THOMAS & HUTTON

DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

Summerville, SC

Prepared for:
Town of Summerville

J – 26611.0000

August 7, 2017

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BACKGROUND AND INTRODUCTION

The Town of Summerville, like many communities in the Low Country, experienced explosive growth in the early 2000's. During that time, the Town's population was growing as much as 10% per year. To support this growth in population, new neighborhoods were developed. One of these neighborhoods was Arbor Oaks, consisting of approximately 114 single-family residences and eleven, four-unit townhome buildings. The Arbor Oaks neighborhood is located in the southwestern portion of the Town of Summerville, off of Bacons Bridge Road, adjacent to the Sawmill Branch Canal and Trail. The Arbor Oaks neighborhood was constructed in approximately 2004.

Roadway flooding and detention pond overtopping have been reported in the neighborhood during high-intensity storm events. Also, structural flooding has been documented for two recent events: October 2015, during Hurricane Joaquin, and October 2016, during Hurricane Matthew. The October 2015 event included about 16.5 inches of rainfall over 5 days, while the October 2016 event included about 10.5 inches of rainfall over approximately 20 hours. For the October 2015 event, structural flooding was reported in seven of the eleven townhome buildings and approximately 25 houses along Holly Street, Arbor Oaks Drive, and Teakwood Court. For the October 2016 event, structural flooding was reported within approximately 15 homes, mainly along Holly Street, Arbor Oaks Drive, and Teakwood Court.

The Town of Summerville has retained Thomas & Hutton (T&H) to conduct a study of the drainage and flooding conditions in and around the Arbor Oaks neighborhood and to evaluate and recommend improvements to resolve the drainage problems. The study includes the following tasks:

1) Establish the study area,
2) Perform an analysis of the study area (including hydrologic and hydraulic modeling), and
3) Prepare a report that documents the study and provides prioritized recommendations.

The Arbor Oaks watershed is approximately 282 acres and outfalls to the Sawmill Branch Canal north of Bacons Bridge Road. The entire contributing area to Sawmill Branch north of Bacons Bridge Road is approximately 11,331 acres. The watershed location is illustrated in Figure 1. Refer to Exhibit 1 for a detailed map of the Sawmill Branch Watershed. The watershed consists of mostly residential neighborhoods with some wetlands and ponds. The area of focus for this study includes the drainage system within the Arbor Oaks neighborhood and the multiple outfalls from the adjacent wetlands to the Sawmill Branch Canal.

DATA COLLECTION

T&H has collected various data to build and validate hydrologic and hydraulic models to simulate existing conditions in the Arbor Oaks watershed.

GIS Data

T&H utilized data obtained from the Town of Summerville and Dorchester County for the project. This data includes drainage infrastructure, utilities, roads, property parcels, structure footprints, LiDAR topography, and land use/land cover. Thomas & Hutton also utilized its extensive GIS data library as part of the project. Additional data used includes contours, aerial photography, and soils mapping (SSURGO) data.

Construction Plans/As-built Drawings/Design Reports

The Town provided several as-built drawings and construction plans for the study area including the Arbor Oaks drainage as-builts, plans for the bridge replacement of Bacons Bridge Road over the Sawmill Branch Canal, and plans for Bacons Bridge Road Improvements. A drainage study for Abor Oaks was also provided. Additional data provided included flooding reports, high water marks, and elevation certificates. These plans, maps, data, and as-builts were used to confirm drainage patterns and model input.

FEMA Flood Insurance Study (FIS)

T&H acquired data from FEMA and SCDNR which included effective and past flood insurance rate maps (FIRM), past FIS study report for the Town of Summerville, Dorchester County Unincorporated Areas, Charleston County Incorporated Areas, and the effective FIS study report for Dorchester County Unincorporated Areas. Other information obtained included hydrology data supporting the effective FIS report, which was performed using USGS regression equations, and electronic copies of the hydraulic modeling files for Sawmill Branch.

Field Reconnaissance

Using the collected data, the basin and sub-basins were delineated, flow patterns were determined, and major drainage features were identified. Exhibit 6 illustrates the basin and sub-basins developed for this study. The basin was divided into 47 sub-basins based on the digital elevation model (DEM) and drainage infrastructure.

Field reconnaissance was conducted on March 15, 2017, to confirm the basin and sub-basin delineation, document drainage infrastructure, and assess reported flooding issues. Also during the field reconnaissance, geo-referenced photography was taken to document the drainage infrastructure. The field reconnaissance findings were used to refine the basin, sub-basins, and model link-node connectivity.

Surveying

A survey was conducted by T&H in early May to obtain required data for the hydrologic and hydraulic model. The survey focused on the drainage system along Sawmill Branch Canal and the ponds within the Arbor Oaks neighborhood. Drainage infrastructure contributing to the Arbor Oaks system from the residential areas to the north were also surveyed. The survey included cross culverts, roadway profiles, pond normal water level (NWL), pond top of bank, control structures, spillways, and channel cross-sections. All elevation data is referenced to NAVD 88.

EXISTING CONDITIONS MODEL DEVELOPMENT

The data collected was used to develop an existing conditions hydrologic and hydraulic model of the Arbor Oaks drainage system. Version 4 of the Interconnected Channel and Pond Routing (ICPR) Model by Streamline Technologies was used to develop the model. Exhibit 7 is a link-node-sub-basin schematic of the ICPR model.

The ICPR program models rainfall and stormwater runoff and performs hydraulic routing through the storm drainage system. The ICPR program is a FEMA approved model that analyzes complex interconnected drainage systems dynamically over extended time periods.

Hydrology Input

The hydrologic input for ICPR consists of information for each drainage sub-basin within the watershed. Input variables include runoff curve number, rainfall distribution pattern, hydrograph peaking factor, contributing area, and time of concentration. The ICPR program generates runoff hydrographs for each sub-basin based on these user-specified variables. Hydrographs are generated by ICPR using the SCS Unit Hydrograph Method.

Hydrologic inputs for each sub-basin include the contributing area, composite curve number, and time of concentration. The following paragraphs summarize the calculation of the hydrologic inputs.

Composite Curve Number

Composite curve numbers (CNs) were calculated for each sub-basin using land use/land cover data that was created using parcel lines and aerial imagery. The existing land use is shown in Figure 3. Hydrologic soils group (HSG) data is available from the USDA SSURGO GIS soils coverage for Horry County. The HSGs within the watershed are illustrated in Figure 2.

Sub-basin, land use, and HSG data were merged to create unique polygons that contain one soil type and one land use/land coverage description within each sub-basin. The unique land use/HSG descriptions were then summarized for each sub-basin and then multiplied by the curve numbers in the table below. These curve numbers are based on the NRCS (formerly SCS) TR-55 reference. The curve number calculations are summarized in Appendix A.

Curve Numbers

Land Use	Hydrologic Soil Group						
	A	A/D	B	B/D	C	C/D	D
Open	49	49	69	69	79	79	84
Residential 1/8 Acre	77	77	85	85	90	90	92
Residential 1/4 Acre	61	61	75	75	83	83	87
Residential 1/3 Acre	57	57	72	72	81	81	86
Residential 1/2 Acre	54	54	70	70	80	80	85
Residential 1 Acre	51	51	68	68	79	79	84
Residential 2 Acre	46	46	65	65	77	77	82
Road (with Right-of-Way)	83	83	89	89	92	92	93
Wetlands	64	89	77	89	84	89	89
Water	100	100	100	100	100	100	100
Woods	36	36	60	60	73	73	79

Time of Concentration

A time of concentration (Tc) value was estimated for each sub-basin. The time of concentration was calculated based on the NRCS, three-part travel time method documented in TR-55. The three equations used are summarized below:

The longest flow path for each sub-basin was estimated by visually inspecting the available topographic and drainage system GIS data. The longest flow paths were digitized in GIS and

split into three segments representing sheet flow, shallow concentrated flow, and pipe/channel flow. The slope of each line segment was determined using the available elevation data. Time of concentration calculations are summarized in Appendix B.

Additional hydrologic data input for the ICPR model includes the following:

- SCS Unit Hydrograph Method
- SCS Type III Statistical Rainfall Distribution: The Type III distribution is appropriate for coastal South Carolina, per the NRCS TR-55 reference.
- 323 and 256 Peaking Factors: A peaking factor of 323 was used for the developed sub-basins in the watershed and is appropriate for graded areas with drainage systems. A peaking factor of 256 is more appropriate for undeveloped areas that do not have a man-made drainage system.
- Design Storm Rainfall Amounts taken from South Carolina DHEC Storm Water Management BMP Handbook for Dorchester County (South):
    - 2-year, 24-hour = 4.2 inches
    - 10-year, 24-hour = 6.4 inches
    - 25-year, 24-hour = 7.8 inches
    - 50-year, 24-hour = 8.9 inches
    - 100-year, 24-hour = 10.1 inches

Hydraulic Input

Link-Node

The model hydraulic input data consists of a system of nodes and links. Nodes represent locations where flows enter or exit the system, pipe or channel characteristics change, or where stage/storage/time relationships are provided. Links represent traditional types of hydraulic conveyance such as pipes, channels, drop structures, weirs, etc. The sizes, inverts, lengths, and Manning's "n" values for links are input into the model. In addition to pipe information, all pond, lake, and detention stage–area information and the respective outfall structure information are input into the model. The node and link conditions are analyzed within the model for a given storm, and flow conditions are determined.

Input data for the hydraulic portion of the hydrologic and hydraulic model was developed from a variety of sources including GIS, survey, and as-built data. Nodes were located at strategic locations to simulate the hydraulics of the watershed's drainage system. Major lake, ponds, and other storage areas are simulated as stage-area nodes to properly account for the detention of hydrographs in the system. LiDAR topography was utilized, where appropriate, to generate the stage-storage relationship data for model input. Road overtopping and overland flow paths were simulated as weirs in the model for the accurate simulation of flooding conditions. Exhibit 7 is the ICPR link-node schematic for the developed model, and graphically illustrates the location and alignment of various model inputs.

Tailwater

Drainage and flooding within Arbor Oaks are heavily influenced by the adjacent Sawmill Branch Canal. To account for Sawmill Branch Canal's effect on drainage and flooding, the timing and staging of the Sawmill Branch Canal were estimated as a tailwater condition in the ICPR model.

The effective FEMA study for Sawmill Branch Canal used regression equations to determine peak flows at various locations along the canal. The timing of these peak flows was not considered in the FEMA study. The peak flows were determined for the 10-, 50-, 100-, and 500-year flood events. The FEMA study used the peak flows in a HEC-RAS hydraulic model to determine the peak water surface elevations (WSEs) along the canal. The 100- and 500- peak WSEs were used to determine the 100- and 500-year regulatory flood plains. The effective FEMA study also established a regulatory floodway for the Sawmill Branch Canal.

T&H used the peak flows and HEC-RAS model data developed by FEMA to establish time series tailwater (TW) conditions along the Sawmill Branch Canal in the area adjacent to Arbor Oaks. The study area discharges at eight different locations across a 3,850 LF reach of the canal. The peak WSEs along the canal vary by as much as three feet from the eastern to western extents of Arbor Oaks. For this reason, three TW conditions were estimated – lower, mid, and upper Sawmill Branch Canal.

To establish the timing of the flow hydrograph in the Sawmill Branch Canal, a simplified HEC-HMS hydrologic model of the Sawmill Branch Canal Watershed upstream of Arbor Oaks was developed. The model input was developed from available GIS data (land use, soils, topography, etc.). The Sawmill Branch watershed was divided into sub-watersheds where changes in flow were identified in the FEMA FIS study. A curve number was estimated for each sub-watershed from available GIS data. The time of concentration for each sub-watershed was estimated using the lag method. The Muskingum-Cunge Channel Flow Routing Method was used. Channel cross sections were extracted from the effective FIS HEC-RAS model and simplified to be defined by eight points. See Appendix E for the model input. The HEC-HMS model was then executed for each storm event and hydrographs were produced. The HEC-HMS model produced similar peak flows as the effective FEMA flood study at Arbor Oaks. But to be consistent with the effective FEMA flood study, the predicted flow hydrograph was "normalized" to produce a peak flow consistent with the FEMA flood study. The FEMA flood study does not include peak flow estimates for the 2- and 25-year storm events. The other predicted peak flows (10-, 50-, 100-, and 500-year) were used to interpolate the 2- and 25-year storm event peak flows (using the natural log of return frequency for the x-axis). The flow hydrographs determined by the simplified HEC-HMS model were also "normalized" for these peak flows.

The stage-flow rating curves from the effective FEMA HEC-RAS model were ultimately used to produce time-stage relationships for the three reaches (lower, mid, and upper reaches) for the five storm events (2-, 10-, 25-, 50-, and 100-year). A total of 15 time-series tailwater conditions were estimated for this study. Refer to Appendix E for the tailwater calculations.

Model Verification

Following the development of the existing conditions model, the results were analyzed and the flooding was assessed. The resulting maximum WSEs of the simulation were extracted from the ICPR results and mapped at the appropriate node locations in the GIS system. Exhibit 8 illustrates the resulting maximum WSEs within the study area.

Some minor model adjustments were made during the verification of the model. This generally included the addition of overland flow weirs to simulate extreme surface flooding and the movement of flood waters overland and minor storage provided by adjacent wetlands and lowlands.

Based on the results of the above simulations, the ICPR model reproduced representative results of the reported flood conditions within the basin (particularity in the areas adjacent to the houses that flooded along Arbor Oaks Drive and Teakwood Court).

EXISTING MODEL FINDINGS AND SUMMARY

T&H developed a hydrologic and hydraulic model of the watershed and examined the model results for errors and reasonableness. The model executes without errors and, in general, produces results consistent with the function of the drainage system under existing conditions. A summary of the model input is included in Appendix C. The results for the existing conditions model for the 2-, 10-, 25-, 50-, and 100-year storm events are included in Appendix D. Table 1 provides a comparison of water surface elevations for existing and improved conditions.

The following are observations made by examining the existing conditions model results for the Arbor Oaks watershed:

- The Arbor Oaks neighborhood drains to a series of interconnected ponds which ultimately outfall through a series of 8 pipes into the Sawmill Branch Canal.
- Based on modeling conducted for this study, portions of the neighborhoods drainage system do not function per the Town of Summerville design standards (generally the 10-year storm event).
- Based on FEMA modeling, the canal is susceptible to overtopping from relatively minor events. The canal trail is overtopped during the 2-year storm event (refer to Figure 4).
- Modeling (FEMA) also shows that some structural flooding may occur for events less than the 25-year storm event.
- Per the previously effective FEMA FIRM, garage floor elevations (GFE) and finished floor elevations (FFE) were constructed above the base flood elevations (BFEs) and no structural flooding was expected. However, per the newly effective FIRM, as of July 2017, multiple structures are below the BFEs and will experience flooding in the 100-year storm event. Refer to Exhibits 2 and 3 for the previously effective and current effective floodplain maps. Exhibits 4 and 5 show the parcels that were flooding during the October 2015 rain event (Hurricane Juaquin) and October 2016 rain event (Hurricane Matthew).

ALTERNATIVES INVESTIGATION

Several improvement alternatives were investigated to assess the potential to improve drainage and flood protection within Arbor Oaks. The following is a discussion of the alternatives assessed as part of this study.

Alternative 1

Cleaning out the existing blocked pipes (and partially blocked pipes), that were identified in the field survey and field reconnaissance along the bikeway that discharge to the canal has little to no effect on the peak stages within the study area because the entire system is inundated by the canal during relatively minor storm events (based on tailwater conditions developed from the effective FEMA modeling). Pond overtopping is occurring in two out of the five ponds during the 10-year storm event, and in four out of the five ponds during the 25-year storm event.

When analyzing the system with no tailwater (no effects from the canal tailwater), parts of the system are still experiencing some minor localized flooding in as little as the 2- and 10-year storm events.

Alternative 2

Alternative 2 consists of building up the canal trail embankment by about 1.5 to 2 feet, providing about 0.5 feet of freeboard for the 10-year storm event, and adding flap gates to the outfall pipes. This will eliminate the potential for the canal to overtop, up to and including the 10-year storm event, and will prevent backflow into the Arbor Oaks storm drain system. This alternative results in reduced peak stages throughout the Arbor Oaks drainage system and a reduction in some places by nearly 2 feet during the 10- and 25-year storm events. In addition, the ponds do not experience any overtopping during the 10-year storm event, however, two ponds experience overtopping during the 25-year storm event. Some localized street flooding is still experienced in the smaller storm events due to the limitations of the capacity of the existing drainage system. The addition of flap gates will require more frequent maintenance. Additional studies and modeling will need to be performed to determine the potential effect of the raised embankment on the floodplain. A FEMA Conditional Letter of Map Revision(CLOMR) will most likely be needed to address any changes to or construction within the floodway/floodplain.

This alternative would not eliminate structural flooding of houses with finished floors below the effective 100-year base flood elevations.

Alternative 2a

Alternative 2a proposes the same improvements as Alternative 2, with the addition of pond outfall improvements within the Arbor Oaks neighborhood. These improvements consist of lowering pond normal water levels (NWL) by lowering and upsizing pipe outfalls and weirs. In addition, the outfall channel along the western boundary of the Arbor Oaks neighborhood will be widened to 8 feet, which matches the channel widths upstream and downstream of where the Arbor Oaks pond discharges into the channel. In addition to eliminating canal overtopping during the 10-year storm event, this alternative eliminates any flooding within the Arbor Oaks neighborhood during the 10-year storm event. This alternative results in reduced peak stages throughout the Arbor Oaks drainage system and a reduction in some places by more than 2 feet during the 10- and 25-year storm events.

This alternative would not eliminate structural flooding of houses with finished floors below the 100-year base flood elevations.

Alternative 3

Alternative 3 consists of building up the canal trail embankment by approximately 3 feet, which is higher than the 100-year WSE, and adding flap gates to the outfall pipes. This will eliminate the potential for the canal to overtop and backflow into the Arbor Oaks storm drain system. This alternative results in reduced peak stages throughout the Arbor Oaks drainage system and a reduction in some places by more than 3.5 feet during the 10-year storm event. In addition, the ponds do not experience any overtopping, including during the 100-year storm event. However, some localized street flooding is still experienced in the smaller storm events due to the limitations of the capacity of the existing drainage system. The addition of flap gates will require more frequent maintenance. Preliminary modeling was performed to determine the potential effect of raising the embankment on the floodplain. 100-year WSEs were increased by about 1 foot upstream of the project site. A FEMA Conditional Letter of Map Revision(CLOMR) will need to be submitted to address the increases in WSELs and floodplain.

This alternative would eliminate structural flooding of houses with finished floors below the 100-year base flood elevations.

Alternative 3a

Alternative 3a (in addition to the berm and flap gates proposed under alternative 3) would include drainage improvements to the Arbor Oaks pond outfalls. These improvements consist of lowering pond normal water levels (NWL) by lowering and upsizing pipe outfalls and weirs. In addition, the outfall channel along the western boundary of the Arbor Oaks neighborhood will be widened to 8 feet, which matches the channel widths upstream and downstream of where the Arbor Oaks pond discharges into the channel.

This alternative would eliminate structural flooding of houses with finished floors below the 100-year base flood elevations.

RECOMMENDATIONS

Based on our modeling and assessment of conditions in and around Arbor Oaks, we recommend the Town pursue the implementation of the drainage improvements included in **Alternative 2a.**

These improvements include the following (in order of recommended phasing, if necessary):

1. Pond Outfall Improvements – These improvements would include:
    - Remove and replace the existing outfall pipe from the pond near Arbor Oaks Dr. and Teakwood Ct. The pipe would maintain the pond NWL approximately 1.8 feet lower than the existing NWL. Additional work may be needed to make this improvement acceptable to some – such as bank re-grading and/or landscaping.
    - Improve the weir outfall from the pond southwest of Twin Tree Dr. to allow more overflow during larger storm events. The NWL of this pond would not be affected.
    - Improve the weir outfall from the pond west of Moon Shadow Ln. to allow more overflow during larger storm events. The weir would maintain the pond NWL approximately 1 foot lower than the existing NWL. Additional work may be needed to make this improvement acceptable to some – such as bank re-grading and/or landscaping.
    - Improve the ditch draining Arbor Oaks (and other neighborhoods) from the pond outfall west of Moon Shadow Ln. to the culvert under Sawmill Branch Path.

2. Sawmill Branch Bike Path Raising - Raising the Sawmill Branch Path to an elevation approximately 0.5 feet above the FEMA predicted 10-year WSEs in the canal. This option is a compromise in the protection of the Arbor Oaks neighborhood from flooding up to and including the 10-year event, without causing significant adjacent or upstream off-site flooding. Special attention would need to be taken for the bike path access along the west side of Bacons Bridge Road. This area would have to be raised significantly.

    The 100-year berm alternative (alternatives 3 and 3a) was discounted as it would most likely cause significant upstream and adjacent flooding that could affect other off-site homes and thus a berm of that scale could not be recommended. The 100-year berm scenario most likely could be implemented if mitigating improvements could be made to the flow capacity of Sawmill Branch Canal (i.e. widening). However, given the potential utility conflicts (power and sewer) and environmental impacts (wetlands) for this type of improvement, this alternative is not recommended.

3. Wetland Outfall Pipes Improvements - Cleaning and/or replacing all drainage outfall pipes (total of 8) from the wetland area and retrofitting/constructing flap gates to prevent backflow from the Sawmill Branch Canal into the wetlands (up to minimum elevation equivalent to the FEMA predicted 10-year WSEs). These improvements would need to be made in conjunction with a structure feasibility assessment of the current pipe outfalls as to the potential to retrofit the pipes. Some pipes may not be appropriate or may be too old to be retrofitted. New pipes and other improvements may be required to implement these improvements.

   These improvements could be further phased. The three outfall pipes associated with major ditches: 1) adjacent to Bacons Bridge Road, 2) Arbor Oaks main outfall, and 3) ditch north of Arbor Oaks, could be improved first as they provide the most backflow capacity under existing conditions. The other pipes are clogged or partially clogged and do not contribute significantly to backflow into the wetlands.

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DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

TABLES

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Table 1
Existing Conditions Results

Node	Ground/ Warning Stage	Existing Conditions Stages				
		2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20.83	22.65	22.21	23.88
A02	20.73	19.54	20.83	22.65	22.34	23.88
A03	20.95	19.54	20.83	22.65	22.21	23.88
A04	22.00	19.54	20.83	22.65	22.24	23.88
A05	23.19	21.1	21.97	23.44	23.14	24.5
A06	23.50	20.99	21.97	23.44	23.14	24.5
A06a	23.13	19.66	21.97	23.44	23.15	24.5
A07	20.67	19.69	20.98	22.65	22.21	23.88
A08	21.50	19.36	21.97	23.44	23.12	24.5
A09	21.34	19.35	21.97	23.44	23.12	24.5
A10	22.00	19.35	21.97	23.44	23.12	24.5
A10a	21.00	17.62	21.98	23.46	23.14	24.53
A10b	21.00	17.31	21.97	23.44	23.13	24.5
A11	21.43	19.39	21.98	23.44	23.13	24.5
A12	20.64	19.39	21.98	23.44	23.13	24.5
A13	20.59	19.39	21.98	23.44	23.13	24.5
A14	21.00	19.38	21.98	23.44	23.13	24.5
A15	22.85	20.06	21.98	23.44	23.07	24.5
A16	23.00	20.05	21.98	23.44	23.07	24.5
A17	22.00	21.04	21.98	23.45	23.11	24.5
A18	21.20	19.84	21.98	23.45	23.11	24.5
A19	20.10	19.83	21.98	23.45	23.13	24.5
A20	21.00	19.83	21.98	23.45	23.13	24.5
A21	25.07	22.51	25.17	26.18	26.36	26.48
A22	25.01	22.36	24.67	25.26	25.44	25.6
A23	24.94	22.33	24.4	24.75	24.89	25.02
A24	26.19	22.88	24.55	25.02	25.33	25.67
A25	24.48	22.32	24.32	24.6	24.71	24.82
A26	25.50	22.22	24	24.33	24.5	24.64
A27	25.50	22.16	23.64	24.04	24.25	24.55
A28	23.03	22.15	23.32	23.7	23.87	24.56
A29	26.47	22.93	23.36	23.69	24.12	24.76
A30	21.31	22.14	23.29	23.66	23.83	24.6
A31	25.00	22.15	23.55	24.17	24.59	25.14
B00	23.00	19.38	20.81	22.64	22.23	23.87
B01	22.00	20.35	20.93	22.64	22.25	23.87
B02	23.26	21.3	22.34	22.92	23.36	23.89
B03a	25.67	25.73	27.83	29.14	30.14	31.18
B03b	24.00	23.9	24.79	25.36	25.83	26.34
B04a	30.65	29.38	31.95	33.54	34.62	35.67
B04b	29.00	27.48	28.68	29.74	30.62	31.57
B05a	40.75	40.67	42.39	43.47	44.26	45.06
B05b	37.00	36.93	37.63	38.12	38.52	38.96
C01	25.57	22.56	23.97	24.48	24.79	25.09
C01a	24.39	20.05	21.97	23.44	23.2	24.51
C02	26.00	22.6	24.09	24.66	25.01	25.35
C03a	28.72	26.11	27.32	27.98	28.37	28.74
C03b	27.76	25.35	26.57	27.23	27.77	28.47
C04a	32.80	31.05	31.82	32.25	32.53	32.82
C04b	32.80	30.34	31.11	31.54	31.87	32.7
Canal-Hig	20.00	17.04	22.91	24.28	24	25.24
Canal-Lov	23.50	14.04	20.6	22.2	21.87	23.35
Canal-Mid	21.00	15.61	21.93	23.4	23.1	24.45
Off1	23.93	20.66	22.86	24.08	24.08	25.16
Off2	23.00	22.15	23.56	24.18	24.6	25.15
Off3	36.00	33.3	34.07	34.52	34.83	35.13
Off4	36.00	36.44	39.96	43.14	45.92	49.18
Wet1a	22.00	19.38	20.82	22.64	22.24	23.88
Wet1b	22.00	17.07	20.74	22.51	22.13	23.68
Wet2	23.00	18.62	21.98	23.44	23.13	24.5
Wet2d	20.80	16.31	21.96	23.44	23.13	24.49
Wet2e	20.90	16.22	21.96	23.43	23.13	24.5

exceeds ground/warning stage

Table 2
Existing Conditions - No Tailwater Results

Node	Ground/ Warning Stage	Existing Conditions - No Tailwater Stages				
		2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20	20.28	20.51	20.94
A02	20.73	19.54	20	20.26	20.48	20.88
A03	20.95	19.54	19.99	20.24	20.45	20.83
A04	22.00	19.54	19.89	20.09	20.2	20.27
A05	23.19	21.1	21.59	22.01	23.01	24.42
A06	23.50	20.99	21.44	21.74	22.37	23.2
A06a	23.13	19.66	21.08	21.43	21.71	22.01
A07	20.67	19.69	20.98	21.37	21.64	21.89
A08	21.50	19.36	20.02	21.68	21.99	22.18
A09	21.34	19.35	19.55	19.76	19.88	20.01
A10	22.00	19.35	19.55	19.73	19.84	19.95
A10a	21.00	17.62	18.62	18.97	19.32	19.73
A10b	21.00	17.31	18.33	18.74	19.17	19.63
A11	21.43	19.39	20	20.52	20.99	21.56
A12	20.64	19.39	20.01	20.54	21.01	21.58
A13	20.59	19.39	19.97	20.46	20.9	21.43
A14	21.00	19.38	19.73	19.98	20.21	20.37
A15	22.85	20.06	20.95	21.72	22.31	22.88
A16	23.00	20.05	20.93	21.69	22.26	22.78
A17	22.00	21.04	21.18	21.52	22.04	22.51
A18	21.20	19.84	20.84	21.52	22.04	22.5
A19	20.10	19.83	20.28	20.4	20.53	20.73
A20	21.00	19.83	20.27	20.39	20.46	20.51
A21	25.07	22.51	25.17	26.18	26.36	26.48
A22	25.01	22.36	24.67	25.26	25.44	25.6
A23	24.94	22.33	24.4	24.75	24.89	25.02
A24	26.19	22.88	24.55	25.02	25.33	25.67
A25	24.48	22.32	24.32	24.6	24.71	24.82
A26	25.50	22.22	24	24.33	24.5	24.64
A27	25.50	22.16	23.64	24.04	24.25	24.43
A28	23.03	22.15	23.32	23.7	23.87	24.01
A29	26.47	22.93	23.36	23.69	24.12	24.76
A30	21.31	22.14	23.29	23.66	23.83	23.98
A31	25.00	22.15	23.55	24.17	24.59	25
B00	23.00	19.38	19.88	20.11	20.21	20.28
B01	22.00	20.35	20.93	21.15	21.3	21.47
B02	23.26	21.3	22.34	22.92	23.36	23.89
B03a	25.67	25.73	27.83	29.14	30.14	31.18
B03b	24.00	23.9	24.79	25.36	25.83	26.34
B04a	30.65	29.38	31.95	33.54	34.62	35.67
B04b	29.00	27.48	28.68	29.74	30.62	31.57
B05a	40.75	40.67	42.39	43.47	44.26	45.06
B05b	37.00	36.93	37.63	38.12	38.52	38.96
C01	25.57	22.56	23.97	24.48	24.79	25.09
C01a	24.39	20.05	21.27	21.63	21.85	22.11
C02	26.00	22.6	24.09	24.66	25.01	25.35
C03a	28.72	26.11	27.32	27.98	28.37	28.74
C03b	27.76	25.35	26.57	27.23	27.77	28.47
C04a	32.80	31.05	31.82	32.25	32.53	32.82
C04b	32.80	30.34	31.11	31.54	31.87	32.7
Canal-Hig	20.00	12.84	12.84	12.84	12.84	12.84
Canal-Lov	23.50	9.44	9.44	9.44	9.44	9.44
Canal-Mi	21.00	11.1	11.1	11.1	11.1	11.1
Off1	23.93	20.66	22.53	23.15	23.58	24.03
Off2	23.00	22.15	23.56	24.18	24.6	25.01
Off3	36.00	33.3	34.07	34.52	34.83	35.13
Off4	36.00	36.44	39.96	43.14	45.92	49.18
Wet1a	22.00	19.38	19.88	20.1	20.21	20.27
Wet1b	22.00	17.07	17.5	18.82	19.11	19.28
Wet2	23.00	18.62	19.66	20.09	20.22	20.37
Wet2d	20.80	16.31	17.45	18.11	18.53	18.98
Wet2e	20.90	16.22	17.32	17.96	18.38	18.83

exceeds ground/warning stage

Table 3
Clean Pipes - No Tailwater Results Comparison

Node	Ground/ Warning Stage	Existing Conditions - No Tailwater					No Tailwater - Clean Pipes									
		Stages					Stages					Difference				
		2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20	20.28	20.51	20.94	19.55	20.00	20.28	20.51	20.94	0.00	-0.83	-2.37	-1.70	-2.94
A02	20.73	19.54	20	20.26	20.48	20.88	19.54	20.00	20.26	20.48	20.88	0.00	-0.83	-2.39	-1.86	-3.00
A03	20.95	19.54	19.99	20.24	20.45	20.83	19.54	19.99	20.24	20.45	20.83	0.00	-0.84	-2.41	-1.76	-3.05
A04	22.00	19.54	19.89	20.09	20.2	20.27	19.54	19.91	20.10	20.18	20.24	0.00	-0.92	-2.55	-2.06	-3.64
A05	23.19	21.1	21.59	22.01	23.01	24.42	21.10	21.59	22.01	23.02	24.43	0.00	-0.38	-1.43	-0.12	-0.07
A06	23.50	20.99	21.44	21.74	22.37	23.2	20.99	21.44	21.74	22.38	23.21	0.00	-0.53	-1.70	-0.76	-1.29
A06a	23.13	19.66	21.08	21.43	21.71	22.01	19.66	21.09	21.44	21.72	22.01	0.00	-0.88	-2.00	-1.43	-2.49
A07	20.67	19.69	20.98	21.37	21.64	21.89	19.69	20.98	21.37	21.64	21.89	0.00	0.00	-1.28	-0.57	-1.99
A08	21.50	19.36	20.02	21.68	21.99	22.18	19.36	20.02	21.68	21.99	22.18	0.00	-1.95	-1.76	-1.13	-2.32
A09	21.34	19.35	19.55	19.76	19.88	20.01	19.35	19.55	19.76	19.88	20.01	0.00	-2.42	-3.68	-3.24	-4.49
A10	22.00	19.35	19.55	19.73	19.84	19.95	19.35	19.55	19.73	19.84	19.94	0.00	-2.42	-3.71	-3.28	-4.56
A10a	21.00	17.62	18.62	18.97	19.32	19.73	17.61	18.59	18.93	19.15	19.41	-0.01	-3.39	-4.53	-3.99	-5.12
A10b	21.00	17.31	18.33	18.74	19.17	19.63	17.30	18.28	18.68	18.94	19.21	-0.01	-3.69	-4.76	-4.19	-5.29
A11	21.43	19.39	20	20.52	20.99	21.56	19.39	20.00	20.52	20.99	21.56	0.00	-1.98	-2.92	-2.14	-2.94
A12	20.64	19.39	20.01	20.54	21.01	21.58	19.39	20.01	20.54	21.01	21.58	0.00	-1.97	-2.90	-2.12	-2.92
A13	20.59	19.39	19.97	20.46	20.9	21.43	19.39	19.97	20.46	20.90	21.43	0.00	-2.01	-2.98	-2.23	-3.07
A14	21.00	19.38	19.73	19.98	20.21	20.37	19.38	19.73	19.98	20.10	20.19	0.00	-2.25	-3.46	-3.03	-4.31
A15	22.85	20.06	20.95	21.72	22.31	22.88	20.06	20.95	21.72	22.31	22.88	0.00	-1.03	-1.72	-0.76	-1.62
A16	23.00	20.05	20.93	21.69	22.26	22.78	20.05	20.93	21.69	22.26	22.78	0.00	-1.05	-1.75	-0.81	-1.72
A17	22.00	21.04	21.18	21.52	22.04	22.51	21.04	21.18	21.52	22.04	22.51	0.00	-0.80	-1.93	-1.07	-1.99
A18	21.20	19.84	20.84	21.52	22.04	22.5	19.84	20.84	21.52	22.04	22.50	0.00	-1.14	-1.93	-1.07	-2.00
A19	20.10	19.83	20.28	20.4	20.53	20.73	19.83	20.28	20.40	20.53	20.73	0.00	-1.70	-3.05	-2.60	-3.77
A20	21.00	19.83	20.27	20.39	20.46	20.51	19.83	20.27	20.39	20.45	20.51	0.00	-1.71	-3.06	-2.68	-3.99
A21	25.07	22.51	25.17	26.18	26.36	26.48	22.51	25.17	26.18	26.36	26.48	0.00	0.00	0.00	0.00	0.00
A22	25.01	22.36	24.67	25.26	25.44	25.6	22.36	24.67	25.26	25.44	25.60	0.00	0.00	0.00	0.00	0.00
A23	24.94	22.33	24.4	24.75	24.89	25.02	22.33	24.40	24.75	24.89	25.02	0.00	0.00	0.00	0.00	0.00
A24	26.19	22.88	24.55	25.02	25.33	25.67	22.88	24.55	25.02	25.33	25.67	0.00	0.00	0.00	0.00	0.00
A25	24.48	22.32	24.32	24.6	24.71	24.82	22.32	24.32	24.60	24.71	24.82	0.00	0.00	0.00	0.00	0.00
A26	25.50	22.22	24	24.33	24.5	24.64	22.22	24.00	24.33	24.50	24.64	0.00	0.00	0.00	0.00	0.00
A27	25.50	22.16	23.64	24.04	24.25	24.43	22.16	23.64	24.04	24.25	24.43	0.00	0.00	0.00	0.00	-0.12
A28	23.03	22.15	23.32	23.7	23.87	24.01	22.15	23.32	23.70	23.87	24.01	0.00	0.00	0.00	0.00	-0.55
A29	26.47	22.93	23.36	23.69	24.12	24.76	22.93	23.36	23.69	24.12	24.76	0.00	0.00	0.00	0.00	0.00
A30	21.31	22.14	23.29	23.66	23.83	23.98	22.14	23.29	23.66	23.83	23.98	0.00	0.00	0.00	0.00	-0.62
A31	25.00	22.15	23.55	24.17	24.59	25	22.15	23.55	24.17	24.59	25.00	0.00	0.00	0.00	0.00	-0.14
B00	23.00	19.38	19.88	20.11	20.21	20.28	19.43	19.93	20.11	20.19	20.25	0.05	-0.88	-2.53	-2.04	-3.62
B01	22.00	20.35	20.93	21.15	21.3	21.47	20.35	20.93	21.16	21.30	21.46	0.00	0.00	-1.48	-0.95	-2.41
B02	23.26	21.3	22.34	22.92	23.36	23.89	21.30	22.34	22.92	23.36	23.89	0.00	0.00	0.00	0.00	0.00
B03a	25.67	25.73	27.83	29.14	30.14	31.18	25.73	27.83	29.14	30.14	31.18	0.00	0.00	0.00	0.00	0.00
B03b	24.00	23.9	24.79	25.36	25.83	26.34	23.90	24.79	25.36	25.83	26.34	0.00	0.00	0.00	0.00	0.00
B04a	30.65	29.38	31.95	33.54	34.62	35.67	29.38	31.95	33.54	34.62	35.67	0.00	0.00	0.00	0.00	0.00
B04b	29.00	27.48	28.68	29.74	30.62	31.57	27.48	28.68	29.74	30.62	31.57	0.00	0.00	0.00	0.00	0.00
B05a	40.75	40.67	42.39	43.47	44.26	45.06	40.67	42.39	43.47	44.26	45.06	0.00	0.00	0.00	0.00	0.00
B05b	37.00	36.93	37.63	38.12	38.52	38.96	36.93	37.63	38.12	38.52	38.96	0.00	0.00	0.00	0.00	0.00
C01	25.57	22.56	23.97	24.48	24.79	25.09	22.56	23.97	24.48	24.79	25.09	0.00	0.00	0.00	0.00	0.00
C01a	24.39	20.05	21.27	21.63	21.85	22.11	20.05	21.27	21.64	21.87	22.11	0.00	-0.70	-1.80	-1.33	-2.40
C02	26.00	22.6	24.09	24.66	25.01	25.35	22.60	24.09	24.66	25.01	25.35	0.00	0.00	0.00	0.00	0.00
C03a	28.72	26.11	27.32	27.98	28.37	28.74	26.11	27.32	27.98	28.37	28.74	0.00	0.00	0.00	0.00	0.00
C03b	27.76	25.35	26.57	27.23	27.77	28.47	25.35	26.57	27.23	27.77	28.47	0.00	0.00	0.00	0.00	0.00
C04a	32.80	31.05	31.82	32.25	32.53	32.82	31.05	31.82	32.25	32.53	32.82	0.00	0.00	0.00	0.00	0.00
C04b	32.80	30.34	31.11	31.54	31.87	32.7	30.34	31.11	31.54	31.87	32.70	0.00	0.00	0.00	0.00	0.00
Canal-Hig	20.00	12.84	12.84	12.84	12.84	12.84	12.84	12.84	12.84	12.84	12.84	-4.20	-10.07	-11.44	-11.16	-12.40
Canal-Lov	23.50	9.44	9.44	9.44	9.44	9.44	9.44	9.44	9.44	9.44	9.44	-4.60	-11.16	-12.76	-12.43	-13.91
Canal-Mid	21.00	11.1	11.1	11.1	11.1	11.1	11.10	11.10	11.10	11.10	11.10	-4.51	-10.83	-12.30	-12.00	-13.35
Off1	23.93	20.66	22.53	23.15	23.58	24.03	20.66	22.53	23.15	23.58	24.03	0.00	-0.33	-0.93	-0.50	-1.13
Off2	23.00	22.15	23.56	24.18	24.6	25.01	22.15	23.56	24.18	24.60	25.01	0.00	0.00	0.00	0.00	-0.14
Off3	36.00	33.3	34.07	34.52	34.83	35.13	33.30	34.07	34.52	34.83	35.13	0.00	0.00	0.00	0.00	0.00
Off4	36.00	36.44	39.96	43.14	45.92	49.18	36.44	39.96	43.14	45.92	49.18	0.00	0.00	0.00	0.00	0.00
Wet1a	22.00	19.38	19.88	20.1	20.21	20.27	19.44	19.93	20.11	20.19	20.25	0.06	-0.89	-2.53	-2.05	-3.63
Wet1b	22.00	17.07	17.5	18.82	19.11	19.28	16.54	16.95	17.25	17.54	18.32	-0.53	-3.79	-5.26	-4.59	-5.36
Wet2	23.00	18.62	19.66	20.09	20.22	20.37	18.03	18.74	19.11	19.38	19.65	-0.59	-3.24	-4.33	-3.75	-4.85
Wet2d	20.80	16.31	17.45	18.11	18.53	18.98	16.22	17.30	17.74	18.03	18.31	-0.09	-4.66	-5.70	-5.10	-6.18
Wet2e	20.90	16.22	17.32	17.96	18.38	18.83	16.13	17.16	17.60	17.89	18.16	-0.09	-4.80	-5.83	-5.24	-6.34

exceeds ground/warning stage
decrease in peak stage
increase in peak stage

Table 4
Pond Improvements - No Tailwater Results Comparison

Node	Ground/ Warning Stage	Existing Conditions No Tailwater					Pond Improvements - No Tailwater									
		Stages					Stages					Difference				
		2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20	20.28	20.51	20.94	19.15	19.34	19.48	19.77	20.18	-0.40	-1.49	-3.17	-2.44	-3.70
A02	20.73	19.54	20	20.26	20.48	20.88	18.63	18.72	19.28	19.65	20.07	-0.91	-2.11	-3.37	-2.69	-3.81
A03	20.95	19.54	19.99	20.24	20.45	20.83	18.63	18.71	19.26	19.62	20.02	-0.91	-2.12	-3.39	-2.59	-3.86
A04	22.00	19.54	19.89	20.09	20.2	20.27	17.69	18.68	19.18	19.51	19.92	-1.85	-2.15	-3.47	-2.73	-3.96
A05	23.19	21.1	21.59	22.01	23.01	24.42	21.10	21.59	21.99	22.99	24.39	0.00	-0.38	-1.45	-0.15	-0.11
A06	23.50	20.99	21.44	21.74	22.37	23.2	20.99	21.44	21.73	22.37	23.19	0.00	-0.53	-1.71	-0.77	-1.31
A06a	23.13	19.66	21.08	21.43	21.71	22.01	19.66	21.09	21.44	21.71	22.00	0.00	-0.88	-2.00	-1.44	-2.50
A07	20.67	19.69	20.98	21.37	21.64	21.89	18.63	19.78	20.95	21.31	21.66	-1.06	-1.20	-1.70	-0.90	-2.22
A08	21.50	19.36	20.02	21.68	21.99	22.18	19.36	19.84	21.54	21.92	22.13	0.00	-2.13	-1.90	-1.20	-2.37
A09	21.34	19.35	19.55	19.76	19.88	20.01	19.35	19.53	19.73	19.85	19.98	0.00	-2.44	-3.71	-3.27	-4.52
A10	22.00	19.35	19.55	19.73	19.84	19.95	19.35	19.53	19.70	19.81	19.92	0.00	-2.44	-3.74	-3.31	-4.58
A10a	21.00	17.62	18.62	18.97	19.32	19.73	17.61	18.61	19.01	19.24	19.48	-0.01	-3.37	-4.45	-3.90	-5.05
A10b	21.00	17.31	18.33	18.74	19.17	19.63	17.31	18.30	18.73	18.99	19.26	0.00	-3.67	-4.71	-4.14	-5.24
A11	21.43	19.39	20	20.52	20.99	21.56	19.39	20.00	20.52	20.99	21.55	0.00	-1.98	-2.92	-2.14	-2.95
A12	20.64	19.39	20.01	20.54	21.01	21.58	19.39	20.01	20.53	21.00	21.57	0.00	-1.97	-2.91	-2.13	-2.93
A13	20.59	19.39	19.97	20.46	20.9	21.43	19.39	19.97	20.46	20.89	21.42	0.00	-2.01	-2.98	-2.24	-3.08
A14	21.00	19.38	19.73	19.98	20.21	20.37	19.38	19.72	19.97	20.10	20.18	0.00	-2.26	-3.47	-3.03	-4.32
A15	22.85	20.06	20.95	21.72	22.31	22.88	20.06	20.90	21.64	22.23	22.81	0.00	-1.08	-1.80	-0.84	-1.69
A16	23.00	20.05	20.93	21.69	22.26	22.78	20.05	20.87	21.60	22.17	22.70	0.00	-1.11	-1.84	-0.90	-1.80
A17	22.00	21.04	21.18	21.52	22.04	22.51	21.04	21.18	21.40	21.92	22.39	0.00	-0.80	-2.05	-1.19	-2.11
A18	21.20	19.84	20.84	21.52	22.04	22.5	19.54	20.73	21.40	21.92	22.39	-0.30	-1.25	-2.05	-1.19	-2.11
A19	20.10	19.83	20.28	20.4	20.53	20.73	19.48	19.89	20.07	20.22	20.42	-0.35	-2.09	-3.38	-2.91	-4.08
A20	21.00	19.83	20.27	20.39	20.46	20.51	19.48	19.89	20.06	20.15	20.22	-0.35	-2.09	-3.39	-2.98	-4.28
A21	25.07	22.51	25.17	26.18	26.36	26.48	22.46	25.06	26.17	26.36	26.48	-0.05	-0.11	-0.01	0.00	0.00
A22	25.01	22.36	24.67	25.26	25.44	25.6	21.84	24.56	25.22	25.41	25.57	-0.52	-0.11	-0.04	-0.03	-0.03
A23	24.94	22.33	24.4	24.75	24.89	25.02	21.81	24.30	24.70	24.85	24.98	-0.52	-0.10	-0.05	-0.04	-0.04
A24	26.19	22.88	24.55	25.02	25.33	25.67	22.88	24.44	24.97	25.28	25.63	0.00	-0.11	-0.05	-0.05	-0.04
A25	24.48	22.32	24.32	24.6	24.71	24.82	21.79	24.22	24.54	24.66	24.77	-0.53	-0.10	-0.06	-0.05	-0.05
A26	25.50	22.22	24	24.33	24.5	24.64	21.72	23.81	24.17	24.35	24.50	-0.50	-0.19	-0.16	-0.15	-0.14
A27	25.50	22.16	23.64	24.04	24.25	24.43	21.61	23.35	23.75	23.98	24.18	-0.55	-0.29	-0.29	-0.27	-0.37
A28	23.03	22.15	23.32	23.7	23.87	24.01	21.46	22.79	23.26	23.50	23.67	-0.69	-0.53	-0.44	-0.37	-0.89
A29	26.47	22.93	23.36	23.69	24.12	24.76	22.93	23.36	23.64	23.86	24.14	0.00	0.00	-0.05	-0.26	-0.62
A30	21.31	22.14	23.29	23.66	23.83	23.98	21.46	22.78	23.17	23.41	23.59	-0.68	-0.51	-0.49	-0.42	-1.01
A31	25.00	22.15	23.55	24.17	24.59	25	21.45	22.83	23.36	23.75	24.15	-0.70	-0.72	-0.81	-0.84	-0.99
B00	23.00	19.38	19.88	20.11	20.21	20.28	19.43	19.90	20.05	20.12	20.18	0.05	-0.91	-2.59	-2.11	-3.69
B01	22.00	20.35	20.93	21.15	21.3	21.47	20.35	20.93	21.15	21.30	21.46	0.00	0.00	-1.49	-0.95	-2.41
B02	23.26	21.3	22.34	22.92	23.36	23.89	21.30	22.34	22.92	23.36	23.89	0.00	0.00	0.00	0.00	0.00
B03a	25.67	25.73	27.83	29.14	30.14	31.18	25.73	27.83	29.14	30.14	31.18	0.00	0.00	0.00	0.00	0.00
B03b	24.00	23.9	24.79	25.36	25.83	26.34	23.90	24.79	25.36	25.83	26.34	0.00	0.00	0.00	0.00	0.00
B04a	30.65	29.38	31.95	33.54	34.62	35.67	29.38	31.95	33.54	34.62	35.67	0.00	0.00	0.00	0.00	0.00
B04b	29.00	27.48	28.68	29.74	30.62	31.57	27.48	28.68	29.74	30.62	31.57	0.00	0.00	0.00	0.00	0.00
B05a	40.75	40.67	42.39	43.47	44.26	45.06	40.67	42.39	43.47	44.26	45.06	0.00	0.00	0.00	0.00	0.00
B05b	37.00	36.93	37.63	38.12	38.52	38.96	36.93	37.63	38.12	38.52	38.96	0.00	0.00	0.00	0.00	0.00
C01	25.57	22.56	23.97	24.48	24.79	25.09	22.56	23.97	24.48	24.79	25.09	0.00	0.00	0.00	0.00	0.00
C01a	24.39	20.05	21.27	21.63	21.85	22.11	20.05	21.27	21.63	21.85	22.10	0.00	-0.70	-1.81	-1.35	-2.41
C02	26.00	22.6	24.09	24.66	25.01	25.35	22.60	24.09	24.66	25.01	25.35	0.00	0.00	0.00	0.00	0.00
C03a	28.72	26.11	27.32	27.98	28.37	28.74	26.11	27.32	27.98	28.37	28.74	0.00	0.00	0.00	0.00	0.00
C03b	27.76	25.35	26.57	27.23	27.77	28.47	25.35	26.57	27.23	27.77	28.47	0.00	0.00	0.00	0.00	0.00
C04a	32.80	31.05	31.82	32.25	32.53	32.82	31.05	31.82	32.25	32.53	32.82	0.00	0.00	0.00	0.00	0.00
C04b	32.80	30.34	31.11	31.54	31.87	32.7	30.34	31.11	31.54	31.87	32.70	0.00	0.00	0.00	0.00	0.00
Canal-Hig	20.00	12.84	12.84	12.84	12.84	12.84	12.84	12.84	12.84	12.84	12.84	-4.20	-10.07	-11.44	-11.16	-12.40
Canal-Lov	23.50	9.44	9.44	9.44	9.44	9.44	9.44	9.44	9.44	9.44	9.44	-4.60	-11.16	-12.76	-12.43	-13.91
Canal-Mid	21.00	11.1	11.1	11.1	11.1	11.1	11.10	11.10	11.10	11.10	11.10	-4.51	-10.83	-12.30	-12.00	-13.35
Off1	23.93	20.66	22.53	23.15	23.58	24.03	20.78	22.62	23.22	23.64	24.07	0.12	-0.24	-0.86	-0.44	-1.09
Off2	23.00	22.15	23.56	24.18	24.6	25.01	21.43	22.84	23.37	23.76	24.16	-0.72	-0.72	-0.81	-0.84	-0.99
Off3	36.00	33.3	34.07	34.52	34.83	35.13	33.55	34.38	34.85	35.19	35.51	0.25	0.31	0.33	0.36	0.38
Off4	36.00	36.44	39.96	43.14	45.92	49.18	36.44	39.96	43.14	45.92	49.19	0.00	0.00	0.00	0.00	0.01
Wet1a	22.00	19.38	19.88	20.1	20.21	20.27	19.44	19.90	20.05	20.12	20.17	0.06	-0.92	-2.59	-2.12	-3.71
Wet1b	22.00	17.07	17.5	18.82	19.11	19.28	16.54	16.94	17.15	17.30	17.51	-0.53	-3.80	-5.36	-4.83	-6.17
Wet2	23.00	18.62	19.66	20.09	20.22	20.37	18.04	18.62	18.96	19.23	19.50	-0.58	-3.36	-4.48	-3.90	-5.00
Wet2d	20.80	16.31	17.45	18.11	18.53	18.98	16.24	17.32	17.78	18.08	18.35	-0.07	-4.64	-5.66	-5.05	-6.14
Wet2e	20.90	16.22	17.32	17.96	18.38	18.83	16.15	17.19	17.64	17.93	18.20	-0.07	-4.77	-5.79	-5.20	-6.30

exceeds ground/warning stage
decrease in peak stage
increase in peak stage

Table 5
Alternative 1 Results Comparison

Node	Ground/ Warning Stage	Existing Conditions					Alternative 1: Clean Pipes									
		Stages					Stages					Difference				
		2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20.83	22.65	22.21	23.88	19.55	20.82	22.64	22.21	23.88	0.00	-0.01	-0.01	0.00	0.00
A02	20.73	19.54	20.83	22.65	22.34	23.88	19.54	20.82	22.64	22.29	23.88	0.00	-0.01	-0.01	-0.05	0.00
A03	20.95	19.54	20.83	22.65	22.21	23.88	19.54	20.82	22.64	22.21	23.88	0.00	-0.01	-0.01	0.00	0.00
A04	22.00	19.54	20.83	22.65	22.24	23.88	19.54	20.82	22.64	22.23	23.88	0.00	-0.01	-0.01	-0.01	0.00
A05	23.19	21.1	21.97	23.44	23.14	24.5	21.1	21.97	23.44	23.14	24.5	0.00	0.00	0.00	0.00	0.00
A06	23.50	20.99	21.97	23.44	23.14	24.5	20.99	21.98	23.44	23.14	24.5	0.00	0.01	0.00	0.00	0.00
A06a	23.13	19.66	21.97	23.44	23.15	24.5	19.66	21.98	23.44	23.14	24.5	0.00	0.01	0.00	-0.01	0.00
A07	20.67	19.69	20.98	22.65	22.21	23.88	19.69	20.98	22.64	22.21	23.88	0.00	0.00	-0.01	0.00	0.00
A08	21.50	19.36	21.97	23.44	23.12	24.5	19.36	21.98	23.44	23.13	24.5	0.00	0.01	0.00	0.01	0.00
A09	21.34	19.35	21.97	23.44	23.12	24.5	19.35	21.98	23.44	23.13	24.5	0.00	0.01	0.00	0.01	0.00
A10	22.00	19.35	21.97	23.44	23.12	24.5	19.35	21.98	23.44	23.13	24.5	0.00	0.01	0.00	0.01	0.00
A10a	21.00	17.62	21.98	23.46	23.14	24.53	17.61	21.99	23.46	23.15	24.53	-0.01	0.01	0.00	0.01	0.00
A10b	21.00	17.31	21.97	23.44	23.13	24.5	17.3	21.98	23.44	23.13	24.5	-0.01	0.01	0.00	0.00	0.00
A11	21.43	19.39	21.98	23.44	23.13	24.5	19.39	21.98	23.44	23.13	24.5	0.00	0.00	0.00	0.00	0.00
A12	20.64	19.39	21.98	23.44	23.13	24.5	19.39	21.98	23.44	23.13	24.5	0.00	0.00	0.00	0.00	0.00
A13	20.59	19.39	21.98	23.44	23.13	24.5	19.39	21.98	23.44	23.13	24.5	0.00	0.00	0.00	0.00	0.00
A14	21.00	19.38	21.98	23.44	23.13	24.5	19.38	21.98	23.44	23.13	24.5	0.00	0.00	0.00	0.00	0.00
A15	22.85	20.06	21.98	23.44	23.07	24.5	20.06	21.99	23.45	23.07	24.5	0.00	0.01	0.01	0.00	0.00
A16	23.00	20.05	21.98	23.44	23.07	24.5	20.05	21.99	23.45	23.07	24.5	0.00	0.01	0.01	0.00	0.00
A17	22.00	21.04	21.98	23.45	23.11	24.5	21.04	21.99	23.45	23.11	24.5	0.00	0.01	0.00	0.00	0.00
A18	21.20	19.84	21.98	23.45	23.11	24.5	19.84	21.99	23.45	23.11	24.5	0.00	0.01	0.00	0.00	0.00
A19	20.10	19.83	21.98	23.45	23.13	24.5	19.83	21.99	23.45	23.13	24.5	0.00	0.01	0.00	0.00	0.00
A20	21.00	19.83	21.98	23.45	23.13	24.5	19.83	21.99	23.45	23.13	24.5	0.00	0.01	0.00	0.00	0.00
A21	25.07	22.51	25.17	26.18	26.36	26.48	22.51	25.17	26.18	26.36	26.48	0.00	0.00	0.00	0.00	0.00
A22	25.01	22.36	24.67	25.26	25.44	25.6	22.36	24.67	25.26	25.44	25.6	0.00	0.00	0.00	0.00	0.00
A23	24.94	22.33	24.4	24.75	24.89	25.02	22.33	24.4	24.75	24.89	25.02	0.00	0.00	0.00	0.00	0.00
A24	26.19	22.88	24.55	25.02	25.33	25.67	22.88	24.55	25.02	25.33	25.67	0.00	0.00	0.00	0.00	0.00
A25	24.48	22.32	24.32	24.6	24.71	24.82	22.32	24.32	24.6	24.71	24.82	0.00	0.00	0.00	0.00	0.00
A26	25.50	22.22	24	24.33	24.5	24.64	22.22	24	24.33	24.5	24.64	0.00	0.00	0.00	0.00	0.00
A27	25.50	22.16	23.64	24.04	24.25	24.55	22.16	23.64	24.04	24.25	24.55	0.00	0.00	0.00	0.00	0.00
A28	23.03	22.15	23.32	23.7	23.87	24.56	22.15	23.32	23.7	23.87	24.56	0.00	0.00	0.00	0.00	0.00
A29	26.47	22.93	23.36	23.69	24.12	24.76	22.93	23.36	23.69	24.12	24.76	0.00	0.00	0.00	0.00	0.00
A30	21.31	22.14	23.29	23.66	23.83	24.6	22.14	23.29	23.66	23.83	24.6	0.00	0.00	0.00	0.00	0.00
A31	25.00	22.15	23.55	24.17	24.59	25.14	22.15	23.55	24.17	24.59	25.14	0.00	0.00	0.00	0.00	0.00
B00	23.00	19.38	20.81	22.64	22.23	23.87	19.43	20.81	22.64	22.23	23.87	0.05	0.00	0.00	0.00	0.00
B01	22.00	20.35	20.93	22.64	22.25	23.87	20.35	20.93	22.64	22.24	23.87	0.00	0.00	0.00	-0.01	0.00
B02	23.26	21.3	22.34	22.92	23.36	23.89	21.3	22.34	22.92	23.36	23.89	0.00	0.00	0.00	0.00	0.00
B03a	25.67	25.73	27.83	29.14	30.14	31.18	25.73	27.83	29.14	30.14	31.18	0.00	0.00	0.00	0.00	0.00
B03b	24.00	23.9	24.79	25.36	25.83	26.34	23.9	24.79	25.36	25.83	26.34	0.00	0.00	0.00	0.00	0.00
B04a	30.65	29.38	31.95	33.54	34.62	35.67	29.38	31.95	33.54	34.62	35.67	0.00	0.00	0.00	0.00	0.00
B04b	29.00	27.48	28.68	29.74	30.62	31.57	27.48	28.68	29.74	30.62	31.57	0.00	0.00	0.00	0.00	0.00
B05a	40.75	40.67	42.39	43.47	44.26	45.06	40.67	42.39	43.47	44.26	45.06	0.00	0.00	0.00	0.00	0.00
B05b	37.00	36.93	37.63	38.12	38.52	38.96	36.93	37.63	38.12	38.52	38.96	0.00	0.00	0.00	0.00	0.00
C01	25.57	22.56	23.97	24.48	24.79	25.09	22.56	23.97	24.48	24.79	25.09	0.00	0.00	0.00	0.00	0.00
C01a	24.39	20.05	21.97	23.44	23.2	24.51	20.05	21.98	23.44	23.21	24.51	0.00	0.01	0.00	0.01	0.00
C02	26.00	22.6	24.09	24.66	25.01	25.35	22.6	24.09	24.66	25.01	25.35	0.00	0.00	0.00	0.00	0.00
C03a	28.72	26.11	27.32	27.98	28.37	28.74	26.11	27.32	27.98	28.37	28.74	0.00	0.00	0.00	0.00	0.00
C03b	27.76	25.35	26.57	27.23	27.77	28.47	25.35	26.57	27.23	27.77	28.47	0.00	0.00	0.00	0.00	0.00
C04a	32.80	31.05	31.82	32.25	32.53	32.82	31.05	31.82	32.25	32.53	32.82	0.00	0.00	0.00	0.00	0.00
C04b	32.80	30.34	31.11	31.54	31.87	32.7	30.34	31.11	31.54	31.87	32.7	0.00	0.00	0.00	0.00	0.00
Canal-Hig	20.00	17.04	22.91	24.28	24	25.24	17.04	22.91	24.28	24	25.24	0.00	0.00	0.00	0.00	0.00
Canal-Lov	23.50	14.04	20.6	22.2	21.87	23.35	14.04	20.6	22.2	21.87	23.35	0.00	0.00	0.00	0.00	0.00
Canal-Mid	21.00	15.61	21.93	23.4	23.1	24.45	15.61	21.93	23.4	23.1	24.45	0.00	0.00	0.00	0.00	0.00
Off1	23.93	20.66	22.86	24.08	24.08	25.16	20.66	22.86	24.08	24.08	25.16	0.00	0.00	0.00	0.00	0.00
Off2	23.00	22.15	23.56	24.18	24.6	25.15	22.15	23.56	24.18	24.6	25.15	0.00	0.00	0.00	0.00	0.00
Off3	36.00	33.3	34.07	34.52	34.83	35.13	33.3	34.07	34.52	34.83	35.13	0.00	0.00	0.00	0.00	0.00
Off4	36.00	36.44	39.96	43.14	45.92	49.18	36.44	39.96	43.14	45.92	49.18	0.00	0.00	0.00	0.00	0.00
Wet1a	22.00	19.38	20.82	22.64	22.24	23.88	19.44	20.81	22.64	22.23	23.87	0.06	-0.01	0.00	-0.01	-0.01
Wet1b	22.00	17.07	20.74	22.51	22.13	23.68	16.54	20.73	22.51	22.13	23.67	-0.53	-0.01	0.00	0.00	-0.01
Wet2	23.00	18.62	21.98	23.44	23.13	24.5	18.03	21.98	23.44	23.13	24.5	-0.59	0.00	0.00	0.00	0.00
Wet2d	20.80	16.31	21.96	23.44	23.13	24.49	16.22	21.97	23.44	23.13	24.49	-0.09	0.01	0.00	0.00	0.00
Wet2e	20.90	16.22	21.96	23.43	23.13	24.5	16.13	21.97	23.43	23.13	24.5	-0.09	0.01	0.00	0.00	0.00

exceeds ground/warning stage
decrease in peak stage
increase in peak stage

Table 6
Alternative 2 Results Comparison

Node	Ground/ Warning Stage	Existing Conditions					Alternative 2: 10-Year Berm and Flap Gates									
		Stages					Stages					Difference				
		2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20.83	22.65	22.21	23.88	19.55	20.00	21.45	22.41	23.90	0.00	-0.83	-1.20	0.20	0.02
A02	20.73	19.54	20.83	22.65	22.34	23.88	19.54	20.00	21.45	22.96	23.90	0.00	-0.83	-1.20	0.62	0.02
A03	20.95	19.54	20.83	22.65	22.21	23.88	19.54	19.99	21.45	22.43	23.90	0.00	-0.84	-1.20	0.22	0.02
A04	22.00	19.54	20.83	22.65	22.24	23.88	19.54	19.89	21.45	22.42	23.91	0.00	-0.94	-1.20	0.18	0.03
A05	23.19	21.1	21.97	23.44	23.14	24.5	21.10	21.59	22.01	23.02	24.43	0.00	-0.38	-1.43	-0.12	-0.07
A06	23.50	20.99	21.97	23.44	23.14	24.5	20.99	21.44	21.74	22.44	23.93	0.00	-0.53	-1.70	-0.70	-0.57
A06a	23.13	19.66	21.97	23.44	23.15	24.5	19.66	21.09	21.51	22.44	23.94	0.00	-0.88	-1.93	-0.71	-0.56
A07	20.67	19.69	20.98	22.65	22.21	23.88	19.69	20.98	21.45	22.41	23.90	0.00	0.00	-1.20	0.20	0.02
A08	21.50	19.36	21.97	23.44	23.12	24.5	19.36	20.11	21.68	22.44	23.94	0.00	-1.86	-1.76	-0.68	-0.56
A09	21.34	19.35	21.97	23.44	23.12	24.5	19.35	20.11	21.51	22.44	23.94	0.00	-1.86	-1.93	-0.68	-0.56
A10	22.00	19.35	21.97	23.44	23.12	24.5	19.35	20.11	21.51	22.44	23.94	0.00	-1.86	-1.93	-0.68	-0.56
A10a	21.00	17.62	21.98	23.46	23.14	24.53	17.61	20.11	21.52	22.46	23.94	-0.01	-1.87	-1.94	-0.68	-0.59
A10b	21.00	17.31	21.97	23.44	23.13	24.5	17.30	20.11	21.51	22.44	23.94	-0.01	-1.86	-1.93	-0.69	-0.56
A11	21.43	19.39	21.98	23.44	23.13	24.5	19.39	20.11	21.51	22.44	23.94	0.00	-1.87	-1.93	-0.69	-0.56
A12	20.64	19.39	21.98	23.44	23.13	24.5	19.39	20.11	21.51	22.44	23.94	0.00	-1.87	-1.93	-0.69	-0.56
A13	20.59	19.39	21.98	23.44	23.13	24.5	19.39	20.11	21.51	22.44	23.94	0.00	-1.87	-1.93	-0.69	-0.56
A14	21.00	19.38	21.98	23.44	23.13	24.5	19.38	20.11	21.51	22.44	23.94	0.00	-1.87	-1.93	-0.69	-0.56
A15	22.85	20.06	21.98	23.44	23.07	24.5	20.06	20.95	21.72	22.35	23.94	0.00	-1.03	-1.72	-0.72	-0.56
A16	23.00	20.05	21.98	23.44	23.07	24.5	20.05	20.93	21.69	22.35	23.94	0.00	-1.05	-1.75	-0.72	-0.56
A17	22.00	21.04	21.98	23.45	23.11	24.5	21.04	21.18	21.52	22.37	23.94	0.00	-0.80	-1.93	-0.74	-0.56
A18	21.20	19.84	21.98	23.45	23.11	24.5	19.84	20.84	21.52	22.37	23.94	0.00	-1.14	-1.93	-0.74	-0.56
A19	20.10	19.83	21.98	23.45	23.13	24.5	19.83	20.28	21.52	22.44	23.94	0.00	-1.70	-1.93	-0.69	-0.56
A20	21.00	19.83	21.98	23.45	23.13	24.5	19.83	20.27	21.52	22.44	23.94	0.00	-1.71	-1.93	-0.69	-0.56
A21	25.07	22.51	25.17	26.18	26.36	26.48	22.51	25.17	26.18	26.36	26.48	0.00	0.00	0.00	0.00	0.00
A22	25.01	22.36	24.67	25.26	25.44	25.6	22.36	24.67	25.26	25.44	25.60	0.00	0.00	0.00	0.00	0.00
A23	24.94	22.33	24.4	24.75	24.89	25.02	22.33	24.40	24.75	24.89	25.02	0.00	0.00	0.00	0.00	0.00
A24	26.19	22.88	24.55	25.02	25.33	25.67	22.88	24.55	25.02	25.33	25.67	0.00	0.00	0.00	0.00	0.00
A25	24.48	22.32	24.32	24.6	24.71	24.82	22.32	24.32	24.60	24.71	24.82	0.00	0.00	0.00	0.00	0.00
A26	25.50	22.22	24	24.33	24.5	24.64	22.22	24.00	24.33	24.50	24.64	0.00	0.00	0.00	0.00	0.00
A27	25.50	22.16	23.64	24.04	24.25	24.55	22.16	23.64	24.04	24.25	24.43	0.00	0.00	0.00	0.00	-0.12
A28	23.03	22.15	23.32	23.7	23.87	24.56	22.15	23.32	23.70	23.87	24.01	0.00	0.00	0.00	0.00	-0.55
A29	26.47	22.93	23.36	23.69	24.12	24.76	22.93	23.36	23.69	24.12	24.76	0.00	0.00	0.00	0.00	0.00
A30	21.31	22.14	23.29	23.66	23.83	24.6	22.14	23.29	23.66	23.83	23.98	0.00	0.00	0.00	0.00	-0.62
A31	25.00	22.15	23.55	24.17	24.59	25.14	22.15	23.55	24.17	24.59	25.00	0.00	0.00	0.00	0.00	-0.14
B00	23.00	19.38	20.81	22.64	22.23	23.87	19.43	19.91	21.45	22.43	23.90	0.05	-0.90	-1.19	0.20	0.03
B01	22.00	20.35	20.93	22.64	22.25	23.87	20.35	20.93	21.45	22.41	23.90	0.00	0.00	-1.19	0.16	0.03
B02	23.26	21.3	22.34	22.92	23.36	23.89	21.30	22.34	22.92	23.36	23.90	0.00	0.00	0.00	0.00	0.01
B03a	25.67	25.73	27.83	29.14	30.14	31.18	25.73	27.83	29.14	30.14	31.18	0.00	0.00	0.00	0.00	0.00
B03b	24.00	23.9	24.79	25.36	25.83	26.34	23.90	24.79	25.36	25.83	26.34	0.00	0.00	0.00	0.00	0.00
B04a	30.65	29.38	31.95	33.54	34.62	35.67	29.38	31.95	33.54	34.62	35.67	0.00	0.00	0.00	0.00	0.00
B04b	29.00	27.48	28.68	29.74	30.62	31.57	27.48	28.68	29.74	30.62	31.57	0.00	0.00	0.00	0.00	0.00
B05a	40.75	40.67	42.39	43.47	44.26	45.06	40.67	42.39	43.47	44.26	45.06	0.00	0.00	0.00	0.00	0.00
B05b	37.00	36.93	37.63	38.12	38.52	38.96	36.93	37.63	38.12	38.52	38.96	0.00	0.00	0.00	0.00	0.00
C01	25.57	22.56	23.97	24.48	24.79	25.09	22.56	23.97	24.48	24.79	25.09	0.00	0.00	0.00	0.00	0.00
C01a	24.39	20.05	21.97	23.44	23.2	24.51	20.05	21.27	21.64	22.45	23.94	0.00	-0.70	-1.80	-0.75	-0.57
C02	26.00	22.6	24.09	24.66	25.01	25.35	22.60	24.09	24.66	25.01	25.35	0.00	0.00	0.00	0.00	0.00
C03a	28.72	26.11	27.32	27.98	28.37	28.74	26.11	27.32	27.98	28.37	28.74	0.00	0.00	0.00	0.00	0.00
C03b	27.76	25.35	26.57	27.23	27.77	28.47	25.35	26.57	27.23	27.77	28.47	0.00	0.00	0.00	0.00	0.00
C04a	32.80	31.05	31.82	32.25	32.53	32.82	31.05	31.82	32.25	32.53	32.82	0.00	0.00	0.00	0.00	0.00
C04b	32.80	30.34	31.11	31.54	31.87	32.7	30.34	31.11	31.54	31.87	32.70	0.00	0.00	0.00	0.00	0.00
Canal-Hig	20.00	17.04	22.91	24.28	24	25.24	17.04	22.91	24.28	24.80	25.24	0.00	0.00	0.00	0.80	0.00
Canal-Lov	23.50	14.04	20.6	22.2	21.87	23.35	14.04	20.60	22.20	22.83	23.35	0.00	0.00	0.00	0.96	0.00
Canal-Mid	21.00	15.61	21.93	23.4	23.1	24.45	15.61	21.93	23.40	23.97	24.45	0.00	0.00	0.00	0.87	0.00
Off1	23.93	20.66	22.86	24.08	24.08	25.16	20.66	22.53	23.35	24.08	24.86	0.00	-0.33	-0.73	0.00	-0.30
Off2	23.00	22.15	23.56	24.18	24.6	25.15	22.15	23.56	24.18	24.60	25.01	0.00	0.00	0.00	0.00	-0.14
Off3	36.00	33.3	34.07	34.52	34.83	35.13	33.30	34.07	34.52	34.83	35.13	0.00	0.00	0.00	0.00	0.00
Off4	36.00	36.44	39.96	43.14	45.92	49.18	36.44	39.96	43.14	45.92	49.18	0.00	0.00	0.00	0.00	0.00
Wet1a	22.00	19.38	20.82	22.64	22.24	23.88	19.44	19.91	21.45	22.43	23.90	0.06	-0.91	-1.19	0.19	0.02
Wet1b	22.00	17.07	20.74	22.51	22.13	23.68	16.54	19.26	21.45	22.43	23.90	-0.53	-1.48	-1.06	0.30	0.22
Wet2	23.00	18.62	21.98	23.44	23.13	24.5	18.03	20.11	21.51	22.44	23.94	-0.59	-1.87	-1.93	-0.69	-0.56
Wet2d	20.80	16.31	21.96	23.44	23.13	24.49	16.22	20.11	21.51	22.44	23.94	-0.09	-1.85	-1.93	-0.69	-0.55
Wet2e	20.90	16.22	21.96	23.43	23.13	24.5	16.13	20.11	21.51	22.45	23.94	-0.09	-1.85	-1.92	-0.68	-0.56

exceeds ground/warning stage
decrease in peak stage
increase in peak stage

Table 7
Alternative 2a Results Comparison

Node	Ground/ Warning Stage	Existing Conditions					Alternative 2a: 10-Year Berm, Gates, and Pond Improvements									
		Stages					Stages					Difference				
		2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20.83	22.65	22.21	23.88	19.15	19.88	21.39	22.26	23.91	-0.40	-0.95	-1.26	0.05	0.03
A02	20.73	19.54	20.83	22.65	22.34	23.88	18.63	19.87	21.39	22.63	23.91	-0.91	-0.96	-1.26	0.29	0.03
A03	20.95	19.54	20.83	22.65	22.21	23.88	18.63	19.87	21.39	22.28	23.91	-0.91	-0.96	-1.26	0.07	0.03
A04	22.00	19.54	20.83	22.65	22.24	23.88	17.69	19.87	21.39	22.28	23.91	-1.85	-0.96	-1.26	0.04	0.03
A05	23.19	21.1	21.97	23.44	23.14	24.5	21.10	21.59	21.99	22.99	24.39	0.00	-0.38	-1.45	-0.15	-0.11
A06	23.50	20.99	21.97	23.44	23.14	24.5	20.99	21.44	21.73	22.37	23.94	0.00	-0.53	-1.71	-0.77	-0.56
A06a	23.13	19.66	21.97	23.44	23.15	24.5	19.66	21.09	21.44	22.30	23.94	0.00	-0.88	-2.00	-0.85	-0.56
A07	20.67	19.69	20.98	22.65	22.21	23.88	18.63	19.87	21.39	22.26	23.91	-1.06	-1.11	-1.26	0.05	0.03
A08	21.50	19.36	21.97	23.44	23.12	24.5	19.36	19.92	21.53	22.29	23.94	0.00	-2.05	-1.91	-0.83	-0.56
A09	21.34	19.35	21.97	23.44	23.12	24.5	19.35	19.92	21.41	22.29	23.94	0.00	-2.05	-2.03	-0.83	-0.56
A10	22.00	19.35	21.97	23.44	23.12	24.5	19.35	19.92	21.41	22.29	23.94	0.00	-2.05	-2.03	-0.83	-0.56
A10a	21.00	17.62	21.98	23.46	23.14	24.53	17.61	19.91	21.40	22.31	23.96	-0.01	-2.07	-2.06	-0.83	-0.57
A10b	21.00	17.31	21.97	23.44	23.13	24.5	17.31	19.91	21.41	22.30	23.94	0.00	-2.06	-2.03	-0.83	-0.56
A11	21.43	19.39	21.98	23.44	23.13	24.5	19.39	20.00	21.41	22.30	23.94	0.00	-1.98	-2.03	-0.83	-0.56
A12	20.64	19.39	21.98	23.44	23.13	24.5	19.39	20.01	21.41	22.30	23.94	0.00	-1.97	-2.03	-0.83	-0.56
A13	20.59	19.39	21.98	23.44	23.13	24.5	19.39	19.97	21.41	22.30	23.94	0.00	-2.01	-2.03	-0.83	-0.56
A14	21.00	19.38	21.98	23.44	23.13	24.5	19.38	19.92	21.41	22.30	23.94	0.00	-2.06	-2.03	-0.83	-0.56
A15	22.85	20.06	21.98	23.44	23.07	24.5	20.06	20.90	21.64	22.23	23.94	0.00	-1.08	-1.80	-0.84	-0.56
A16	23.00	20.05	21.98	23.44	23.07	24.5	20.05	20.87	21.60	22.22	23.94	0.00	-1.11	-1.84	-0.85	-0.56
A17	22.00	21.04	21.98	23.45	23.11	24.5	21.04	21.18	21.41	22.23	23.94	0.00	-0.80	-2.04	-0.88	-0.56
A18	21.20	19.84	21.98	23.45	23.11	24.5	19.54	20.73	21.41	22.23	23.94	-0.30	-1.25	-2.04	-0.88	-0.56
A19	20.10	19.83	21.98	23.45	23.13	24.5	19.48	19.93	21.41	22.30	23.94	-0.35	-2.05	-2.04	-0.83	-0.56
A20	21.00	19.83	21.98	23.45	23.13	24.5	19.48	19.92	21.41	22.30	23.94	-0.35	-2.06	-2.04	-0.83	-0.56
A21	25.07	22.51	25.17	26.18	26.36	26.48	22.46	25.06	26.17	26.36	26.48	-0.05	-0.11	-0.01	0.00	0.00
A22	25.01	22.36	24.67	25.26	25.44	25.6	21.84	24.56	25.22	25.41	25.56	-0.52	-0.11	-0.04	-0.03	-0.04
A23	24.94	22.33	24.4	24.75	24.89	25.02	21.81	24.29	24.70	24.84	24.97	-0.52	-0.11	-0.05	-0.05	-0.05
A24	26.19	22.88	24.55	25.02	25.33	25.67	22.88	24.44	24.96	25.28	25.62	0.00	-0.11	-0.06	-0.05	-0.05
A25	24.48	22.32	24.32	24.6	24.71	24.82	21.79	24.21	24.54	24.66	24.76	-0.53	-0.11	-0.06	-0.05	-0.06
A26	25.50	22.22	24	24.33	24.5	24.64	21.72	23.80	24.16	24.33	24.49	-0.50	-0.20	-0.17	-0.17	-0.15
A27	25.50	22.16	23.64	24.04	24.25	24.55	21.61	23.34	23.73	23.95	24.16	-0.55	-0.30	-0.31	-0.30	-0.39
A28	23.03	22.15	23.32	23.7	23.87	24.56	21.41	22.74	23.18	23.47	23.97	-0.74	-0.58	-0.52	-0.40	-0.59
A29	26.47	22.93	23.36	23.69	24.12	24.76	22.93	23.36	23.64	23.86	24.14	0.00	0.00	-0.05	-0.26	-0.62
A30	21.31	22.14	23.29	23.66	23.83	24.6	21.41	22.73	23.13	23.47	23.98	-0.73	-0.56	-0.53	-0.36	-0.62
A31	25.00	22.15	23.55	24.17	24.59	25.14	21.40	22.78	23.36	24.06	24.83	-0.75	-0.77	-0.81	-0.53	-0.31
B00	23.00	19.38	20.81	22.64	22.23	23.87	19.43	19.89	21.39	22.28	23.90	0.05	-0.92	-1.25	0.05	0.03
B01	22.00	20.35	20.93	22.64	22.25	23.87	20.35	20.93	21.39	22.26	23.90	0.00	0.00	-1.25	0.01	0.03
B02	23.26	21.3	22.34	22.92	23.36	23.89	21.30	22.34	22.92	23.36	23.90	0.00	0.00	0.00	0.00	0.01
B03a	25.67	25.73	27.83	29.14	30.14	31.18	25.73	27.83	29.14	30.14	31.18	0.00	0.00	0.00	0.00	0.00
B03b	24.00	23.9	24.79	25.36	25.83	26.34	23.90	24.79	25.36	25.83	26.34	0.00	0.00	0.00	0.00	0.00
B04a	30.65	29.38	31.95	33.54	34.62	35.67	29.38	31.95	33.54	34.62	35.67	0.00	0.00	0.00	0.00	0.00
B04b	29.00	27.48	28.68	29.74	30.62	31.57	27.48	28.68	29.74	30.62	31.57	0.00	0.00	0.00	0.00	0.00
B05a	40.75	40.67	42.39	43.47	44.26	45.06	40.67	42.39	43.47	44.26	45.06	0.00	0.00	0.00	0.00	0.00
B05b	37.00	36.93	37.63	38.12	38.52	38.96	36.93	37.63	38.12	38.52	38.96	0.00	0.00	0.00	0.00	0.00
C01	25.57	22.56	23.97	24.48	24.79	25.09	22.56	23.97	24.48	24.79	25.09	0.00	0.00	0.00	0.00	0.00
C01a	24.39	20.05	21.97	23.44	23.2	24.51	20.05	21.27	21.63	22.30	23.94	0.00	-0.70	-1.81	-0.90	-0.57
C02	26.00	22.6	24.09	24.66	25.01	25.35	22.60	24.09	24.66	25.01	25.35	0.00	0.00	0.00	0.00	0.00
C03a	28.72	26.11	27.32	27.98	28.37	28.74	26.11	27.32	27.98	28.37	28.74	0.00	0.00	0.00	0.00	0.00
C03b	27.76	25.35	26.57	27.23	27.77	28.47	25.35	26.57	27.23	27.77	28.47	0.00	0.00	0.00	0.00	0.00
C04a	32.80	31.05	31.82	32.25	32.53	32.82	31.05	31.82	32.25	32.53	32.82	0.00	0.00	0.00	0.00	0.00
C04b	32.80	30.34	31.11	31.54	31.87	32.7	30.34	31.11	31.54	31.87	32.70	0.00	0.00	0.00	0.00	0.00
Canal-Hig	20.00	17.04	22.91	24.28	24	25.24	17.04	22.91	24.28	24.80	25.24	0.00	0.00	0.00	0.80	0.00
Canal-Lov	23.50	14.04	20.6	22.2	21.87	23.35	14.04	20.60	22.20	22.82	23.35	0.00	0.00	0.00	0.95	0.00
Canal-Mid	21.00	15.61	21.93	23.4	23.1	24.45	15.61	21.93	23.40	23.97	24.45	0.00	0.00	0.00	0.87	0.00
Off1	23.93	20.66	22.86	24.08	24.08	25.16	20.70	22.55	23.35	24.07	24.84	0.04	-0.31	-0.73	-0.01	-0.32
Off2	23.00	22.15	23.56	24.18	24.6	25.15	21.38	22.78	23.37	24.08	24.84	-0.77	-0.78	-0.81	-0.52	-0.31
Off3	36.00	33.3	34.07	34.52	34.83	35.13	33.21	33.86	34.22	34.48	34.73	-0.09	-0.21	-0.30	-0.35	-0.40
Off4	36.00	36.44	39.96	43.14	45.92	49.18	36.44	39.96	43.14	45.92	49.18	0.00	0.00	0.00	0.00	0.00
Wet1a	22.00	19.38	20.82	22.64	22.24	23.88	19.44	19.89	21.39	22.28	23.90	0.06	-0.93	-1.25	0.04	0.02
Wet1b	22.00	17.07	20.74	22.51	22.13	23.68	16.54	19.21	21.39	22.28	23.90	-0.53	-1.53	-1.12	0.15	0.22
Wet2	23.00	18.62	21.98	23.44	23.13	24.5	18.04	19.92	21.41	22.30	23.94	-0.58	-2.06	-2.03	-0.83	-0.56
Wet2d	20.80	16.31	21.96	23.44	23.13	24.49	16.24	19.92	21.41	22.30	23.94	-0.07	-2.04	-2.03	-0.83	-0.55
Wet2e	20.90	16.22	21.96	23.43	23.13	24.5	16.15	19.92	21.41	22.30	23.94	-0.07	-2.04	-2.02	-0.83	-0.56

exceeds ground/warning stage
decrease in peak stage
increase in peak stage

Table 8
Alternative 3 Results Comparison

Node	Ground/ Warning Stage	Existing Conditions					Alternative 3: 100-Year Berm and Flap Gates									
		Stages					Stages					Difference				
		2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20.83	22.65	22.21	23.88	19.54	20.00	20.26	20.48	20.88	0.00	-0.83	-2.37	-1.70	-2.94
A02	20.73	19.54	20.83	22.65	22.34	23.88	19.54	19.99	20.24	20.45	20.83	0.00	-0.83	-2.39	-1.86	-3.00
A03	20.95	19.54	20.83	22.65	22.21	23.88	19.54	19.89	20.09	20.20	20.27	0.00	-0.84	-2.41	-1.76	-3.05
A04	22.00	19.54	20.83	22.65	22.24	23.88	21.10	21.59	22.01	23.01	24.42	0.00	-0.94	-2.56	-2.04	-3.61
A05	23.19	21.1	21.97	23.44	23.14	24.5	20.99	21.44	21.74	22.37	23.20	0.00	-0.38	-1.43	-0.13	-0.08
A06	23.50	20.99	21.97	23.44	23.14	24.5	19.66	21.08	21.43	21.71	22.01	0.00	-0.53	-1.70	-0.77	-1.30
A06a	23.13	19.66	21.97	23.44	23.15	24.5	19.69	20.98	21.37	21.64	21.89	0.00	-0.89	-2.01	-1.44	-2.49
A07	20.67	19.69	20.98	22.65	22.21	23.88	19.36	20.02	21.68	21.99	22.18	0.00	0.00	-1.28	-0.57	-1.99
A08	21.50	19.36	21.97	23.44	23.12	24.5	19.35	19.55	19.76	19.88	20.01	0.00	-1.95	-1.76	-1.13	-2.32
A09	21.34	19.35	21.97	23.44	23.12	24.5	19.35	19.55	19.73	19.84	19.95	0.00	-2.42	-3.68	-3.24	-4.49
A10	22.00	19.35	21.97	23.44	23.12	24.5	17.62	18.62	18.97	19.32	19.73	0.00	-2.42	-3.71	-3.28	-4.55
A10a	21.00	17.62	21.98	23.46	23.14	24.53	17.31	18.33	18.74	19.17	19.63	0.00	-3.36	-4.49	-3.82	-4.80
A10b	21.00	17.31	21.97	23.44	23.13	24.5	19.39	20.00	20.52	20.99	21.56	0.00	-3.64	-4.70	-3.96	-4.87
A11	21.43	19.39	21.98	23.44	23.13	24.5	19.39	20.01	20.54	21.01	21.58	0.00	-1.98	-2.92	-2.14	-2.94
A12	20.64	19.39	21.98	23.44	23.13	24.5	19.39	19.97	20.46	20.90	21.43	0.00	-1.97	-2.90	-2.12	-2.92
A13	20.59	19.39	21.98	23.44	23.13	24.5	19.38	19.73	19.98	20.21	20.37	0.00	-2.01	-2.98	-2.23	-3.07
A14	21.00	19.38	21.98	23.44	23.13	24.5	20.06	20.95	21.72	22.31	22.88	0.00	-2.25	-3.46	-2.92	-4.13
A15	22.85	20.06	21.98	23.44	23.07	24.5	20.05	20.93	21.69	22.26	22.78	0.00	-1.03	-1.72	-0.76	-1.62
A16	23.00	20.05	21.98	23.44	23.07	24.5	21.04	21.18	21.52	22.04	22.51	0.00	-1.05	-1.75	-0.81	-1.72
A17	22.00	21.04	21.98	23.45	23.11	24.5	19.84	20.84	21.52	22.04	22.50	0.00	-0.80	-1.93	-1.07	-1.99
A18	21.20	19.84	21.98	23.45	23.11	24.5	19.83	20.28	20.40	20.53	20.73	0.00	-1.14	-1.93	-1.07	-2.00
A19	20.10	19.83	21.98	23.45	23.13	24.5	19.83	20.27	20.39	20.46	20.51	0.00	-1.70	-3.05	-2.60	-3.77
A20	21.00	19.83	21.98	23.45	23.13	24.5	22.51	25.17	26.18	26.36	26.48	0.00	-1.71	-3.06	-2.67	-3.99
A21	25.07	22.51	25.17	26.18	26.36	26.48	22.36	24.67	25.26	25.44	25.60	0.00	0.00	0.00	0.00	0.00
A22	25.01	22.36	24.67	25.26	25.44	25.6	22.33	24.40	24.75	24.89	25.02	0.00	0.00	0.00	0.00	0.00
A23	24.94	22.33	24.4	24.75	24.89	25.02	22.88	24.55	25.02	25.33	25.67	0.00	0.00	0.00	0.00	0.00
A24	26.19	22.88	24.55	25.02	25.33	25.67	22.32	24.32	24.60	24.71	24.82	0.00	0.00	0.00	0.00	0.00
A25	24.48	22.32	24.32	24.6	24.71	24.82	22.22	24.00	24.33	24.50	24.64	0.00	0.00	0.00	0.00	0.00
A26	25.50	22.22	24	24.33	24.5	24.64	22.16	23.64	24.04	24.25	24.43	0.00	0.00	0.00	0.00	0.00
A27	25.50	22.16	23.64	24.04	24.25	24.55	22.15	23.32	23.70	23.87	24.01	0.00	0.00	0.00	0.00	-0.12
A28	23.03	22.15	23.32	23.7	23.87	24.56	22.93	23.36	23.69	24.12	24.76	0.00	0.00	0.00	0.00	-0.55
A29	26.47	22.93	23.36	23.69	24.12	24.76	22.14	23.29	23.66	23.83	23.98	0.00	0.00	0.00	0.00	0.00
A30	21.31	22.14	23.29	23.66	23.83	24.6	22.15	23.55	24.17	24.59	25.00	0.00	0.00	0.00	0.00	-0.62
A31	25.00	22.15	23.55	24.17	24.59	25.14	19.38	19.88	20.11	20.21	20.28	0.00	0.00	0.00	0.00	-0.14
B00	23.00	19.38	20.81	22.64	22.23	23.87	20.35	20.93	21.15	21.30	21.47	0.00	-0.93	-2.53	-2.02	-3.59
B01	22.00	20.35	20.93	22.64	22.25	23.87	21.30	22.34	22.92	23.36	23.89	0.00	0.00	-1.49	-0.95	-2.40
B02	23.26	21.3	22.34	22.92	23.36	23.89	25.73	27.83	29.14	30.14	31.18	0.00	0.00	0.00	0.00	0.00
B03a	25.67	25.73	27.83	29.14	30.14	31.18	23.90	24.79	25.36	25.83	26.34	0.00	0.00	0.00	0.00	0.00
B03b	24.00	23.9	24.79	25.36	25.83	26.34	29.38	31.95	33.54	34.62	35.67	0.00	0.00	0.00	0.00	0.00
B04a	30.65	29.38	31.95	33.54	34.62	35.67	27.48	28.68	29.74	30.62	31.57	0.00	0.00	0.00	0.00	0.00
B04b	29.00	27.48	28.68	29.74	30.62	31.57	40.67	42.39	43.47	44.26	45.06	0.00	0.00	0.00	0.00	0.00
B05a	40.75	40.67	42.39	43.47	44.26	45.06	36.93	37.63	38.12	38.52	38.96	0.00	0.00	0.00	0.00	0.00
B05b	37.00	36.93	37.63	38.12	38.52	38.96	22.56	23.97	24.48	24.79	25.09	0.00	0.00	0.00	0.00	0.00
C01	25.57	22.56	23.97	24.48	24.79	25.09	20.05	21.27	21.63	21.85	22.11	0.00	0.00	0.00	0.00	0.00
C01a	24.39	20.05	21.97	23.44	23.2	24.51	22.60	24.09	24.66	25.01	25.35	0.00	-0.70	-1.81	-1.35	-2.40
C02	26.00	22.6	24.09	24.66	25.01	25.35	26.11	27.32	27.98	28.37	28.74	0.00	0.00	0.00	0.00	0.00
C03a	28.72	26.11	27.32	27.98	28.37	28.74	25.35	26.57	27.23	27.77	28.47	0.00	0.00	0.00	0.00	0.00
C03b	27.76	25.35	26.57	27.23	27.77	28.47	31.05	31.82	32.25	32.53	32.82	0.00	0.00	0.00	0.00	0.00
C04a	32.80	31.05	31.82	32.25	32.53	32.82	30.34	31.11	31.54	31.87	32.70	0.00	0.00	0.00	0.00	0.00
C04b	32.80	30.34	31.11	31.54	31.87	32.7	12.84	12.84	12.84	12.84	12.84	0.00	0.00	0.00	0.00	0.00
Canal-Hig	20.00	17.04	22.91	24.28	24	25.24	9.44	9.44	9.44	9.44	9.44	-4.20	-10.07	-11.44	-11.16	-12.40
Canal-Lov	23.50	14.04	20.6	22.2	21.87	23.35	11.10	11.10	11.10	11.10	11.10	-4.60	-11.16	-12.76	-12.43	-13.91
Canal-Mid	21.00	15.61	21.93	23.4	23.1	24.45	20.66	22.53	23.15	23.58	24.03	-4.51	-10.83	-12.30	-12.00	-13.35
Off1	23.93	20.66	22.86	24.08	24.08	25.16	22.15	23.56	24.18	24.60	25.01	0.00	-0.33	-0.93	-0.50	-1.13
Off2	23.00	22.15	23.56	24.18	24.6	25.15	33.30	34.07	34.52	34.83	35.13	0.00	0.00	0.00	0.00	-0.14
Off3	36.00	33.3	34.07	34.52	34.83	35.13	36.44	39.96	43.14	45.92	49.18	0.00	0.00	0.00	0.00	0.00
Off4	36.00	36.44	39.96	43.14	45.92	49.18	19.38	19.88	20.10	20.21	20.27	0.00	0.00	0.00	0.00	0.00
Wet1a	22.00	19.38	20.82	22.64	22.24	23.88	17.07	17.50	18.82	19.11	19.28	0.00	-0.94	-2.54	-2.03	-3.61
Wet1b	22.00	17.07	20.74	22.51	22.13	23.68	18.62	19.66	20.09	20.22	20.37	0.00	-3.24	-3.69	-3.02	-4.40
Wet2	23.00	18.62	21.98	23.44	23.13	24.5	16.31	17.45	18.11	18.53	18.98	0.00	-2.32	-3.35	-2.91	-4.13
Wet2d	20.80	16.31	21.96	23.44	23.13	24.49	16.22	17.32	17.96	18.38	18.83	0.00	-4.51	-5.33	-4.60	-5.51
Wet2e	20.90	16.22	21.96	23.43	23.13	24.5	16.13	21.97	23.43	23.13	24.5	0.00	-4.64	-5.47	-4.75	-5.67

exceeds ground/warning stage
decrease in peak stage
increase in peak stage

Table 9
Alternative 3a Results Comparison

Node	Ground/ Warning Stage	Existing Conditions					Alternative 3a: 100-Year Berm, Gates, and Pond Improvements									
		Stages					Stages					Difference				
		2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year	2-Year	10-Year	25-Year	50-Year	100-Year
A01	22.13	19.55	20.83	22.65	22.21	23.88	19.15	19.88	20.58	21.37	21.98	-0.40	-0.95	-2.07	-0.84	-1.90
A02	20.73	19.54	20.83	22.65	22.34	23.88	18.63	19.87	20.58	21.38	21.98	-0.91	-0.96	-2.07	-0.96	-1.90
A03	20.95	19.54	20.83	22.65	22.21	23.88	18.63	19.87	20.58	21.37	21.98	-0.91	-0.96	-2.07	-0.84	-1.90
A04	22.00	19.54	20.83	22.65	22.24	23.88	17.69	19.87	20.58	21.37	21.98	-1.85	-0.96	-2.07	-0.87	-1.90
A05	23.19	21.1	21.97	23.44	23.14	24.5	21.10	21.59	21.99	22.99	24.39	0.00	-0.38	-1.45	-0.15	-0.11
A06	23.50	20.99	21.97	23.44	23.14	24.5	20.99	21.44	21.73	22.37	23.19	0.00	-0.53	-1.71	-0.77	-1.31
A06a	23.13	19.66	21.97	23.44	23.15	24.5	19.66	21.09	21.44	21.71	22.00	0.00	-0.88	-2.00	-1.44	-2.50
A07	20.67	19.69	20.98	22.65	22.21	23.88	18.63	19.87	20.95	21.37	21.98	-1.06	-1.11	-1.70	-0.84	-1.90
A08	21.50	19.36	21.97	23.44	23.12	24.5	19.36	19.92	21.53	21.91	22.12	0.00	-2.05	-1.91	-1.21	-2.38
A09	21.34	19.35	21.97	23.44	23.12	24.5	19.35	19.92	20.73	21.38	21.98	0.00	-2.05	-2.71	-1.74	-2.52
A10	22.00	19.35	21.97	23.44	23.12	24.5	19.35	19.92	20.73	21.38	21.98	0.00	-2.05	-2.71	-1.74	-2.52
A10a	21.00	17.62	21.98	23.46	23.14	24.53	17.61	19.91	20.73	21.39	21.98	-0.01	-2.07	-2.73	-1.75	-2.55
A10b	21.00	17.31	21.97	23.44	23.13	24.5	17.31	19.91	20.73	21.38	21.98	0.00	-2.06	-2.71	-1.75	-2.52
A11	21.43	19.39	21.98	23.44	23.13	24.5	19.39	20.00	20.74	21.38	21.98	0.00	-1.98	-2.70	-1.75	-2.52
A12	20.64	19.39	21.98	23.44	23.13	24.5	19.39	20.01	20.74	21.38	21.98	0.00	-1.97	-2.70	-1.75	-2.52
A13	20.59	19.39	21.98	23.44	23.13	24.5	19.39	19.97	20.74	21.38	21.98	0.00	-2.01	-2.70	-1.75	-2.52
A14	21.00	19.38	21.98	23.44	23.13	24.5	19.38	19.92	20.73	21.38	21.98	0.00	-2.06	-2.71	-1.75	-2.52
A15	22.85	20.06	21.98	23.44	23.07	24.5	20.06	20.90	21.64	22.23	22.80	0.00	-1.08	-1.80	-0.84	-1.70
A16	23.00	20.05	21.98	23.44	23.07	24.5	20.05	20.87	21.60	22.17	22.70	0.00	-1.11	-1.84	-0.90	-1.80
A17	22.00	21.04	21.98	23.45	23.11	24.5	21.04	21.18	21.40	21.92	22.39	0.00	-0.80	-2.05	-1.19	-2.11
A18	21.20	19.84	21.98	23.45	23.11	24.5	19.54	20.73	21.39	21.91	22.39	-0.30	-1.25	-2.06	-1.20	-2.11
A19	20.10	19.83	21.98	23.45	23.13	24.5	19.48	19.93	20.74	21.38	21.98	-0.35	-2.05	-2.71	-1.75	-2.52
A20	21.00	19.83	21.98	23.45	23.13	24.5	19.48	19.92	20.74	21.38	21.98	-0.35	-2.06	-2.71	-1.75	-2.52
A21	25.07	22.51	25.17	26.18	26.36	26.48	22.46	25.06	26.17	26.36	26.48	-0.05	-0.11	-0.01	0.00	0.00
A22	25.01	22.36	24.67	25.26	25.44	25.6	21.84	24.56	25.22	25.41	25.56	-0.52	-0.11	-0.04	-0.03	-0.04
A23	24.94	22.33	24.4	24.75	24.89	25.02	21.81	24.29	24.70	24.84	24.97	-0.52	-0.11	-0.05	-0.05	-0.05
A24	26.19	22.88	24.55	25.02	25.33	25.67	22.88	24.44	24.96	25.28	25.62	0.00	-0.11	-0.06	-0.05	-0.05
A25	24.48	22.32	24.32	24.6	24.71	24.82	21.79	24.21	24.54	24.66	24.76	-0.53	-0.11	-0.06	-0.05	-0.06
A26	25.50	22.22	24	24.33	24.5	24.64	21.72	23.80	24.16	24.33	24.49	-0.50	-0.20	-0.17	-0.17	-0.15
A27	25.50	22.16	23.64	24.04	24.25	24.55	21.61	23.34	23.73	23.95	24.16	-0.55	-0.30	-0.31	-0.30	-0.39
A28	23.03	22.15	23.32	23.7	23.87	24.56	21.41	22.74	23.18	23.47	23.75	-0.74	-0.58	-0.52	-0.40	-0.81
A29	26.47	22.93	23.36	23.69	24.12	24.76	22.93	23.36	23.64	23.86	24.14	0.00	0.00	-0.05	-0.26	-0.62
A30	21.31	22.14	23.29	23.66	23.83	24.6	21.41	22.73	23.13	23.47	23.75	-0.73	-0.56	-0.53	-0.36	-0.85
A31	25.00	22.15	23.55	24.17	24.59	25.14	21.40	22.78	23.36	24.06	24.83	-0.75	-0.77	-0.81	-0.53	-0.31
B00	23.00	19.38	20.81	22.64	22.23	23.87	19.43	19.89	20.58	21.37	21.98	0.05	-0.92	-2.06	-0.86	-1.89
B01	22.00	20.35	20.93	22.64	22.25	23.87	20.35	20.93	21.15	21.37	21.97	0.00	0.00	-1.49	-0.88	-1.90
B02	23.26	21.3	22.34	22.92	23.36	23.89	21.30	22.34	22.92	23.36	23.89	0.00	0.00	0.00	0.00	0.00
B03a	25.67	25.73	27.83	29.14	30.14	31.18	25.73	27.83	29.14	30.14	31.18	0.00	0.00	0.00	0.00	0.00
B03b	24.00	23.9	24.79	25.36	25.83	26.34	23.90	24.79	25.36	25.83	26.34	0.00	0.00	0.00	0.00	0.00
B04a	30.65	29.38	31.95	33.54	34.62	35.67	29.38	31.95	33.54	34.62	35.67	0.00	0.00	0.00	0.00	0.00
B04b	29.00	27.48	28.68	29.74	30.62	31.57	27.48	28.68	29.74	30.62	31.57	0.00	0.00	0.00	0.00	0.00
B05a	40.75	40.67	42.39	43.47	44.26	45.06	40.67	42.39	43.47	44.26	45.06	0.00	0.00	0.00	0.00	0.00
B05b	37.00	36.93	37.63	38.12	38.52	38.96	36.93	37.63	38.12	38.52	38.96	0.00	0.00	0.00	0.00	0.00
C01	25.57	22.56	23.97	24.48	24.79	25.09	22.56	23.97	24.48	24.79	25.09	0.00	0.00	0.00	0.00	0.00
C01a	24.39	20.05	21.97	23.44	23.2	24.51	20.05	21.27	21.63	21.85	22.10	0.00	-0.70	-1.81	-1.35	-2.41
C02	26.00	22.6	24.09	24.66	25.01	25.35	22.60	24.09	24.66	25.01	25.35	0.00	0.00	0.00	0.00	0.00
C03a	28.72	26.11	27.32	27.98	28.37	28.74	26.11	27.32	27.98	28.37	28.74	0.00	0.00	0.00	0.00	0.00
C03b	27.76	25.35	26.57	27.23	27.77	28.47	25.35	26.57	27.23	27.77	28.47	0.00	0.00	0.00	0.00	0.00
C04a	32.80	31.05	31.82	32.25	32.53	32.82	31.05	31.82	32.25	32.53	32.82	0.00	0.00	0.00	0.00	0.00
C04b	32.80	30.34	31.11	31.54	31.87	32.7	30.34	31.11	31.54	31.87	32.70	0.00	0.00	0.00	0.00	0.00
Canal-Hig	20.00	17.04	22.91	24.28	24	25.24	17.04	22.91	24.28	24.81	25.24	0.00	0.00	0.00	0.81	0.00
Canal-Lov	23.50	14.04	20.6	22.2	21.87	23.35	14.04	20.60	22.20	22.83	23.35	0.00	0.00	0.00	0.96	0.00
Canal-Mid	21.00	15.61	21.93	23.4	23.1	24.45	15.61	21.93	23.40	23.97	24.45	0.00	0.00	0.00	0.87	0.00
Off1	23.93	20.66	22.86	24.08	24.08	25.16	20.70	22.55	23.35	24.07	24.84	0.04	-0.31	-0.73	-0.01	-0.32
Off2	23.00	22.15	23.56	24.18	24.6	25.15	21.38	22.78	23.37	24.08	24.84	-0.77	-0.78	-0.81	-0.52	-0.31
Off3	36.00	33.3	34.07	34.52	34.83	35.13	33.21	33.86	34.22	34.48	34.73	-0.09	-0.21	-0.30	-0.35	-0.40
Off4	36.00	36.44	39.96	43.14	45.92	49.18	36.44	39.96	43.14	45.92	49.18	0.00	0.00	0.00	0.00	0.00
Wet1a	22.00	19.38	20.82	22.64	22.24	23.88	19.44	19.89	20.58	21.37	21.98	0.06	-0.93	-2.06	-0.87	-1.90
Wet1b	22.00	17.07	20.74	22.51	22.13	23.68	16.54	19.21	20.58	21.37	21.98	-0.53	-1.53	-1.93	-0.76	-1.70
Wet2	23.00	18.62	21.98	23.44	23.13	24.5	18.04	19.92	20.73	21.38	21.98	-0.58	-2.06	-2.71	-1.75	-2.52
Wet2d	20.80	16.31	21.96	23.44	23.13	24.49	16.24	19.92	20.73	21.38	21.98	-0.07	-2.04	-2.71	-1.75	-2.51
Wet2e	20.90	16.22	21.96	23.43	23.13	24.5	16.15	19.92	20.73	21.38	21.98	-0.07	-2.04	-2.70	-1.75	-2.52

exceeds ground/warning stage
decrease in peak stage
increase in peak stage

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DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

FIGURES

J – 26611.0000

August 2017

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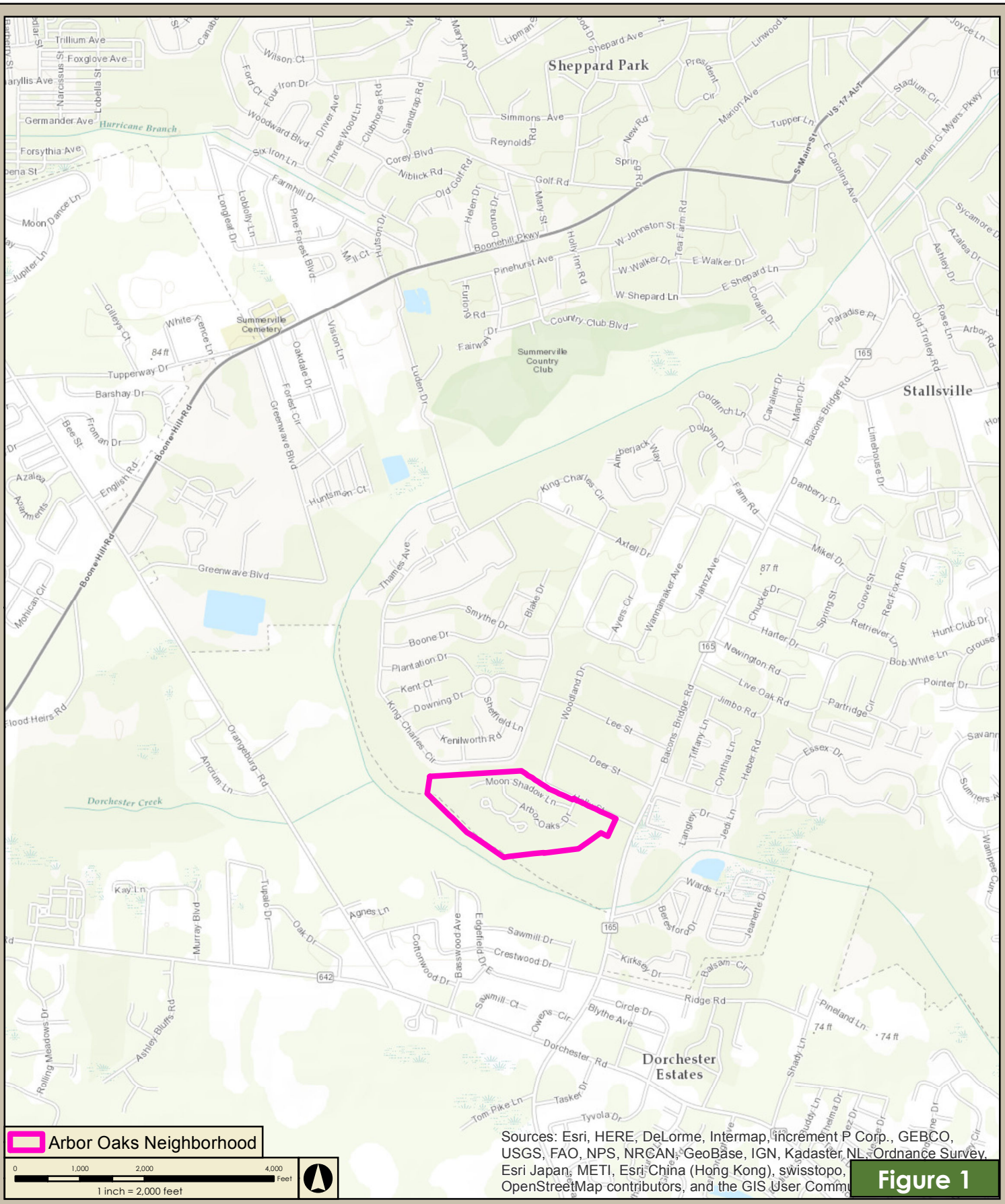

Figure 1

Job Number: 26611	Produced: 8/7/2017	Produced By: HEA	Modified: 8/7/2017	Modified By: SAW
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Fig 1 - Location Map.mxd				Vertical Datum:

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
Arbor Oaks Neighborhood	T&H	2017
Base Map	ESRI	Varies

DISCLAIMER
Where Thomas & Hutton is cited as the data source, the firm has created or verified the data. For all other sources cited, Thomas & Hutton used the data "as is," has made no independent investigation of the data, and makes no representation as to the accuracy or completeness of the data. Please see each source for available documentation of its respective datasets.

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Arbor Oaks Drainage Improvements

Town of Summerville, SC

Location Map

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Figure 2

Job Number: 26611.0000	Produced: 7/31/2017	Produced By: SAW	Modified: 8/1/2017	Modified By:
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Fig 2 - Soils Map.mxd				Vertical Datum:

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
Watershed Base Map	T&H ESRI	2017 Varies

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Arbor Oaks Drainage Improvements

Town of Summerville, SC

Soils Map

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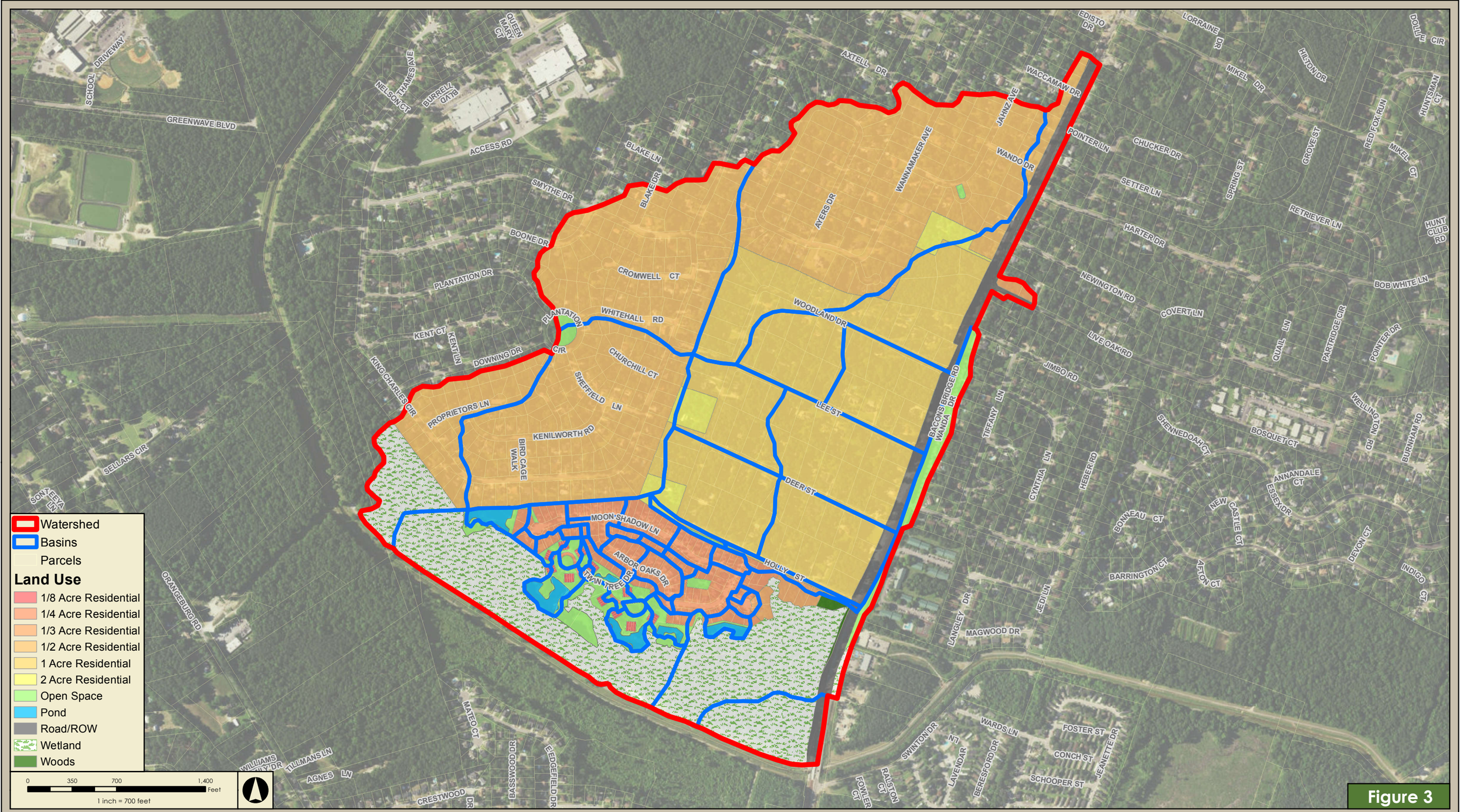

Figure 3

Job Number: 26611.0000	Produced: 7/31/2017	Produced By: SAW	Modified: 8/2/2017	Modified By:
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Fig 3 - Land Use Map.mxd				Vertical Datum:

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
Watershed	T&H	2017
Base Map	ESRI	Varies

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Arbor Oaks Drainage Improvements

Town of Summerville, SC

Land Use Map

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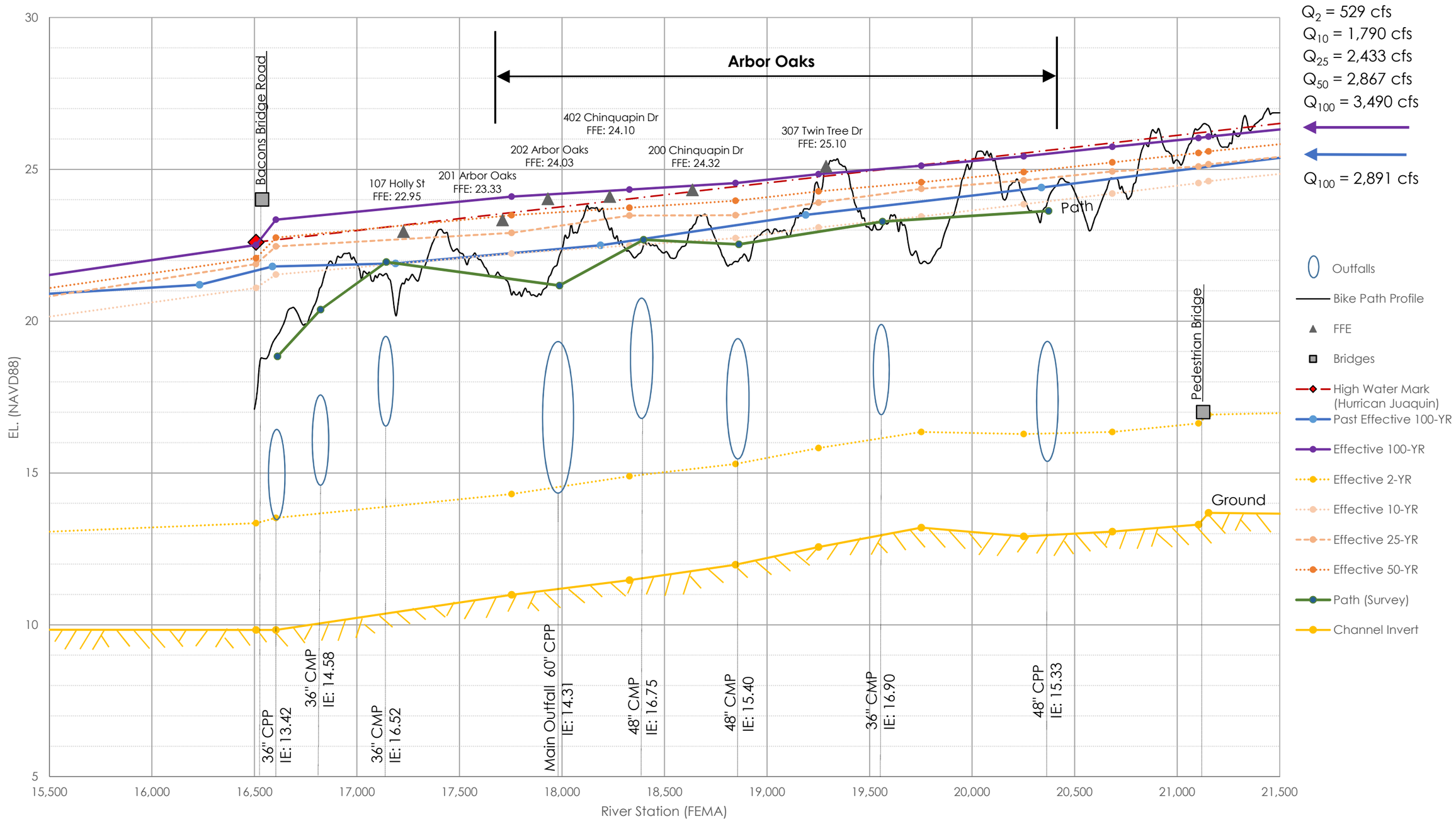
Figure 4. Sawmill Branch Water Surface Profile



THOMAS & HUTTON

DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

APPENDIX A

EXISTING CONDITIONS

CURVE NUMBER CALCULATIONS

J – 26611.0000

August 2017

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Existing Conditions
Curve Number Calculations

Basins	Area (ac)																																		Grand Total
	1 Acre Residential					1/2 Acre Residential			1/3 Acre Residential			1/4 Acre Residential			1/8 Acre Residential	2 Acre Residential			Open Space					Water		Road/ROW				Wetland				Woods	
	A/D	B	B/D	C	C/D	B	B/D	C	A/D	B	C/D	A/D	B/D	C/D	B/D	A/D	B	B/D	A/D	B	B/D	C	C/D	B/D	C/D	B	B/D	C	C/D	A/D	B/D	C	C/D	C/D	
A01												0.97							0.01																0.98
A02												0.26																							0.26
A03									0.11		0.06	0.18		0.34																					0.69
A04														0.60									0.23		0.48										1.32
A05												1.69							0.00																1.69
A06												0.42	0.13								0.01														0.57
A07												1.39	0.56	1.19					0.14		0.19		0.01												3.46
A08												0.99	1.04																						2.04
A09													0.25								0.02														0.27
A10													0.12	0.26	0.08						0.65		0.27	0.14	0.14								0.02		1.68
A11													0.34		0.04						0.32														0.71
A12													0.16		0.12						0.34														0.62
A13													0.14								0.23														0.37
A14													0.06		0.27						0.88			0.64											1.85
A15												0.72	0.92								0.01														1.65
A16													0.71		0.08						0.41			0.15											1.36
A17													0.00		0.06						0.23														0.29
A18													0.06		0.04						0.07														0.17
A19													0.16		0.12						0.49														0.77
A20													0.13		0.22						1.17			1.03							0.00				2.56
A21	0.00											1.89	0.43			0.12		0.00	0.00																2.45
A22												0.37																							0.37
A23												0.18	0.28																						0.47
A24							0.00						1.43																						1.43
A25													1.11																						1.11
A26													0.13								0.00														0.13
A27													0.31								0.04														0.35
A28													0.47		0.18						0.28										0.00				0.93
A29													1.55								0.09														1.63
A30													0.42																		0.00				0.42
A31													0.42								0.42			0.92							0.00				1.76
B01	0.42				0.17				0.22		0.08	0.37							0.06										0.08					0.06	1.46
B02	7.68		2.54		2.41																0.00						1.33		0.29						14.26
B03	4.59		11.70																								1.48								17.77
B04		3.39	8.40																								1.49								13.27
B05		12.67	0.12	0.93		3.92				0.73							0.32									5.85	0.08	0.59							25.21
C01	0.26											0.01				0.28			0.22																0.77
C02	12.60		0.12													0.99																			13.71
C03	8.86		0.89													1.18		0.64																	11.57
C04	1.15	4.37	4.41																																9.93
Off1							5.03	7.42													0.01										7.40	0.17			20.04
Off2	0.14		0.76				26.44	14.26					0.06			0.35		0.45			0.14	0.45													43.07
Off3		0.21	0.11			22.57	7.62	5.35														0.28													36.14
Off4	0.03	8.62	3.51			59.16											1.77			0.13						0.02									73.24
Wet2													0.10		0.17						2.90		0.07	0.03							24.76		0.08		28.10
Wet1a					0.00				1.12		0.61	0.74		0.27							3.97	0.72	0.68						1.49	0.50	3.38		15.68	0.55	29.72
Wet1b																											0.03		1.11		2.81		5.11		9.05
Grand Total	**35.73**	**29.27**	**32.56**	**0.93**	**2.58**	**85.65**	**39.10**	**27.03**	**1.45**	**0.72**	**0.75**	**10.19**	**11.50**	**2.66**	**1.40**	**2.92**	**2.09**	**1.09**	**0.42**	**0.13**	**12.86**	**1.45**	**1.27**	**2.92**	**0.62**	**5.87**	**4.41**	**0.59**	**2.96**	**0.50**	**38.36**	**0.17**	**20.88**	**0.61**	**381.64**

Basins	Area X CN																																		Composite CN
	1 Acre Residential					1/2 Acre Residential			1/3 Acre Residential			1/4 Acre Residential			1/8 Acre Residential	2 Acre Residential			Open Space					Water		Road/ROW				Wetland				Woods	
	A/D	B	B/D	C	C/D	B	B/D	C	A/D		C/D	A/D	B/D	C/D	B/D	A/D	B	B/D	A/D	B	B/D	C	C/D	B/D	C/D	B	B/D	C	C/D	A/D	B/D	C	C/D	C/D	
	51	**68**	**68**	**79**	**79**	**70**	**70**	**80**	**57**		**81**	**61**	**75**	**83**	**85**	**46**	**65**	**65**	**49**	**69**	**69**	**79**	**79**	**100**	**100**	**89**	**89**	**92**	**92**	**89**	**89**	**84**	**89**	**73**	
A01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.20	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61
A02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61
A03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.33	0.00	4.65	11.14	0.00	28.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73
A04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.53	0.00	47.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	88
A05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.82	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61
A06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.87	9.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64
A07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	84.49	41.91	98.40	0.00	0.00	0.00	0.00	6.75	0.00	12.81	0.00	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71
A08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.65	78.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68
A09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75
A10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.78	21.96	6.99	0.00	0.00	0.00	0.00	0.00	44.51	0.00	21.30	14.24	13.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51	0.00	79
A11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.78	0.00	3.79	0.00	0.00	0.00	0.00	0.00	22.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73
A12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.71	0.00	10.51	0.00	0.00	0.00	0.00	0.00	23.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74
A13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71
A14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.24	0.00	23.36	0.00	0.00	0.00	0.00	0.00	60.86	0.00	0.00	64.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	82
A15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.10	69.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69
A16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.59	0.00	7.07	0.00	0.00	0.00	0.00	0.00	28.32	0.00	0.00	14.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	77
A17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	5.39	0.00	0.00	0.00	0.00	0.00	15.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72
A18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.38	0.00	3.61	0.00	0.00	0.00	0.00	0.00	4.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75
A19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.02	0.00	10.26	0.00	0.00	0.00	0.00	0.00	33.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73
A20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.68	0.00	18.97	0.00	0.00	0.00	0.00	0.00	80.98	0.00	0.00	103.21	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	83
A21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115.32	32.55	0.00	0.00	5.45	0.00	0.16	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63
A22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61
A23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.11	21.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70
A24	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	107.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75
A25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75
A26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75
A27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74
A28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.51	0.00	14.91	0.00	0.00	0.00	0.00	0.00	19.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	75
A29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75
A30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	75
A31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	0.00	0.00	91.90	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	87
B01	21.61	0.00	0.00	0.00	13.21	0.00	0.00	0.00	12.67	0.00	6.71	22.28	0.00	0.00	0.00	0.00	0.00	0.00	2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.42	0.00	0.00	0.00	0.00	4.48	62
B02	391.92	0.00	172.96	0.00	190.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	118.68	0.00	26.55	0.00	0.00	0.00	0.00	0.00	63
B03	234.05	0.00	795.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	131.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65
B04	0.00	230.25	571.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	132.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70
B05	0.00	861.86	8.34	73.54	0.00	274.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	520.25	7.44	53.90	0.00	0.00	0.00	0.00	0.00	0.00	72
C01	13.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.00	0.00	0.00	12.83	0.00	0.00	10.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49
C02	642.40	0.00	8.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51
C03	451.78	0.00	60.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.22	0.00	41.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53
C04	58.45	297.45	299.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66
Off1	0.00	0.00	0.00	0.00	0.00	0.00	352.45	593.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	658.80	14.44	0.00	0.00	81
Off2	7.34	0.00	51.95	0.00	0.00	0.00	1851.11	1140.46	0.00	0.00	0.00	0.00	4.84	0.00	0.00	16.20	0.00	29.48	0.00	0.00	9.62	35.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73
Off3	0.00	14.45	7.22	0.00	0.00	1580.12	533.17	428.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72
Off4	1.74	586.06	238.52	0.00	0.00	4141.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	114.79	0.00	0.00	9.01	0.00	0.00	0.00	0.00	0.00	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70
Wet2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.19	0.00	14.22	0.00	0.00	0.00	0.00	0.00	199.88	0.00	5.47	3.45	0.00	0.00	0.00	0.00	0.00	0.00	2203.46	0.00	7.21	0.00	87
Wet1a	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	63.75	0.00	49.31	45.40	0.00	22.45	0.00	0.00	0.00	0.00	0.00	0.00	274.12	57.03	53.81	0.00	0.00	0.00	0.00	0.00	136.87	44.36	300.87	0.00	1395.24	40.25	84
Wet1b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43	0.00	101.73	0.00	250.42	0.00	454.40	0.00	89

THOMAS & HUTTON

DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

APPENDIX B

EXISTING CONDITIONS

TIME OF CONCENTRATION CALCULATIONS

J – 26611.0000

August 2017

thomasandhutton.com

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

DRAINAGE BASIN A01 **DRAINAGE BASIN A01**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 36 ft
P2 = 4.20 in
S = 0.0240 ft/ft
t_1 = 3.5 min

Shallow Concentrated Flow:

t=l/60v
where
l = 106 ft
Paved ? No
Slope, S = 0.0240 ft/ft
v = 2.50 ft/s
t_2 = 0.7 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0050 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.02 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 265 ft
v= 2.00 ft/s
t= 2.2 min

Basin A01: Tc = 6.0 min

DRAINAGE BASIN A02 **DRAINAGE BASIN A02**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 38 ft
P2 = 4.20 in
S = 0.0180 ft/ft
t_1 = 4.1 min

Shallow Concentrated Flow:

t=l/60v
where
l = 106 ft
Paved ? No
Slope, S = 0.0180 ft/ft
v = 2.16 ft/s
t_2 = 0.8 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 14 ft
v= 2.00 ft/s
t= 0.1 min

Basin A02: Tc = 5.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN A03 **DRAINAGE BASIN A03**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 43 ft
P2 = 4.20 in
S = 0.0340 ft/ft
t_1 = 3.5 min

Shallow Concentrated Flow:

t=l/60v
where
l = 60 ft
Paved ? No
Slope, S = 0.0340 ft/ft
v = 2.98 ft/s
t_2 = 0.3 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 97 ft
v= 2.00 ft/s
t= 0.8 min

Basin A03: Tc = 5.0 min

DRAINAGE BASIN A04 **DRAINAGE BASIN A04**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0130 ft/ft
t_1 = 10.2 min

Shallow Concentrated Flow:

t=1/60v
where
l = 55 ft
Paved ? No
Slope, S = 0.0130 ft/ft
v = 1.84 ft/s
t_2 = 0.5 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A04: Tc = 11.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN A05 **DRAINAGE BASIN A05**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0150 ft/ft
t_1 = 9.6 min

Shallow Concentrated Flow:

t=1/60v

where l = 49 ft
Paved ? No
Slope, S = 0.0150 ft/ft
v = 1.98 ft/s
t_2 = 0.4 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 213 ft
v= 2.00 ft/s
t= 1.8 min

Basin A05: Tc = 12.0 min

DRAINAGE BASIN A06 **DRAINAGE BASIN A06**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 72 ft
P2 = 4.20 in
S = 0.0200 ft/ft
t_1 = 6.6 min

Shallow Concentrated Flow:

t=1/60v

where l =
Paved ? No
Slope, S = 0.0200 ft/ft
v = 2.28 ft/s
t_2 = 0.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 250 ft
S = 0.0048 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.49 ft/s
t_3 = 2.8 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A06: Tc = 9.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN A07 **DRAINAGE BASIN A07**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0200 ft/ft
t_1 = 8.6 min

Shallow Concentrated Flow:

t=l/60v

where l = 50 ft
Paved ? No
Slope, S = 0.0200 ft/ft
v = 2.28 ft/s
t_2 = 0.4 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=l/60v

l= 404 ft
v= 2.00 ft/s
t= 3.4 min

Basin A07: Tc = 12.0 min

DRAINAGE BASIN A08 **DRAINAGE BASIN A08**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0200 ft/ft
t_1 = 8.6 min

Shallow Concentrated Flow:

t=l/60v

where l = 48 ft
Paved ? No
Slope, S = 0.0200 ft/ft
v = 2.28 ft/s
t_2 = 0.4 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=l/60v

l= 322 ft
v= 2.00 ft/s
t= 2.7 min

Basin A08: Tc = 12.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN A09 **DRAINAGE BASIN A09**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 82 ft
P2 = 4.20 in
S = 0.0240 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=l/60v

where l =
Paved ? No
Slope, S = 0.0240 ft/ft
v = 2.50 ft/s
t_2 = 0.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=l/60v

l= 81 ft
v= 2.00 ft/s
t= 0.7 min

Basin A09: Tc = 7.0 min

DRAINAGE BASIN A10 **DRAINAGE BASIN A10**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400
l = 100 ft
P2 = 4.20 in
S = 0.0140 ft/ft
t_1 = 21.6 min

Shallow Concentrated Flow:

t=l/60v

where l = 198 ft
Paved ? No
Slope, S = 0.0140 ft/ft
v = 1.91 ft/s
t_2 = 1.7 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=l/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A10: Tc = 23.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A11 **DRAINAGE BASIN A11**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0220 ft/ft
t_1 = 8.2 min

Shallow Concentrated Flow:

t=1/60v

where
l = 69 ft
Paved ? No
Slope, S = 0.0220 ft/ft
v = 2.39 ft/s
t_2 = 0.5 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A11: Tc = 9.0 min

DRAINAGE BASIN A12 **DRAINAGE BASIN A12**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0120 ft/ft
t_1 = 10.5 min

Shallow Concentrated Flow:

t=1/60v

where
l = 55 ft
Paved ? No
Slope, S = 0.0120 ft/ft
v = 1.77 ft/s
t_2 = 0.5 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A12: Tc = 11.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A13 **DRAINAGE BASIN A13**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0200 ft/ft
t_1 = 8.6 min

Shallow Concentrated Flow:

t=1/60v

where
l = 46 ft
Paved ? No
Slope, S = 0.0200 ft/ft
v = 2.28 ft/s
t_2 = 0.3 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A13: Tc = 9.0 min

DRAINAGE BASIN A14 **DRAINAGE BASIN A14**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0290 ft/ft
t_1 = 7.4 min

Shallow Concentrated Flow:

t=1/60v

where
l = 39 ft
Paved ? No
Slope, S = 0.0290 ft/ft
v = 2.75 ft/s
t_2 = 0.2 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A14: Tc = 8.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A15 **DRAINAGE BASIN A15**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 20 ft
P2 = 4.20 in
S = 0.0060 ft/ft
t_1 = 3.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 92 ft
Paved ? No
Slope, S = 0.0060 ft/ft
v = 1.25 ft/s
t_2 = 1.2 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 359 ft
v= 2.00 ft/s
t= 3.0 min

Basin A15: Tc = 8.0 min

DRAINAGE BASIN A16 **DRAINAGE BASIN A16**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 47 ft
P2 = 4.20 in
S = 0.0210 ft/ft
t_1 = 4.6 min

Shallow Concentrated Flow:

t=1/60v

where l = 290 ft
Paved ? No
Slope, S = 0.0210 ft/ft
v = 2.34 ft/s
t_2 = 2.1 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A16: Tc = 7.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A17 **DRAINAGE BASIN A17**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0200 ft/ft
t_1 = 8.6 min

Shallow Concentrated Flow:

t=1/60v

where
l = 157 ft
Paved ? No
Slope, S = 0.0200 ft/ft
v = 2.28 ft/s
t_2 = 1.1 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A17: Tc = 10.0 min

DRAINAGE BASIN A18 **DRAINAGE BASIN A18**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Pvmt. & Grass Combo (50/50) = 0.100
l = 100 ft
P2 = 4.20 in
S = 0.0240 ft/ft
t_1 = 5.7 min

Shallow Concentrated Flow:

t=1/60v

where
l = 19 ft
Paved ? No
Slope, S = 0.0240 ft/ft
v = 2.50 ft/s
t_2 = 0.1 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A18: Tc = 6.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A19 **DRAINAGE BASIN A19**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0430 ft/ft
t_1 = 6.3 min

Shallow Concentrated Flow:

t=1/60v

where
l = 97 ft
Paved ? No
Slope, S = 0.0430 ft/ft
v = 3.35 ft/s
t_2 = 0.5 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A19: Tc = 7.0 min

DRAINAGE BASIN A20 **DRAINAGE BASIN A20**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Pvmt. & Grass Combo (50/50) = 0.100
l = 41 ft
P2 = 4.20 in
S = 0.0210 ft/ft
t_1 = 3.0 min

Shallow Concentrated Flow:

t=1/60v

where
l = 187 ft
Paved ? No
Slope, S = 0.0210 ft/ft
v = 2.34 ft/s
t_2 = 1.3 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A20: Tc = 4.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A21 **DRAINAGE BASIN A21**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0220 ft/ft
t_1 = 8.2 min

Shallow Concentrated Flow:

t=1/60v

where l = 140 ft
Paved ? No
Slope, S = 0.0220 ft/ft
v = 2.39 ft/s
t_2 = 1.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 239 ft
v= 2.00 ft/s
t= 2.0 min

Basin A21: Tc = 11.0 min

DRAINAGE BASIN A22 **DRAINAGE BASIN A22**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 34 ft
P2 = 4.20 in
S = 0.0220 ft/ft
t_1 = 3.5 min

Shallow Concentrated Flow:

t=1/60v

where l = 43 ft
Paved ? No
Slope, S = 0.0220 ft/ft
v = 2.39 ft/s
t_2 = 0.3 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 127 ft
v= 2.00 ft/s
t= 1.1 min

Basin A22: Tc = 5.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A23 **DRAINAGE BASIN A23**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 72 ft
P2 = 4.20 in
S = 0.0260 ft/ft
t_1 = 5.9 min

Shallow Concentrated Flow:

t=1/60v

where l =
Paved ? No
Slope, S = 0.0260 ft/ft
v = 2.60 ft/s
t_2 = 0.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 193 ft
v= 2.00 ft/s
t= 1.6 min

Basin A23: Tc = 8.0 min

DRAINAGE BASIN A24 **DRAINAGE BASIN A24**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 31 ft
P2 = 4.20 in
S = 0.0080 ft/ft
t_1 = 4.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 113 ft
Paved ? No
Slope, S = 0.0080 ft/ft
v = 1.44 ft/s
t_2 = 1.3 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 205 ft
v= 2.00 ft/s
t= 1.7 min

Basin A24: Tc = 8.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
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By: HEH

THOMAS & HUTTON

DRAINAGE BASIN A25 **DRAINAGE BASIN A25**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 47 ft
P2 = 4.20 in
S = 0.0170 ft/ft
t_1 = 5.0 min

Shallow Concentrated Flow:

t=1/60v

where l =
Paved ? No
Slope, S = 0.0170 ft/ft
v = 2.10 ft/s
t_2 = 0.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 354 ft
v= 2.00 ft/s
t= 3.0 min

Basin A25: Tc = 8.0 min

DRAINAGE BASIN A26 **DRAINAGE BASIN A26**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0220 ft/ft
t_1 = 8.2 min

Shallow Concentrated Flow:

t=1/60v

where l = 20 ft
Paved ? No
Slope, S = 0.0220 ft/ft
v = 2.39 ft/s
t_2 = 0.1 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A26: Tc = 8.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A27 **DRAINAGE BASIN A27**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 97 ft
P2 = 4.20 in
S = 0.0100 ft/ft
t_1 = 11.0 min

Shallow Concentrated Flow:

t=1/60v

where l = 127 ft
Paved ? No
Slope, S = 0.0100 ft/ft
v = 1.61 ft/s
t_2 = 1.3 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A27: Tc = 12.0 min

DRAINAGE BASIN A28 **DRAINAGE BASIN A28**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 51 ft
P2 = 4.20 in
S = 0.0200 ft/ft
t_1 = 5.0 min

Shallow Concentrated Flow:

t=1/60v

where l = 253 ft
Paved ? No
Slope, S = 0.0200 ft/ft
v = 2.28 ft/s
t_2 = 1.8 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A28: Tc = 7.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A29 **DRAINAGE BASIN A29**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 41 ft
P2 = 4.20 in
S = 0.0100 ft/ft
t_1 = 5.5 min

Shallow Concentrated Flow:

t=1/60v

where l = 92 ft
Paved ? No
Slope, S = 0.0100 ft/ft
v = 1.61 ft/s
t_2 = 1.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 300 ft
v= 2.00 ft/s
t= 2.5 min

Basin A29: Tc = 9.0 min

DRAINAGE BASIN A30 **DRAINAGE BASIN A30**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0260 ft/ft
t_1 = 7.7 min

Shallow Concentrated Flow:

t=1/60v

where l = 69 ft
Paved ? No
Slope, S = 0.0260 ft/ft
v = 2.60 ft/s
t_2 = 0.4 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A30: Tc = 8.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN A31 **DRAINAGE BASIN A31**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 153 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 0.8 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin A31: Tc = 8.0 min

DRAINAGE BASIN B01 **DRAINAGE BASIN B01**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 0 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 0.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 1041 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 12.7 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin B01: Tc = 19.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN B02 **DRAINAGE BASIN B02**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 436 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 2.4 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 883 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 10.8 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin B02: Tc = 20.0 min

DRAINAGE BASIN B03 **DRAINAGE BASIN B03**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 1170 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 6.4 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 390 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 4.8 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin B03: Tc = 18.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN B04 **DRAINAGE BASIN B04**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where
l = 381 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 2.1 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 946 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 11.6 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin B04: Tc = 20.0 min

DRAINAGE BASIN B05 **DRAINAGE BASIN B05**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where
l = 36 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 0.2 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 1163 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 14.2 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin B05: Tc = 21.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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THOMAS & HUTTON

DRAINAGE BASIN C01 **DRAINAGE BASIN C01**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 0 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 0.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 588 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 7.2 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin C01: Tc = 14.0 min

DRAINAGE BASIN C02 **DRAINAGE BASIN C02**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 305 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 1.7 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 906 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 11.1 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin C02: Tc = 19.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN C03 **DRAINAGE BASIN C03**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 341 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 1.9 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 800 ft
S = 0.0040 ft/ft
n = Hwy. r/w grass to 2-inches = 0.0500
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 1.36 ft/s
t_3 = 9.8 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin C03: Tc = 18.0 min

DRAINAGE BASIN C04 **DRAINAGE BASIN C04**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0360 ft/ft
t_1 = 6.8 min

Shallow Concentrated Flow:

t=1/60v

where l = 0 ft
Paved ? No
Slope, S = 0.0360 ft/ft
v = 3.06 ft/s
t_2 = 0.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 4.00 sf
P = 6.47 ft => Hydraulic Radius, R = 0.62 ft
v = 0.91 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 536 ft
v= 2.00 ft/s
t= 4.5 min

Basin C04: Tc = 11.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN Off1 **DRAINAGE BASIN Off1**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0500 ft/ft
t_1 = 5.9 min

Shallow Concentrated Flow:

t=1/60v

where l = 544 ft
Paved ? No
Slope, S = 0.0500 ft/ft
v = 3.61 ft/s
t_2 = 2.5 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 1178 ft
S = 0.0020 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 9.00 sf
P = 13.25 ft => Hydraulic Radius, R = 0.68 ft
v = 0.68 ft/s
t_3 = 28.7 min

Pipe/Gutter Flow: t=1/60v

l= 760 ft
v= 2.00 ft/s
t= 6.3 min

Basin Off1: Tc = 43.0 min

DRAINAGE BASIN Off2 **DRAINAGE BASIN Off2**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0480 ft/ft
t_1 = 6.0 min

Shallow Concentrated Flow:

t=1/60v

where l = 407 ft
Paved ? No
Slope, S = 0.0480 ft/ft
v = 3.53 ft/s
t_2 = 1.9 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 278 ft
S = 0.0040 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 9.00 sf
P = 13.25 ft => Hydraulic Radius, R = 0.68 ft
v = 0.97 ft/s
t_3 = 4.8 min

Pipe/Gutter Flow: t=1/60v

l= 2215 ft
v= 2.00 ft/s
t= 18.5 min

Basin Off2: Tc = 31.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

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Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN Off3 **DRAINAGE BASIN Off3**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0080 ft/ft
t_1 = 12.3 min

Shallow Concentrated Flow:

t=1/60v

where l = 333 ft
Paved ? No
Slope, S = 0.0080 ft/ft
v = 1.44 ft/s
t_2 = 3.8 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0060 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 9.00 sf
P = 13.25 ft => Hydraulic Radius, R = 0.68 ft
v = 1.19 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 1123 ft
v= 2.00 ft/s
t= 9.4 min

Basin Off3: Tc = 26.0 min

DRAINAGE BASIN Off4 **DRAINAGE BASIN Off4**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Grass: Short = 0.150
l = 100 ft
P2 = 4.20 in
S = 0.0080 ft/ft
t_1 = 12.3 min

Shallow Concentrated Flow:

t=1/60v

where l = 633 ft
Paved ? No
Slope, S = 0.0080 ft/ft
v = 1.44 ft/s
t_2 = 7.3 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l =
S = 0.0060 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 9.00 sf
P = 13.25 ft => Hydraulic Radius, R = 0.68 ft
v = 1.19 ft/s
t_3 = 0.0 min

Pipe/Gutter Flow: t=1/60v

l= 3543 ft
v= 2.00 ft/s
t= 29.5 min

Basin Off4: Tc = 49.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
Revised:
By: HEH

THOMAS & HUTTON

DRAINAGE BASIN Wet1a **DRAINAGE BASIN Wet1a**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400
l = 100 ft
P2 = 4.20 in
S = 0.0250 ft/ft
t_1 = 17.1 min

Shallow Concentrated Flow:

t=1/60v

where l = 1164 ft
Paved ? No
Slope, S = 0.0040 ft/ft
v = 1.02 ft/s
t_2 = 19.0 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 435 ft
S = 0.0080 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 9.00 sf
P = 13.25 ft => Hydraulic Radius, R = 0.68 ft
v = 1.37 ft/s
t_3 = 5.3 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin Wet1a: Tc = 41.0 min

DRAINAGE BASIN Wet1b **DRAINAGE BASIN Wet1b**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400
l = 100 ft
P2 = 4.20 in
S = 0.0250 ft/ft
t_1 = 17.1 min

Shallow Concentrated Flow:

t=1/60v

where l = 516 ft
Paved ? No
Slope, S = 0.0040 ft/ft
v = 1.02 ft/s
t_2 = 8.4 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 0 ft
S = 0.0000 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 0.00 sf
P = 0.00 ft => Hydraulic Radius, R = n/a
v = n/a
t_3 = n/a

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin Wet1b: Tc = 26.0 min

STORMWATER DESIGN CONSIDERATIONS

PROJECT: **Arbor Oaks Drainage Study** **Job:** **26611**

PREPARED BY: Thomas & Hutton
PREPARED FOR: Town of Summerville

Date: 8/1/17
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By: HEH

DRAINAGE BASIN **Wet2** **DRAINAGE BASIN Wet2**

Calculate Existing Conditions "Tc" **"Ex"**

Calculate Time of Concentration:

Use Travel Time Concept:

Overland Sheet Flow:

t = (0.007(nl)^0.8)/((P2^0.5)*(S^0.4))

where: t = Travel time for Overland Flow (min)
n = Manning's coefficient - from TR-55
l = Length of flow (ft)
P2 = 2-yr rainfall depth (in)
S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400
l = 100 ft
P2 = 4.20 in
S = 0.0250 ft/ft
t_1 = 17.1 min

Shallow Concentrated Flow:

t=1/60v

where
l = 834 ft
Paved ? No
Slope, S = 0.0040 ft/ft
v = 1.02 ft/s
t_2 = 13.6 min

Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)
l=Length of flow (ft)
S=Average watercourse slope (ft/ft)
n = Manning's Coefficient for Channel Flow
A=Cross-Sectional Area (ft^2)
P=Wetted Perimeter (ft)
R=Hydraulic Radius (ft)
v=Velocity (ft/s)- From TR-55

l = 370 ft
S = 0.0080 ft/ft
n = Not maintained, clean btm, brush on sides = 0.0750
A = 9.00 sf
P = 13.25 ft => Hydraulic Radius, R = 0.68 ft
v = 1.37 ft/s
t_3 = 4.5 min

Pipe/Gutter Flow: t=1/60v

l=
v= 2.00 ft/s
t= 0.0 min

Basin Wet2: Tc = 35.0 min

THOMAS & HUTTON

DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

APPENDIX C

EXISTING CONDITIONS

ICPR MODEL INPUT

J – 26611.0000

August 2017

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Manual Basin: A01

Scenario: Existing Conditions
Node: A01
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 45.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.9767	A01	A01	~SCSIII-24		

Comment:

Manual Basin: A02

Scenario: Existing Conditions
Node: A02
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 5.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.2592	A02	A02	~SCSIII-24		

Comment:

Manual Basin: A03

Scenario: Existing Conditions
Node: A03
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 5.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.6904	A03	A03	~SCSIII-24		

Comment:

Manual Basin: A04

Scenario: Existing Conditions
Node: A04
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 11.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.3163	A04	A04	~SCSIII-24		

Comment:

Manual Basin: A05

Scenario: Existing Conditions
Node: A05
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 12.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.6877	A05	A05	~SCSIII-24		

Comment:

Manual Basin: A06

Scenario: Existing Conditions
Node: A06
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 9.0000 min
Max Allowable Q: 9999.00 cfs

Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.5660	A06	A06	~SCSIII-24		

Comment:

Manual Basin: A07

Scenario: Existing Conditions
Node: A07
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 12.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
3.4639	A07	A07	~SCSIII-24		

Comment:

Manual Basin: A08

Scenario: Existing Conditions
Node: A08
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 12.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
2.0364	A08	A08	~SCSIII-24		

Comment:

Manual Basin: A09

Scenario: Existing Conditions
Node: A09
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 7.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.2677	A09	A09	~SCSIII-24		

Comment:

Manual Basin: A10

Scenario: Existing Conditions
Node: A10
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 23.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.6771	A10	A10	~SCSIII-24		

Comment:

Manual Basin: A11

Scenario: Existing Conditions
Node: A11
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 9.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.7119	A11	A11	~SCSIII-24		

Comment:

Manual Basin: A12

Scenario: Existing Conditions
Node: A12
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 11.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.6202	A12	A12	~SCSIII-24		

Comment:

Manual Basin: A13

Scenario: Existing Conditions
Node: A13
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 9.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.3749	A13	A13	~SCSIII-24		

Comment:

Manual Basin: A14

Scenario: Existing Conditions
Node: A14
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr

Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.8549	A14	A14	~SCSIII-24		

Comment:

Manual Basin: A15

Scenario: Existing Conditions
Node: A15
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.6533	A15	A15	~SCSIII-24		

Comment:

Manual Basin: A16

Scenario: Existing Conditions
Node: A16
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 7.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.3560	A16	A16	~SCSIII-24		

Comment:

Manual Basin: A17

Scenario: Existing Conditions

Node: A17
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.2936	A17	A17	~SCSIII-24		

Comment:

Manual Basin: A18

Scenario: Existing Conditions
Node: A18
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 6.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.1692	A18	A18	~SCSIII-24		

Comment:

Manual Basin: A19

Scenario: Existing Conditions
Node: A19
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 7.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.7691	A19	A19	~SCSIII-24		

Comment:

Manual Basin: A20

Scenario: Existing Conditions
Node: A20
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 4.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
2.5592	A20	A20	~SCSIII-24		

Comment:

Manual Basin: A21

Scenario: Existing Conditions
Node: A21
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 11.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
2.4487	A21	A21	~SCSIII-24		

Comment:

Manual Basin: A22

Scenario: Existing Conditions
Node: A22
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 5.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.3687	A22	A22	~SCSIII-24		

Comment:

Manual Basin: A23

Scenario: Existing Conditions
Node: A23
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.4657	A23	A23	~SCSIII-24		

Comment:

Manual Basin: A24

Scenario: Existing Conditions
Node: A24
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.4297	A24	A24	~SCSIII-24		

Comment:

Manual Basin: A25

Scenario: Existing Conditions
Node: A25
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs

Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.1098	A25	A25	~SCSIII-24		

Comment:

Manual Basin: A26

Scenario: Existing Conditions
Node: A26
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.1320	A26	A26	~SCSIII-24		

Comment:

Manual Basin: A27

Scenario: Existing Conditions
Node: A27
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.3458	A27	A27	~SCSIII-24		

Comment:

Manual Basin: A28

Scenario: Existing Conditions
Node: A28
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 12.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.9301	A28	A28	~SCSIII-24		

Comment:

Manual Basin: A29

Scenario: Existing Conditions
Node: A29
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 7.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.6348	A29	A29	~SCSIII-24		

Comment:

Manual Basin: A30

Scenario: Existing Conditions
Node: A30
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 9.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.4247	A30	A30	~SCSIII-24		

Comment:

Manual Basin: A31

Scenario: Existing Conditions
Node: A31
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 8.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.7569	A31	A31	~SCSIII-24		

Comment:

Manual Basin: B01

Scenario: Existing Conditions
Node: B01
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 19.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
1.4581	B01	B01	~SCSIII-24		

Comment:

Manual Basin: B02

Scenario: Existing Conditions
Node: B02
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 20.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr

Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
14.2568	B02	B02	~SCSIII-24		

Comment:

Manual Basin: B03

Scenario: Existing Conditions
Node: B03a
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 18.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
17.7700	B03	B03	~SCSIII-24		

Comment:

Manual Basin: B04

Scenario: Existing Conditions
Node: B04a
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 20.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
13.2703	B04	B04	~SCSIII-24		

Comment:

Manual Basin: B05

Scenario: Existing Conditions

Node: B05a
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 21.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
25.2668	B05	B05	~SCSIII-24		

Comment:

Manual Basin: C01

Scenario: Existing Conditions
Node: C01
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 14.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
0.7663	C01	C01	~SCSIII-24		

Comment:

Manual Basin: C02

Scenario: Existing Conditions
Node: C02
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 19.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
13.7059	C02	C02	~SCSIII-24		

Comment:

Manual Basin: C03

Scenario: Existing Conditions
Node: C03a
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 18.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
11.5628	C03	C03	~SCSIII-24		

Comment:

Manual Basin: C04

Scenario: Existing Conditions
Node: C04a
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 11.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
9.9265	C04	C04	~SCSIII-24		

Comment:

Manual Basin: Off1

Scenario: Existing Conditions
Node: Off1
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 43.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
20.0858	Off1	Off1	~SCSIII-24		

Comment:

Manual Basin: Off2

Scenario: Existing Conditions
Node: Off2
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 31.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
43.0743	Off2	Off2	~SCSIII-24		

Comment:

Manual Basin: Off3

Scenario: Existing Conditions
Node: Off3
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 26.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
36.1752	Off3	Off3	~SCSIII-24		

Comment:

Manual Basin: Off4

Scenario: Existing Conditions
Node: Off4
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 49.0000 min
Max Allowable Q: 9999.00 cfs

Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
73.2829	Off4	Off4	~SCSIII-24		

Comment:

Manual Basin: Wet1a

Scenario: Existing Conditions
Node: Wet1a
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 41.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH256
Peaking Factor: 256.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
29.7733	Wet1a	Wet1a	~SCSIII-24		

Comment:

Manual Basin: Wet1b

Scenario: Existing Conditions
Node: Wet1b
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 26.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH256
Peaking Factor: 256.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
9.0738	Wet1b	Wet1b	~SCSIII-24		

Comment:

Manual Basin: Wet2

Scenario: Existing Conditions
Node: Wet2
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 35.0000 min
Max Allowable Q: 9999.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH256
Peaking Factor: 256.0

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
28.1403	Wet2	Wet2	~SCSIII-24		

Comment:

Node: A01

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.88 ft
Warning Stage: 22.13 ft

Comment:

Node: A02

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.63 ft
Warning Stage: 20.73 ft

Comment:

Node: A03

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.63 ft
Warning Stage: 20.95 ft

Comment:

Node: A04

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.63 ft
Warning Stage: 22.00 ft

Stage [ft]	Area [ac]	Area [ft2]
19.00	0.3400	14810
20.00	0.4100	17860
21.00	0.7100	30928
18.00	0.3400	14810

Comment:

Node: A05

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 20.42 ft
Warning Stage: 23.19 ft

Comment:

Node: A06

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 20.36 ft
Warning Stage: 23.50 ft

Comment:

Node: A06a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.43 ft
Warning Stage: 23.13 ft

Comment:

Node: A07

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.63 ft
Warning Stage: 20.67 ft

Stage [ft]	Area [ac]	Area [ft2]
18.63	0.0000	0
20.67	0.0100	436
21.30	0.2000	8712

Comment:

Node: A08

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.89 ft
Warning Stage: 21.50 ft

Comment:

Node: A09

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.89 ft
Warning Stage: 21.34 ft

Comment:

Node: A10

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.89 ft
Warning Stage: 22.00 ft

Stage [ft]	Area [ac]	Area [ft2]
18.00	0.2700	11761
19.00	0.3500	15246
20.00	0.4200	18295
21.00	0.7400	32234
22.00	1.2000	52272

Comment:

Node: A10a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 16.30 ft
Warning Stage: 21.00 ft

Comment:

Node: A10b

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 16.30 ft
Warning Stage: 21.00 ft

Comment:

Node: A11

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.89 ft
Warning Stage: 21.43 ft

Comment:

Node: A12

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.89 ft
Warning Stage: 20.64 ft

Comment:

Node: A13

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.89 ft
Warning Stage: 20.59 ft

Comment:

Node: A14

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.89 ft
Warning Stage: 21.00 ft

Stage [ft]	Area [ac]	Area [ft2]
19.00	0.6200	27007
20.00	0.7200	31363
21.00	0.9900	43124

Comment:

Node: A15

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 19.34 ft
Warning Stage: 22.85 ft

Comment:

Node: A16

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 19.00 ft
Warning Stage: 23.00 ft

Stage [ft]	Area [ac]	Area [ft2]
21.00	0.1600	6970
22.00	0.1800	7841
23.00	0.2900	12632
24.00	0.4700	20473
19.00	0.1600	6970
20.00	0.1600	6970

Comment:

Node: A17

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 20.75 ft
Warning Stage: 22.00 ft

Comment:

Node: A18

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.90 ft
Warning Stage: 21.20 ft

Comment:

Node: A19

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.90 ft
Warning Stage: 20.10 ft

Comment:

Node: A20

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.90 ft
Warning Stage: 21.00 ft

Stage [ft]	Area [ac]	Area [ft2]
19.00	0.8300	36155
20.00	0.9100	39640
21.00	1.1000	47916

Comment:

Node: A21

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.75 ft
Warning Stage: 25.07 ft

Comment:

Node: A22

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.08 ft
Warning Stage: 25.01 ft

Comment:

Node: A23

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 20.43 ft
Warning Stage: 24.94 ft

Comment:

Node: A24

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 22.11 ft
Warning Stage: 26.19 ft

Comment:

Node: A25

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.00 ft
Warning Stage: 24.48 ft

Comment:

Node: A26

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.00 ft
Warning Stage: 25.50 ft

Comment:

Node: A27

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.00 ft
Warning Stage: 25.50 ft

Comment:

Node: A28

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.00 ft
Warning Stage: 23.03 ft

Comment:

Node: A29

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 22.10 ft
Warning Stage: 26.47 ft

Comment:

Node: A30

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.00 ft
Warning Stage: 21.31 ft

Comment:

Node: A31

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.00 ft
Warning Stage: 25.00 ft

Stage [ft]	Area [ac]	Area [ft2]
22.00	0.7700	33541
23.00	0.8800	38333
24.00	1.0800	47045
25.00	1.1700	50965
21.00	0.7700	33541

Comment:

Node: B00

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 17.48 ft
Warning Stage: 23.00 ft

Comment:

Node: B01

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.50 ft
Warning Stage: 22.00 ft

Comment:

Node: B02

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.85 ft
Warning Stage: 23.26 ft

Stage [ft]	Area [ac]	Area [ft2]
20.00	0.0500	2178
21.00	0.3800	16553
22.00	2.1900	95396
23.00	4.9300	214751
18.85	0.0500	2178

Comment:

Node: B03a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 22.74 ft
Warning Stage: 25.67 ft

Stage [ft]	Area [ac]	Area [ft2]
23.30	0.0200	871
24.00	0.1500	6534
25.00	0.6500	28314

Comment:

Node: B03b

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 22.07 ft
Warning Stage: 24.00 ft

Comment:

Node: B04a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 26.16 ft
Warning Stage: 30.65 ft

Stage [ft]	Area [ac]	Area [ft2]
29.00	0.0400	1742
30.00	0.2600	11326
26.40	0.0400	1742

Comment:

Node: B04b

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 25.11 ft
Warning Stage: 29.00 ft

Comment:

Node: B05a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 36.02 ft
Warning Stage: 40.75 ft

Stage [ft]	Area [ac]	Area [ft2]
40.00	0.0500	2178
41.00	0.2000	8712
39.95	0.0500	2178

Comment:

Node: B05b

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 35.82 ft
Warning Stage: 37.00 ft

Comment:

Node: C01

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 20.99 ft
Warning Stage: 25.57 ft

Stage [ft]	Area [ac]	Area [ft2]
24.00	0.0200	871
25.00	0.1100	4792
26.00	0.2500	10890
20.99	0.0200	871
25.57	0.0200	871

Comment:

Node: C01a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.74 ft
Warning Stage: 24.39 ft

Comment:

Node: C02

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 21.00 ft
Warning Stage: 26.00 ft

Stage [ft]	Area [ac]	Area [ft2]
23.00	0.0300	1307
24.00	0.2900	12632
25.00	1.7300	75359
26.00	3.1300	136343
21.00	0.0300	1307

Comment:

Node: C03a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 24.64 ft
Warning Stage: 28.72 ft

Stage [ft]	Area [ac]	Area [ft2]
27.00	0.0100	436
28.00	0.2400	10454
29.00	1.1100	48352
24.64	0.0100	436

Comment:

Node: C03b

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 23.89 ft
Warning Stage: 27.76 ft

Comment:

Node: C04a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 29.75 ft
Warning Stage: 32.80 ft

Stage [ft]	Area [ac]	Area [ft2]
31.00	0.0200	871
32.00	0.1300	5663
33.00	0.5200	22651
29.75	0.0200	871

Comment:

Node: C04b

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 29.05 ft
Warning Stage: 32.80 ft

Comment:

Node: Canal-High

Scenario: Existing Conditions
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 12.84 ft
Warning Stage: 23.50 ft
Boundary Stage: High

Comment:

Node: Canal-Low

Scenario: Existing Conditions
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 9.44 ft
Warning Stage: 20.00 ft
Boundary Stage: Low

Comment:

Node: Canal-Mid

Scenario: Existing Conditions
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 11.10 ft
Warning Stage: 21.00 ft
Boundary Stage: Mid

Comment:

Node: Off1

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 15.90 ft
Warning Stage: 23.93 ft

Stage [ft]	Area [ac]	Area [ft2]
20.00	0.2700	11761
21.00	0.5400	23522
22.00	1.1400	49658
23.00	5.7500	250470
23.93	8.2600	359806
15.90	0.0500	2178

Comment:

Node: Off2

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 19.20 ft
Warning Stage: 23.00 ft

Stage [ft]	Area [ac]	Area [ft2]
20.00	0.0300	1307
21.00	0.0900	3920
22.00	0.1600	6970
23.00	0.2600	11326
19.20	0.0300	1307

Comment:

Node: Off3

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 32.10 ft
Warning Stage: 36.00 ft

Stage [ft]	Area [ac]	Area [ft2]
34.00	0.0300	1307
35.00	0.1300	5663
36.00	0.4000	17424
32.10	0.0300	1307

Comment:

Node: Off4

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 32.39 ft
Warning Stage: 36.00 ft

Stage [ft]	Area [ac]	Area [ft2]
32.00	0.0100	436
33.00	0.0300	1307
34.00	0.0800	3485
35.00	0.4600	20038
36.00	0.8700	37897

Comment:

Node: Wet1a

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 18.50 ft
Warning Stage: 22.00 ft

Stage [ft]	Area [ac]	Area [ft2]
20.00	13.4400	585446
21.00	19.9000	866844
22.00	22.0000	958320
18.50	1.9000	82764
19.00	3.8000	165528

Comment:

Node: Wet1b

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 15.05 ft
Warning Stage: 22.00 ft

Stage [ft]	Area [ac]	Area [ft2]
15.33	0.0000	0
16.00	0.0000	0
17.00	0.0300	1307
18.00	0.1100	4792
19.00	0.7400	32234
20.00	6.1100	266152
21.00	7.3800	321473
22.00	7.7900	339332

Comment:

Node: Wet2

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 16.90 ft
Warning Stage: 23.00 ft

Stage [ft]	Area [ac]	Area [ft2]
20.00	2.2700	98881
21.00	9.6700	421225
22.00	20.8900	909968
23.00	26.7100	1163488
19.00	2.0000	87120
18.00	1.5000	65340
17.00	0.7500	32670
16.00	0.5000	21780

Comment:

Node: Wet2d

Scenario: Existing Conditions

Type:	Stage/Area
Base Flow:	0.00 cfs
Initial Stage:	14.62 ft
Warning Stage:	20.80 ft

Comment:

Node: Wet2e

Scenario:	Existing Conditions
Type:	Stage/Area
Base Flow:	0.00 cfs
Initial Stage:	14.62 ft
Warning Stage:	20.90 ft

Comment:

Pipe Link: A01-A02		Upstream		Downstream	
Scenario:	Existing	Invert:	18.88 ft	Invert:	17.93 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A01	Geometry: Circular		Geometry: Circular	
To Node:	A02	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	337.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Channel Link: A01-A03-1		Upstream		Downstream	
Scenario:	Existing	Invert:	22.13 ft	Invert:	20.95 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A01	Geometry: Parabolic		Geometry: Parabolic	
To Node:	A03	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Max Width:	24.00 ft	Max Width:	24.00 ft
Flow Direction:	Both	Extrapolation:	Normal	Extrapolation:	Normal

Dampening:	0.0000 ft				
Length:	453.00 ft				
Contraction Coef:	0.30	Bottom Clip			
		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: A02-A03		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	17.93 ft	Invert:	16.60 ft
		Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A02	Geometry: Circular		Geometry: Circular	
To Node:	A03	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	95.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Weir Link: A02-A03-Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A02	Default:	0.00 ft
To Node:	A03	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	20.95 ft	Discharge Coefficients	
Control Elevation:	20.95 ft	Weir Default:	2.800
Cross Section:	Teakwood	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Pipe Link: A03-A04		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	16.60 ft	Invert:	15.51 ft
		Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A03	Geometry: Circular		Geometry: Circular	
To Node:	A04	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	133.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Weir Link: A03-A04-Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A03	Default:	0.00 ft
To Node:	A04	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	22.00 ft	Discharge Coefficients	
Control Elevation:	22.00 ft	Weir Default:	2.800
Max Depth:	999.00 ft	Weir Table:	
Max Width:	100.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	

Comment:

Pipe Link: A04-A10a		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	18.63 ft	Invert:	17.51 ft
		Manning's N:	0.0270	Manning's N:	0.0270
From Node:	A04	Geometry: Circular		Geometry: Circular	
To Node:	A10a	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft

Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	177.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	0.50	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Weir Link: A04-Wet1a-1			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A04	Default:	0.00 ft
To Node:	Wet1a	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	19.56 ft	Discharge Coefficients	
Control Elevation:	19.56 ft	Weir Default:	2.600
Cross Section:	A04_Weir	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Pipe Link: A05-A06		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	20.42 ft	Invert:	20.36 ft
		Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A05	Geometry: Circular		Geometry: Circular	
To Node:	A06	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	149.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A06-A06a		Upstream		Downstream	
Scenario:	Existing	Invert:	20.36 ft	Invert:	19.58 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A06	Geometry: Circular		Geometry: Circular	
To Node:	A06a	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	94.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Pipe Link: A06a-A10a		Upstream		Downstream	
Scenario:	Existing	Invert:	18.43 ft	Invert:	17.73 ft
	Conditions	Manning's N:	0.0270	Manning's N:	0.0270
From Node:	A06a	Geometry: Circular		Geometry: Circular	
To Node:	A10a	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	2	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	403.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	0.50	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Survey					

Channel Link: A07-A03-1		Upstream		Downstream	
Scenario:	Existing	Invert:	21.30 ft	Invert:	21.30 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A07	Geometry: Parabolic		Geometry: Parabolic	
To Node:	A03	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Max Width:	24.00 ft	Max Width:	24.00 ft
Flow Direction:	Both	Extrapolation:	Normal	Extrapolation:	Normal
Dampening:	0.0000 ft				
Length:	380.00 ft				
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft

Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: A07-A04		Upstream		Downstream	
Scenario:	Existing	Invert:	17.50 ft	Invert:	16.70 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A07	Geometry: Circular		Geometry: Circular	
To Node:	A04	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	169.30 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built 1

Pipe Link: A08-A09		Upstream		Downstream	
Scenario:	Existing	Invert:	17.24 ft	Invert:	16.92 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A08	Geometry: Circular		Geometry: Circular	
To Node:	A09	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	120.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A09-A10		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	16.92 ft	Invert:	15.88 ft
		Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A09	Geometry: Circular		Geometry: Circular	
To Node:	A10	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	154.00 ft	Ref Node:		Ref Node:	
FHWA Code:	2	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Weir Link: A10-A10b			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A10	Default:	0.00 ft
To Node:	A10b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	18.89 ft	Discharge Coefficients	
Control Elevation:	18.89 ft	Weir Default:	3.200
Max Depth:	1.00 ft	Weir Table:	
Max Width:	0.30 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment:

Weir Link: A10-A10b-2			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A10	Default:	0.00 ft
To Node:	A10b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	19.17 ft	Discharge Coefficients	
Control Elevation:	19.17 ft	Weir Default:	3.200
Max Depth:	10.00 ft	Weir Table:	

Extrapolation Method:	Normal Projection		
Bottom Width:	15.00 ft	Orifice Default:	0.600
Left Slope:	0.000 (h:v)	Orifice Table:	
Right Slope:	0.000 (h:v)		

Comment:

Weir Link: A10-A10b-3			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A10	Default:	0.00 ft
To Node:	A10b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	22.00 ft	Discharge Coefficients	
Control Elevation:	22.00 ft	Weir Default:	2.600
Max Depth:	999.00 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	76.00 ft	Orifice Table:	
Left Slope:	0.250 (h:v)		
Right Slope:	0.250 (h:v)		

Comment:

Channel Link: A10a-A10b		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	16.30 ft	Invert:	16.40 ft
		Manning's N:	0.0350	Manning's N:	0.0350
From Node:	A10a	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	A10b	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	5.00 ft	Bottom Width:	5.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)
Length:	50.00 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction Coef:	0.10	Bottom Clip			
		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Channel Link: A10b-Wet2d		Upstream		Downstream	
Scenario:	Existing	Invert:	16.30 ft	Invert:	14.62 ft
	Conditions	Manning's N:	0.0350	Manning's N:	0.0350
From Node:	A10b	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	Wet2d	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	8.00 ft	Bottom Width:	10.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)
Length:	565.00 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment: Estimate					

Pipe Link: A11-A13		Upstream		Downstream	
Scenario:	Existing	Invert:	18.36 ft	Invert:	17.14 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A11	Geometry: Circular		Geometry: Circular	
To Node:	A13	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	110.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Pipe Link: A12-A13		Upstream		Downstream	
Scenario:	Existing	Invert:	17.78 ft	Invert:	17.14 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A12	Geometry: Circular		Geometry: Circular	
To Node:	A13	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft

Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	170.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A13-A14		Upstream		Downstream	
Scenario:	Existing	Invert:	17.14 ft	Invert:	16.78 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A13	Geometry: Circular		Geometry: Circular	
To Node:	A14	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	142.00 ft	Ref Node:		Ref Node:	
FHWA Code:	3	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A14-A10		Upstream		Downstream	
Scenario:	Existing	Invert:	17.00 ft	Invert:	16.48 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A14	Geometry: Circular		Geometry: Circular	
To Node:	A10	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	128.00 ft	Ref Node:		Ref Node:	
FHWA Code:	3	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Weir Link: A14-Wet2-Over_Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A14	Default:	0.00 ft
To Node:	Wet2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	20.00 ft	Discharge Coefficients	
Control Elevation:	20.00 ft	Weir Default:	2.800
Max Depth:	10.00 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	30.00 ft	Orifice Table:	
Left Slope:	50.000 (h:v)		
Right Slope:	20.000 (h:v)		
Comment:			

Pipe Link: A15-A16		Upstream		Downstream	
Scenario:	Existing	Invert:	18.43 ft	Invert:	18.34 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A15	Geometry: Circular		Geometry: Circular	
To Node:	A16	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	22.00 ft	Ref Node:		Ref Node:	
FHWA Code:	3	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Drop Structure Link: A16-A18		Upstream Pipe		Downstream Pipe	
Scenario:	Existing	Invert:	18.74 ft	Invert:	18.74 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A16	Geometry: Circular		Geometry: Circular	
To Node:	A18	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Solution:	Split	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Dampening:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000

Length:	80.00 ft	Top Clip			
FHWA Code:	1	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.00	Op Table:		Op Table:	
Exit Loss Coef:	0.50	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 ft				
Energy Switch:	Energy				

Pipe Comment:

Weir Component			
Weir:	1	Bottom Clip	
Weir Count:	1	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:	
Weir Type:	Sharp Crested Vertical	Ref Node:	
Geometry Type:	Circular	Top Clip	
Invert:	19.00 ft	Default:	0.00 ft
Control Elevation:	19.00 ft	Op Table:	
Max Depth:	0.50 ft	Ref Node:	
		Discharge Coefficients	
		Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Weir Component			
Weir:	2	Bottom Clip	
Weir Count:	1	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:	
Weir Type:	Sharp Crested Vertical	Ref Node:	
Geometry Type:	Rectangular	Top Clip	
Invert:	20.00 ft	Default:	0.00 ft
Control Elevation:	20.00 ft	Op Table:	
Max Depth:	0.75 ft	Ref Node:	
Max Width:	9.00 ft	Discharge Coefficients	
Fillet:	0.00 ft	Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Drop Structure Comment:

Pipe Link: A17-A18		Upstream		Downstream	
Scenario:	Existing	Invert:	20.75 ft	Invert:	18.74 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A17	Geometry: Circular		Geometry: Circular	
To Node:	A18	Max Depth:	1.50 ft	Max Depth:	1.50 ft

Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	83.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As BUilt

Weir Link: A17-A20-Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A17	Default:	0.00 ft
To Node:	A20	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	22.50 ft	Discharge Coefficients	
Control Elevation:	22.50 ft	Weir Default:	2.800
Max Depth:	999.00 ft	Weir Table:	
Max Width:	68.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	

Comment:

Pipe Link: A18-A20		Upstream		Downstream	
Scenario:	Existing	Invert:	18.74 ft	Invert:	18.01 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A18	Geometry: Circular		Geometry: Circular	
To Node:	A20	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	183.00 ft	Ref Node:		Ref Node:	
FHWA Code:	3	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Weir Link: A18-A20-Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A18	Default:	0.00 ft
To Node:	A20	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	22.50 ft	Discharge Coefficients	
Control Elevation:	22.50 ft	Weir Default:	2.800
Max Depth:	999.00 ft	Weir Table:	
Max Width:	100.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	
Comment:			

Pipe Link: A19-A20		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	17.48 ft	Invert:	17.34 ft
		Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A19	Geometry: Circular		Geometry: Circular	
To Node:	A20	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	139.00 ft	Ref Node:		Ref Node:	
FHWA Code:	3	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Weir Link: A19-A20-Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A19	Default:	0.00 ft
To Node:	A20	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	22.50 ft	Discharge Coefficients	
Control Elevation:	22.50 ft	Weir Default:	2.800
Max Depth:	999.00 ft	Weir Table:	

Max Width:	160.00 ft		
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: A20-Wet2-1

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	A20	Default:	0.00 ft
To Node:	Wet2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	18.90 ft	**Discharge Coefficients**	
Control Elevation:	18.90 ft	Weir Default:	2.800
Max Depth:	0.76 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	0.50 ft	Orifice Table:	
Left Slope:	0.000 (h:v)		
Right Slope:	0.000 (h:v)		

Comment:

Weir Link: A20-Wet2-2

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	A20	Default:	0.00 ft
To Node:	Wet2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	19.70 ft	**Discharge Coefficients**	
Control Elevation:	19.70 ft	Weir Default:	2.800
Max Depth:	10.00 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	11.00 ft	Orifice Table:	
Left Slope:	0.000 (h:v)		
Right Slope:	0.000 (h:v)		

Comment:

Weir Link: A20-Wet2-3

Scenario:	Existing Conditions		
From Node:	A20	**Bottom Clip**	
To Node:	Wet2	Default:	0.00 ft
Link Count:	1	Op Table:	
Flow Direction:	Both	Ref Node:	
Dampening:	0.0000 ft	**Top Clip**	
Weir Type:	Broad Crested Vertical	Default:	0.00 ft
Geometry Type:	Trapezoidal	Op Table:	
Invert:	20.00 ft	Ref Node:	
Control Elevation:	20.00 ft	**Discharge Coefficients**	
Max Depth:	10.00 ft	Weir Default:	2.800
Extrapolation Method:	Normal Projection	Weir Table:	
Bottom Width:	20.00 ft	Orifice Default:	0.600
Left Slope:	20.000 (h:v)	Orifice Table:	
Right Slope:	20.000 (h:v)		

Comment:

Channel Link: A21-A05		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	26.07 ft	Invert:	24.19 ft
		Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A21	**Geometry: Parabolic**		**Geometry: Parabolic**	
To Node:	A05	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Max Width:	24.00 ft	Max Width:	24.00 ft
Flow Direction:	Both	Extrapolation:	Normal	Extrapolation:	Normal
Dampening:	0.0000 ft				
Length:	336.00 ft				
Contraction Coef:	0.10	**Bottom Clip**			
		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	**Top Clip**			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: A21-A22		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	21.75 ft	Invert:	21.08 ft
		Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A21	**Geometry: Circular**		**Geometry: Circular**	
To Node:	A22	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	**Bottom Clip**			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft

Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	258.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A22-A23		Upstream		Downstream	
Scenario:	Existing	Invert:	21.08 ft	Invert:	20.43 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A22	Geometry: Circular		Geometry: Circular	
To Node:	A23	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	107.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A23-A25		Upstream		Downstream	
Scenario:	Existing	Invert:	20.43 ft	Invert:	20.28 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A23	Geometry: Circular		Geometry: Circular	
To Node:	A25	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	103.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A24-A25		Upstream		Downstream	
Scenario:	Existing	Invert:	22.11 ft	Invert:	20.28 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A24	Geometry: Circular		Geometry: Circular	
To Node:	A25	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	155.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Channel Link: A25-A08		Upstream		Downstream	
Scenario:	Existing	Invert:	24.00 ft	Invert:	21.50 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A25	Geometry: Parabolic		Geometry: Parabolic	
To Node:	A08	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Max Width:	24.00 ft	Max Width:	24.00 ft
Flow Direction:	Both	Extrapolation:	Normal	Extrapolation:	Normal
Dampening:	0.0000 ft				
Length:	735.00 ft				
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: A25-A26		Upstream		Downstream	
Scenario:	Existing	Invert:	20.28 ft	Invert:	19.76 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A25	Geometry: Circular		Geometry: Circular	
To Node:	A26	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft

Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	139.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Pipe Link: A26-A27		Upstream		Downstream	
Scenario:	Existing	Invert:	19.76 ft	Invert:	19.31 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A26	Geometry: Circular		Geometry: Circular	
To Node:	A27	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	148.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Pipe Link: A27-A28		Upstream		Downstream	
Scenario:	Existing	Invert:	19.31 ft	Invert:	18.88 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A27	Geometry: Circular		Geometry: Circular	
To Node:	A28	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	248.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Pipe Link: A28-A30		Upstream		Downstream	
Scenario:	Existing	Invert:	18.88 ft	Invert:	17.69 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A28	Geometry: Circular		Geometry: Circular	
To Node:	A30	Max Depth:	2.50 ft	Max Depth:	2.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	233.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: As Built					

Weir Link: A28-Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A28	Default:	0.00 ft
To Node:	A20	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	23.03 ft	Discharge Coefficients	
Control Elevation:	23.03 ft	Weir Default:	2.800
Max Depth:	999.00 ft	Weir Table:	
Max Width:	100.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	
Comment:			

Pipe Link: A29-A30		Upstream		Downstream	
Scenario:	Existing	Invert:	22.10 ft	Invert:	17.69 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A29	Geometry: Circular		Geometry: Circular	
To Node:	A30	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	153.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft

Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: A30-A31		Upstream		Downstream	
Scenario:	Existing	Invert:	17.69 ft	Invert:	17.52 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A30	Geometry: Circular		Geometry: Circular	
To Node:	A31	Max Depth:	2.50 ft	Max Depth:	2.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	72.00 ft	Ref Node:		Ref Node:	
FHWA Code:	3	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Weir Link: A30-Weir			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A30	Default:	0.00 ft
To Node:	A20	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	21.31 ft	Discharge Coefficients	
Control Elevation:	21.31 ft	Weir Default:	2.800
Max Depth:	999.00 ft	Weir Table:	
Max Width:	100.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	

Comment:

Weir Link: A31-Off2-2			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	A31	Default:	0.00 ft
To Node:	Off2	Op Table:	

Link Count:	1		
Flow Direction:	Both	Ref Node:	
Dampening:	0.0000 ft	**Top Clip**	
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Trapezoidal	Op Table:	
Invert:	22.50 ft	Ref Node:	
Control Elevation:	22.50 ft	**Discharge Coefficients**	
Max Depth:	10.00 ft	Weir Default:	2.800
Extrapolation Method:	Normal Projection	Weir Table:	
Bottom Width:	8.00 ft	Orifice Default:	0.600
Left Slope:	0.000 (h:v)	Orifice Table:	
Right Slope:	0.000 (h:v)		

Comment:

Weir Link: A31-Off2-3

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	A31	Default:	0.00 ft
To Node:	Off2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	21.62 ft	**Discharge Coefficients**	
Control Elevation:	21.62 ft	Weir Default:	2.600
Cross Section:	A31_Weir	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: A31-off2-1

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	A31	Default:	0.00 ft
To Node:	Off2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	21.50 ft	**Discharge Coefficients**	
Control Elevation:	21.50 ft	Weir Default:	3.200
Max Depth:	0.50 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	0.50 ft	Orifice Table:	
Left Slope:	0.000 (h:v)		

Right Slope: 0.000 (h:v)

Comment:

Channel Link: B00-Wet1b		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	17.48 ft	Invert:	15.05 ft
		Manning's N:	0.0350	Manning's N:	0.0350
From Node:	B00	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	Wet1b	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	5.00 ft	Bottom Width:	5.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.600 (h:v)
Length:	921.12 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.600 (h:v)
Contraction Coef:	0.10	Bottom Clip			
		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Channel Link: B01-B00		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	18.43 ft	Invert:	17.48 ft
		Manning's N:	0.0350	Manning's N:	0.0350
From Node:	B01	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	B00	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	5.00 ft	Bottom Width:	5.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.600 (h:v)
Length:	361.09 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.600 (h:v)
Contraction Coef:	0.10	Bottom Clip			
		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Pipe Link: B02-B01		Upstream		Downstream	
Scenario:	Existing	Invert:	18.67 ft	Invert:	18.43 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	B02	Geometry: Circular		Geometry: Circular	
To Node:	B01	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	81.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Estimate					

Pipe Link: B03a-B03b		Upstream		Downstream	
Scenario:	Existing	Invert:	22.74 ft	Invert:	22.07 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	B03a	Geometry: Circular		Geometry: Circular	
To Node:	B03b	Max Depth:	2.50 ft	Max Depth:	2.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	72.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Estimate					

Channel Link: B03b-B02		Upstream		Downstream	
Scenario:	Existing	Invert:	22.07 ft	Invert:	18.67 ft
	Conditions	Manning's N:	0.0350	Manning's N:	0.0350
From Node:	B03b	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	B02	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	3.00 ft	Bottom Width:	4.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)
Length:	549.00 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft

Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Pipe Link: B04a-B04b		Upstream		Downstream	
Scenario:	Existing	Invert:	26.16 ft	Invert:	25.11 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	B04a	Geometry: Circular		Geometry: Circular	
To Node:	B04b	Max Depth:	2.50 ft	Max Depth:	2.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	56.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Channel Link: B04b-B03a		Upstream		Downstream	
Scenario:	Existing	Invert:	25.11 ft	Invert:	22.74 ft
	Conditions	Manning's N:	0.0350	Manning's N:	0.0350
From Node:	B04b	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	B03a	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	3.00 ft	Bottom Width:	3.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)
Length:	575.00 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	

	Manning's N:	0.0000	Manning's N: 0.0000

Comment: Estimate

Pipe Link: B05a-B05b		Upstream		Downstream	
Scenario:	Existing	Invert:	39.59 ft	Invert:	35.82 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	B05a	Geometry: Circular		Geometry: Circular	
To Node:	B05b	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	114.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Pipe Link: B05a-B05b-2		Upstream		Downstream	
Scenario:	Existing	Invert:	36.02 ft	Invert:	35.83 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	B05a	Geometry: Circular		Geometry: Circular	
To Node:	B05b	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	67.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Channel Link: B05b-B04a		Upstream		Downstream	
Scenario:	Existing	Invert:	35.82 ft	Invert:	26.16 ft
	Conditions	Manning's N:	0.0350	Manning's N:	0.0350
From Node:	B05b	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	B04a	Max Depth:	10.00 ft	Max Depth:	10.00 ft

Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	3.00 ft	Bottom Width:	3.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)
Length:	578.00 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Channel Link: C-A08-A09		Upstream		Downstream	
Scenario:	Existing	Invert:	21.50 ft	Invert:	18.10 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	A08	Geometry: Parabolic		Geometry: Parabolic	
To Node:	A09	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Max Width:	24.00 ft	Max Width:	24.00 ft
Flow Direction:	Both	Extrapolation:	Normal	Extrapolation:	Normal
Dampening:	0.0000 ft				
Length:	121.00 ft				
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	1.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Channel Link: C-A09-A10		Upstream		Downstream	
Scenario:	Existing	Invert:	18.10 ft	Invert:	18.00 ft
	Conditions	Manning's N:	0.0350	Manning's N:	0.0350
From Node:	A09	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	A10	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	10.00 ft	Bottom Width:	10.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)

Length:	158.00 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	1.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: C01-C01a		Upstream		Downstream	
Scenario:	Existing	Invert:	20.99 ft	Invert:	18.48 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	C01	Geometry: Circular		Geometry: Circular	
To Node:	C01a	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	84.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: C01a-A06a		Upstream		Downstream	
Scenario:	Existing	Invert:	18.74 ft	Invert:	18.48 ft
	Conditions	Manning's N:	0.0270	Manning's N:	0.0270
From Node:	C01a	Geometry: Circular		Geometry: Circular	
To Node:	A06a	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	210.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.50	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Pipe Link: C01a-A10a		Upstream		Downstream	
Scenario:	Existing	Invert:	18.85 ft	Invert:	16.25 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	C01a	Geometry: Circular		Geometry: Circular	
To Node:	A10a	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	314.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: As Built

Pipe Link: C02-C01		Upstream		Downstream	
Scenario:	Existing	Invert:	21.00 ft	Invert:	20.75 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	C02	Geometry: Circular		Geometry: Circular	
To Node:	C01	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	44.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: C03a-C03b		Upstream		Downstream	
Scenario:	Existing	Invert:	24.63 ft	Invert:	23.88 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	C03a	Geometry: Circular		Geometry: Circular	
To Node:	C03b	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			

Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	48.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Survey					

Pipe Link: C03b-C02		Upstream		Downstream	
Scenario:	Existing	Invert:	23.88 ft	Invert:	21.00 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	C03b	Geometry: Circular		Geometry: Circular	
To Node:	C02	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	591.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Estimate					

Pipe Link: C04a-C04b		Upstream		Downstream	
Scenario:	Existing	Invert:	29.75 ft	Invert:	29.58 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	C04a	Geometry: Circular		Geometry: Circular	
To Node:	C04b	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	42.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Survey					

Pipe Link: C04b-C03a		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	29.05 ft	Invert:	27.56 ft
		Manning's N:	0.0270	Manning's N:	0.0270
From Node:	C04b	Geometry: Circular		Geometry: Circular	
To Node:	C03a	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	173.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Weir Link: CanalHigh-Wet2			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	Canal-High	Default:	0.00 ft
To Node:	Wet2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	21.81 ft	Discharge Coefficients	
Control Elevation:	21.81 ft	Weir Default:	2.800
Cross Section:	Canal-High	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: CanalLow-Wet1b			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	Canal-Low	Default:	0.00 ft
To Node:	Wet1b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	18.84 ft	Discharge Coefficients	
Control Elevation:	18.84 ft	Weir Default:	2.800
Cross Section:	Canal-Low	Weir Table:	

Orifice Default:	0.600
Orifice Table:	

Comment:

Weir Link: CanalMid-Wet1a

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	Canal-Mid	Default:	0.00 ft
To Node:	Wet1a	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	20.92 ft	**Discharge Coefficients**	
Control Elevation:	20.92 ft	Weir Default:	2.800
Cross Section:	Canal-Mid1	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: CanalMid-Wet2

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	Canal-Mid	Default:	0.00 ft
To Node:	Wet2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	20.86 ft	**Discharge Coefficients**	
Control Elevation:	20.86 ft	Weir Default:	2.800
Cross Section:	Canal-Mid	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Channel Link: L-0830C

		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	16.90 ft	Invert:	15.50 ft
		Manning's N:	0.0350	Manning's N:	0.0350
From Node:	Wet2	**Geometry: Trapezoidal**		**Geometry: Trapezoidal**	
To Node:	Wet2d	Max Depth:	5.00 ft	Max Depth:	5.00 ft

Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	5.00 ft	Bottom Width:	5.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)
Length:	1061.79 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction	0.30	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.50	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: Off1-CanalHigh		Upstream		Downstream	
Scenario:	Existing	Invert:	15.37 ft	Invert:	15.33 ft
	Conditions	Manning's N:	0.0240	Manning's N:	0.0240
From Node:	Off1	Geometry: Circular		Geometry: Circular	
To Node:	Canal-High	Max Depth:	4.00 ft	Max Depth:	4.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	80.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Channel Link: Off2-Off1		Upstream		Downstream	
Scenario:	Existing	Invert:	19.20 ft	Invert:	16.00 ft
	Conditions	Manning's N:	0.0350	Manning's N:	0.0350
From Node:	Off2	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	Off1	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	4.00 ft	Bottom Width:	8.00 ft
Dampening:	0.0000 ft	Left Slope:	0.770 (h:v)	Left Slope:	1.000 (h:v)
Length:	840.00 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.730 (h:v)
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	

Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Channel Link: Off3-Off2		Upstream		Downstream	
Scenario:	Existing	Invert:	32.10 ft	Invert:	19.20 ft
	Conditions	Manning's N:	0.0350	Manning's N:	0.0350
From Node:	Off3	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	Off2	Max Depth:	10.00 ft	Max Depth:	10.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	10.00 ft	Bottom Width:	4.00 ft
Dampening:	0.0000 ft	Left Slope:	0.300 (h:v)	Left Slope:	0.770 (h:v)
Length:	2546.00 ft	Right Slope:	0.300 (h:v)	Right Slope:	0.500 (h:v)
Contraction	0.10	Bottom Clip			
Coef:		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Estimate

Pipe Link: Off4-Off3		Upstream		Downstream	
Scenario:	Existing	Invert:	31.65 ft	Invert:	33.22 ft
	Conditions	Manning's N:	0.0130	Manning's N:	0.0130
From Node:	Off4	Geometry: Circular		Geometry: Circular	
To Node:	Off3	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	116.00 ft	Ref Node:		Ref Node:	
FHWA Code:	1	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Weir Link: W-B02-B01

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	B02	Default:	0.00 ft
To Node:	B01	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	23.26 ft	**Discharge Coefficients**	
Control Elevation:	23.26 ft	Weir Default:	2.000
Max Depth:	999.00 ft	Weir Table:	
Max Width:	50.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	

Comment:

Weir Link: W-B03a-B03b

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	B03a	Default:	0.00 ft
To Node:	B03b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	25.67 ft	**Discharge Coefficients**	
Control Elevation:	25.67 ft	Weir Default:	2.000
Max Depth:	999.00 ft	Weir Table:	
Max Width:	50.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	

Comment:

Weir Link: W-B04a-B04b

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	B04a	Default:	0.00 ft
To Node:	B04b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	

Geometry Type:	Parabolic		
Invert:	30.65 ft	Ref Node:	
Control Elevation:	30.65 ft	Discharge Coefficients	
Max Depth:	999.00 ft	Weir Default:	2.000
Max Width:	50.00 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: W-B05a-B05b

Scenario:	Existing Conditions	Bottom Clip	
From Node:	B05a	Default:	0.00 ft
To Node:	B05b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	40.75 ft	Discharge Coefficients	
Control Elevation:	40.75 ft	Weir Default:	2.000
Max Depth:	999.00 ft	Weir Table:	
Max Width:	50.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	

Comment:

Weir Link: W-C03a-C03b

Scenario:	Existing Conditions	Bottom Clip	
From Node:	C03a	Default:	0.00 ft
To Node:	C03b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Parabolic	Ref Node:	
Invert:	28.72 ft	Discharge Coefficients	
Control Elevation:	28.72 ft	Weir Default:	2.000
Max Depth:	999.00 ft	Weir Table:	
Max Width:	50.00 ft	Orifice Default:	0.600
Extrapolation Method:	Normal Projection	Orifice Table:	

Comment:

Weir Link: W-C04a-C04b

Scenario:	Existing Conditions		
From Node:	C04a	**Bottom Clip**	
To Node:	C04b	Default:	0.00 ft
Link Count:	1	Op Table:	
Flow Direction:	Both	Ref Node:	
Dampening:	0.0000 ft	**Top Clip**	
Weir Type:	Paved Road Vertical	Default:	0.00 ft
Geometry Type:	Parabolic	Op Table:	
Invert:	32.80 ft	Ref Node:	
Control Elevation:	32.80 ft	**Discharge Coefficients**	
Max Depth:	999.00 ft	Weir Default:	2.000
Max Width:	50.00 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: Wet1-Wet2

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	Wet1a	Default:	0.00 ft
To Node:	Wet2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	20.92 ft	**Discharge Coefficients**	
Control Elevation:	20.92 ft	Weir Default:	2.800
Cross Section:	Wet1-Wet2	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: Wet1a-B01

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	Wet1a	Default:	0.00 ft
To Node:	B00	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	18.50 ft	**Discharge Coefficients**	
Control Elevation:	18.50 ft	Weir Default:	2.800
Cross Section:	Wet1_Over_Weir	Weir Table:	
		Orifice Default:	0.600

Orifice Table:	

Comment:

Weir Link: Wet1b-Wet1a			
Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	Wet1b	Default:	0.00 ft
To Node:	Wet1a	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	19.44 ft	**Discharge Coefficients**	
Control Elevation:	19.44 ft	Weir Default:	2.800
Cross Section:	Wet1	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Pipe Link: Wet1b1-CanalLow		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	17.03 ft	Invert:	16.52 ft
		Manning's N:	0.0270	Manning's N:	0.0270
From Node:	Wet1b	**Geometry: Circular**		**Geometry: Circular**	
To Node:	Canal-Low	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	**Bottom Clip**			
Flow Direction:	None	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	40.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	**Top Clip**			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Pipe Link: Wet1b2-CanalLow		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	14.13 ft	Invert:	14.58 ft
		Manning's N:	0.0270	Manning's N:	0.0270
From Node:	Wet1b	**Geometry: Circular**		**Geometry: Circular**	
To Node:	Canal-Low	Max Depth:	3.00 ft	Max Depth:	3.00 ft

Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	2.67 ft	Default:	2.67 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	37.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0300	Manning's N:	0.0300
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Pipe Link: Wet1b3-Canal		Upstream		Downstream	
Scenario:	Existing	Invert:	15.05 ft	Invert:	13.42 ft
	Conditions	Manning's N:	0.0240	Manning's N:	0.0240
From Node:	Wet1b	Geometry: Circular		Geometry: Circular	
To Node:	Canal-Low	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	49.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.20	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Weir Link: Wet2-A10b			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	Wet2	Default:	0.00 ft
To Node:	A10b	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Dampening:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	19.85 ft	Discharge Coefficients	
Control Elevation:	19.85 ft	Weir Default:	2.800
Cross Section:	Wet2_Over_Weir	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Pipe Link: Wet2a-CanalHigh		Upstream		Downstream	
Scenario:	Existing	Invert:	16.88 ft	Invert:	16.90 ft
	Conditions	Manning's N:	0.0270	Manning's N:	0.0270
From Node:	Wet2	Geometry: Circular		Geometry: Circular	
To Node:	Canal-High	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	None	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	38.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Survey					

Pipe Link: Wet2b-CanalMid		Upstream		Downstream	
Scenario:	Existing	Invert:	16.77 ft	Invert:	15.40 ft
	Conditions	Manning's N:	0.0270	Manning's N:	0.0270
From Node:	Wet2	Geometry: Circular		Geometry: Circular	
To Node:	Canal-Mid	Max Depth:	4.00 ft	Max Depth:	4.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	3.67 ft	Default:	3.67 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	38.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0300	Manning's N:	0.0300
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment: Survey					

Pipe Link: Wet2c-CanalMid		Upstream		Downstream	
Scenario:	Existing	Invert:	17.69 ft	Invert:	16.75 ft
	Conditions	Manning's N:	0.0270	Manning's N:	0.0270
From Node:	Wet2	Geometry: Circular		Geometry: Circular	
To Node:	Canal-Mid	Max Depth:	4.00 ft	Max Depth:	4.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	1.00 ft	Default:	1.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	39.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0300	Manning's N:	0.0300
Entr Loss Coef:	0.00	Top Clip			

Exit Loss Coef:	1.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment: Survey

Channel Link: Wet2d-Wet2e		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	14.62 ft	Invert:	14.62 ft
		Manning's N:	0.0350	Manning's N:	0.0350
From Node:	Wet2d	Geometry: Trapezoidal		Geometry: Trapezoidal	
To Node:	Wet2e	Max Depth:	8.00 ft	Max Depth:	8.00 ft
Link Count:	1	Extrapolation:	Normal	Extrapolation:	Normal
Flow Direction:	Both	Bottom Width:	10.00 ft	Bottom Width:	10.00 ft
Dampening:	0.0000 ft	Left Slope:	0.500 (h:v)	Left Slope:	0.500 (h:v)
Length:	101.51 ft	Right Slope:	0.500 (h:v)	Right Slope:	0.500 (h:v)
Contraction Coef:	0.10	Bottom Clip			
		Default:	0.00 ft	Default:	0.00 ft
Expansion Coef:	0.30	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: Wet2e-CanalMid		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	14.62 ft	Invert:	14.31 ft
		Manning's N:	0.0230	Manning's N:	0.0230
From Node:	Wet2e	Geometry: Circular		Geometry: Circular	
To Node:	Canal-Mid	Max Depth:	5.00 ft	Max Depth:	5.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Dampening:	0.0000 ft	Op Table:		Op Table:	
Length:	40.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 ft	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Simulation: 002-Year

Scenario: Existing Conditions
Run Date/Time: 7/31/2017 6:53:30 PM
Program Version: ICPR4 4.03.01

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	72.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.5000	900.0000
Max Calculation Time:		60.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: 002
Extern Hydrograph Set:
Curve Number Set: Exist_CN
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: ArborOaks
Roughness Set:

Crop Coef Set:	
Fillable Porosity Set:	
Conductivity Set:	
Leakage Set:	

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Manual Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~SCSIII-24
		Rainfall Amount:	4.20 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Dampening (2D):	0.0050 ft	Dflt Dampening (1D):	0.0050 ft
Min Node Srf Area (2D):	1 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 010-Year

Scenario:	Existing Conditions
Run Date/Time:	7/31/2017 6:56:15 PM
Program Version:	ICPR4 4.03.01

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	72.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.5000	900.0000
Max Calculation Time:		60.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: 010
Extern Hydrograph Set:
Curve Number Set: Exist_CN
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: ArborOaks
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching: SAOR
Max Iterations: 6
Over-Relax Weight Fact: 0.5 dec
dZ Tolerance: 0.0010 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft
Edge Length Option: Automatic
Dflt Dampening (2D): 0.0050 ft
Min Node Srf Area (2D): 1 ft2
Energy Switch (2D): Energy

IA Recovery Time: 24.0000 hr
ET for Manual Basins: False
Manual Basin Rain Opt: Global
OF Region Rain Opt: Global
Rainfall Name: ~SCSIII-24
Rainfall Amount: 6.40 in
Storm Duration: 24.0000 hr
Dflt Dampening (1D): 0.0050 ft
Min Node Srf Area (1D): 100 ft2
Energy Switch (1D): Energy

Comment:

Simulation: 025-Year

Scenario: Existing Conditions
Run Date/Time: 7/31/2017 7:00:34 PM
Program Version: ICPR4 4.03.01

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	72.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.5000	900.0000
Max Calculation Time:		60.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph

Lookup Tables

Boundary Stage Set: 025
Extern Hydrograph Set:
Curve Number Set: Exist_CN

Folder:			
		Green-Ampt Set:	
		Vertical Layers Set:	
		Impervious Set:	ArborOaks
		Roughness Set:	
		Crop Coef Set:	
		Fillable Porosity Set:	
		Conductivity Set:	
		Leakage Set:	

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Manual Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~SCSIII-24
		Rainfall Amount:	7.80 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Dampening (2D):	0.0050 ft	Dflt Dampening (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 050-Year

Scenario:	Existing Conditions
Run Date/Time:	7/31/2017 7:05:19 PM
Program Version:	ICPR4 4.03.01

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	72.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.5000	900.0000
Max Calculation Time:		60.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: 050
Extern Hydrograph Set:
Curve Number Set: Exist_CN
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: ArborOaks
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching: SAOR
Max Iterations: 8
Over-Relax Weight Fact: 0.5 dec
dZ Tolerance: 0.0050 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0000 ft
Edge Length Option: Automatic

IA Recovery Time: 24.0000 hr
ET for Manual Basins: False
Manual Basin Rain Opt: Global
OF Region Rain Opt: Global
Rainfall Name: ~SCSIII-24
Rainfall Amount: 8.90 in
Storm Duration: 24.0000 hr

Dflt Dampening (2D):	0.0000 ft	Dflt Dampening (1D):	0.0000 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 100-Year

Scenario: Existing Conditions
Run Date/Time: 7/31/2017 7:08:01 PM
Program Version: ICPR4 4.03.01

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	72.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.5000	900.0000
Max Calculation Time:		60.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Lookup Tables

Rainfall Folder:		Boundary Stage Set:	100
Reference ET Folder:		Extern Hydrograph Set:	
Unit Hydrograph Folder:		Curve Number Set:	Exist_CN
		Green-Ampt Set:	
		Vertical Layers Set:	
		Impervious Set:	ArborOaks
		Roughness Set:	
		Crop Coef Set:	
		Fillable Porosity Set:	
		Conductivity Set:	
		Leakage Set:	

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Manual Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~SCSIII-24
		Rainfall Amount:	10.10 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Dampening (2D):	0.0050 ft	Dflt Dampening (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

THOMAS & HUTTON

DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

APPENDIX D

EXISTING CONDITIONS

ICPR MODEL RESULTS

J – 26611.0000

August 2017

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Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	002-Year	A01	22.13	19.55	12.7274	0.29	0.29
Existing Conditions	002-Year	A02	20.73	19.54	12.7230	0.34	0.52
Existing Conditions	002-Year	A03	20.95	19.54	12.7297	1.15	1.11
Existing Conditions	002-Year	A04	22.00	19.54	12.7260	7.79	2.90
Existing Conditions	002-Year	A05	23.19	21.10	12.3153	1.07	1.07
Existing Conditions	002-Year	A06	23.50	20.99	12.3100	1.54	1.53
Existing Conditions	002-Year	A06a	23.13	19.66	12.4868	6.03	5.67
Existing Conditions	002-Year	A07	20.67	19.69	12.3424	3.96	3.88
Existing Conditions	002-Year	A08	21.50	19.36	12.5520	2.00	1.99
Existing Conditions	002-Year	A09	21.34	19.35	12.6261	2.38	2.20
Existing Conditions	002-Year	A10	22.00	19.35	12.6190	4.77	3.89
Existing Conditions	002-Year	A10a	21.00	17.62	12.4983	16.00	15.94
Existing Conditions	002-Year	A10b	21.00	17.31	12.5548	19.60	19.28
Existing Conditions	002-Year	A11	21.43	19.39	12.6248	0.97	0.95
Existing Conditions	002-Year	A12	20.64	19.39	12.6287	0.84	0.82
Existing Conditions	002-Year	A13	20.59	19.39	12.6426	2.23	2.21
Existing Conditions	002-Year	A14	21.00	19.38	12.7449	5.78	1.55
Existing Conditions	002-Year	A15	22.85	20.06	12.7333	1.92	2.61
Existing Conditions	002-Year	A16	23.00	20.05	12.7363	4.12	0.99
Existing Conditions	002-Year	A17	22.00	21.04	12.2851	0.37	0.37
Existing Conditions	002-Year	A18	21.20	19.84	13.8579	1.16	1.14
Existing Conditions	002-Year	A19	20.10	19.83	13.9020	1.10	1.07
Existing Conditions	002-Year	A20	21.00	19.83	13.9047	8.23	2.78
Existing Conditions	002-Year	A21	25.07	22.51	12.3136	1.85	1.84
Existing Conditions	002-Year	A22	25.01	22.36	12.3106	2.05	2.11
Existing Conditions	002-Year	A23	24.94	22.33	12.3082	2.58	2.62
Existing Conditions	002-Year	A24	26.19	22.88	12.2620	2.16	2.16
Existing Conditions	002-Year	A25	24.48	22.32	12.3089	6.24	6.20
Existing Conditions	002-Year	A26	25.50	22.22	12.3114	6.39	6.35

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	002-Year	A27	25.50	22.16	12.9957	6.84	6.81
Existing Conditions	002-Year	A28	23.03	22.15	12.9952	8.08	8.04
Existing Conditions	002-Year	A29	26.47	22.93	12.2535	2.53	2.52
Existing Conditions	002-Year	A30	21.31	22.14	12.9902	11.12	11.08
Existing Conditions	002-Year	A31	25.00	22.15	12.9850	14.04	4.89
Existing Conditions	002-Year	B00	23.00	19.38	14.2333	29.39	29.36
Existing Conditions	002-Year	B01	22.00	20.35	13.1815	29.30	29.30
Existing Conditions	002-Year	B02	23.26	21.30	13.1969	32.64	29.01
Existing Conditions	002-Year	B03a	25.67	25.73	12.8737	41.40	28.31
Existing Conditions	002-Year	B03b	24.00	23.90	12.9000	28.31	28.29
Existing Conditions	002-Year	B04a	30.65	29.38	12.5361	32.68	30.86
Existing Conditions	002-Year	B04b	29.00	27.48	12.4966	30.86	30.92
Existing Conditions	002-Year	B05a	40.75	40.67	12.4728	24.13	21.82
Existing Conditions	002-Year	B05b	37.00	36.93	12.4899	21.82	21.80
Existing Conditions	002-Year	C01	25.57	22.56	12.4270	12.84	12.68
Existing Conditions	002-Year	C01a	24.39	20.05	12.4453	12.68	12.63
Existing Conditions	002-Year	C02	26.00	22.60	12.4251	13.33	12.75
Existing Conditions	002-Year	C03a	28.72	26.11	12.3457	11.33	11.30
Existing Conditions	002-Year	C03b	27.76	25.35	12.3639	11.30	11.22
Existing Conditions	002-Year	C04a	32.80	31.05	12.3097	9.02	8.93
Existing Conditions	002-Year	C04b	32.80	30.34	12.3224	8.93	8.91
Existing Conditions	002-Year	Canal-High	23.50	17.04	29.0004	73.20	0.20
Existing Conditions	002-Year	Canal-Low	20.00	14.04	29.2502	32.99	0.00
Existing Conditions	002-Year	Canal-Mid	21.00	15.61	28.8332	27.27	0.00
Existing Conditions	002-Year	Off1	23.93	20.66	13.0642	82.59	73.20
Existing Conditions	002-Year	Off2	23.00	22.15	12.9597	78.01	70.09
Existing Conditions	002-Year	Off3	36.00	33.30	12.5289	42.97	42.96
Existing Conditions	002-Year	Off4	36.00	36.44	13.4234	38.27	24.69
Existing Conditions	002-Year	Wet1a	22.00	19.38	14.2432	30.28	19.04

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	002-Year	Wet1b	22.00	17.07	13.5247	33.01	32.99
Existing Conditions	002-Year	Wet2	23.00	18.62	13.9408	31.99	15.08
Existing Conditions	002-Year	Wet2d	20.80	16.31	12.7203	27.60	27.27
Existing Conditions	002-Year	Wet2e	20.90	16.22	12.7284	27.27	27.27
Existing Conditions	002-Year	D~A16-A18~N	*****	19.85	13.8590	0.99	0.98
Existing Conditions	010-Year	A01	22.13	20.83	26.8288	0.84	0.87
Existing Conditions	010-Year	A02	20.73	20.83	26.8653	0.99	1.00
Existing Conditions	010-Year	A03	20.95	20.83	26.8716	2.87	2.83
Existing Conditions	010-Year	A04	22.00	20.83	26.8331	14.59	12.37
Existing Conditions	010-Year	A05	23.19	21.97	26.7283	2.87	2.87
Existing Conditions	010-Year	A06	23.50	21.97	26.7231	4.02	4.02
Existing Conditions	010-Year	A06a	23.13	21.97	26.7230	11.84	11.86
Existing Conditions	010-Year	A07	20.67	20.98	12.3749	8.40	7.13
Existing Conditions	010-Year	A08	21.50	21.97	26.8498	6.46	6.44
Existing Conditions	010-Year	A09	21.34	21.97	26.8119	7.14	6.94
Existing Conditions	010-Year	A10	22.00	21.97	26.7842	13.34	11.57
Existing Conditions	010-Year	A10a	21.00	21.98	26.7119	43.09	43.00
Existing Conditions	010-Year	A10b	21.00	21.97	26.7162	54.01	64.00
Existing Conditions	010-Year	A11	21.43	21.98	26.7880	1.96	1.92
Existing Conditions	010-Year	A12	20.64	21.98	26.7812	1.68	1.65
Existing Conditions	010-Year	A13	20.59	21.98	26.7605	4.54	4.51
Existing Conditions	010-Year	A14	21.00	21.98	26.7356	21.42	4.60
Existing Conditions	010-Year	A15	22.85	21.98	27.0076	4.15	4.07
Existing Conditions	010-Year	A16	23.00	21.98	26.9623	8.33	5.27
Existing Conditions	010-Year	A17	22.00	21.98	26.8156	0.77	0.77
Existing Conditions	010-Year	A18	21.20	21.98	26.7499	4.12	3.81
Existing Conditions	010-Year	A19	20.10	21.98	26.7531	2.20	2.15
Existing Conditions	010-Year	A20	21.00	21.98	26.7288	26.08	24.93
Existing Conditions	010-Year	A21	25.07	25.17	12.2983	4.65	4.62

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	010-Year	A22	25.01	24.67	12.2986	5.29	5.26
Existing Conditions	010-Year	A23	24.94	24.40	12.3071	6.45	6.42
Existing Conditions	010-Year	A24	26.19	24.55	12.2871	4.23	4.18
Existing Conditions	010-Year	A25	24.48	24.32	12.3133	13.84	13.01
Existing Conditions	010-Year	A26	25.50	24.00	12.3235	11.75	11.69
Existing Conditions	010-Year	A27	25.50	23.64	12.3535	12.68	12.62
Existing Conditions	010-Year	A28	23.03	23.32	12.7649	15.05	14.99
Existing Conditions	010-Year	A29	26.47	23.36	12.2503	4.91	4.91
Existing Conditions	010-Year	A30	21.31	23.29	12.7930	21.12	21.05
Existing Conditions	010-Year	A31	25.00	23.55	12.8718	40.12	15.95
Existing Conditions	010-Year	B00	23.00	20.81	26.8280	46.11	45.86
Existing Conditions	010-Year	B01	22.00	20.93	13.8339	46.11	46.11
Existing Conditions	010-Year	B02	23.26	22.34	13.8028	62.19	45.73
Existing Conditions	010-Year	B03a	25.67	27.83	13.1183	71.46	54.20
Existing Conditions	010-Year	B03b	24.00	24.79	13.1668	54.20	54.16
Existing Conditions	010-Year	B04a	30.65	31.95	12.7067	67.64	53.16
Existing Conditions	010-Year	B04b	29.00	28.68	12.9247	53.16	52.65
Existing Conditions	010-Year	B05a	40.75	42.39	12.4824	51.06	44.70
Existing Conditions	010-Year	B05b	37.00	37.63	12.5263	44.70	44.50
Existing Conditions	010-Year	C01	25.57	23.97	12.5092	35.11	35.07
Existing Conditions	010-Year	C01a	24.39	21.97	26.7116	35.07	35.11
Existing Conditions	010-Year	C02	26.00	24.09	12.5058	40.92	34.67
Existing Conditions	010-Year	C03a	28.72	27.32	12.3844	30.78	30.10
Existing Conditions	010-Year	C03b	27.76	26.57	12.3933	30.10	30.08
Existing Conditions	010-Year	C04a	32.80	31.82	12.3276	21.03	19.98
Existing Conditions	010-Year	C04b	32.80	31.11	12.3378	19.98	19.95
Existing Conditions	010-Year	Canal-High	23.50	22.91	26.5001	113.13	357.70
Existing Conditions	010-Year	Canal-Low	20.00	20.60	26.4170	573.95	76.81
Existing Conditions	010-Year	Canal-Mid	21.00	21.93	26.6670	172.34	376.03

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	010-Year	Off1	23.93	22.86	27.1827	148.83	113.13
Existing Conditions	010-Year	Off2	23.00	23.56	12.8652	161.76	142.76
Existing Conditions	010-Year	Off3	36.00	34.07	12.4948	89.34	89.02
Existing Conditions	010-Year	Off4	36.00	39.96	13.8226	86.52	41.54
Existing Conditions	010-Year	Wet1a	22.00	20.82	26.8252	572.08	567.16
Existing Conditions	010-Year	Wet1b	22.00	20.74	26.8427	567.40	573.95
Existing Conditions	010-Year	Wet2	23.00	21.98	26.7255	349.65	360.66
Existing Conditions	010-Year	Wet2d	20.80	21.96	26.6813	73.22	72.95
Existing Conditions	010-Year	Wet2e	20.90	21.96	26.6702	72.95	72.95
Existing Conditions	010-Year	~A16-A18~N	*****	21.98	26.8595	5.27	3.12
Existing Conditions	025-Year	A01	22.13	22.65	25.9869	1.26	1.27
Existing Conditions	025-Year	A02	20.73	22.65	25.9484	1.47	1.52
Existing Conditions	025-Year	A03	20.95	22.65	25.9498	4.05	4.03
Existing Conditions	025-Year	A04	22.00	22.65	25.9240	17.69	16.40
Existing Conditions	025-Year	A05	23.19	23.44	25.8140	4.45	4.45
Existing Conditions	025-Year	A06	23.50	23.44	25.8126	6.06	6.06
Existing Conditions	025-Year	A06a	23.13	23.44	25.9198	13.98	13.98
Existing Conditions	025-Year	A07	20.67	22.65	25.9766	11.40	8.16
Existing Conditions	025-Year	A08	21.50	23.44	26.0547	14.53	13.58
Existing Conditions	025-Year	A09	21.34	23.44	25.9998	14.41	14.16
Existing Conditions	025-Year	A10	22.00	23.44	26.0013	24.09	20.76
Existing Conditions	025-Year	A10a	21.00	23.46	25.7586	51.44	51.45
Existing Conditions	025-Year	A10b	21.00	23.44	25.8788	87.57	84.14
Existing Conditions	025-Year	A11	21.43	23.44	26.0498	2.62	2.57
Existing Conditions	025-Year	A12	20.64	23.44	26.0338	2.24	2.20
Existing Conditions	025-Year	A13	20.59	23.44	26.0279	6.08	6.04
Existing Conditions	025-Year	A14	21.00	23.44	26.0015	42.57	7.01
Existing Conditions	025-Year	A15	22.85	23.44	26.1475	5.67	5.56
Existing Conditions	025-Year	A16	23.00	23.44	26.1161	11.13	4.84

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	025-Year	A17	22.00	23.45	26.0055	1.04	1.04
Existing Conditions	025-Year	A18	21.20	23.45	25.9936	4.72	4.69
Existing Conditions	025-Year	A19	20.10	23.45	25.9980	2.93	2.88
Existing Conditions	025-Year	A20	21.00	23.45	26.0009	38.38	37.38
Existing Conditions	025-Year	A21	25.07	26.18	12.3001	6.65	6.61
Existing Conditions	025-Year	A22	25.01	25.26	12.2772	7.27	7.25
Existing Conditions	025-Year	A23	24.94	24.75	12.2839	8.88	8.87
Existing Conditions	025-Year	A24	26.19	25.02	12.2679	5.59	5.57
Existing Conditions	025-Year	A25	24.48	24.60	12.2893	18.76	18.45
Existing Conditions	025-Year	A26	25.50	24.33	12.3075	11.89	11.83
Existing Conditions	025-Year	A27	25.50	24.04	12.3655	13.01	12.95
Existing Conditions	025-Year	A28	23.03	23.70	12.6215	15.84	15.76
Existing Conditions	025-Year	A29	26.47	23.69	12.6408	6.49	6.49
Existing Conditions	025-Year	A30	21.31	23.66	12.6814	28.66	28.65
Existing Conditions	025-Year	A31	25.00	24.17	12.7830	56.00	22.62
Existing Conditions	025-Year	B00	23.00	22.64	25.9215	53.52	53.27
Existing Conditions	025-Year	B01	22.00	22.64	25.9238	53.52	53.52
Existing Conditions	025-Year	B02	23.26	22.92	14.0280	88.10	53.06
Existing Conditions	025-Year	B03a	25.67	29.14	13.0356	99.18	75.92
Existing Conditions	025-Year	B03b	24.00	25.36	13.0673	75.92	75.88
Existing Conditions	025-Year	B04a	30.65	33.54	12.6754	93.09	74.45
Existing Conditions	025-Year	B04b	29.00	29.74	12.9279	74.45	73.26
Existing Conditions	025-Year	B05a	40.75	43.47	12.4716	69.40	61.51
Existing Conditions	025-Year	B05b	37.00	38.12	12.5293	61.51	61.09
Existing Conditions	025-Year	C01	25.57	24.48	12.6682	43.26	43.16
Existing Conditions	025-Year	C01a	24.39	23.44	25.7583	43.16	43.17
Existing Conditions	025-Year	C02	26.00	24.66	12.6623	58.43	42.69
Existing Conditions	025-Year	C03a	28.72	27.98	12.4379	44.44	40.80
Existing Conditions	025-Year	C03b	27.76	27.23	12.4420	40.80	40.80

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	025-Year	C04a	32.80	32.25	12.3408	29.44	26.86
Existing Conditions	025-Year	C04b	32.80	31.54	12.3459	26.86	26.85
Existing Conditions	025-Year	Canal-High	23.50	24.28	25.7501	127.02	2398.57
Existing Conditions	025-Year	Canal-Low	20.00	22.20	25.7501	4069.55	95.18
Existing Conditions	025-Year	Canal-Mid	21.00	23.40	25.5830	992.02	2629.25
Existing Conditions	025-Year	Off1	23.93	24.08	27.0098	202.84	127.02
Existing Conditions	025-Year	Off2	23.00	24.18	12.7769	218.41	195.94
Existing Conditions	025-Year	Off3	36.00	34.52	12.4811	119.86	119.36
Existing Conditions	025-Year	Off4	36.00	43.14	14.0183	120.08	50.14
Existing Conditions	025-Year	Wet1a	22.00	22.64	25.9215	4048.23	4063.35
Existing Conditions	025-Year	Wet1b	22.00	22.51	25.9175	4063.48	4069.55
Existing Conditions	025-Year	Wet2	23.00	23.44	26.0001	2383.44	2403.61
Existing Conditions	025-Year	Wet2d	20.80	23.44	25.9897	124.02	118.70
Existing Conditions	025-Year	Wet2e	20.90	23.43	25.9898	124.44	124.02
Existing Conditions	025-Year	~A16-A18~N	*****	23.44	26.0215	4.84	4.35
Existing Conditions	050-Year	A01	22.13	22.21	22.0001	1.61	2.12
Existing Conditions	050-Year	A02	20.73	22.34	21.9386	75.16	89.60
Existing Conditions	050-Year	A03	20.95	22.21	22.0001	90.05	75.55
Existing Conditions	050-Year	A04	22.00	22.24	22.0001	21.32	19.14
Existing Conditions	050-Year	A05	23.19	23.14	21.9996	7.27	6.63
Existing Conditions	050-Year	A06	23.50	23.14	21.9993	8.48	8.45
Existing Conditions	050-Year	A06a	23.13	23.15	21.9991	15.67	15.69
Existing Conditions	050-Year	A07	20.67	22.21	22.0001	13.80	9.38
Existing Conditions	050-Year	A08	21.50	23.12	22.0001	19.47	19.07
Existing Conditions	050-Year	A09	21.34	23.12	22.0001	20.17	19.84
Existing Conditions	050-Year	A10	22.00	23.12	22.0001	55.36	26.99
Existing Conditions	050-Year	A10a	21.00	23.14	21.9977	57.20	57.02
Existing Conditions	050-Year	A10b	21.00	23.13	21.9996	107.52	96.58
Existing Conditions	050-Year	A11	21.43	23.13	22.0001	3.15	3.09

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	050-Year	A12	20.64	23.13	22.0001	2.68	2.64
Existing Conditions	050-Year	A13	20.59	23.13	22.0001	7.31	7.26
Existing Conditions	050-Year	A14	21.00	23.13	22.0001	39.14	7.53
Existing Conditions	050-Year	A15	22.85	23.07	22.0001	6.90	6.76
Existing Conditions	050-Year	A16	23.00	23.07	22.0001	13.37	4.73
Existing Conditions	050-Year	A17	22.00	23.11	22.0001	1.25	1.18
Existing Conditions	050-Year	A18	21.20	23.11	22.0001	6.05	5.44
Existing Conditions	050-Year	A19	20.10	23.13	22.0001	3.52	3.48
Existing Conditions	050-Year	A20	21.00	23.13	22.0001	45.89	45.00
Existing Conditions	050-Year	A21	25.07	26.36	12.2829	8.29	8.30
Existing Conditions	050-Year	A22	25.01	25.44	12.2677	7.57	7.56
Existing Conditions	050-Year	A23	24.94	24.89	12.2750	9.54	9.53
Existing Conditions	050-Year	A24	26.19	25.33	12.2571	6.67	6.66
Existing Conditions	050-Year	A25	24.48	24.71	12.2865	21.37	21.09
Existing Conditions	050-Year	A26	25.50	24.50	12.3072	11.84	11.75
Existing Conditions	050-Year	A27	25.50	24.25	12.3252	13.06	12.98
Existing Conditions	050-Year	A28	23.03	23.87	12.5902	16.22	16.13
Existing Conditions	050-Year	A29	26.47	24.12	12.2944	7.75	7.71
Existing Conditions	050-Year	A30	21.31	23.83	12.6404	33.14	33.14
Existing Conditions	050-Year	A31	25.00	24.59	12.7450	69.84	26.80
Existing Conditions	050-Year	B00	23.00	22.23	22.0001	59.44	58.44
Existing Conditions	050-Year	B01	22.00	22.25	16.1715	58.65	58.65
Existing Conditions	050-Year	B02	23.26	23.36	14.1447	112.32	58.12
Existing Conditions	050-Year	B03a	25.67	30.14	12.9735	125.09	96.08
Existing Conditions	050-Year	B03b	24.00	25.83	12.9904	96.08	96.05
Existing Conditions	050-Year	B04a	30.65	34.62	12.6418	114.41	93.60
Existing Conditions	050-Year	B04b	29.00	30.62	12.9025	93.60	91.66
Existing Conditions	050-Year	B05a	40.75	44.26	12.4608	84.10	75.69
Existing Conditions	050-Year	B05b	37.00	38.52	12.5250	75.69	75.03

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	050-Year	C01	25.57	24.79	12.8046	48.20	48.01
Existing Conditions	050-Year	C01a	24.39	23.20	21.9990	48.01	48.01
Existing Conditions	050-Year	C02	26.00	25.01	12.7971	70.21	47.57
Existing Conditions	050-Year	C03a	28.72	28.37	12.4955	54.82	46.88
Existing Conditions	050-Year	C03b	27.76	27.77	12.5506	46.88	46.85
Existing Conditions	050-Year	C04a	32.80	32.53	12.3545	36.29	31.52
Existing Conditions	050-Year	C04b	32.80	31.87	12.3608	31.52	31.52
Existing Conditions	050-Year	Canal-High	23.50	24.00	22.0001	133.51	1774.63
Existing Conditions	050-Year	Canal-Low	20.00	21.87	22.0001	2789.88	237.03
Existing Conditions	050-Year	Canal-Mid	21.00	23.10	22.0001	673.93	2014.30
Existing Conditions	050-Year	Off1	23.93	24.08	17.1072	247.18	133.51
Existing Conditions	050-Year	Off2	23.00	24.60	12.7387	262.47	238.25
Existing Conditions	050-Year	Off3	36.00	34.83	12.4650	143.13	142.03
Existing Conditions	050-Year	Off4	36.00	45.92	14.1388	147.28	56.60
Existing Conditions	050-Year	Wet1a	22.00	22.24	22.0001	3047.31	2867.55
Existing Conditions	050-Year	Wet1b	22.00	22.13	22.0001	2851.26	2789.88
Existing Conditions	050-Year	Wet2	23.00	23.13	22.0001	1748.72	1593.45
Existing Conditions	050-Year	Wet2d	20.80	23.13	22.0000	139.85	148.19
Existing Conditions	050-Year	Wet2e	20.90	23.13	21.9994	148.19	139.85
Existing Conditions	050-Year	~A16-A18~N	*****	23.07	22.0001	4.73	4.75
Existing Conditions	100-Year	A01	22.13	23.88	25.1054	2.00	2.05
Existing Conditions	100-Year	A02	20.73	23.88	25.0951	2.32	2.37
Existing Conditions	100-Year	A03	20.95	23.88	25.0946	6.60	6.58
Existing Conditions	100-Year	A04	22.00	23.88	25.0604	36.93	21.97
Existing Conditions	100-Year	A05	23.19	24.50	24.6247	10.44	9.18
Existing Conditions	100-Year	A06	23.50	24.50	24.6958	11.35	11.30
Existing Conditions	100-Year	A06a	23.13	24.50	24.6957	17.28	17.29
Existing Conditions	100-Year	A07	20.67	23.88	25.1021	16.47	11.54
Existing Conditions	100-Year	A08	21.50	24.50	24.8469	24.76	24.47

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	100-Year	A09	21.34	24.50	25.0069	25.82	25.49
Existing Conditions	100-Year	A10	22.00	24.50	24.8540	95.12	33.20
Existing Conditions	100-Year	A10a	21.00	24.53	24.8941	63.98	62.44
Existing Conditions	100-Year	A10b	21.00	24.50	24.7843	118.10	104.04
Existing Conditions	100-Year	A11	21.43	24.50	24.5461	3.73	3.65
Existing Conditions	100-Year	A12	20.64	24.50	24.5554	3.17	3.13
Existing Conditions	100-Year	A13	20.59	24.50	24.6141	8.65	8.60
Existing Conditions	100-Year	A14	21.00	24.50	24.8941	60.23	11.76
Existing Conditions	100-Year	A15	22.85	24.50	25.3941	8.25	8.11
Existing Conditions	100-Year	A16	23.00	24.50	25.3619	15.84	5.31
Existing Conditions	100-Year	A17	22.00	24.50	25.0676	2.25	2.17
Existing Conditions	100-Year	A18	21.20	24.50	25.2161	7.32	7.25
Existing Conditions	100-Year	A19	20.10	24.50	25.0934	4.17	4.13
Existing Conditions	100-Year	A20	21.00	24.50	25.0608	67.49	52.52
Existing Conditions	100-Year	A21	25.07	26.48	12.2767	10.13	10.14
Existing Conditions	100-Year	A22	25.01	25.60	12.2667	7.77	7.75
Existing Conditions	100-Year	A23	24.94	25.02	12.2697	10.10	10.09
Existing Conditions	100-Year	A24	26.19	25.67	12.2542	7.85	7.84
Existing Conditions	100-Year	A25	24.48	24.82	12.2802	24.02	23.72
Existing Conditions	100-Year	A26	25.50	24.64	12.2937	11.73	11.51
Existing Conditions	100-Year	A27	25.50	24.55	25.1090	12.94	12.85
Existing Conditions	100-Year	A28	23.03	24.56	25.1359	16.53	16.45
Existing Conditions	100-Year	A29	26.47	24.76	12.2790	9.13	8.98
Existing Conditions	100-Year	A30	21.31	24.60	25.2897	37.15	37.15
Existing Conditions	100-Year	A31	25.00	25.14	25.3332	81.79	31.45
Existing Conditions	100-Year	B00	23.00	23.87	25.0441	90.69	90.01
Existing Conditions	100-Year	B01	22.00	23.87	25.0255	64.89	64.88
Existing Conditions	100-Year	B02	23.26	23.89	14.2168	141.75	64.27
Existing Conditions	100-Year	B03a	25.67	31.18	12.9131	155.66	120.49

Scenario	Sim	Node Name	Warning Stage [ft]	Maximum Stage [ft]	Time to Maximum Stage [hrs]	Maximum Total Inflow Rate [cfs]	Maximum Total Outflow Rate [cfs]
Existing Conditions	100-Year	B03b	24.00	26.34	12.9138	120.49	120.51
Existing Conditions	100-Year	B04a	30.65	35.67	12.6097	138.47	116.01
Existing Conditions	100-Year	B04b	29.00	31.57	12.8644	116.01	113.05
Existing Conditions	100-Year	B05a	40.75	45.06	12.4492	100.31	91.74
Existing Conditions	100-Year	B05b	37.00	38.96	12.5183	91.74	90.75
Existing Conditions	100-Year	C01	25.57	25.09	12.9949	51.93	51.76
Existing Conditions	100-Year	C01a	24.39	24.51	24.6954	51.76	51.77
Existing Conditions	100-Year	C02	26.00	25.35	12.9851	81.22	51.35
Existing Conditions	100-Year	C03a	28.72	28.74	12.5897	65.71	50.81
Existing Conditions	100-Year	C03b	27.76	28.47	12.5986	50.81	50.73
Existing Conditions	100-Year	C04a	32.80	32.82	12.3715	43.91	35.78
Existing Conditions	100-Year	C04b	32.80	32.70	12.3736	35.78	35.78
Existing Conditions	100-Year	Canal-High	23.50	25.24	24.4171	138.30	5135.31
Existing Conditions	100-Year	Canal-Low	20.00	23.35	24.7501	7983.43	455.14
Existing Conditions	100-Year	Canal-Mid	21.00	24.45	24.5001	2089.06	4846.09
Existing Conditions	100-Year	Off1	23.93	25.16	25.3605	296.60	138.30
Existing Conditions	100-Year	Off2	23.00	25.15	25.3271	309.67	284.21
Existing Conditions	100-Year	Off3	36.00	35.13	12.4595	167.17	166.00
Existing Conditions	100-Year	Off4	36.00	49.18	14.2446	177.51	63.34
Existing Conditions	100-Year	Wet1a	22.00	23.88	25.0446	7962.27	7972.60
Existing Conditions	100-Year	Wet1b	22.00	23.68	25.0447	7976.01	7983.43
Existing Conditions	100-Year	Wet2	23.00	24.50	24.8573	5137.41	5199.54
Existing Conditions	100-Year	Wet2d	20.80	24.49	24.8939	154.31	154.21
Existing Conditions	100-Year	Wet2e	20.90	24.50	24.4987	154.21	154.20
Existing Conditions	100-Year	~A16-A18~N	*****	24.50	25.3386	7.25	7.17

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DRAINAGE STUDY REPORT

ARBOR OAKS DRAINAGE IMPROVEMENTS

APPENDIX E

TAILWATER CALCULATIONS

J – 26611.0000

August 2017

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Basin	Area		CN	Ia	Lag Calculation				
	(sq mi)	(acres)			L (ft)	S (%)	S'	Lag (hr)	Lag (min)
1	5.80	3,712	79.1	0.5299	20,361	0.118	2.65	10.60	636
2	2.13	1,366	79.4	0.5196	13,922	0.272	2.60	5.10	306
3	3.85	2,463	73.4	0.7260	16,093	0.237	3.63	7.33	440
4	1.50	960	68.6	0.9169	8,378	0.455	4.58	3.58	215
5	0.46	295	72.6	0.7565	5,128	0.858	3.78	1.58	95
6	0.72	460	72.7	0.7510	5,973	0.745	3.75	1.91	114
7	0.87	556	76.9	0.6006	7,021	0.657	3.00	2.05	123
8	1.58	1,012	74.9	0.6702	8,578	0.456	3.35	3.06	184
9	0.49	314	66.9	0.9882	5,323	0.633	4.94	2.20	132
Total:	17.40	8,501							

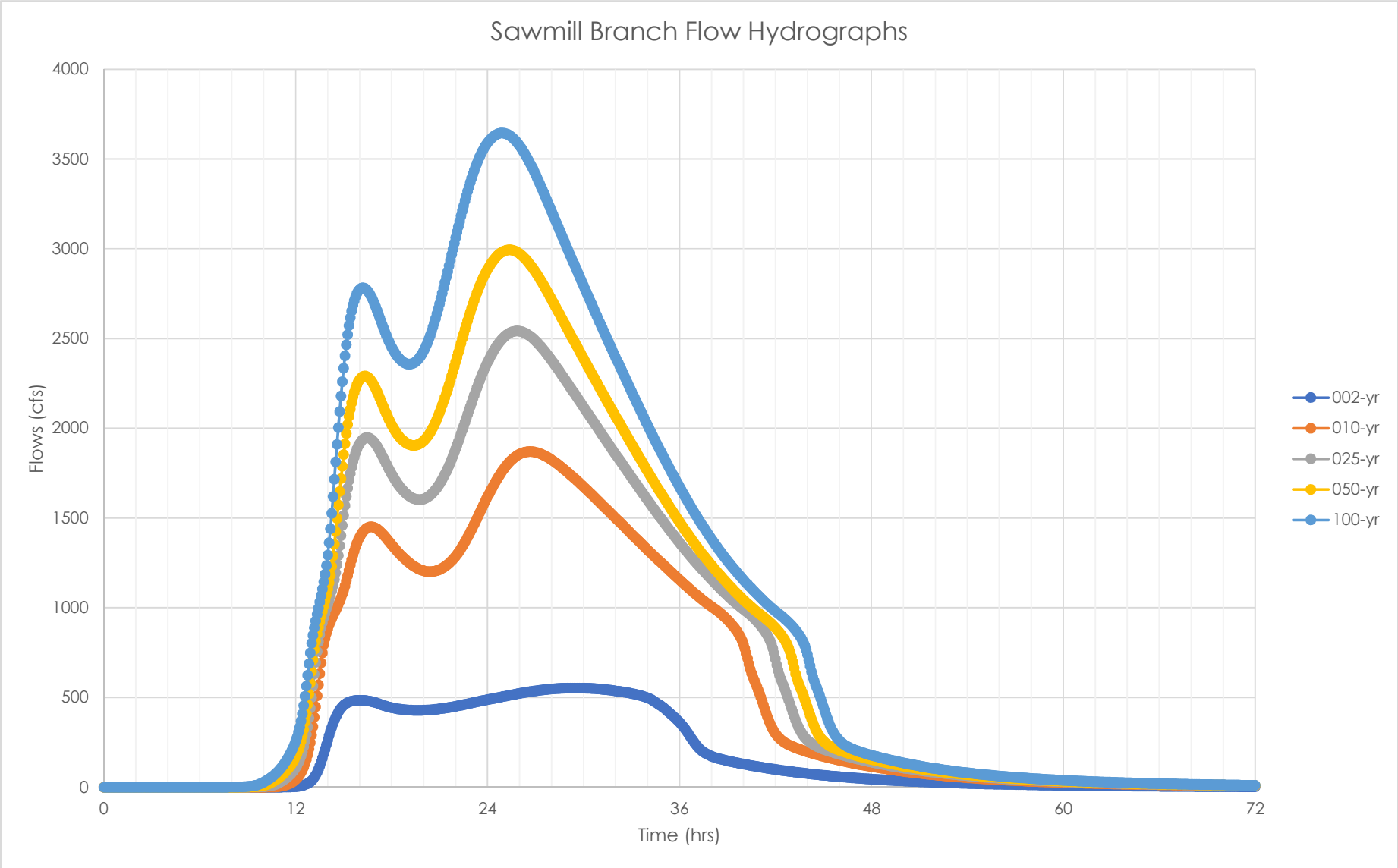
$Tlag = L^{0.8} (S' + 1)^{0.7} / 1900 S^{0.5}$

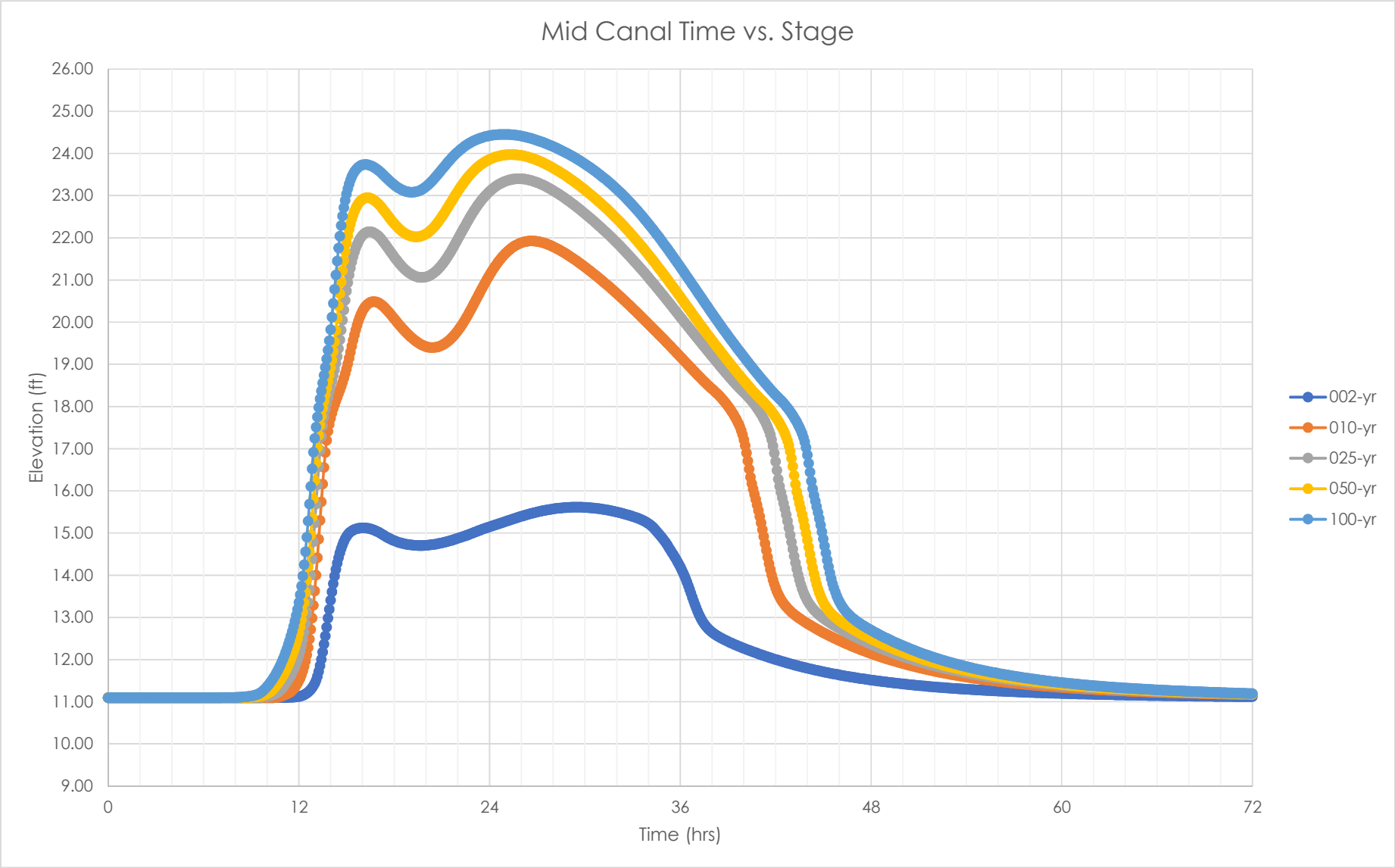
L = flow length (ft)

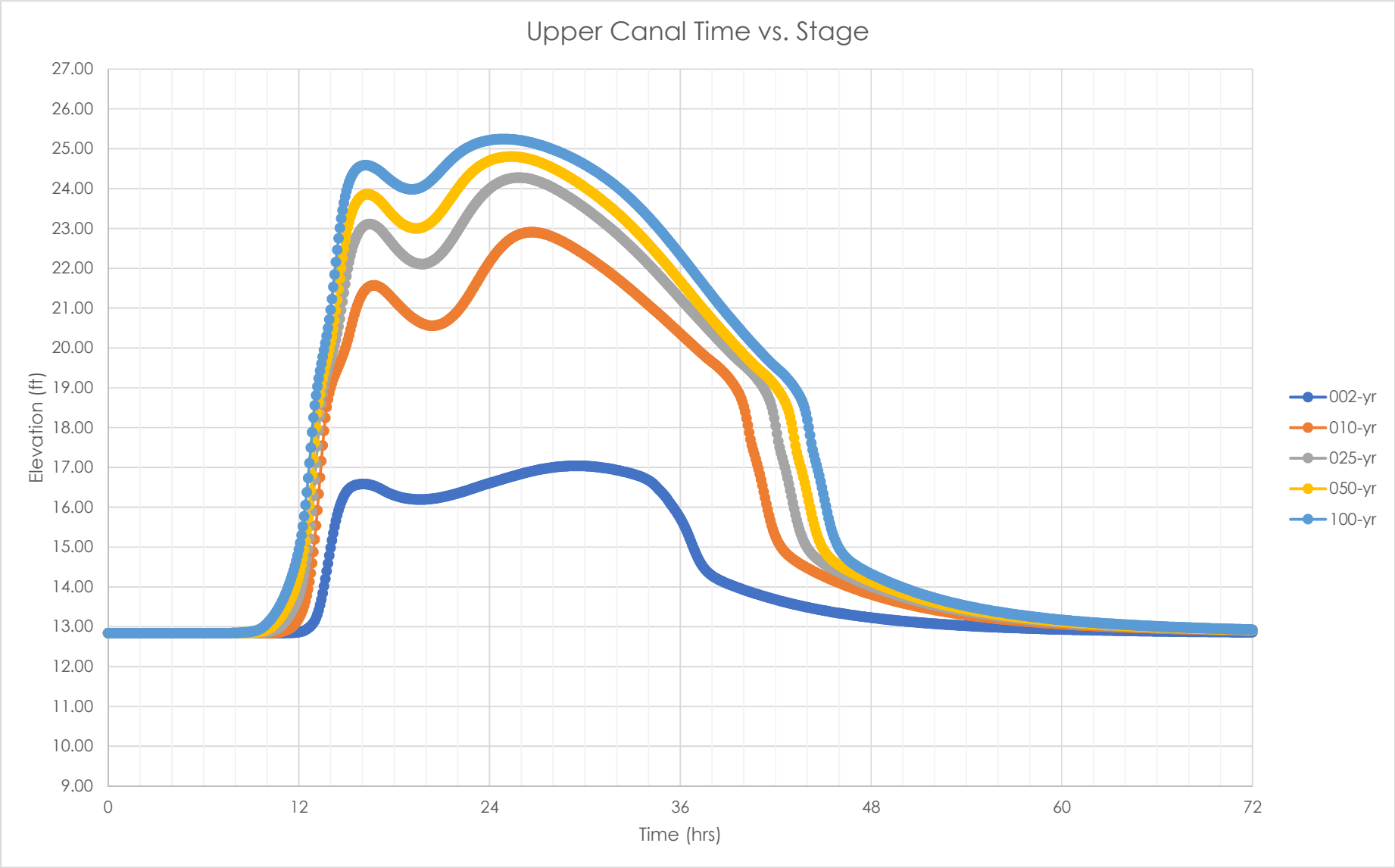
S = mean slope (%)

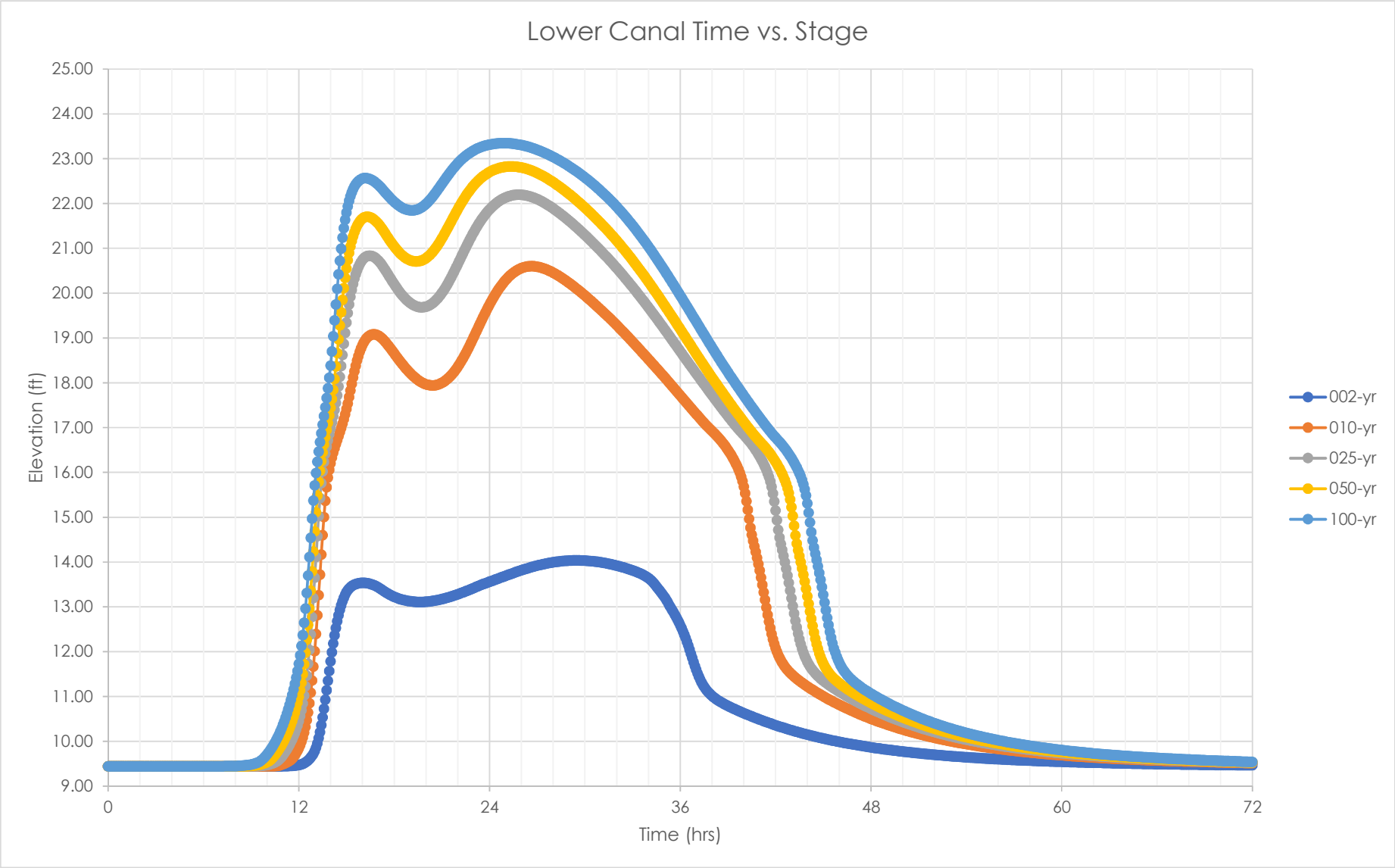
S' = (1000/CN) - 10

CN = Curve Number


Sawmill Branch Flow Hydrographs
Flows (cfs)
4000
3500
3000
2500
2000
1500
1000
500
0
0
12
24
36
48
60
72
Time (hrs)
002-yr
010-yr
025-yr
050-yr
100-yr


Mid Canal Time vs. Stage
Elevation (ft)
26.00
25.00
24.00
23.00
22.00
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
0
12
24
36
48
60
72
Time (hrs)
002-yr
010-yr
025-yr
050-yr
100-yr


Upper Canal Time vs. Stage
Elevation (ft)
27.00
26.00
25.00
24.00
23.00
22.00
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
0
12
24
36
48
60
72
Time (hrs)
002-yr
010-yr
025-yr
050-yr
100-yr


Lower Canal Time vs. Stage
Elevation (ft)
25.00
24.00
23.00
22.00
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
0
12
24
36
48
60
72
Time (hrs)
002-yr
010-yr
025-yr
050-yr
100-yr

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ARBOR OAKS DRAINAGE IMPROVEMENTS

EXHIBITS

J – 26611.0000

August 2017

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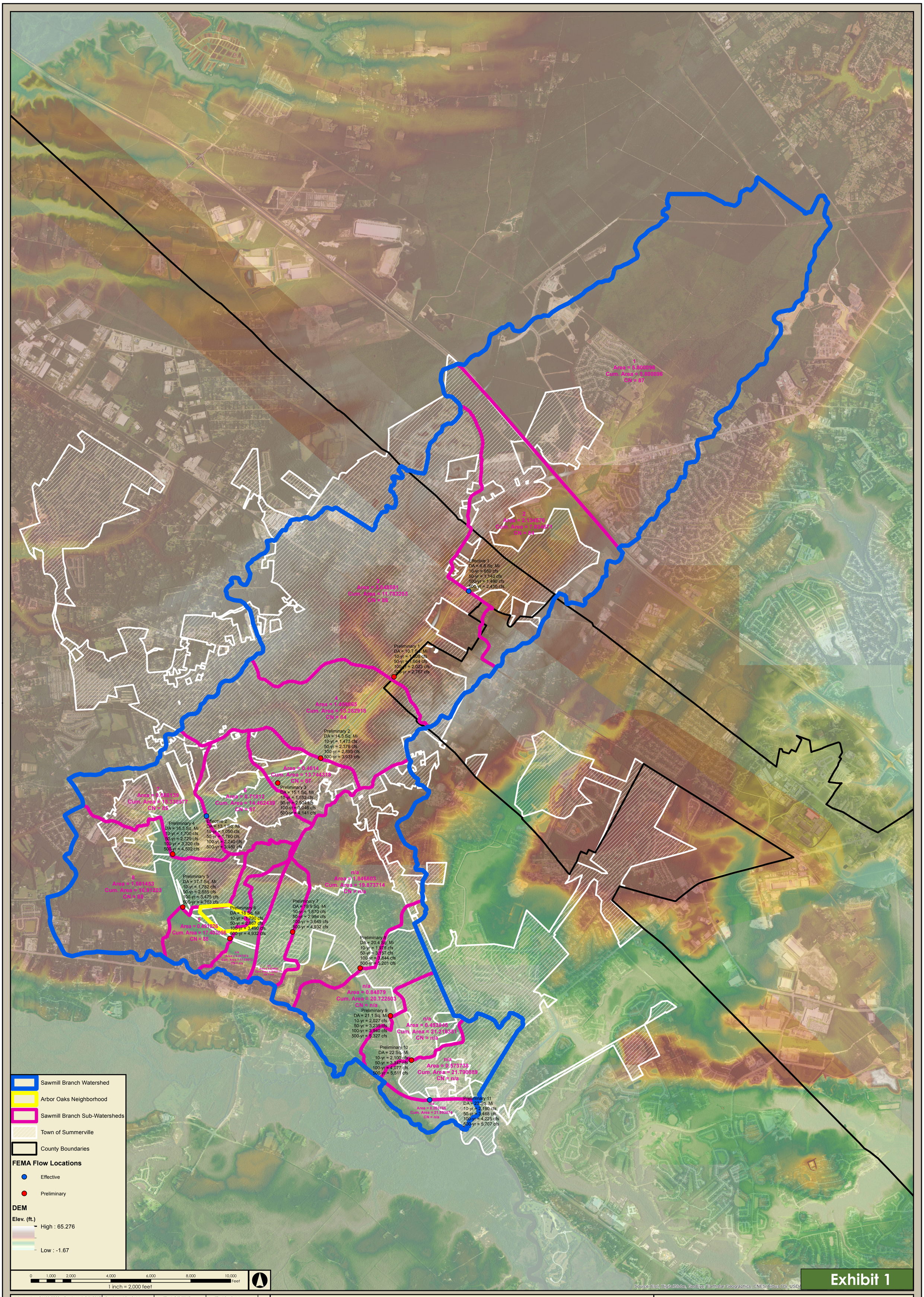

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File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Ex 1 - Sawmill Branch Watersheds.mxd			Vertical Datum:	

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
Watershed	T&H	2017
FEMA outlets	FEMA	2017
Town Boundaries	Town of Summerville	Varies
County Boundaries	Charleston Co., Berkley Co. & Dorchester Co.	Varies
DEM	Charleston Co., Berkley Co. & Dorchester Co.	2009
Basemap	ESRI	Varies

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Town of Summerville, SC

Sawmill Branch Watershed

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Job Number: 26611	Produced: 8/7/17	Produced By: HEA	Modified: 8/7/2017	Modified By: SAW
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Ex 2 - Previous Effective FIRM (NGVD 29).mxd				Vertical Datum:

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
FEMA FIRM	FEMA	1994
Parcels	Dorchester County	2014
DEM	Dorchester County	2009

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Town of Summerville, South Carolina

Previous Effective FIRM (NGVD 29)

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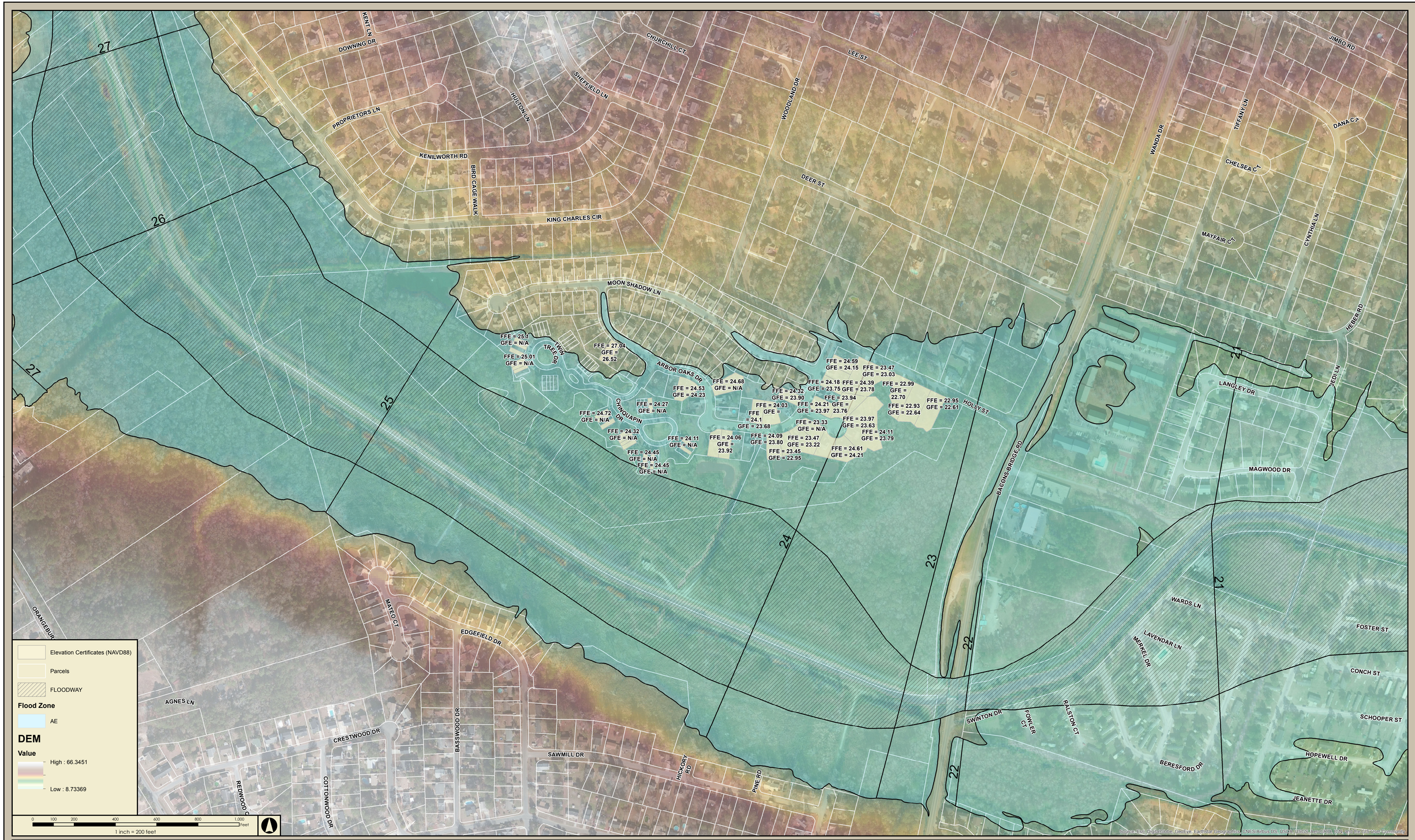
Arbor Oaks Drainage Improvements : Previous Effective FIRM

Exhibit 2



Job Number: 26611	Produced: 8/7/17	Produced By: HEA	Modified: 8/4/2017	Modified By: SAW
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Ex 3 - Effective FIRM (NAVD 88).mxd				Vertical Datum:

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Data	Source	Date
FEMA Data	FEMA	2014
Parcels	Dorchester County	2014
DEM	Dorchester County	2009

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Town of Summerville, South Carolina

Effective FIRM (NAVD88)

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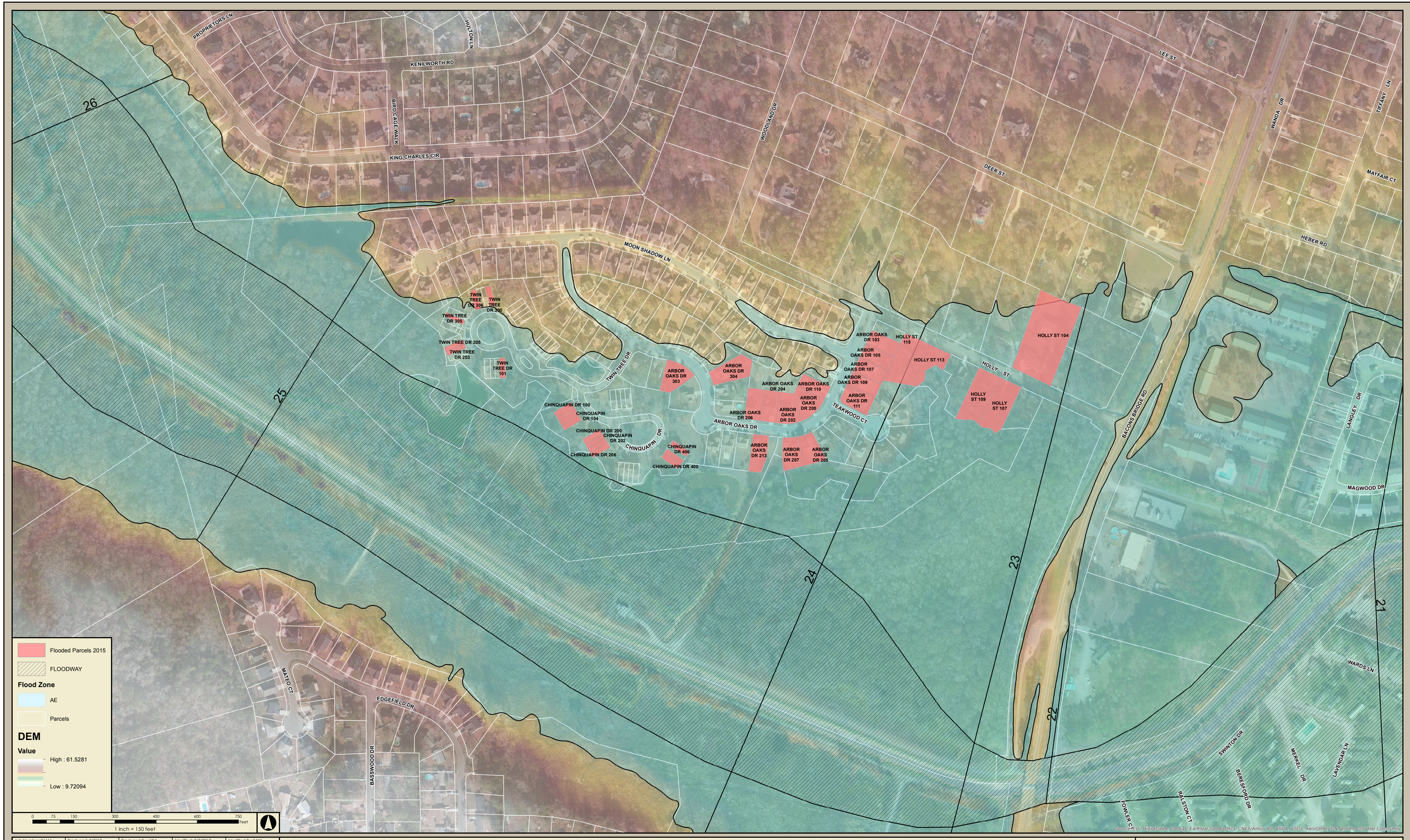
Arbor Oaks Drainage Improvements : Effective FIRM (NAVD 88)

Exhibit 3



Arbor Oaks Drainage Improvements : 2015 Flooded Parcels

Exhibit 4

Job Number: 26611	Produced: 8/7/17	Produced By: HEA	Modified: 8/7/2017	Modified By: SAW
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Ex 4 - 2015 Flooded Parcels.mxd				Vertical Datum:

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
FEMA Data	FEMA	2014
Parcels	Dorchester County	2014
DEM	Dorchester County	2009

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Town of Summerville, South Carolina

October 2015 Event Flooded Parcels

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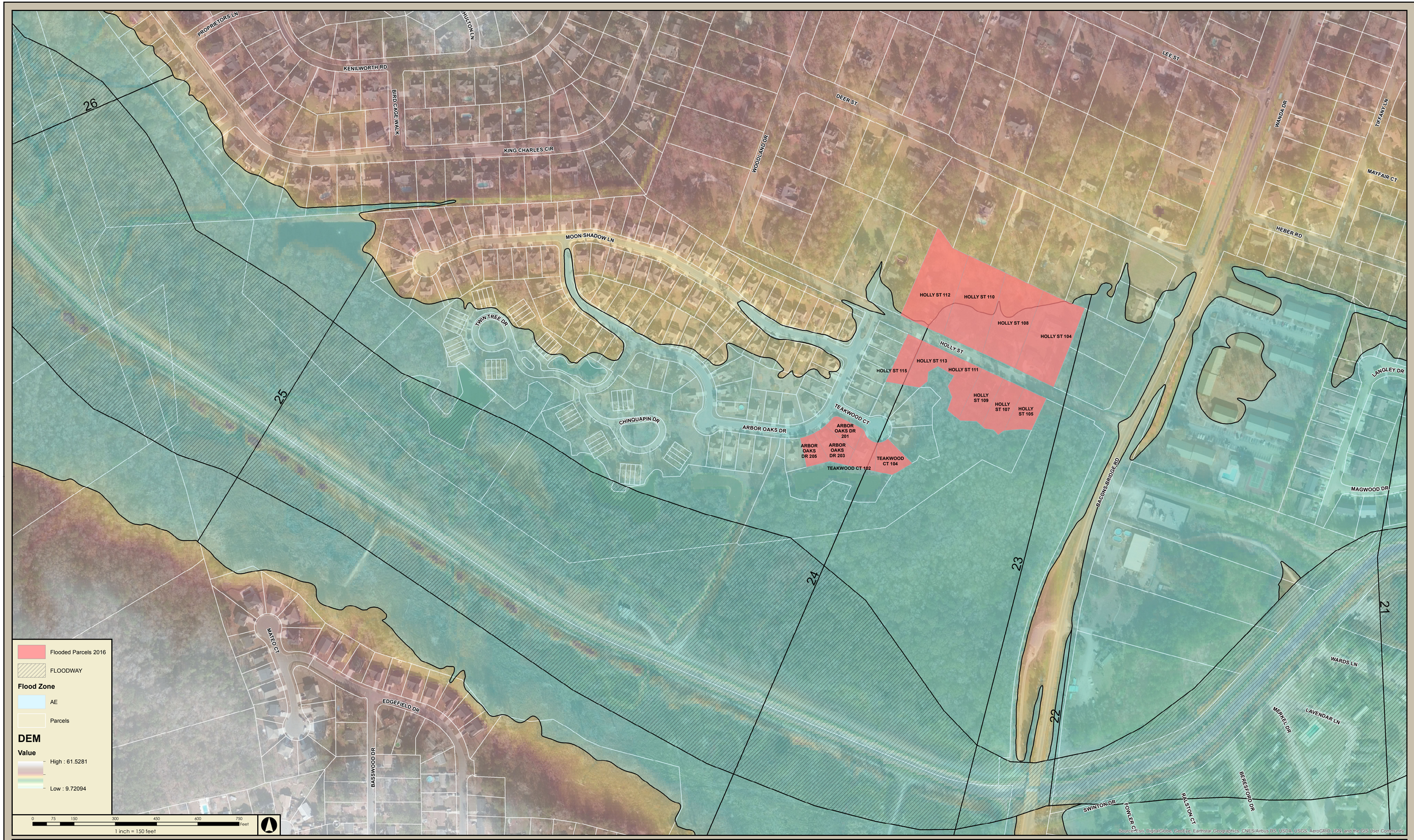

Arbor Oaks Drainage Improvements : 2016 Flooded Parcels

Job Number: 26611	Produced: 8/7/17	Produced By: HEA	Modified: 8/7/2017	Modified By: SAW
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Ex 5 - 2016 Flooded Parcels.mxd				Vertical Datum:

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Data	Source	Date
FEMA Data	FEMA	2014
Parcels	Dorchester County	2014
DEM	Dorchester County	2009

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Town of Summerville, South Carolina

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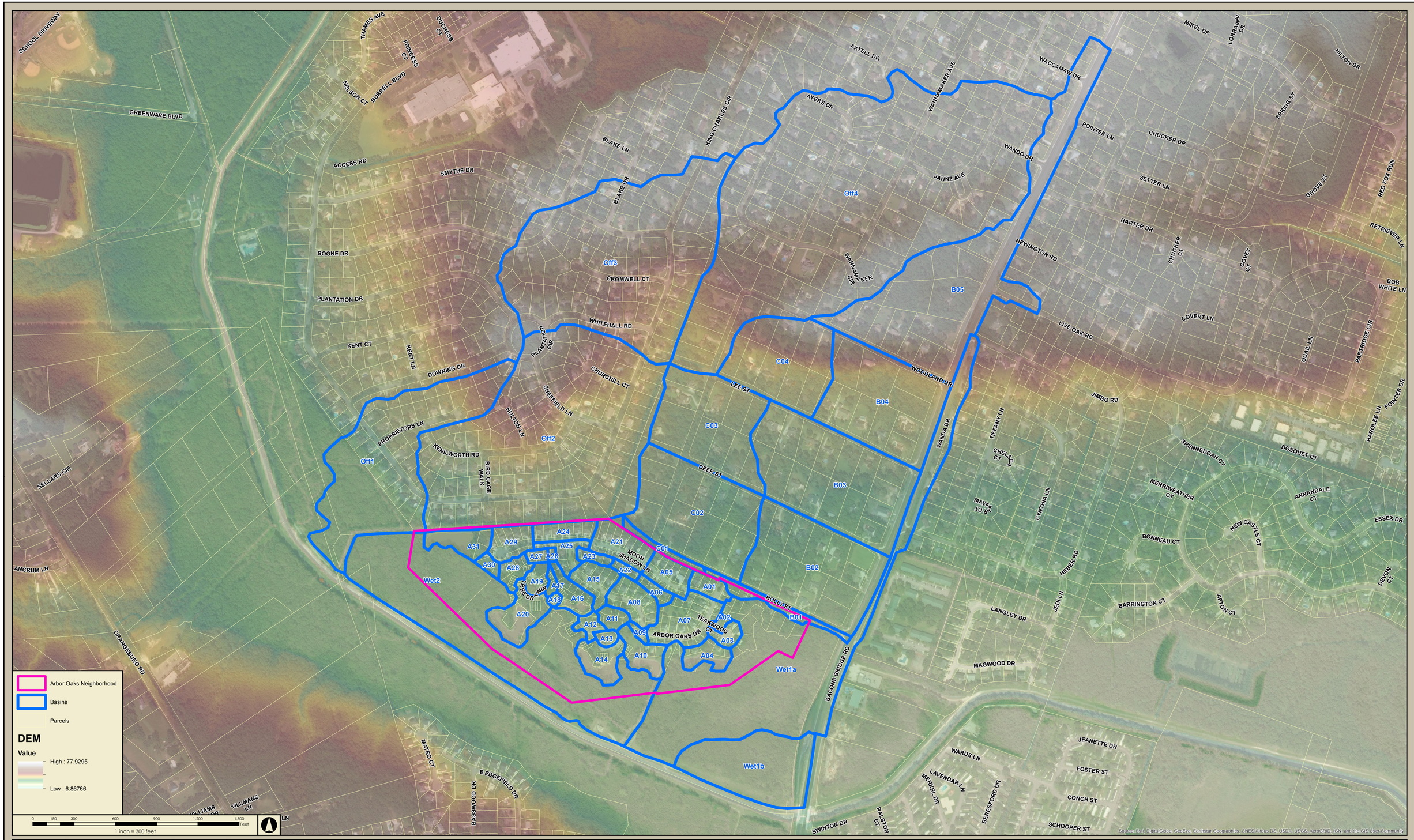
Exhibit 5



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Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
Basins	T&H	2017
Parcels	Dorchester County	2014
DEM	Dorchester County	2009

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Arbor Oaks Drainage Improvements

Town of Summerville, SC

Basin Map

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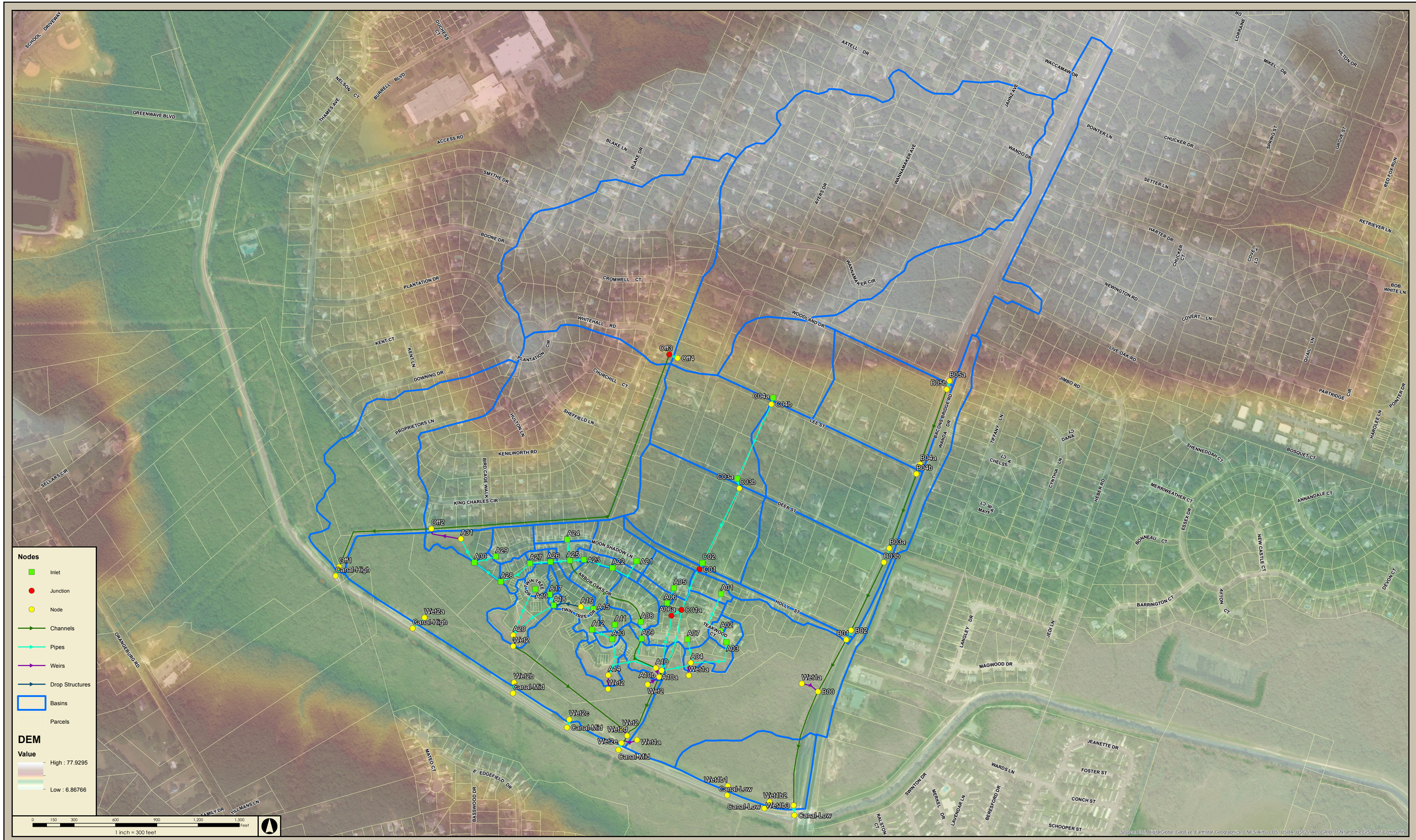
Arbor Oaks Drainage Improvements : Basin Map

Exhibit 6



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File: Z:\26611\26611.0000\GIS\Mxd's\Exhibits\Ex 7 - ICPR Network Layout.mxd				Vertical Datum:

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
Basins/Links/Nodes	T&H	2017
Parcels	Dorchester County	2014
DEM	Dorchester County	2009

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ICPR Network Layout

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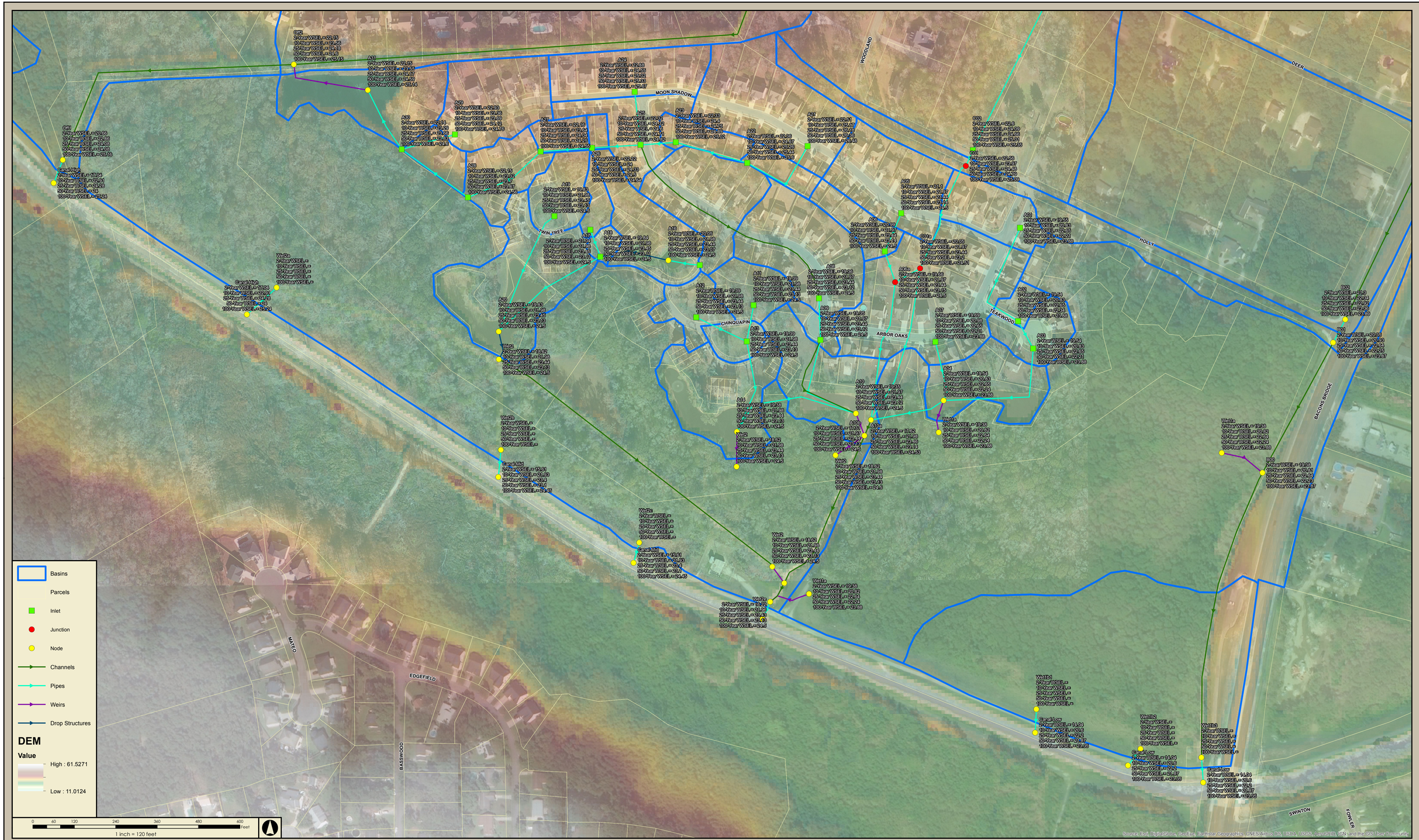
Arbor Oaks Drainage Improvements : ICPR Network Layout

Exhibit 7



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File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Ex 8 - Existing Conditions ICPR Results.mxd				Vertical Datum:

Thomas & Hutton compiled the map information from the following sources:

Data	Source	Date
Basins/Links/Nodes	T&H	2017
Parcels	Dorchester County	2014
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Town of Summerville, SC

Existing Conditions ICPR Results

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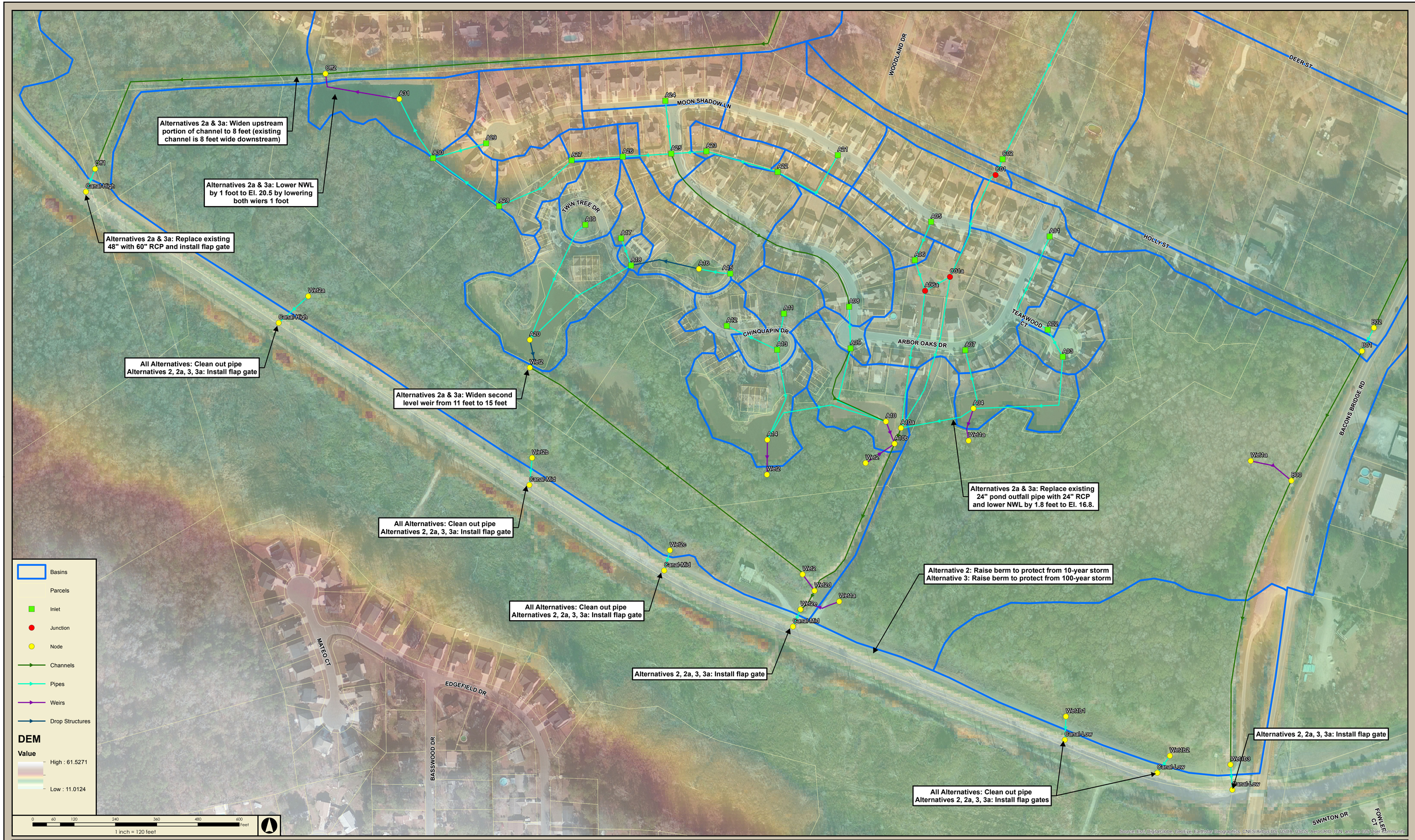
Arbor Oaks Drainage Improvements: Existing Conditions ICPR Results

Exhibit 8



Job Number: 26611	Produced: 8/7/2017	Produced By: HEA	Modified: 8/7/2017	Modified By: SAW
File: Z:\26611\26611.0000\GIS\Mxd\Exhibits\Ex 9 - Improvements.mxd				Vertical Datum:

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Data	Source	Date
Basins/Links/Nodes	T&H	2017
Parcels	Dorchester County	2014
DEM	Dorchester County	2009

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Arbor Oaks Drainage Improvements

Town of Summerville, SC

Proposed Improvements

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Arbor Oaks Drainage Improvements:Proposed Improvements

Exhibit 9