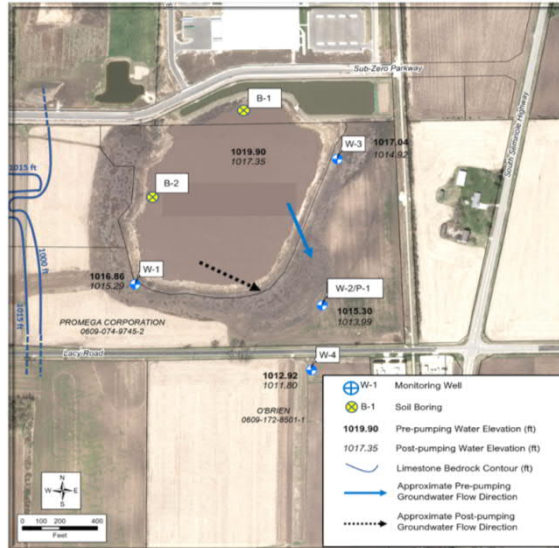
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Soil Boring and Well Locations

- 7 Soil Borings
- 4 Monitoring Wells
- 1 Piezometer Well

- Upper and Lower aquifers are present
- Soil Layers Consist of
 - 10-inches of topsoil
 - 2.5-feet of clay
 - 14-feet sand
 - 5-feet of clay



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2020 Pumping – Sub-Zero Kettle

- Pump Rate 850-1000 GPM
- 364 hours of pumping
- September Water Elevation 1019.9'
- October Water Elevation 1017.4'
- Removed approx. 18.5 million gallons



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Well Measurements/Observations

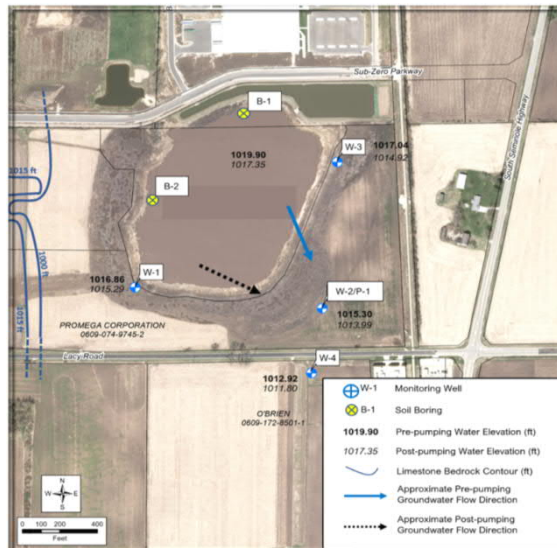
Groundwater Elevation (feet)											
Well	August 31	Pump Start September 3	September 10	September 17	September 25	October 2	Pump Stop October 2	Water Level Decline August 31 to October 2	October 8,	October 19	Water Level Decline August 31 to October 19
W-1	1,016.86		1,016.44	1,016.47	1,016.22	1,015.84		1.02	1,015.61	1,015.29	1.57
W-2	1,015.30		1,015.00	1,014.85	1,014.69	1,014.47		0.83	1,014.27	1,013.99	1.31
P-1	1,007.62		1,007.18	1,007.22	1,007.22	1,006.90		0.72	1,006.71	1,006.58	1.04
W-3	1,017.04		1,016.59	1,016.44	1,015.98	1,015.54		1.50	1,015.32	1,014.92	2.12
W-4	1,012.92		1,012.61	1,012.42	1,012.32	1,012.17		0.75	1,012.00	1,011.80	1.12
Horizontal Flow	South/Southeast		Southeast	Southeast	Southeast	Southeast			Southeast	Southeast	
W-2/P-1 Vertical Flow	Down		Down	Down	Down	Down			Down	Down	
Sub-Zero Kettle	1,019.9		1,019.2	1,018.7	1,017.7	1,017.67		2.23	1,017.4	1,017.35	2.55

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Well Measurements/Observations

Groundwater Elevation (feet)			
Well	August 31	October 19	Water Level Decline August 31 to October 19
W-1	1,016.86	1,015.29	1.57
W-2	1,015.30	1,013.99	1.31
P-1	1,007.62	1,006.58	1.04
W-3	1,017.04	1,014.92	2.12
W-4	1,012.92	1,011.80	1.12
Horizontal Flow	South/Southeast	Southeast	
W-2/P-1 Vertical Flow	Down	Down	
Sub-Zero Kettle	1,019.9	1,017.35	2.55



20

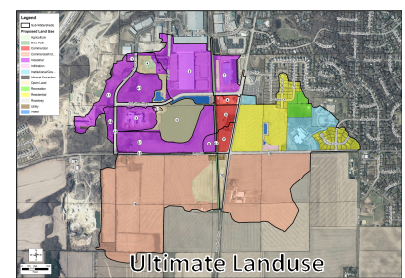
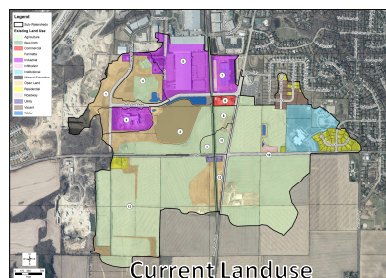
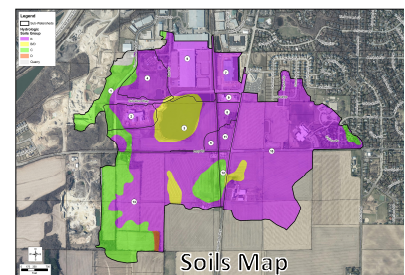
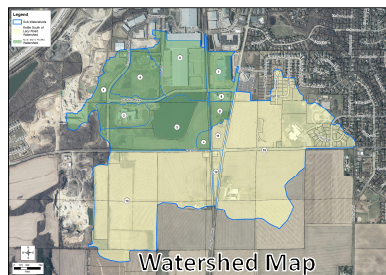
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Hydrology and Hydraulics

21

Hydrologic Parameters

- Watershed Delineations
- NRCS Soils Mapping
- Current Landuse Mapping
- Ultimate Buildout Mapping
- Runoff Curve Number Generation

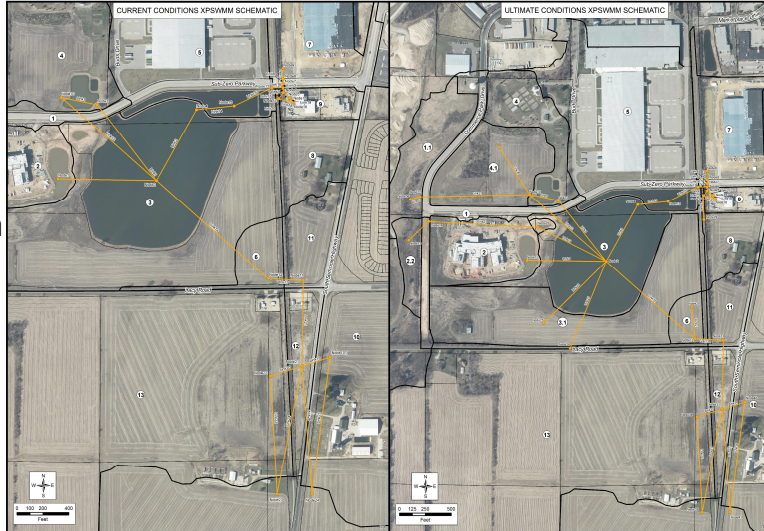


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Hydraulic Modeling

- Modeling Incorporated
 - Storm Sewer System
 - Cross Culverts
 - Overland Flow Routes
 - Storage Volumes (low areas, kettles, detention basins)
- 24-Hour Design Storms
 - 1-Year
 - 2-Year
 - 10-Year
 - 100-Year
 - Back-To-Back 100-Year

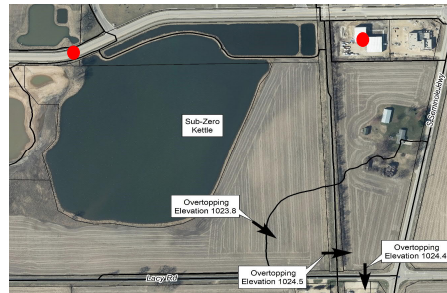


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Hydraulic Modeling Results

- Sub-Zero Kettle
 - Overtopping Elev. - 1024.5
 - Bottom of Kettle Elev - 1015.0
 - Sub-Zero Parkway Low point Elev - 1023.7
 - Lowest FFE - 1028.5, >4 feet of freeboard during larger storm events



Current Conditions					Ultimate Conditions				
Sub-Zero Kettle	Starting Elevation in Kettle	Starting Elevation in Kettle	Starting Elevation in Kettle	Starting Elevation in Kettle	Event	Starting Elevation in Kettle	Starting Elevation in Kettle	Starting Elevation in Kettle	Starting Elevation in Kettle
	1,015 feet	1,016 feet	1,017 feet	1,018 feet		1,015 feet	1,016 feet	1,017 feet	1,018 feet
Event	HWEL (feet)	HWEL (feet)	HWEL (feet)	HWEL (feet)	Event	HWEL (feet)	HWEL (feet)	HWEL (feet)	HWEL (feet)
1	1016.65	1016.95	1017.71	1018.63	1	1017.07	1017.32	1017.97	1018.79
2	1016.9	1017.18	1017.91	1018.81	2	1017.32	1017.55	1018.18	1018.99
10	1017.75	1017.99	1018.66	1019.47	10	1018.15	1018.37	1018.95	1019.66
100	1019.44	1019.63	1020.17	1020.88	100	1019.83	1020.01	1020.52	1021.12
100 back-to-back	1023.43	1023.57	1023.88	1024.24	100 back-to-back	1023.55	1023.68	1024.23	1024.53

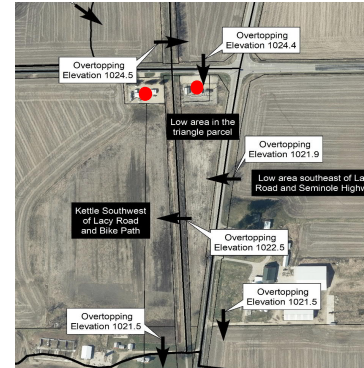
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Hydraulic Modeling Results

- Kettle South Of Lacy Road
 - Overtopping Elev. – 1021.5
 - Utility Pad Elev. – 1023.0

Current Conditions				Ultimate Conditions			
Kettle South of Lacy Road	Kettle Southwest of Lacy Road and Badger State Trail	Low Area in Triangle Parcel South of Lacy Road	Low Area Southeast of Lacy Road and Seminole Highway	Kettle Southwest of Lacy Road and Badger State Trail	Low Area in Triangle Parcel South of Lacy Road	Low Area Southeast of Lacy Road and Seminole Highway	
Event	HWEL (feet)	HWEL (feet)	HWEL (feet)	Event	HWEL (feet)	HWEL (feet)	HWEL (feet)
1	1018.23	1018.76	1019.74	1	1019.06	1019.54	1020.26
2	1018.62	1019.23	1020.1	2	1019.47	1019.94	1020.6
10	1019.89	1020.49	1021.17	10	1020.7	1021.11	1021.63
100	1021.44	1022.08	1022.09	100	1021.62	1022.33	1022.33
100 back-to-back	1022.46	1022.70	1022.71	100 back-to-back	1022.5	1022.71	1022.73



Alternatives Analysis

Select one option from A, B, and C

- A. Increase infiltration within the watershed
 - A1 – Infiltration within the existing kettle footprint
 - A2 – Infiltration to southeast of kettle footprint
- B. Drainage to Dunn's Marsh
 - B1 – Pump station with fixed pump (automatic)
 - B2 – Pump station with a mobile pump (manual)
 - B3 – Gravity sewer line north to Seminole Village Pond
- C. Gravity drain water from kettle to south, north into the Sub-Zero Kettle

→ Consider establishing a new flood protection elevation to reflect new storm events and the selected alternate.

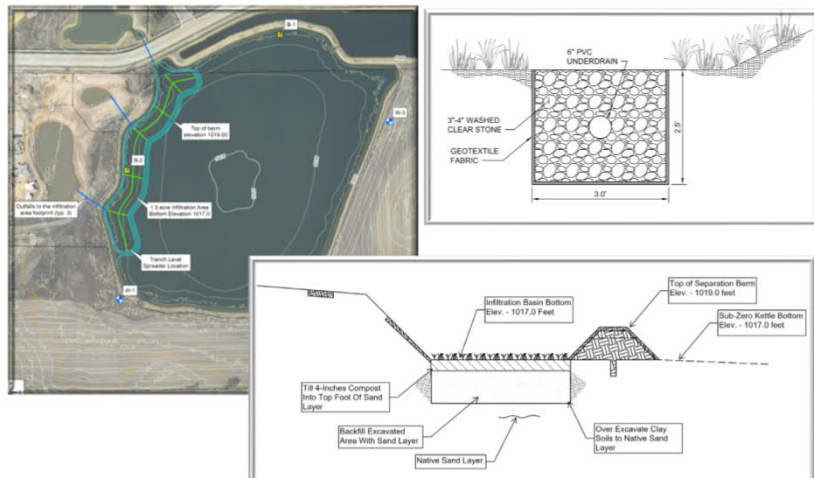
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ALTERNATIVE A1

Infiltration within the footprint of the Sub-Zero Kettle

- Infiltration Alt. Includes:
 - Intercepts flow from west as it enters the kettle
 - 2-foot-high separation berm along east side
 - Excavation of approximately 3-feet of material to get to native sand layer.
 - Engineered soil required for treatment before infiltration
 - Installation of level spreader device



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ALTERNATIVE A1

Infiltration within the footprint of the Sub-Zero Kettle

- Observations:
 - Infiltration basin can approximately a 1-year design storm
 - Infiltration capacity is approximately 3-month design storm
 - Groundwater proximity to bottom of infiltration affects infiltration capacity Per WDNR Tech Standard 1002
 - Separation berm limits kettle drainage to infiltration area. Other drainage alternatives are required to drain the kettle from 1019 feet to 1015 feet



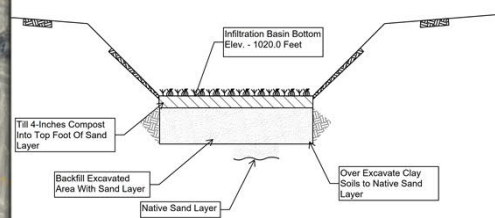
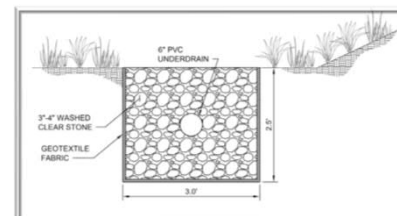
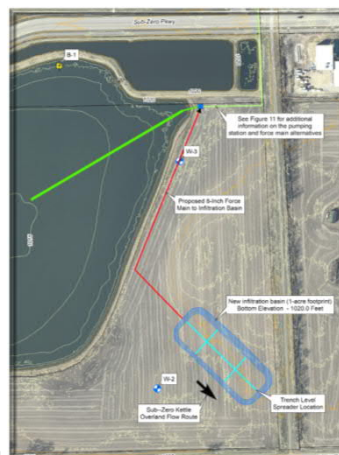
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ALTERNATIVE A2

New Infiltration Basin outside of the Sub-Zero Kettle

- Infiltration Alt. Includes:
 - Excavation of 3-feet of material to get to native sand layer.
 - Engineered soil required for treatment before infiltration
 - Installation of level spreader device
 - Requires pump station to get water to infiltration basin
 - Include 900 feet of 8-inch force main



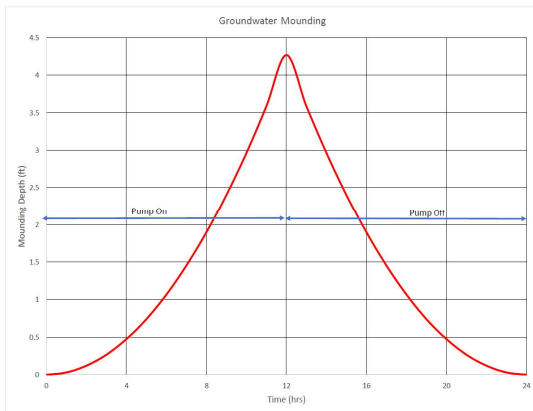
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ALTERNATIVE A2

New Infiltration Basin outside of the Sub-Zero Kettle

- Observations:
 - Groundwater mounding calculation revealed max 12-hours pump time
 - Days to drain Sub-Zero Kettle summarized in table.



	HWEL (feet)	Runoff Volume in Kettle (ac-ft)	Days to Drain Kettle at 12 Hours per Day
Current Condition			
1-Year	1,016.65	15.1	8
2-Year	1,016.90	18.5	10
10-Year	1,017.75	34.0	18
100-Year	1,019.44	70.2	37
100-Year Back-to-Back	1,023.43	179.8	96
Ultimate Condition			
1-Year	1,017.07	21.4	11
2-Year	1,017.32	25.9	14
10-Year	1,018.15	41.7	22
100-Year	1,019.83	79.7	43
100-Year Back-to-Back	1,023.55	183.9	98

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ALTERNATIVE B1&B2

Fixed/Mobile Pumping Station

- Two Pumping Options
 - B1- Fixed Pumping Station
 - B2 - Mobile Pumping Station



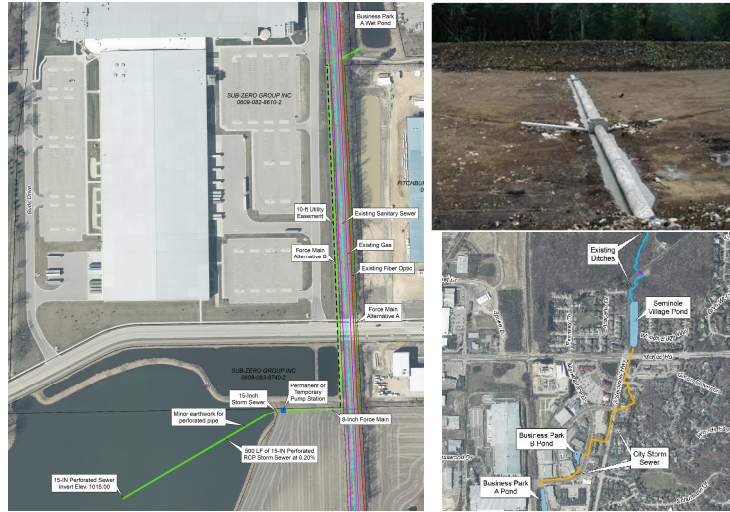
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ALTERNATIVE B1&B2

Fixed/Mobile Pumping Station

- Wet well and sitework
- 500 feet 15-Inch perforated RCP in Sub-Zero Kettle
- 1,700 feet 8-inch force main
- Two force main routes to Business Park A Pond



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ALTERNATIVE B1&B2

Fixed/Mobile Pumping Station

- Fixed option would have pump on/off set points to automate pumping
- Mobile option would require City staff on site to operate and fuel pump
- Time in days to drain Sub-Zero Kettle dependent on storm events
- Operation to occur after downstream system is free



	HWEL (feet)	Runoff Volume in Kettle (ac-ft)	Total Pump Time to Drain Kettle at 850 gpm (Day)
Current Condition			
1-Year	1,016.65	15.1	4
2-Year	1,016.90	18.5	5
10-Year	1,017.75	34.0	9
100-Year	1,019.44	70.2	18.5
100-Year Back-to-Back	1,023.43	179.8	48
Ultimate Condition			
1-Year	1,017.07	21.4	5.5
2-Year	1,017.32	25.9	7
10-Year	1,018.15	41.7	11
100-Year	1,019.83	79.7	21.5
100-Year Back-to-Back	1,023.55	183.9	49

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ALTERNATIVE B3

Low Flow Gravity Pipe to Seminole Village Pond

Alternative Includes

- 4,600 feet 15-inch storm sewer at 0.2%
- 500 feet 15-Inch perforated RCP in Sub-Zero Kettle
- Control structure with gate
- Sump manhole to settle solids on upstream end
- Alignment follows western edge of right-of-way



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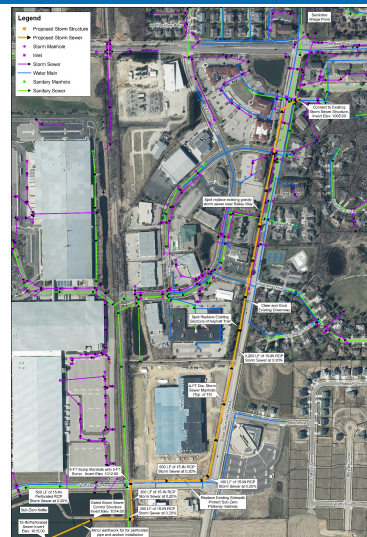
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ALTERNATIVE B3

Low Flow Gravity Pipe to Seminole Village Pond

Observations

- Average depth of storm sewer is 19 feet with a max depth of 26 feet
- 15-inch storm sewer at 0.2% has a velocity greater than 2 ft/s making it self-cleaning
- Release rate would equal pump station rate at Sub-Zero Kettle
- Operation to occur after downstream system is free



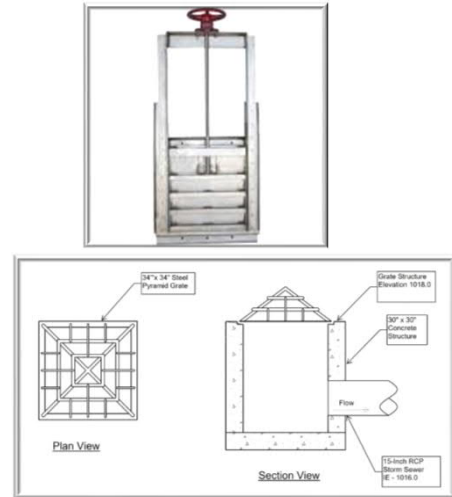
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ALTERNATIVE C1

Low Flow Gravity Pipe - Kettle South of Lacy Road to Sub-Zero Kettle

- Alternative Includes
 - 2,080 feet 15-inch storm sewer at 0.2%
 - Connects to pump station wet well
 - Control structure with gate
 - Kettle Inlet with Grate Set at Elev. 1018.0 feet
 - Release rate would equal pump station rate at Sub-Zero Kettle



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ALTERNATIVE C1

Low Flow Gravity Pipe - Kettle South of Lacy Road to Sub-Zero Kettle

- Observations
 - Alignment follows western edge of Badger State Trail
 - Average depth of storm sewer is 10 feet with a max depth of 13 feet
 - Kettle draw down time is 22 days
 - 15-inch storm sewer at 0.2% has a velocity greater than 2 ft/s making it self-cleaning
 - Operation to occur after Sub-Zero Kettle has been drained



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ALTERNATIVE COSTS

Construction Cost and 20-Year O+M Cost

City of Fitchburg Temporary Pumping Station (B2)				
	Quantity	Unit	Unit Price	Total
PUMPING STATION				
15" RCP Storm Sewer	100	LF	\$ 100	\$ 10,000
Precast 8-FT Diameter Wetwell	1	EA	\$ 25,000	\$ 25,000
Precast 8-FT Diameter Wetwell Lid with Access Hatch	1	EA	\$ 15,000	\$ 15,000
Piping/Mechanical	1	LS	\$ 10,000	\$ 10,000
Dewatering	1	LS	\$ 20,000	\$ 20,000
FORCE MAIN				
8" Ductile Iron	1700	LF	\$ 100	\$ 170,000
Street/Path Crossing	1	LS	\$ 15,000	\$ 15,000
Pond Outfall	1	EA	\$ 15,000	\$ 15,000
MISCELLANEOUS				
Erosion Control/Site Restoration	1	LS	\$ 15,000	\$ 15,000
Class II - 15" Perforated RCP Storm Sewer with Tie Downs	500	LF	\$ 125	\$ 62,500
Sitework (Lift Station)	1	LS	\$ 10,000	\$ 10,000
Riprap	20	SY	\$ 65	\$ 1,300
Subtotal				\$ 368,800
Geotechnical				\$ 15,000
Contractor's General Conditions (10%)				\$ 37,000
Total Construction Costs				\$ 420,800
Contingencies and Engineering (35%)				\$ 147,000
Total Capital Costs				\$ 567,800

City of Fitchburg Temporary Pumping Station (B2) Maintenance Schedule and Cost				
	Quantity	Unit	Unit Price	Total
Yearly Maintenance				
Maintenance Of Pumps	1	EA	\$ 2,500	\$ 2,500
Operations Labor Cost	240	HRS	\$ 100	\$ 24,000
Operations Fuel Cost	2250	GAL	\$ 2.25	\$ 5,100
Water Quality Testing	10	EA	\$ 100	\$ 1,000
Total Yearly Maintenance				\$ 32,600
Notes:				
Volume of runoff to the Sub-Zero Kettle during an average annual year is 679,840 gallons.				
Pumping time to remove average annual runoff amount is 750 hours or 31 days				
Assumes 25 manhours per month for 9 months.				

- Detailed Opinion of Probable Construction Cost for each alternative

- Maintenance Included
 - Removal of sediment / deep tilling
 - Removal and replacement of Engineered Soil
 - Maintenance / Operation / Fueling
 - City staff hours for general work

ALTERNATIVE COSTS

Construction Cost and 20-Year O+M Cost

	Alt. A1	Alt. A2	Alt. B1	Alt. B2	Alt. B3	Alt. C1
Construction Cost	\$759,900	\$847,300	\$856,600	\$567,800	\$2,288,000	\$649,150
20-Year Operation and Maintenance Cost	\$459,050	\$728,400	\$483,500	\$817,900	\$226,100	\$163,250
20-Year Total Cost	\$1,218,950	\$1,575,700	\$1,340,100	\$1,385,700	\$2,514,100	\$900,300

- Cost Summary
 - Alternative A1 (Infiltration Inside Kettle Footprint) has lowest 20-year cost for infiltration
 - Alternative B1 (Fixed Pump Station) has lowest 20-year cost for drainage to Dunn's Marsh
 - Alternative C1 (Low Flow Gravity Pipe to Drain Kettle to South) provides cost effective and sustainable option to drain kettle to south

Recommendations

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Alternative Matrix

Alternative	Opportunity	Pros	Cons	Dependency on Other Alternatives	Time to Drain Kettle After 10-Year Design Storm Under Existing Condition Land Use	Land Acquisition	Sustainability	Effectiveness	Resilience	Cost
A1	Infiltration within the footprint of the Sub-Zero Kettle	<ul style="list-style-type: none"> Contained within the existing stormwater management footprint. 	<ul style="list-style-type: none"> Proximity of groundwater elevation to bottom of the kettle lowers effective infiltration rate. During high groundwater conditions, groundwater may take up storage volume. Requires use of engineered soil for groundwater protection. Requires wetland reseeded in areas disturbed. Only provides infiltration for areas that drain into the west side of the Sub-Zero Kettle. Does not infiltrate water in the Sub-Zero Kettle below elevation 1019.00. Maintenance required as infiltration rate naturally decreases. 	<p>Select a pumping option to work in tandem with this alternative.</p>	<p>This alternative only provides infiltration for areas draining from the west side off the kettle for small design storms. All other stormwater will need other means to be removed from the kettle by Alternatives B1, B2, C1.</p>	<ul style="list-style-type: none"> Property acquisition required for new infiltration basin. 	<p>While this alternative provides some level of volume control through infiltration it is still dependent on a pumping station to lower the kettle as required. This option is considered semi-sustainable.</p>	<p>With proper Maintenance this alternative should be effective to infiltrate small design storms (when the groundwater table is down) however a pumping station alternative is required to lower the kettle as required.</p>	<p>Provides over 4.5 feet of freeboard from overtopping elevations to south and adjacent structure FFE.</p>	<p>Installation Cost: \$837,700</p> <p>Anticipated Annual Operating Cost: \$3,750</p> <p>Year 5 & 15 Operation Cost: \$58,240</p> <p>Year 10 & 20 Operating Cost: \$145,585</p>
A2	New Infiltration Basin outside of the Sub-Zero Kettle	<ul style="list-style-type: none"> 5 feet of separation between the bottom of the basin and groundwater allows for infiltration. 	<ul style="list-style-type: none"> Dependent on pumping to get stormwater from the kettle to the new basin. Land acquisition is required to construct a new infiltration basin. Requires use of engineered soil for groundwater protection. Maintenance required as infiltration rate naturally decreases over time. 	<p>Select a pumping option to work in tandem with this alternative.</p>	<p>18 days</p>	<ul style="list-style-type: none"> Utility easement required for all piping. Property acquisition required for new infiltration basin. 	<p>This alternative is dependent on infiltration however a pumping station alternative is required to get the stormwater to the infiltration basin. This option is considered semi-sustainable.</p>	<p>With proper Maintenance this alternative should be effective to lower the kettle as required without conveying additional stormwater to Dunn's Marsh.</p>	<p>Provides over 4.5 feet of freeboard from overtopping elevations to south and adjacent structure FFE.</p>	<p>Installation Cost: \$752,300</p> <p>Anticipated Annual Operating Cost: \$2,500</p> <p>Year 5 & 15 Operation Cost: \$38,720</p> <p>Year 10 & 20 Operating Cost: \$96,765</p>

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Next Steps

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NEXT STEPS

- Feasibility Report will be finalized and published on the following website:
<http://www.fitchburgwi.gov/2679/Sub-Zero-Stoner-Prairie-Stormwater-Study>
- The costs for the proposed alternative will appear in the proposed 2022-2031 Capital Improvement Plan.
- Easements and/or land acquisition will be discussed with relevant property owners.
- Permitting and design.
- Construction.

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Questions?



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Contact

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City of Fitchburg
Claudia.Guy@Fitchburgwi.gov



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5520 Lacy Road
Fitchburg, WI 53711-5318
Phone: (608)270-4260
Fax: (608)270-4275
www.fitchburgwi.gov

To: Jay Hochmuth et al.

cc: Mayor, Aaron Richardson; Bill Balke, Director of Public Works

From: Claudia Guy, P.E., Environmental Engineer

Date: March 17, 2021 Original Memo
March 25, 2021 Follow-up questions added in **green**
April 14, 2021 Response to follow-up questions added in **red** (by Strand unless otherwise noted)

Subject: Response to Questions regarding Sub Zero Stormwater Study

This memorandum provides responses to questions that were received from Jay Hochmuth, Sue Easterday, Tom Thoresen, Rita Henricks, and Cheryl Strassman regarding the Sub Zero Stormwater Study.

1) When was staff directed to hire a consultant to prepare the Sub Zero Stormwater Study? Who was involved in determining what the assumptions for the Study would be and what alternatives would be considered? Were owners of properties not zoned residential within the study area involved in this? If so, how and when? Were owners of residential property in the study area involved? If so, how and when?

The Sub Zero Stormwater Study was included in the 2020-2029 Capital Improvement Plan (CIP) as Project #4723, "Lacy/Seminole Regional Stormwater." (We later changed the name because the main concern is what to do with water in the kettle that we're calling the "Sub Zero Kettle" located south of Sub Zero Parkway; however, this is the same project).

The 2020-2029 CIP process began in February 2019 with staff recommended projects due to the Finance Director by April 10, 2019. The draft was submitted to the Mayor for Review on April 19, 2019 and the Mayor's Proposed 2020-2029 CIP was published on May 20, 2019. The proposed CIP then went to various boards and committees for review and comment. Public hearings were held on July 9, 2019 and August 13, 2019. The Final 2020-2029 CIP was adopted on August 13, 2019. The full CIP schedule can be found [here](#). Funds to move forward with proposed projects became available on January 1, 2020.

The scope for the project was generally outlined in the 2020-2029 CIP, which went through the approval process described above:

Perform a comprehensive drainage study of the area, with potential recommendations for pumping plans if needed, identification of potential drainage infrastructure, identification of retention areas, identification of low impact development techniques or recommended stormwater ordinance changes, or recommended conditions on development. TID #9 Amendment #2 includes 75% funding (\$225,000 of \$300,000 total). Remaining 25% to be paid through stormwater utility.

Many alternatives were considered, including creating canals several miles to the south to a tributary of Story Creek, pumping water to the west to Goose Lake, and pumping water to the north to Marketplace A Pond which flows to Dunn's Marsh (ultimately selected for further analysis). The decision to further assess sending water to the north was primarily driven by permitability discussions with DNR, as well as cost and general feasibility. Building a canal to the south would require significant easement acquisition over several miles of private property, would require significant earthwork compared to the other options, and would be more difficult to permit due to cold weather communities in Story Creek. Pumping to the west was expected to be much more expensive than pumping to the north because it would require traveling a further distance both horizontally and vertically. Water would enter roadside ditches rather than storm sewer which was considered to be less desirable, and flooding of Fitchrona Road may be impacted by sending water in that direction. Pumping to the north was considered the most feasible and cost effective solution, especially given the short length between the kettle and already-in-place stormwater infrastructure. The City Administrator, Director of Public Works, and Environmental Engineer were part of the decision-making process, with input from regulatory agencies and Strand, the consultant hired to do the feasibility study. This is also in keeping with what was specified in the NSPN, see recommendation M14 on page 126 ("Pumped water would be discharge to the existing storm sewer system north of the North Stoner Prairie Neighborhood, where it would eventually discharge to Dunn's Marsh.").

The property owners immediately surrounding Sub Zero Kettle were somewhat involved in the process because we implemented a temporary pumping plan to drain the kettle in 2020. This required the City to obtain temporary limited easements from Promega, Sub Zero, and the O'Briens. In addition, a DOT right-of-way permit was obtained to get DOT permission to lay down pipe within the DOT right-of-way along the bike path. The easements went through Council as Resolution R-129-20, R-128-20, and R-134-20. The temporary pumping plan was approved by DNR and then approve by Council in Resolution R-102-20.

Thanks for this information. There are no follow-up questions.

2) Does the recommended alternative in the Study satisfy all the stormwater management requirements listed: a) on pages 113 thru 115 of the Plan for the North Stoner Prairie Neighborhood (NSPN) that was approved as an Amendment to the City's Comprehensive Plan in 2013 and b) in documents related to the approval of rezone requests for specific parcels within NSPN? Where in the NSPN Plan does it recommend that pumping alternates should be evaluated for managing NSPN stormwater?

M1: 100% Infiltration – Due to more recent regulations at the state level, the City is unable to require more than 90% infiltration, which is what we have been requiring for new development in this area per our ordinance.

Wis. Stat. sec. 281.33(3m). Wis. Stat. sec. 281.33(3)(a)1.c. provides that the DNR shall establish by rule uniform statewide standards for stormwater management. Wisconsin Admin. Code section NR 151 sets the uniform statewide standards, and provides that the post-construction infiltration standard for residential development is 90% of the average annual predevelopment infiltration by volume or 25% of the 2 year, 24-hour storm.

Subject to certain exceptions, under state law, a city, village, town, or county may not enact an ordinance relating to stormwater management unless the ordinance strictly conforms to uniform statewide standards. See Wis. Stat. sec. 281.33 (3m).

Under Wis. Stat. sec. 281.33(6), a City may adopt an ordinance more strict than the uniform rules under NR 151 to “control stormwater quantity or peak flow to address existing flooding problems or prevent further flooding problems except that an ordinance under this subdivision may not require more than 90 percent of the difference between the predevelopment annual runoff volume at a site and the post-development annual runoff volume at that site to be retained on site.”

For this reason, we are unable to require more than 90% infiltration for private development. As part of the proposed regional stormwater plan, the City would build additional infiltration basins to supplement the privately-owned basins. This would be in keeping with the spirit of the intent of the NSPNP.

M2: DNR Technical Standard 1002 for Infiltration – The City requires that all stormwater practices be designed according to DNR technical standards, including DNR Technical Standard 1002. This is being done.

M3: Encourage Volume Controls through Evaporation/Transpiration – The City requires that infiltration practices be outfitted with native vegetation. Native vegetation provides more transpiration when compared to regular turf grass. In addition, the City has encouraged evaporative measures as well. Promega met their volume reduction requirement in part via a stormwater reuse system which uses stormwater to cool their cooling towers. Volume reduction is achieved via evaporation.

M4: No infiltration within 400ft of a City supply well – The nearest supply well is over 2,000 feet away from the North Stoner Prairie neighborhood, and no new wells are anticipated within 400 feet of the neighborhood. Therefore this requirement is met.

M5: 80% TSS Removal – 80% TSS removal is required by ordinance for new development. This requirement is met.

M6: Control Peak Flow for 1-100 year Storm Events east of Badger State Trail – Control peak flow for the 1 to 100-year storm events is required per City ordinance. This requirement is met.

M7: Control peak Flow for 1 and 2-year Events West of Badger State Trail – Control peak flow for the 1 to 100-year storm events is required per City ordinance. This requirement is exceeded.

M8: Create drainageways to route water to stormwater controls. Currently uncontrolled runoff from Parcel 7) into the Seminole Forest and Lacy Heights Neighborhoods should be routed to stormwater control practices. Grading will be needed in Parcels 1 and 5, between Seminole Highway and the Badger State Trail, to route runoff to the north and south. A new culvert under Seminole Highway north of Lacy Road will likely be needed to convey

runoff from Parcel 1 east to Parcel 11, where it would drain south through the existing culverts under Lacy Road. The figure below has been excerpted from the NSPNP for each in understanding where parcels are located. Parcel 7 is generally the north portion of the Stoner Prairie Neighborhood and flows to a detention basin and underground infiltration trench for treatment. A culvert is planned north of Parcel 5 to allow water from Parcel 5 to overflow to the Marketplace Pond A pond if overflow conditions are reached. Grading around Parcel 5 and in the Seminole Highway / Badger State Trail area will be done with the Lacy reconstruction project.



Figure 4. North Stoner Prairie Neighborhood growth model.

M9: Create a safe drainageway for runoff flowing from the North Stoner Prairie Neighborhood northward to the storm drainage system in the Seminole Forest Neighborhood. Runoff from the existing agricultural land has impacted residential properties along Schumann Drive in low lying areas lacking controlled runoff routes. As stated, water from the agriculture area previously flowed uncontrolled through properties along Schumann Drive, causing issues for those home owners. Water is now collected and conveyed to the storm sewer system. The valve has been shut so that water does not flow into the Seminole Glen Kettle.

M10: Wetland delineations and determinations: Private developers are required to submit wetland delineations to the DNR as required. Wetland permitting is overseen at the state level.

M12: Restore native vegetation in these wetlands to improve habitat, provide recreational and educational opportunities, and maintain stormwater infiltration rate. The depression on the Dunn property north of Sub Zero Parkway was relocated to the western side of that property with CARPC review and approval. The area now serves as detention basin and infiltration basin. Native vegetation was required within the infiltration basin (as well as smaller bioretention basins on site). The larger depression to the west, the Sub Zero Kettle, was determined to be a wetland. The area is currently privately owned and the City does not have an ordinance to require native vegetation in this area. If the City is permitted to install an infiltration basin in this area, native vegetation will be installed within the infiltration area.

M13: Establish a flood protection elevation of approximately 1022.6 ft for the closed depression west of the Badger State Trail, based on the predicted water surface for back-to-back 100 year runoff events. This corresponds to an inundation area of approximately 44 acres for the existing topography. This extreme weather scenario is recommended for flood protection because there is no surface outlet for this watershed. This has been completed. The shape of the outlot on which the Sub Zero Kettle sits generally follows the 1022.6' contour and development is now allowed within this area. As discussed in the Committee of Whole meeting, the 100-year storm event has changed since the 1022.6' elevation was calculated, so we recommend reconsideration of if 1022.6' fulfills the intent of this requirement (which was intended to provide volume for the back-to-back 100-year event).

M14 Develop an emergency pumping plan and install infrastructure needed to mitigate unanticipated flooding of the western closed depression due to climate change, stormwater system failure, or other factors. This is especially recommended due to the challenges in maintaining 100% of the pre-development runoff volume. Pumped water would be discharge to the existing storm sewer system north of the North Stoner Prairie Neighborhood, where it would eventually discharge to Dunn's Marsh. Infrastructure improvements would include an intake pipe and manhole in the closed depression, electric submersible pumps in an enclosure, and a buried HDPE pipeline to the storm sewer. We are working on addressing this concern with the current feasibility analysis.

M15 Monitor water levels in the closed depressions to provide early warning of unanticipated conditions. Installation of a staff gage and monthly stage readings are recommended. Water levels have been monitored periodically. A staff gage has not been installed, but should be considered as part of the future design for proposed pumping infrastructure.

Thanks for the detailed answer to question 2a. Regarding question 2b, there's a closely related follow-up question to the answer provided for question 10.

3) Was the scope (or status) of the study ever an agenda item for a meeting of the Board of Public Works, Finance Committee, or Common Council ? If so, which meeting(s)? Are the boundaries of the Study "area" and NSPN the same? If not, which NSPN properties are excluded? Which properties not in NSPN are included and which of these properties are not within the Urban Service Area? Why are they in the study area? Do they drain into NSPN? If the recommended alternative (or a different alternative the City selects) is implemented, what percentage of the tributary stormwater will originate on properties not in NSPN? How will those properties pay their "fair" share of capital and operation/ maintenance costs?

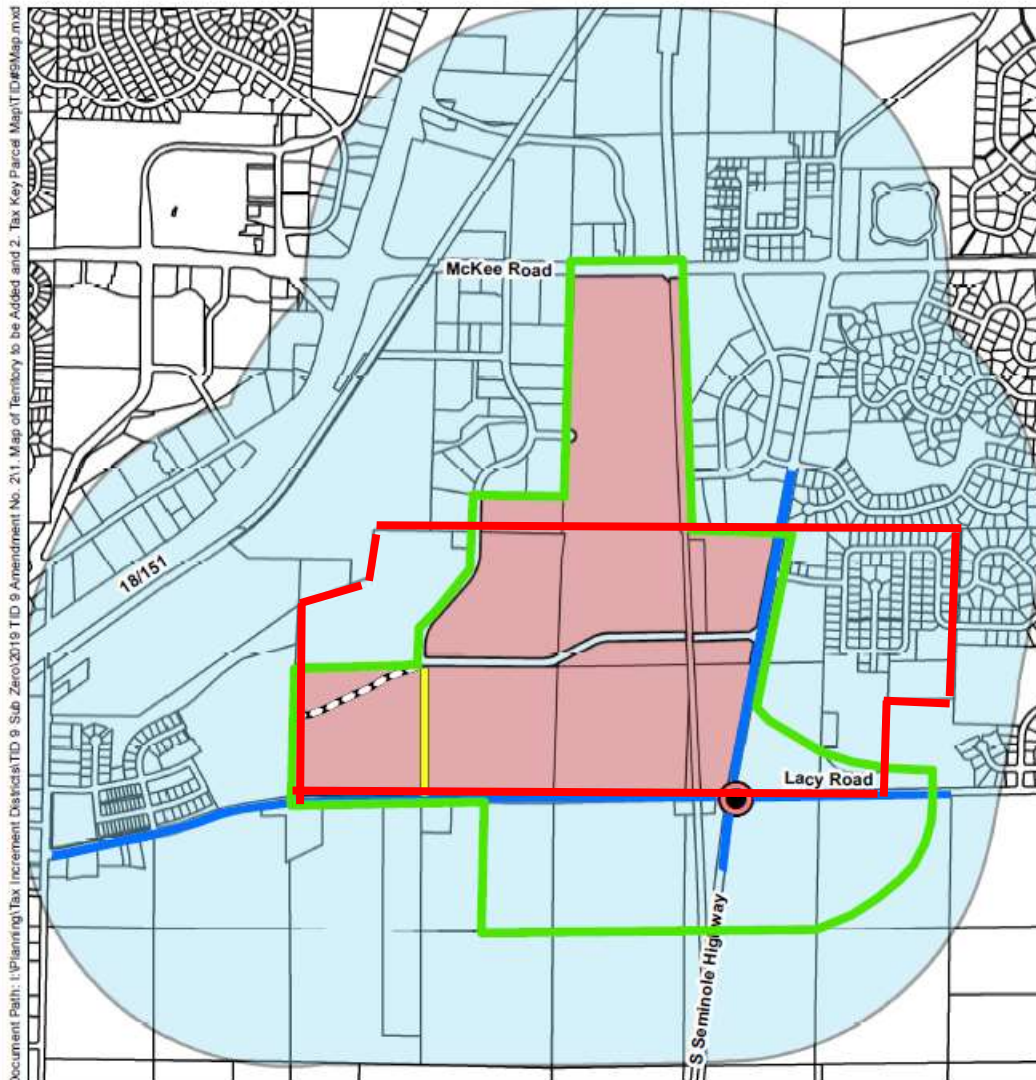
The Request for Proposal (RFP) for the project was made available to BPW, Council, and CC when the contract went through for approval as Resolution R-191-19 (Referred by CC 11/12/19, BPW 11/18/19, Finance 11/26/19, Council decision 11/26/19). I know that an update would have been provided when the easements and pumping plan went through for approval as well (resolution numbers provided previously). Unfortunately, our previous DPW would have a better idea on what other updates may have been provided to BPW and Council. I believe Finance would only have been involved in the contract approval.

The area of the NSPNP is shown below:

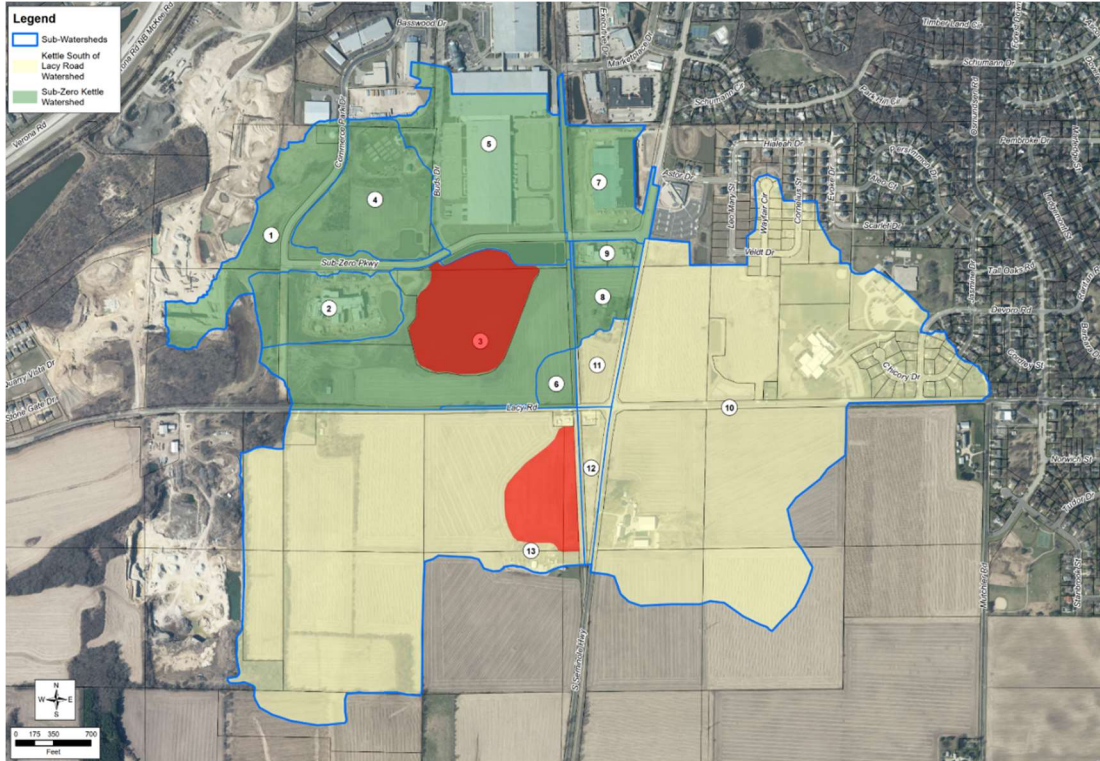


Existing surface drainage conditions with closed depressions (CD)

The "Area of Interest" for the stormwater study included the area shown below. This area included most of the anticipated problem areas (including the Sub Zero Kettle, Closed Depression 5 (CD5), as well as the right-of-way along Lacy Road where we wanted to ensure the ditch was sized appropriately). However, the consultant was expected to analyze areas outside of this area as necessary in order to fully develop a regional stormwater plan because areas outside of the AOI that drain into it. I've generally outlined the Stoner Prairie Neighborhood in red, for ease in comparison of these two figures.



As alluded to on the previous page, the areas draining into the area of interest were looked at as part of the feasibility study for modeling purposes. The green area in the image below is the watershed for the Sub Zero Kettle, and the yellow area is the watershed associated with CD 5. For the feasibility study, 75% of the study was funded by TID 9 funds (see pink parcels in the previous image for TID 9 parcels), and 25% of the study was funded by the Stormwater Utility. Please see the response to Question 9 for more information regarding capital and operational costs.



Thanks for this information. There are no follow-up questions.

4) How many stormwater studies has Fitchburg conducted besides this one? Has Fitchburg ever conducted a stormwater study that has a recommended alternative with implementation costs greater than 50% of the implementation costs of the alternative recommended in this Study? If so, which ones and when in the past 10 years?

Flood studies have become much more relevant since the record rainfall events that we experienced in the 2017-2019 timeframe. Studies have included the Fitchrona Road / Goose Lake Flood Study, Sub Zero Regional Stormwater Study, Lake Barney Study, Hillside Heights Study, and Curry Court / Old Indian Trail Study. I am less familiar with projects that were completed prior to this timeframe as I was not employed at the City.

I apologize but I don't understand the second part of your question.

Thanks for the information related to the 1st part of this question. Regarding the 2nd part, is it possible to determine what other stormwater studies have been conducted prior to your employment with the City?

The two links below will direct you to previous stormwater studies completed by the City.

<https://www.fitchburgwi.gov/DocumentCenter/View/428/Fitchburg-Stormwater-Reports?bidId=>

<https://www.fitchburgwi.gov/149/Stormwater>

Have any of those studies recommended pumping of stormwater?

I am not aware if these studies have recommended stormwater pumping measures as one of the recommended alternatives. Stormwater pumping alternatives are typically recommended in areas that do not have the capability to cost effectively provide a gravity discharge. In this situation, both the gravity discharges to the north and south involve the construction of thousands of feet of new storm sewer that would be installed at deep depths. As discussed during the presentation, we did investigate the cost to provide a gravity outlet to the north and compared that cost to the pumping station option (along with 20-year operation and maintenance cost). Based on the results of this investigation, we deemed the pumping station alternative to be the most cost-effective option.

Also, regarding the 2nd part of this question, the intent is to determine how the cost of the recommended alternative in the Sub Zero Study compares to the cost of the recommended alternative in other studies conducted over the past 10 years (or a shorter time if a 10 year look-back is not possible).

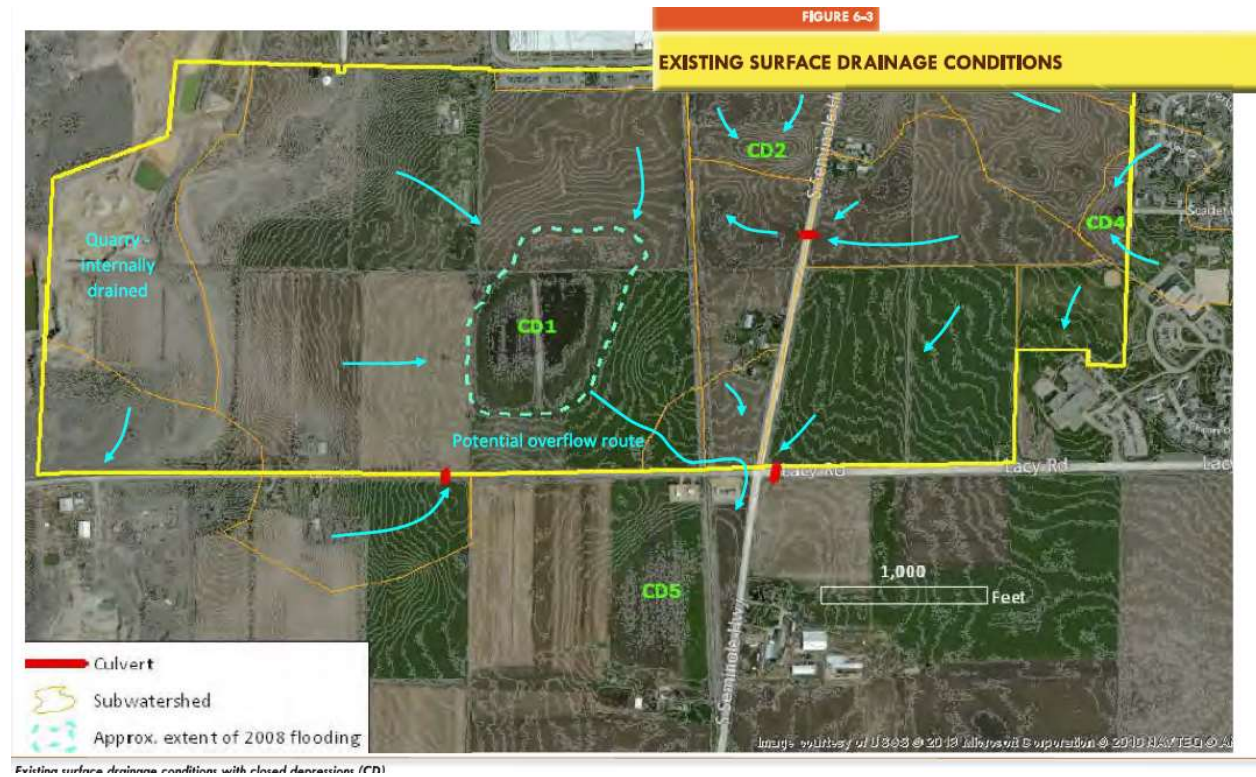
The City does not own or operate any stormwater pump stations to date, and we are unaware of any other areas within the City where a pump station was recommended as part of a past study. It is unlikely because other areas within the urban area are generally able to drain economically via gravity flow. The opinion of probable construction costs for the alternatives in this study are based on planning level quantities and the most recent bid prices from other projects throughout the state.

5) According to the NSPN Plan approved in 2013, the land within the NSPN boundary currently drains towards surface water located south of Lacy Rd or into the McKee Farms Park stormwater basins or into the kettle north of Lacy Rd and west of Seminole Hwy or into the kettle south of Lacy Rd and west of Seminole Hwy. What is the estimated “pre-development” annual average runoff discharged into each of these areas and into the groundwater? If the recommended alternative is implemented how many gallons will be discharged on an annual average (and peak year) basis into each of these 4 areas and into the groundwater. How much will be discharged into Dunn’s Marsh? During the Feb 24 Committee of the Whole Meeting, it was mentioned that DNR in 2016 approved using the Kettle north of Lacy Rd and west of Seminole Hwy as a storm water detention basin. What entity received that approval, what are the conditions listed therein, and how can a copy of it be obtained? Does this approval prevent a dike from being constructed around the perimeter to increase the amount of stormwater that it can hold?

The image on the next page shows the pre-development flow patterns. The discharge rate to the various directions that stormwater flows was maintained from pre- to post-development for the 1-, 2-, 10-, and 100-year storm events, per City ordinance. The post-development infiltration volume was maintained to at least 90 percent of the pre-development infiltration volume.

The amount of water that will be discharged to Dunn's Marsh in the future will vary from year to year based on rainfall. We would recommend pumping only during dry weather conditions and at a rate that is safe for downstream infrastructure and receiving waters to accept.

I'm not sure what you're referring to when you said DNR approved the kettle to be used as a stormwater detention basin. The term "stormwater detention basin" typically refers to a basin that was designed to meet ordinance requirements such as rate control or water quality control. The kettle is not being used as a stormwater detention basin in that definition of the word. Private property owners were required to install basins on their own properties to meet ordinance requirements; those requirements are not being met within the kettle. The DNR approved a wetland scrape to reshape the kettle, at the request of Sub Zero, Inc., the owner of the Sub Zero Kettle at the time. This may be what you are referring to. In concept, I do not believe the DNR would prevent a dike from being constructed around the perimeter of the kettle to increase the amount of stormwater that the area can hold. However, the area is already bowl shaped so constructing a berm wouldn't really achieve that goal. Additional water can already be accepted beyond the 1022.6' flood protection zone until it reaches the overflow route. (A large area would be under water prior to overtopping to the south).



Thanks for this information. There are some "loose ends" we hope can be tied up. Please see the follow-up questions to the answers provided to Question 6.

6) If the recommended alternative is implemented, will the discharge into Dunn's Marsh need to be authorized by a permit issued by DNR? Has the City of Fitchburg confirmed with the City of Madison and Dane County, the owners of the 2 properties that front on Dunn's Marsh, what conditions they believe should apply to the discharge from the alternative recommended in the Study? What will be the impacts on groundwater south of Lacy Rd of diverting stormwater into Dunn's Marsh? Also, how many gallons of stormwater are currently being discharged on an annual average (and peak year) basis from properties in Fitchburg that are tributary to Dunn's Marsh? How many of those properties are in NSPN? Also, how many gallons of stormwater will be discharged on an annual average (and peak year) basis into Dunn's Marsh, and how many gallons of will be discharged on an annual average (and peak year) basis into the infiltration basin if the recommended alternative is implemented? How many times per year on an annual average (and peak year) basis will a discharge occur to Dunn's Marsh? To the infiltration basin?

The temporary pumping plan which was implemented in 2020 was approved by the DNR and was covered by the City's MS4 Permit. A permanent pumping plan would also need DNR approval and permitting. It is my understanding that water quality monitoring would be required for implementation of a permanent pumping plan. During development of a permanent pumping plan, the draft pumping plan will be provided to the City of Madison for comment.

It is anticipated that groundwater recharge will be addressed primarily in infiltration basins that have been built (and will be built as development continues) throughout the watershed. Our soil borings indicate that there effectively may be a natural clay liner under the kettle, so once water gets to the kettle, very little infiltration (and thereby very little groundwater recharge) occurs within the kettle footprint. The fact that the kettles has retained water for several years now (while kettles in the ag land to the south have infiltrated relatively quickly during the same timeframe) further indicates that the kettle must have less permeable native soils. That being the case, pumping water that has already reached the kettle is not anticipated to have adverse effects on groundwater. We do recommend additional infiltration measures prior to moving the water from the watershed, to allow for additional infiltration and recharge. How often pumping would need to occur would be entirely weather dependent. In very wet years (like 2018), we could be pumping almost every month. During drier years (like 2020), we may not need to pump at all, or minimally.

Thanks for this information. We hope answers can also be provided to following questions (some are initial; some follow-up): Before more money is spent on project design, would it be appropriate to obtain the DNR discharge permit and approval of the permanent pumping plan, along with the City of Madison's concurrence with the contents of the permit and approval?

We agree that discussions with the DNR and City of Madison should be conducted before moving forward with design.

Also, how many gallons of stormwater are currently being discharged on an annual average (and peak year) basis from properties in Fitchburg that are tributary to Dunn's Marsh?

This investigation was beyond the scope of this study and was not calculated for this report.

What is the total acreage of these properties?

The Dunn's Marsh watershed area is approximately 1,365 acres. Approximately 812 acres of this watershed is within the City of Fitchburg.

How many of those properties are in NSPN?

The properties within the North Stoner Prairie Neighborhood currently do not drain to Dunn's Marsh.

What is the acreage?

See previous answer.

Also, if the recommended alternative is implemented, how many gallons of stormwater will be discharged on an annual average (and peak year) basis into Dunn's Marsh, and how many gallons of will be discharged on an annual average (and peak year) basis into the infiltration basin?

The average annual and peak year stormwater runoff volume in gallons that will either be infiltrated or conveyed to Dunn's Marsh is 73 million and 103 million gallons, respectively. Please note that the recommended alternative is to have stormwater runoff first be delivered to the infiltration basin. Stormwater will only be diverted to Dunn's Marsh if the infiltration basin is under maintenance, a high groundwater condition that limits infiltration, or infiltration is not keeping up with pumping needs.

How many days per year on an annual average (and peak year) basis will a discharge occur to Dunn's Marsh?

Pumping to Dunn's Marsh is considered a "plan B" in the case that the infiltration basin is not operating. The goal of the recommended alternative is to limit the amount of stormwater runoff conveyed to Dunn's Marsh via pumping as much as possible.

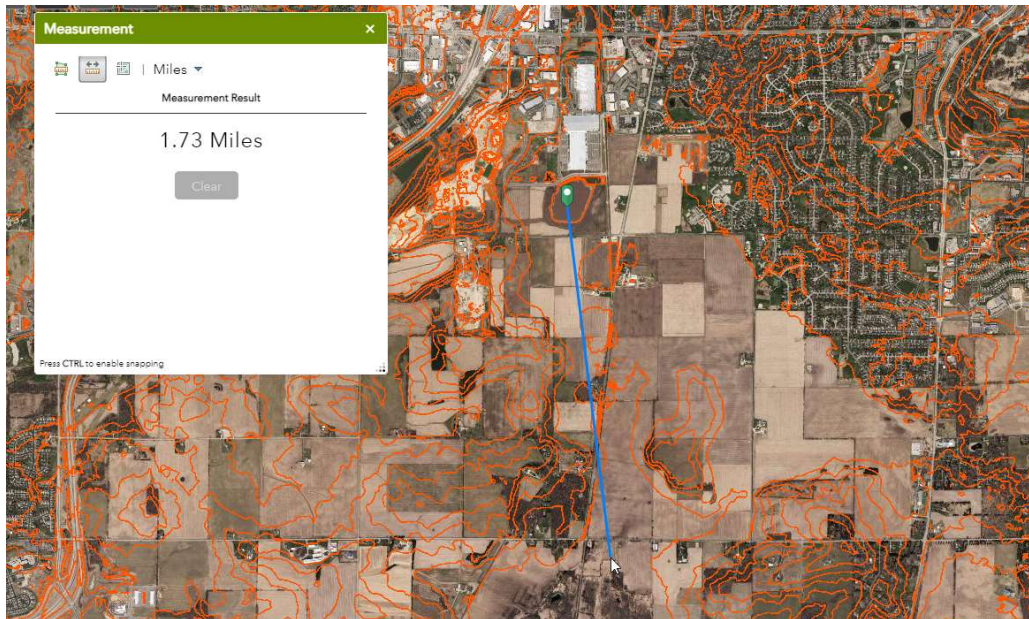
To the infiltration basin?

The average annual rainfall and peak year rainfall amounts are based on rainfall data used by the DNR for water quality modeling to meet state standards. Actual rainfall data from 1981 is generally considered to be an "average" year for modeling purposes. For the "peak year," we ran the model using data from 1981 to July of 1982 (which generates rainfall equivalent to 2019, which the State Climatology Office has said was the wettest year on record). Based on this data, there were 90 rainfall events during the average annual year and 134 rainfall events during the peak year. It is expected that each one of these rainfall events will have some level of stormwater runoff. However, the modeling does not tell us how often stormwater runoff will be pumped from the Sub-Zero kettle to the infiltration basin.

7) If the recommended alternative is implemented, how many gallons of storage would be needed to contain the amount discharged into Dunn's Marsh during the design storm so it could instead: a) be diverted into a "new" detention basin, b) stored in that basin, c) eventually be released at a "controlled" rate under suitable weather conditions, and d) flow by gravity in a storm sewer (or travel in a force main) until it reaches a drainage way (or intermittent waterway) south of Lacy Rd that has sufficient conveyance capacity? How far south of Lacy Rd is such a location? Is the intermittent waterway that originates in the wetland just south of the Seminole Hwy/Whalen Rd intersection and is approximately 1 mile south of the kettle that's located slightly south and west of the Seminole Hwy/Whalen Rd intersection a suitable location since this waterway is not tributary to Story Creek (a cold water fish stream)? Also, what would be the dimensions of a "new" detention basin in comparison to the dimensions of the infiltration basin that's a component of the recommended alternative? What would be the estimated capital cost of a "discharge to the south" alternative that is tributary to the intermittent waterway that originates in the wetland just south of the Seminole Hwy/Whalen Rd intersection ? How about annual operation and maintenance costs? Potential locations?

The idea would be to pump water from the kettle to the north at a controlled rate under suitable weather conditions ("c") in your question above.

The area to the south of Lacy Road is very flat with predominantly kettle topography. Pumping to this would not be recommended as water will pool and "kettle hop" to the south. The nearest clearly defined waterway is about 1.7 miles away, if you go in a straight line. The waterway is an unnamed tributary to Story Creek.



A new detention basin is not proposed, so I'm unclear what this is referring to. As part of the feasibility study, various options were considered at a concept level, but only the options presented during the meeting were further analyzed for more detailed construction and operational costs.

Thanks for this information. We hope answers can also be provided to following questions: a) Is this statement correct: "The waterway is an unnamed tributary to Story Creek?" [NOTE: The USGS Quadrangle Map shows this intermittent waterway that originates in the wetland just south of the Seminole Hwy/Whalen Rd intersection drains into Lake Harriett, not Story Creek.]

Yes. The waterway on the USGS map starting just south of Seminole Highway and Whalen Road is an unnamed tributary to Story Creek.

b) Does Lake Harriett have an intermittent outlet tributary to Story Creek?

Lake Harriett does not have a low flow outlet for drainage to the south. Lake Harriett must fill up to an overtopping elevation before stormwater runoff is released to the south. While Lake Harriett was not studied under this project, based on the significant size of its upstream watershed, it is a reasonable assumption that the lake does overtop during storm events releasing water to Story Creek.

c) If it does, is this why DNR prefers a discharge to Dunn's Marsh?

During meetings with the DNR, it was stated that they prefer a discharge to Dunn's Marsh due to Story Creek being identified as a Class 1 Trout Stream. These fish are highly susceptible to temporary changes in the waterway and the DNR is concerned that providing a discharge of urban runoff in this direction will harm the fish.

d) If it does not, why does DNR prefer a discharge to Dunn's Marsh?

See response to c).

8) If the recommended alternative is implemented, how many gallons of storage would be needed to contain the amount discharged into Dunn's Marsh during the design storm so it could instead be diverted into one or more infiltration basins with sufficient capacity to eliminate any discharge to surface water? What would be the dimensions of those basins (and annual average hydraulic loading) in comparison to the dimensions (and annual average hydraulic loading) of the infiltration basin that's a component of the recommended alternative? What would be the estimated capital cost of an "infiltration only" alternative? How about annual operation and maintenance costs? Potential locations?

The infiltration capacity of the proposed one acre infiltration basins is approximately the 3 month design storm. The goal is for the kettle to have volume sufficient to hold back-to-back 100-year storm events. It is not feasible to infiltrate that volume, if such an event were to occur.

An "infiltrate only" alternative is not recommended because kettles are naturally low-lying areas with no natural outlet, and there should be a method to deal with storm events that are larger than the design of the infiltration basins.

Thanks for this information. These answers are qualitative only and are based on the premise that "An 'infiltrate only' alternative is not recommended...". Since a discharge to Dunn's Marsh has not yet been approved by DNR, perhaps it would be appropriate to answer the following question:

If the recommended alternative can't be implemented, what is the estimated capital (and operating) cost of an alternative under which stormwater in the Sub Zero kettle would pumped

south in a force main to a point where it can flow in a gravity sewer that discharges into the intermittent waterway that originates just south of the Seminole Hwy/Whalen Rd intersection?

Unfortunately, since this alternative was ruled out based on DNR comments, we did not move forward with analyzing the cost for this alternative.

What is the estimated capital (and annual operating) cost of this alternative versus the recommended alternative?

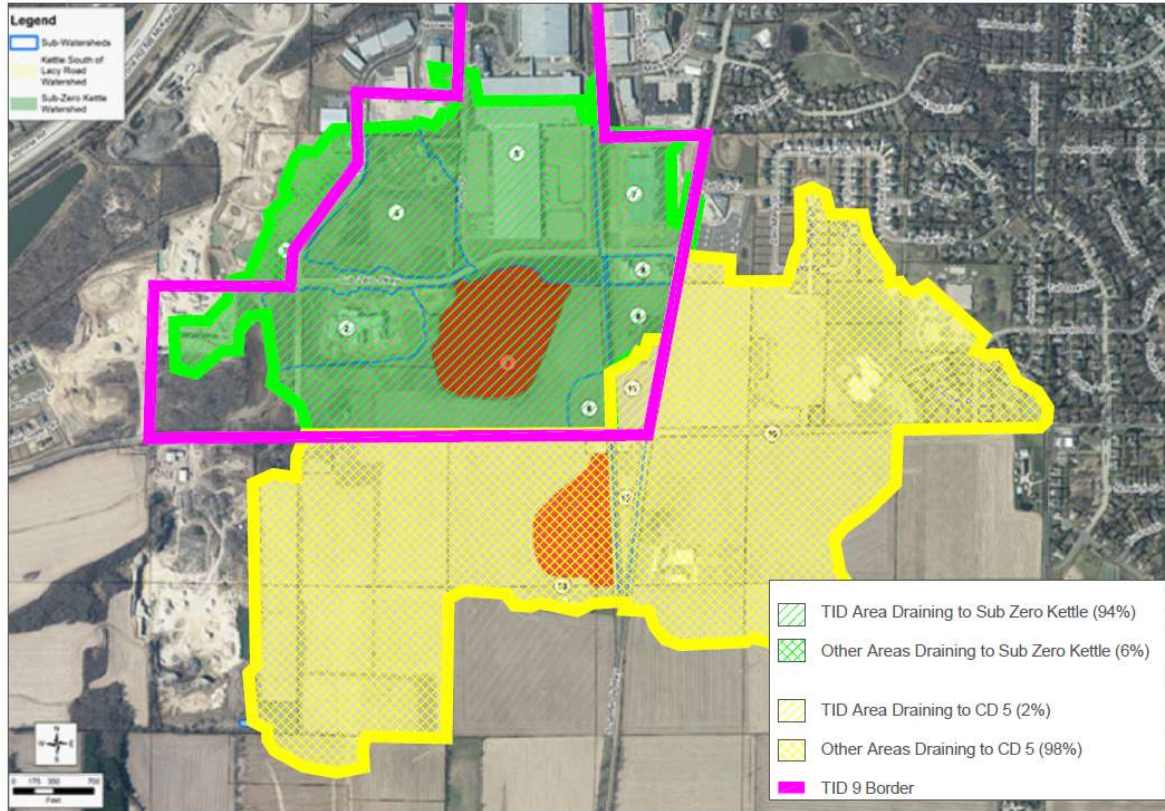
See response above.

9) How much of the capital cost of the recommended alternative (or another alternative the City decides to implement) will be paid by funds in the TID for NSPN? If TID funding is involved, what is the expiration date for that funding? What is the amount of money in the TID now? How much more is forecast to be deposited into it until it expires? If there is money in it after it expires, what happens to that money? Also, will any other funding source be used? If so, what is the expiration date for that funding, what is it, what is the required "match" of City funding, and will using it increase the property tax levy for the City? If so, why? How will the operating cost of the recommended alternative be raised? Will a stormwater district be created or does one already exist? Will funds raised by the stormwater district pay all operating and maintenance costs for the recommended

alternative? If not, what other funding will be used and will using it increase the property tax levy for the City of Fitchburg?

The proposed pump station and infiltration basin serve the Sub Zero watershed (shown in green on the image below), with 94% of the area in the TID and 6% outside of it. Therefore, it is recommended that 94% of the funding come from the TID and 6% come from the Stormwater Utility.

The proposed stormwater infrastructure to drain Closed Depression 5 (if the kettle were to become plugged and no longer infiltrate) serve the area shown in yellow below. 98% of this watershed is outside of the TID and 2% is located within the TID. Therefore, it is recommended that 98% of capital costs associated with this infrastructure be paid by the Stormwater Utility, and 2% be paid by the TID.



Input from the Finance Director regarding other aspects of the question:

The TID #9 expenditure period ends in 2030. The original TID projections were included in the TID project plan: <http://www.fitchburgwi.gov/DocumentCenter/View/20969/Project-Plan---201919---Final> (page 26). The TID forecasts were last updated as of 12/31/19 and are available on the City's website here: <http://www.fitchburgwi.gov/DocumentCenter/View/21048/TID-9-2020-Annual-Report> (page 7). The forecasts as of 12/31/20 are expected to be available, and shared at a public Joint Review Board meeting, in June 2021. There remains uncertainty about the tax increment expected to be collected over the life of the TID since two of the larger projects are under construction and the final buildings will be assessed by the State manufacturing division. If there is funding available at the end of a TID's life, it is distributed proportionally to all of the overlying jurisdictions that are involved in the TID (County, School, MATC, City).

A stormwater utility already exists and rates through that utility are the primary funding source for stormwater projects. The capital project may be borrowed for by the Stormwater Utility with subsequent repayment of the debt by stormwater utility rates. Operating costs of the project will also be paid through stormwater rates.

It is not anticipated that property taxes will be used to pay for this project.

Thanks for this information.

If the recommended alternative is implemented, how many dollars of the capital and annual operating costs will be paid by the TID? Same question for the stormwater utility?

The breakdown in TID versus Stormwater Utility contribution to capital costs is provided in response to Question 9. The costs are available in the COW presentation, available online here: <http://www.fitchburgwi.gov/2679/Sub-Zero-Stoner-Prairie-Stormwater-Study>. TID does not pay toward annual operating costs, only capital costs. Therefore, operating costs would be paid by the Stormwater Utility.

To the extent that the stormwater utility pays capital and operating costs, how much will that raise stormwater utility rates?

The answer to this question is beyond the scope of this study as a stormwater utility rate study would be needed to understand any increases this project would require.

What are the current rates?

The current stormwater utility rates are available in the 2019 rate study: <http://www.fitchburgwi.gov/DocumentCenter/View/19560/2019-Stormwater-Utility-Rate-Study?bidId=>.

Does the recommended alternative have the capacity to properly handle all the stormwater generated by the proposal to reconstruct Lacy Rd that was presented at a public meeting on Feb 17?

The Lacy Road reconstruct project will have its own stormwater management features implemented to meet City and State requirements. Once that stormwater flows into the kettle, the pumping system will be able to handle it.

If not, what are the cost impacts of increasing the capacity of the recommended alternative?

The ultimate buildout of Lacy Road was considered when determining the pump capacity requirements. We do not anticipate needing to increase the capacity of the pump due to the Lacy Road reconstruction project.

If the Lacy Rd project does include buffered bike lanes, a median, a sidewalk/terrace, and curb/gutter between Seminole Hwy and Commerce park Dr, what are the cost impacts on the recommended alternative?

The cost of the recommended alternative will not be impacted by the bike lanes, median, curb/gutter, etc, as it has already been accounted for in modeling the ultimate buildout condition used to determine pumping needs.

In any event, does the City have the option of creating a separate stormwater district for the properties within the study area that would pay all the capital and operating costs for the recommended alternative?

Input from Finance:

A separate district is not a likely option. I also do not recommend a separate billing rate that applies to only specific properties. While it could be an option, it would be administratively burdensome and would provide inconsistencies with other projects that also only truly benefit a select area. As far as I understand, this project is not overly unique in scope or cost.

If so, what are the pros and cons of doing that and what is the process? Are there any precedents?

There is additional cost borne by the City to administer a special zone rate within the Utility that only applies to a specific area of the City, versus spreading the cost to all Stormwater Utility rate payers. Typically, special zone rates are warranted in situations where the additional cost of stormwater service is significant enough that it is not fair and equitable to distribute the cost to other Stormwater Utility users.

Currently, does the City have any “area-specific” stormwater districts?

Input from Finance:

The Rural and Urban distinctions are “areas”, not “districts.” There are no other area specific distinctions in the stormwater rate structure and there are no separate stormwater districts. Every property is under the single stormwater utility district.

Did the City have “area-specific” districts in the past?

Input from Finance:

Not that I’m aware of.

If so, when and why was that changed?

Input from Finance:

Not applicable.

Regarding the floating booms that the Study recommends be used as the intake structure for pumping stormwater to Dunn’s Marsh from the Sub Zero kettle, will they be able to function if the surface of the kettle is frozen and the stormwater in the kettle needs to be pumped?

We are proposing the use of perforated concrete storm sewer that is placed along the bottom of the Sub-Zero kettle as an inlet for the pumping station. It is not recommended that this pumping station be operated during a frozen condition. Once the kettle has thawed in the spring, the pumping to the infiltration basin can be restarted.

Why was a submerged intake structure not recommended for the Sub Zero kettle?

It is proposed that the Sub-Zero kettle be pumped down to a point where there is minimal water remaining in the kettle. When the water level is high, the intake will be submerged. However, as the kettle is drawn down, the perforated piping will become exposed.

How about Closed Depression #5?

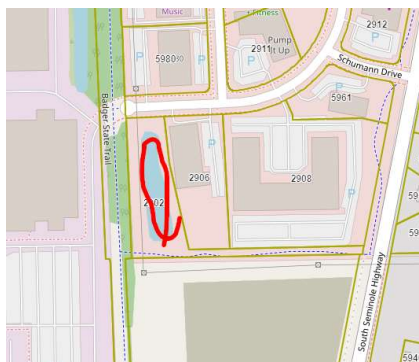
To reduce the amount of piping and disturbance in closed depression #5, it is recommended to place an outlet control structure along the eastern edge of the depression that will allow water to drain out of this kettle.

10) Who owns the stormwater detention basins located: a) north of and adjacent to the kettle, b) east of the Badger State Trail between Lacy Rd and Schumann Dr, and c) at the southwest corner of the Crescent Crossing Neighborhood that's still under construction. Which basins currently drain to surface water and in what direction? Which ones will eventually drain to the Kettle north of Lacy Rd if the recommended alternative is implemented? How has the City confirmed that the properties tributary to the basins that eventually drain to the Kettle meet the "90% pre-development" infiltration standard? Who currently pays the operation and maintenance costs of each basin? Is a stormwater district eventually going to be responsible for operating and maintaining any of these basins? If so, which ones and when? Was increasing the storage capacity of one or more of these basins, in conjunction with implementing one of the alternatives outlined in the questions 7 and 8, ever considered? If not, why? How long will it take to evaluate an alternative like this?

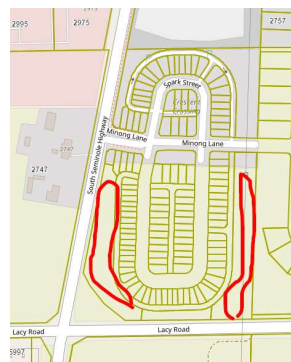
a) The basin adjacent to the Sub Zero Kettle is owned by Sub Zero Inc. and drains to the Sub Zero Kettle. b) I believe you are referring to Marketplace Pond A, which is owned by the City of Fitchburg (see first screen shot below). This drains to Dunn's Marsh. c) The basins in the Crescent Crossing Neighborhood are actually located in the southwest and southeast corners (see second screen shot below). These will be owned and maintained by the City. They drain to Closed Depression 5 (CD5) south of Lacy Road. Please note, ownership of any parcel is publicly available information. Feel free to use Access Dane as a resource to determine ownership of parcels: <https://accessdane.countyofdane.com/>.

Verification that development meets the 90% infiltration requirement is done during the Erosion Control and Stormwater Management permitting process. An in-depth review is completed by Dane County staff on behalf of the City via an Intergovernmental Agreement. In general, basins located on private property are maintained by the private property owner. Generally, commercial properties maintain their own basins. Basins located on public property are maintained by the Stormwater Utility. Generally, large regional basins that serve single-family homes would be maintained by the Stormwater Utility.

Private developers are required to meet the City's ordinance requirements. The City does not have authority to require upsizing basins beyond what is needed to meet ordinance requirements.



Marketplace A Pond



Crescent Crossing Ponds

Thanks for this information. What is the route (and maximum conveyance capacity (in gallons/day)) of the storm sewers by which Marketplace Pond A drains to Dunn's Marsh?

The image below shows the conveyance route from Business Park A Pond to Dunn's Marsh. The capacity in gallons per day of the downstream storm sewer system was not calculated as part of this study. However, this same route was used in the summer of 2020 to pump 850 GPM to 1000 GPM to Dunn's Marsh. During this time there were not issues of flooding within the downstream conveyance system.



Is any pumping required?

A pump station is not required to drain the Business Park A Pond.

What is the route by which the two long and narrow detention basins to the northwest of the Marketplace Pond A drain?

These ponds drain via storm sewer to the north and outfall on the north east side of CTH PD and the Badger State Trail. From this point, the stormwater drains through a ditch along the east side of the Badger State trail to the north and then along a north easterly route to Dunn's Marsh.

Is it to Dunn's Marsh?

Yes. These ponds drain to Dunn's Marsh.

Who owns these basins and is any pumping required?

These ponds are owned and maintained by Sub-Zero. Pumping is not needed as the ponds are able to gravity drain.

What is the route of the storm sewers by which the long and narrow detention basin to the south of the Marketplace Pond A drains and to what does it drain?

This pond was constructed as part of a Sub-Zero construction project to meet state and local stormwater requirements. This pond was designed as an infiltration basin and does not have an outfall that allows water to drain off site.

What is the elevation of the bottom of the Sub Zero kettle, Marketplace Pond A, the 2 basins northwest of Pond A, and the basin south Pond A?

The approximate bottom elevations are listed in the table below:

Stormwater Feature	Approximate Bottom Elevation (ft)
Sub-Zero Kettle	1015.0
Business Park Pond A (Marketplace Pond A)	1020.85
Sub-Zero Pond (NW of Business Park Pond A)	1019.6
Sub-Zero Pond (NW of Business Park Pond A)	1019.6
Sub-Zero Pond (South of Business Park Pond A)	1015.0

What is the maximum allowable stormwater level for each?

The approximate stormwater elevation before street/pavement flooding occurs are listed in the table below:

Stormwater Feature	Approximate Stormwater Elevation Before Street/Pavement Flooding Occurs (ft)
Sub-Zero Kettle	1023.7
Business Park Pond A (Marketplace Pond A)	1027.0
Sub-Zero Pond (NW of Business Park Pond A)	1028.0
Sub-Zero Pond (NW of Business Park Pond A)	1028.0
Sub-Zero Pond (South of Business Park Pond A)	1025.0

Does the option exist to pump (or drain via gravity or a siphon) stormwater from the Sub Zero kettle to Marketplace Pond A (or the 2 basins northwest of Pond A), instead of pumping stormwater in a force main to the north next to Seminole Hwy so it can eventual drain into the detention basin northeast of the Hwy PD/Seminole Hwy intersection?

This is the option that we are recommending to move forward with. The figure below shows the force main in red going from the Sub-Zero Kettle to Business Park A Pond. Due to the elevation difference between the bottom of the Sub-Zero Kettle and Business Park A pond, we are not able to drain in this direction by gravity.



Also, after an infiltration basin serving private commercial/industrial property is approved as meeting the 90% standard, how does the City verify ongoing compliance with that standard since the performance of infiltration basins degrades over time which in turn means more runoff will be delivered to the Sub Zero kettle, unless stormwater basins tributary to the kettle are properly maintained?

The City's permitting process requires a stormwater facility maintenance agreement to be established and recorded against the property. If the owner fails to maintain the stormwater management measures, the City has the right to enter the property in order to conduct the maintenance required at the owner's expense.

Also, when will a copy of the Study Report that served as the basis for the presentation made at the Feb 24 Committee of the Whole Meeting (or a revised version thereof) be posted on the City's website?

A copy of this study will be posted to the City's website in late April or early May 2021 at this website: <http://www.fitchburgwi.gov/2679/Sub-Zero-Stoner-Prairie-Stormwater-Study>.

Will the answers to the initial and follow-up questions in this memo be an Appendix to the final version of the Study Report.

Yes. We can include these questions as an appendix to the Study Report.

11) During the Feb 24 Committee of the Whole Meeting it was mentioned that DNR preferred a discharged into Dunn's Marsh because there was a cold water fish stream (Story Creek) approximately 5 miles south of Lacy Rd. Were DNR representatives asked when their preference to avoid a discharge to Story Creek was expressed if they would be concerned about a discharge from an alternative like the one outlined in the questions 7? If not, would it be appropriate to do that? If not, why?

Question 7 recommended discharging to the south. If we discharge to the nearest waterway to the south, it will flow to Story Creek.

Please confirm this answer is correct (or needs revision) in light of the answers provided to the followup questions on the answers to Question 7.

Drainage to the south would consist of a low flow gravity pipe that would outfall to an Unnamed Tributary to Story Creek. The unnamed tributary flows to Lake Harriett and ultimately to Story Creek.

12) Did the scope of this study take into account runoff generated by implementing the proposal for reconstructing Lacy Rd that was presented at a Public Meeting on Feb 17 and is available at: <https://www.fitchburgwi.gov/DocumentCenter/View/21630/Lacy-Rd-PIM-Presentation>. If not, why?

Stormwater runoff from the Lacy Road reconstruction project will be required to meet the City's stormwater ordinance requirements. Facilities will be designed to meet those requirements, and design of those facilities is outside of the scope of this project. It may be possible to combine facilities rather than having two separate infiltration facilities.

Thanks for this information. Is there a storm sewer under/next to Commerce Park Dr between Lacy Rd and Sub Zero Parkway?

Not currently. When this roadway is developed, storm sewer will likely be installed and will drain to the Sub-Zero Kettle.

If so, does it eventually drain to the Sub Zero kettle?

See response above.

If so, what route does stormwater follow?

This storm sewer will drain to the intersection of Commerce Park Drive and Sub-Zero Parkway which then drains to the east to the Sub-Zero Kettle.

When will it be decided if the detention basin proposed for runoff from the east half of the Lacy Rd project will be eliminated and combined with this project?

Per DNR Technical Standards, detention basins have an impervious liner. Therefore, a detention basin would not be combined with the infiltration basin proposed as part of this project. If an infiltration basin is required for the Lacy Rd project, it may be combined with this project's infiltration basin. The feasibility of this will be determined during the design of the road's stormwater facilities.

If it is eliminated, what will be the change in the capital and operating costs for the recommended alternative in the Sub Zero Stormwater Study?

During this study, we did investigate both Current and Full Buildout conditions. However, we did not specifically create a Current Condition with the Lacy Road Reconstruction. We cannot provide an answer to this question at this time.

How about the operational plan?

Refer to previous response.

How much stormwater on an annual average basis will will enter the Sub Zero kettle from storm sewers that are part of the Lacy Rd reconstruction project as currently proposed?

Refer to previous response.

How much from other storm sewers or detention basins tributary to the Sub Zero kettle? When will the project recommended in the Sub Zero Stormwater Study be completed and operational?

The average annual stormwater runoff volume in gallons draining to the Sub-Zero Kettle is 73 million gallons. Modeling the average annual stormwater runoff volume assumes data from 1981 is an average year. To answer the second question, in the 2021-2030 Capital Improvement Plan, this project was scheduled to be designed in 2022 and constructed in 2023. The CIP is updated every year and this schedule is subject to change.

If it will not be operational when the Lacy Rd project is completed (and that project includes a storm sewer), what interim arrangement will be used to manage stormwater?

DNR's approval of the City's Temporary Pumping Plan expired in December 2020. The City would need to pursue a new pumping plan to allow the City to use a portable pump to pump the water from the Sub Zero Kettle to Business Park Pond A. In addition, temporary easements would need to be pursued from property owners (Promega, Sub Zero, and WisDOT) to allow the City to operate a pump on their property.

If the east basin is not eliminated it will discharge to the Sub Zero kettle (as per answers to questions about the Lacy Rd project), so what will be the change in the operational plan as well as the capital and operating costs for the recommended alternative in the Sub Zero Stormwater Study?

During this study we did investigate both Current and Full Buildout conditions however we did not specifically create a Current Condition with the Lacy Road Reconstruction. We cannot provide an answer to this question at this time.

Also , what interim arrangement will be used to manage stormwater, if the project recommended in the Sub Zero Stormwater Study will not be operational when the Lacy Rd project is completed?

See previous response.

13) What are the key milestones in the schedule for implementing the alternative recommended in the Study or a revised version thereof if revisions are deemed needed by the City? Will at least one public hearing be held on the alternative the City decides to implement before the City authorizes any design or construction work for the recommended alternative or a modified version thereof?

The Study findings were presented to Committee of the Whole on February 24. We do not anticipate a dedicated public hearing to reiterate the findings; however, the project will be recommended as part 2022-2031 Capital Improvement Plan, and there are two public hearings

associated with that process. The schedule for those hearings can be found here: <http://www.fitchburgwi.gov/176/Capital-Improvement-Plan>

Thanks for this information. There are no follow-up questions.

14) Is there a project currently in the Fitchburg Capital Improvement Plan (CIP) for managing stormwater originating on properties within the boundary of the Sub Zero Stormwater Study? If not, when will such a project be added?

Yes, see CIP Project #4723.

Thanks for this information. There are no follow-up questions.

15) Prior to Feb 24, what effort was undertaken by the City to obtain public input on various options for managing stormwater originating on properties within the boundary of the Sub Zero Stormwater Study?

This project was discussed at various public meetings including the 2021-2029 CIP meetings, when the resolution to accept the contract was discussed, when the resolution to approved the pumping plan was discussed, as well as the meetings to approve the easements. Unfortunately, I'm less familiar with any other updates that were provided to Council or BPW as the previous DPW would be more familiar with the updates that were provided.

Thanks for this information. There are no follow-up questions.

16) Will any of the cost of the project the City decides to implement be paid by Federal or State Funds? Will an environmental assessment of the project the City decides to implement be prepared before the design of the project is authorized?

Federal or state funds are not anticipated. The City will perform all assessments required as part of the DNR permitting process. We anticipate that outfall monitoring will be required.

Thanks for this information. There are no follow-up questions.