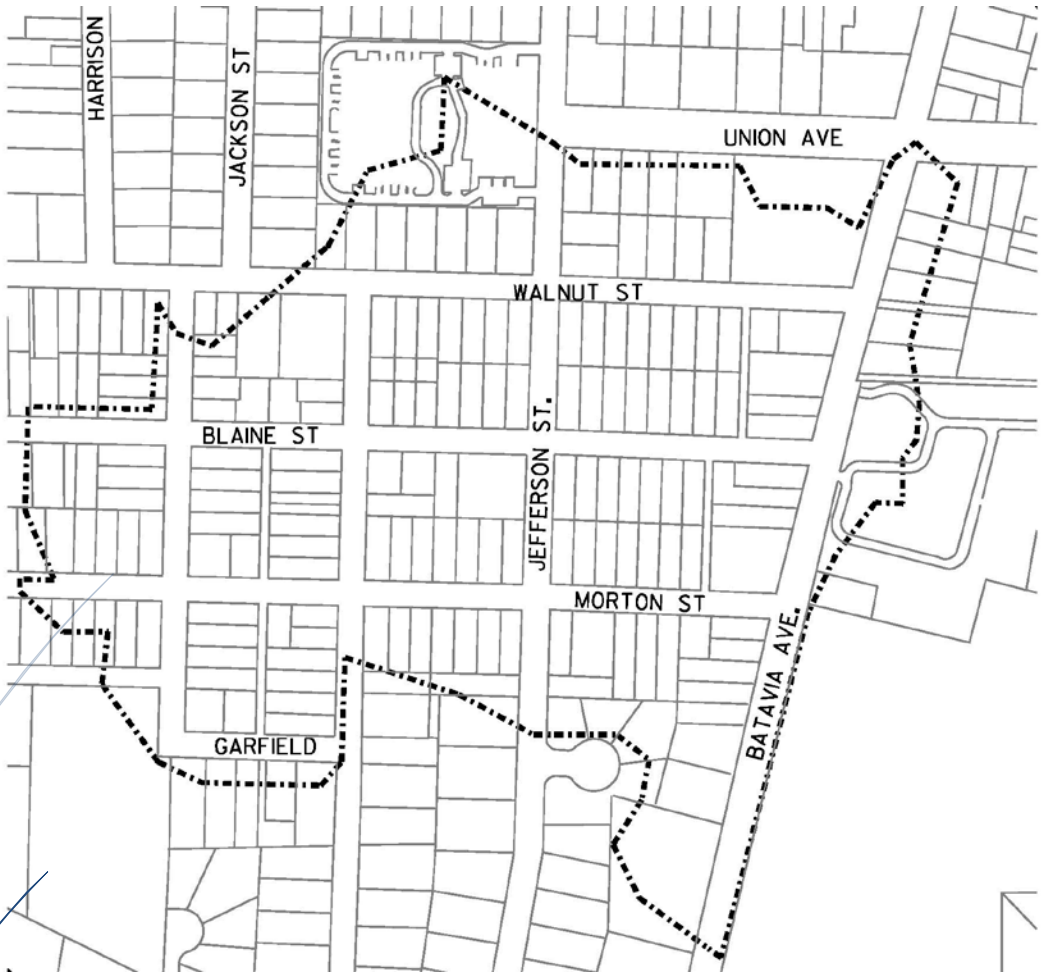
AREA 3 SEWER SEPARATION STUDY

City of Batavia, Illinois

PROJECT ROUTE:	Walnut, Blaine, Morton, Garfield, Harrison, Jackson, Jefferson & Rt. 31
LIMITS:	Walnut Street to Garfield & Old RR tracks to IL Rt 31 w/ outfall to Fox River
COUNTY:	Kane County
JOB NUMBER:	BT-624



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PREPARED FOR:
CITY OF BATAVIA ENGINEERING DEPARTMENT

DATE: SEPTEMBER 2016

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EXECUTIVE SUMMARY

Area 3 has experienced frequent flooding and numerous drainage complaints. The City of Batavia has tasked Rempe-Sharpe and Associates with investigating the scope of improvements needed to reduce the severity and frequency of flooding within Area 3 as an initial step in understanding the magnitude of infrastructure investment required.

Excepting portions of Illinois Route 31 and the West Batavia Cemetery, Area 3 is generally served by combined sewers, and therefore, the sewer normally used to convey domestic waste during dry weather conditions must also carry stormwater during rain events. Should the sewer become inundated with storm water runoff, there is little or no room to convey domestic waste and can cause sewer backups within homes. The flooding experienced in Area 3 has confirmed the existing sewer is not capable of conveying both stormwater runoff and domestic flow rates at a satisfactory level. To reduce flooding, a new separate sewer, dedicated to conveying solely stormwater is proposed. The existing combined sewer will remain in place, but would convey domestic waste only.

Rempe-Sharpe performed stormwater modeling to develop and size a preliminary storm sewer pipe network necessary to convey the stormwater runoff per the design criteria of the City (10% chance storm event) and examined the ability to re-use the existing storm sewer that currently exists within the West Batavia Cemetery using XPSWMM software.

Results of the modeling indicate the existing storm sewer within the Cemetery (27” pipe) is undersized and it will be necessary to increase the size to a larger pipe (48” diameter) or add an additional parallel 36” diameter storm sewer.

An estimated 7,200 feet of pipe ranging in size from 12 inch diameter up to 48 inch diameter and 200 storm structures will be necessary to construct a new storm sewer network sized to convey stormwater runoff for Area 3. In addition to the necessary pipe and structures required, it is anticipated due to the large number of mature trees and numerous existing utilities, most of the improvements will be constructed within the existing street, therefore over 6,000 square yards or more of street pavement will need to be removed and replaced to construct the sewer. The preliminary estimated total construction cost of the proposed improvements is just under four million dollars. The improvements can be separated into phases as needed and combined with other projects such as street resurfacing projects to reduce overall total construction costs.

INTRODUCTION

The City of Batavia's Area 3 has experienced repeated drainage complaints and sewer back-ups, with reports of flooding during the September 2008, April 2013 and June 15th 2015 rain events.

As part of the City of Batavia's initial steps to reduce the severity and frequency of flooding within Area 3, this study was commissioned to determine the potential impacts and scope of improvements needed to construct a separate relief storm sewer to service the area. This report will attempt to answer some important questions necessary for the City to determine the planning and resource allocation required to move forward with this conceptual infrastructure improvement.

EXISTING DRAINAGE SYSTEM

Almost all of Area 3 (excepting Illinois Route 31 from Morton Street to Walnut Street) is served by combined sewers, therefore the underground sanitary sewer pipe network constructed to normally carry domestic waste during clear weather conditions must also carry stormwater runoff during rain events. During normal conditions, domestic waste is transported from homes to the city's wastewater treatment plant, where the waste is filtered, treated and removed before the remaining clean water is released to the Fox River. In intense storms, the existing network of inlets and pipes becomes inundated with rainwater causing flooding in the streets. Because most of the piping is combined, flood water backs up into homes. Not only is this a concern for the damage and inconvenience that flooding causes residents, but it is also a concern for the environment. Storm water pollution can occur as untreated domestic waste, combined with rainwater, surcharges out of the undersized combined sewer and flows directly to the Fox River, instead of being treated by the waste water treatment plant. For this reason, combined sewers are no longer permitted in new construction. Typical new construction for a residential subdivision the size of Area 3 would normally require an estimated 8 to 10 inch diameter pipe sized solely to convey domestic waste and a separate system of approximately 12 to 48 inch diameter pipes to convey storm water. Area 3 is mostly served by 8 and 10 inch dimeter pipes that must convey both sanitary and stormwater waste combined. It is hypothesized that the system may actually flood more often than realized, however the natural positive slope of the surrounding area (positive street slopes to the Fox River) is able to convey some of the excess flood water via street overflows without noticeable flooding impacts to some homes.

DESIGN METHODOLOGY

Per the City of Batavia, hydrograph and hydraulic modeling of a proposed conceptual storm relief sewer is to be utilized to determine design flow rates and

pipe sizes necessary to convey the 10% chance storm for incorporation into a final design at a later date. Rempe-Sharpe utilized XPSWMM software to model the design storm hydrographs and analyze a concept level storm sewer design.

DESIGN STORMS

The storm sewer is to be sized for the 10 % chance storm (i.e. the 10 year design storm). Rainfall depths for this design storm for multiple duration events were interpolated from Figure 13. “Frequency distribution of 24-hour maximum rainfall (inches), Chicago urban area (adjusted)” from the Illinois State Water Survey Circular-173/90 *Time Distributions of Heavy Rainstorms in Illinois* then extrapolated for the durations utilized using table 2 on page 32 of the Circular. The rainfall runoff from the 0.5, 1, 2, 3, 6, 12, 18, and 24 hour storm durations for the design storm (10% chance storm) were analyzed using XPSWMM software. The first, second, third, or fourth quartile Huff distributions were utilized corresponding to the storm duration. The rainfall isohyets interpolations and corresponding rainfall depth tables for specific storm durations are included as shown on Appendix B.

The Soil Conservation Service (SCS) curve number method and Huff Distribution was chosen to develop the storm event distribution utilized for the storm sewer design. A runoff curve number of 87 was used based on an average lot size of 0.17 acres (approximately 52% impervious area) and predominately hydraulic soil group “C” soils for the watershed. See Appendix C “Hydrologic Soil Group and Curve Number Calculation”.

Area 3 is fairly homogenous in terms of its land use cover (residential subdivision homes) and has relatively symmetric block sizes and land slope. Because the area is uniform, and inlet times of concentration are not expected to vary significantly from one inlet cluster to the next, a typical “grab sample” inlet area time of concentration was computed at 0.33 hours (19.8 minutes). Rempe-Sharpe utilized 0.25 hours (15 minutes) as a conservative average time of concentration, universally applied to all inlet clusters. The time of concentration calculation is shown on Appendix D.

The critical storm duration (1 hour) was determined by the duration which produced the highest peak discharge at the design storm sewer’s outfall (90 cfs).

HISTORICAL STORMS

The City of Batavia received several reports of flooding caused by the storm event on June 15th 2015 (see “City of Batavia 2015 Flood Reports” exhibit– Appendix I) The event was a short duration (approximately 3 hours) but intense storm (3.9 inches, at approximately a max of 2.72 inches per hour). The event was estimated, according to historical data, as a storm event with a return internal having a 4%

chance of being equaled or exceeded in any given year (25 year storm). The event was likely exacerbated by the nearly 2 inches of rainfall that fell during the previous 4 days, saturating soils and increasing runoff potential. Per the IDOT Drainage Manual: "The type of rainstorm that most frequently produces flash floods in Illinois and the United States is very localized and produces a large amount of rainfall. According to Changnon and Vogel (1981), these storms usually last from 3 to 12 hours, significantly affect fewer than 400 square miles, and have 1 to 4 hour rainfall totals in excess of 3 inches. Changnon and Vogel's study indicates that approximately 40 of these storms will occur in an average year in Illinois, or about one for every 1,500 square miles of territory…."

The June 15th 2015 historical storm event was input into the model to enable a secondary alternative analysis or "design check" (other than the design storms noted below) of the proposed storm sewers conceptual design performance. The rainfall event was developed by Rempe-Sharpe from data obtained from the City of Batavia. The data utilized for the storm is included in Appendix A "June 15th Rain Data".

TRIBUTARY DRAINAGE AREAS

Drainage areas were developed and delineated by hand within Microstation CADD software using 2 foot Kane County contour topography (interpolated to 1 foot intervals), supplemented with Kane County Aerial photography and field investigation. Reasonableness of the Kane County topography for use in determining tributary drainage areas was checked against field survey elevations and was found to be acceptable. All streets are generally crowned with full curb and gutter, therefore it was assumed runoff will typically follow the curb line in normal drainage conditions and not cross the centerline of the street, and lot ridge line high points would generally follow the roof ridgeline of the houses. The general drainage patterns and tributary drainage areas are shown on the "Aerial Drainage Exhibit" and "Contour Drainage Exhibit" in the Appendix E folder of this report. The delineated areas were measured electronically within Microstation for input directly into the model. The total areas tributary to the outfall of the system is 53.14 acres.

PROPOSED STORM SEWER SYSTEM / MODELING ASSUMPTIONS

Reuse of the Existing Sanitary Sewer

Because most of the existing sewer network generally consists of combined sewers which appear to function satisfactorily in conveying domestic waste during dry conditions, and therefore, can likely continue to be utilized to do such, the existing combined sewer is expected to remain. Its new function however, will be to solely convey domestic (sanitary) waste only. Therefore, to remove stormwater from the existing sanitary system, a new separate sewer will be necessary to convey stormwater runoff.

Proposed Storm Sewer Routing

The proposed storm sewer concept routing for this separate system was prioritized first by purposefully following the natural slope of the land as shown on the "Contour Drainage Exhibit" in the Appendix E. This is typical design procedure because it generally minimizes required construction depth and provides the largest change in grade to maximize storm sewer slopes, thus allowing reduced required pipe sizes. Then, near Illinois Route 31 and at the West Batavia Cemetery, the proposed storm sewer follows the route of the existing storm sewer. This was done because the existing storm sewer will most likely either be reused if possible, supplemented with additional pipe, or need to be removed and replaced. If one of these assumptions is correct, there should be room to locate supplemental or replacement sewer in the same location as the existing as to not disturb existing grave sites.

Proposed Rim, Inverts and Inlet Modeling

Where detailed field survey data was obtained, the surveyed existing rim, invert and pipe size was input into the model (along the cemetery and near Route 31). In other areas along the residential streets, only rim elevations were utilized in the model because no main line storm sewer exists. Representative street center line elevations and field identified inlet locations/elevations are shown on the topographic survey exhibit in Appendix H. As the scope of this report is preliminary, only the proposed main storm sewer is modeled. Inlets clusters are represented by "Nodes" in the model. These inlet clusters or "Nodes" are located at all intersections and schematically represent a group of inlets needed to adequately drain an intersection. The inclusion of minor elements was beyond the project scope and was not necessary to adequately and appropriately reflect the overall system performance. "Inlet cluster" rim elevations were set based on the lowest nearby field survey inlet rim elevation rounded to 0.10 feet. Additional sag inlets and on grade inlets will need to be added during the final design of the storm sewer as necessary, sized for inlet capacity and permissible pavement encroachment width as well as sump junction box connections where necessary. All flow tributary to a main line structure node is assumed to reach the node without restriction and 100% flow capture.

Sewer Sizing and Modeling

A "manning's n" roughness coefficient of 0.013 was utilized for the mainline pipes. An entrance and exit energy loss K coefficient of 0.15 was used to account for minor losses at all manhole junctions. Dynamic Wave modeling is necessary to account for backwater conditions caused by the restrictive outlet pipes or tailwater conditions and was therefore utilized in the model. Pipe sizes and slopes were developed to convey design flows by trial and error using XPSWMM design tools and engineering evaluation of the systems overall performance. Based on discussions with and concurrence with staff, storm sewer design was also purposefully set deep to clear existing sanitary crossings along Route 31

(proposed storm pipe under existing sanitary). It is believed deep storm sewer will minimize conflicts and therefore limit necessary utility relocations thereby reducing overall construction costs. The preliminary pipe sizes are shown on the Aerial Drainage Exhibit in Appendix E. It should be noted that parts of the system are undersized, meaning some sections of proposed pipe have a calculated capacity less than the estimated peak flow required, however under slightly surcharged conditions the pipe will have sufficient capacity to convey the flow. Also, proposed concept level pipe sizes are smaller than existing pipe sizes in a few locations (specifically along Walnut street, the northern portion of Illinois Route 31 and the east end of Blaine Street) because only the minimum pipe size necessary to convey design flow was computed. Existing storm sewer does not need to be replaced, if during final design, it is determined it will provide the required design capacity and can be incorporated into the overall system design. Maps of the existing pipe sizes for these select locations are included in Appendix K.

Design Storm Hydrograph Routing

The storm sewer and rainfall hydrographs were modeled simultaneously using XPSWMM software (XPSWMM version: May 16, 2014 build). The 10% chance storm (10 year) critical duration (1 hour) event produces a peak outfall discharge of 90 cfs. The June 15th, 2015 storm had a computed peak outfall discharge of approximately 115 cfs. The capacity of the existing 27” storm sewer within the cemetery has a capacity of approximately 15 to 32 cfs depending on its slope, therefore, design for a 10% chance storm will necessitate increasing the existing 27” storm sewer within the cemetery to a 48 inch diameter or hydraulic equivalent pipe. It may be possible to utilize the existing 27 inch pipe near the outfall (the last 400 feet or so) as the steep slope provides capacity, however the standard and recommended design option would normally dictate uniform downstream pipes sizes and not decreasing from a 48 inch diameter to 27 inch diameter pipe. Utilizing the existing pipe and outfall may be considered as a viable option because it would reduce construction cost and eliminate some of the limitations of working within tight working conditions (existing trees, bedrock, steep slopes) as well as the need for obtaining Army Corps or Illinois Department of Natural Resources permits. Utilizing the existing undersized pipe and outfall however must also consider that the discharge velocity will increase, increasing the potential for erosion, and the existing pipe may be in need of repair or replacement anyway.

The concept design of the proposed storm sewer is sized for the 10% chance storm. The storm sewer has capacity for the computed discharge at all locations within the system excepting links 9 & 10 where minor surcharge (0.2 feet) above the crown of the pipe will be necessary to convey the design flow of 90 cfs within the 72 cfs capacity pipe. The system also has capacity to convey the June 15th storm, however the proposed pipe will be surcharged to almost the rim elevation in some locations (nodes 21 and 22). The results of the design storm analysis are summarized in the enclosed tables (Appendix F).

Conceptual Design Caveats

Only the sanitary sewer utility crossings at Illinois Route 31 were reviewed for conflict with the proposed storm sewer. These existing sanitary sewer elevations were estimated based on GIS data received from Batavia; therefore final design will need to verify these and all other utility crossings against survey data. Adjustments to the design will be necessary depending on final proposed location and field conditions encountered. Minor adjustments should be able to be readily made by adjusting inverts, slopes and storm sewer shape (circular to elliptical) as necessary.

COST ESTIMATE

The preliminary concept estimate of probable storm sewer construction cost is $3,991,000.00. A detailed breakdown of the estimate and assumptions is included in Appendix G.

CONSTRUCTION PHASING

It is recommended, if possible, to coordinate the construction of proposed improvements concurrently with street reconstruction projects to limit removal and replacement of existing pavement only once, for efficient use of storm utility and street improvement funding. For future design purposes a list of existing streets and when they were last paved is attached in Appendix J. Other similar projects, such as watermain or sanitary replacement should also be considered for concurrent construction. Phasing must be started from the outfall and work upstream. First the Main line trunk sewer could be constructed up to any point after which lateral trunk sewer could be connected immediately or years later at any point where the main trunk has been extended.

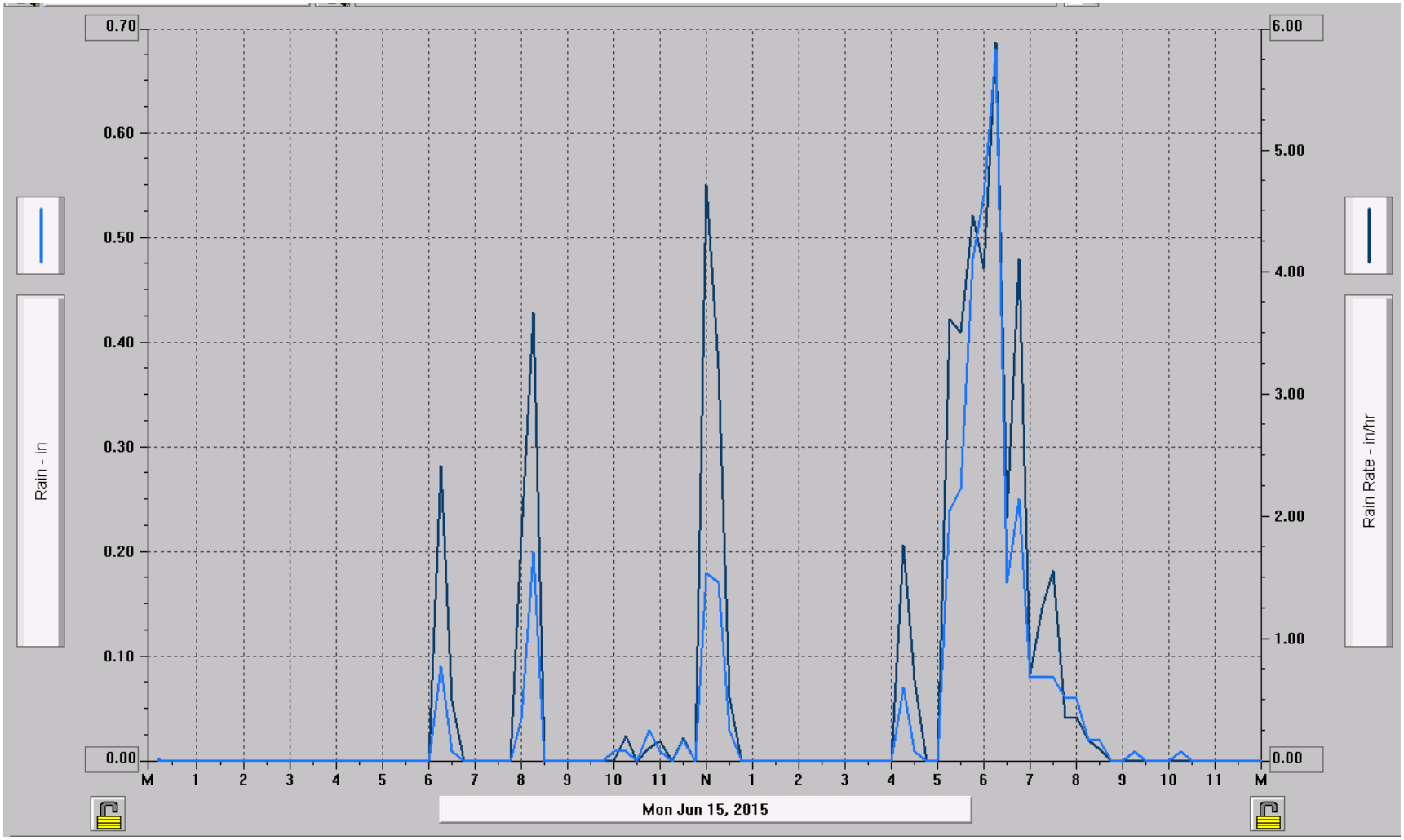
It is strongly advised, final design of the entire drainage network be completed at one time prior to construction of any phase. This will ensure all parts of the system will work together when the project is completely built out, taking into consideration all utility conflicts and utility relocations necessary. After final design is completed, the project may be separated into any preferred phasing desired to be completed as funding and resources allow.

APPENDIX A
JUNE 15 RAIN DATA

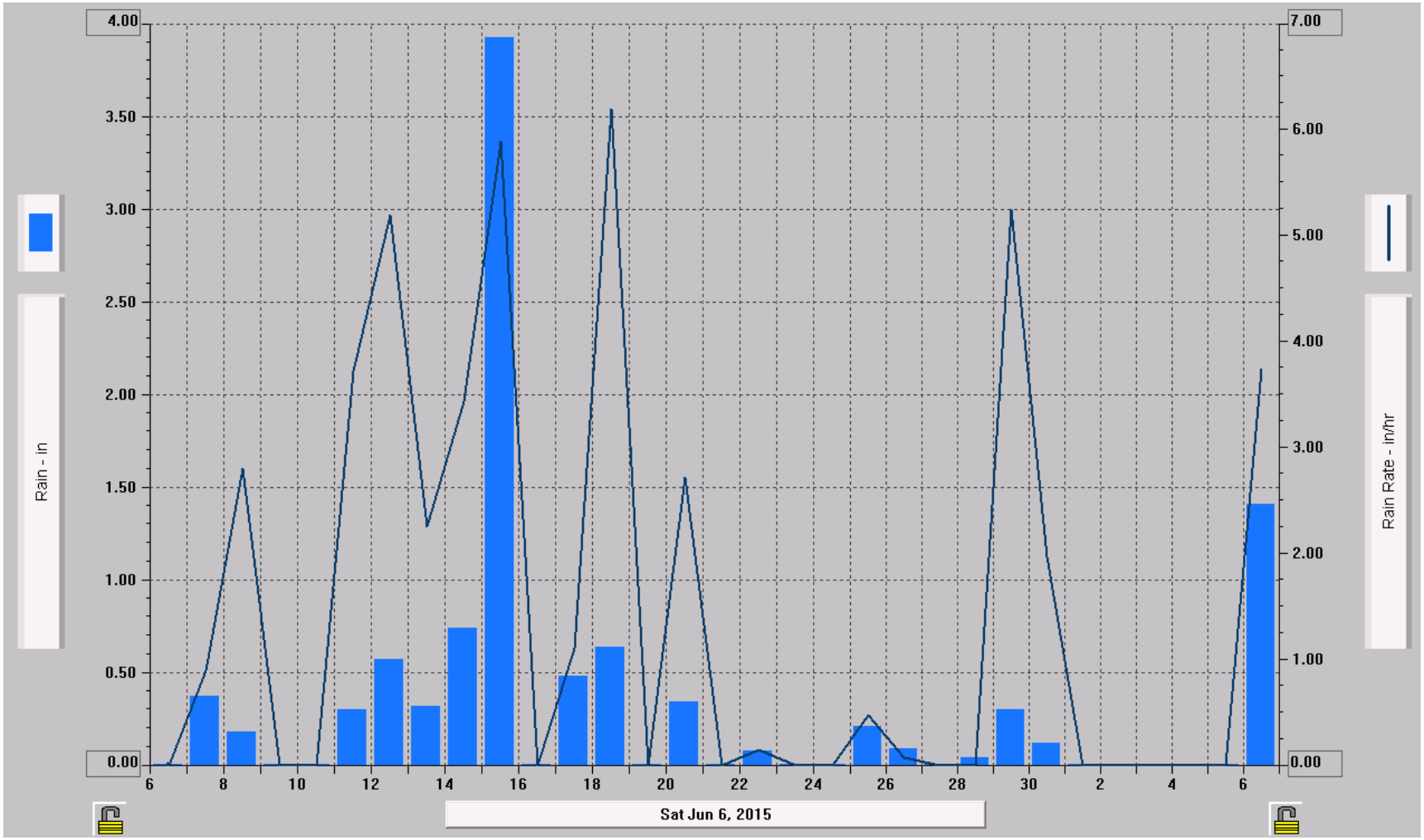
DATE	TIME	RAINFALL (INCHES)		
6/15/2015	6:00	0		
6/15/2015	6:15	0.08		
6/15/2015	6:30	0.01		
6/15/2015	6:45	0		
6/15/2015	7:00	0		
6/15/2015	7:15	0		
6/15/2015	7:30	0		
6/15/2015	7:45	0		
6/15/2015	8:00	0.04		
6/15/2015	8:15	0.2		
6/15/2015	8:30	0		
6/15/2015	8:45	0		
6/15/2015	9:00	0		
6/15/2015	9:15	0		
6/15/2015	9:30	0		
6/15/2015	9:45	0		
6/15/2015	10:00	0.01		
6/15/2015	10:15	0.01		
6/15/2015	10:30	0		
6/15/2015	10:45	0.03		
6/15/2015	11:00	0.01		
6/15/2015	11:15	0		
6/15/2015	11:30	0.02		
6/15/2015	11:45	0		
6/15/2015	12:00	0.18		
6/15/2015	12:15	0.17		
6/15/2015	12:30	0.03		
6/15/2015	12:45	0		
6/15/2015	1:00	0		
6/15/2015	1:15	0		
6/15/2015	1:30	0		
6/15/2015	1:45	0		
6/15/2015	2:00	0		
6/15/2015	2:15	0		
6/15/2015	2:30	0		
6/15/2015	2:45	0		
6/15/2015	3:00	0		
6/15/2015	3:15	0		
6/15/2015	3:30	0		
6/15/2015	3:45	0		
6/15/2015	4:00	0		
6/15/2015	4:15	0.07		
6/15/2015	4:30	0.01		
6/15/2015	4:45	0		
6/15/2015	5:00	0		
6/15/2015	5:15	0.24		
6/15/2015	5:30	0.26		
6/15/2015	5:45	0.48		
6/15/2015	6:00	0.54		
6/15/2015	6:15	0.68	2.72	inches /hour max
6/15/2015	6:30	0.18		
6/15/2015	6:45	0.25		
6/15/2015	7:00	0.08		
6/15/2015	7:15	0.08		
6/15/2015	7:30	0.08		
6/15/2015	7:45	0.06		
6/15/2015	8:00	0.06		
6/15/2015	8:15	0.02		
6/15/2015	8:30	0.02		
6/15/2015	8:45	0		
6/15/2015	9:00	0		
6/15/2015	9:15	0.01		
6/15/2015	9:30	0		
6/15/2015	9:45	0		
6/15/2015	10:00	0		
6/15/2015	10:15	0.01		
6/15/2015	10:30	0	**3.13**	total inches

(developed from June 15 Rain Data Provided by City of Batavia - see page 2)

APPENDIX A
JUNE 15 RAIN DATA



APPENDIX A
JUNE 15 RAIN DATA



APPENDIX A
JUNE 15 RAIN DATA

We had 4” of rain on June 15th with about 1” in the morning prior to the main system and another 3” with the main system. Looks like the evening rain was about 3” in a 2-hour time frame with the highest rainfall rate at 6” per hour. Also included is the same info starting with June 6th so one could see that we had a fair amount of rain in the days prior to the June 15 event.

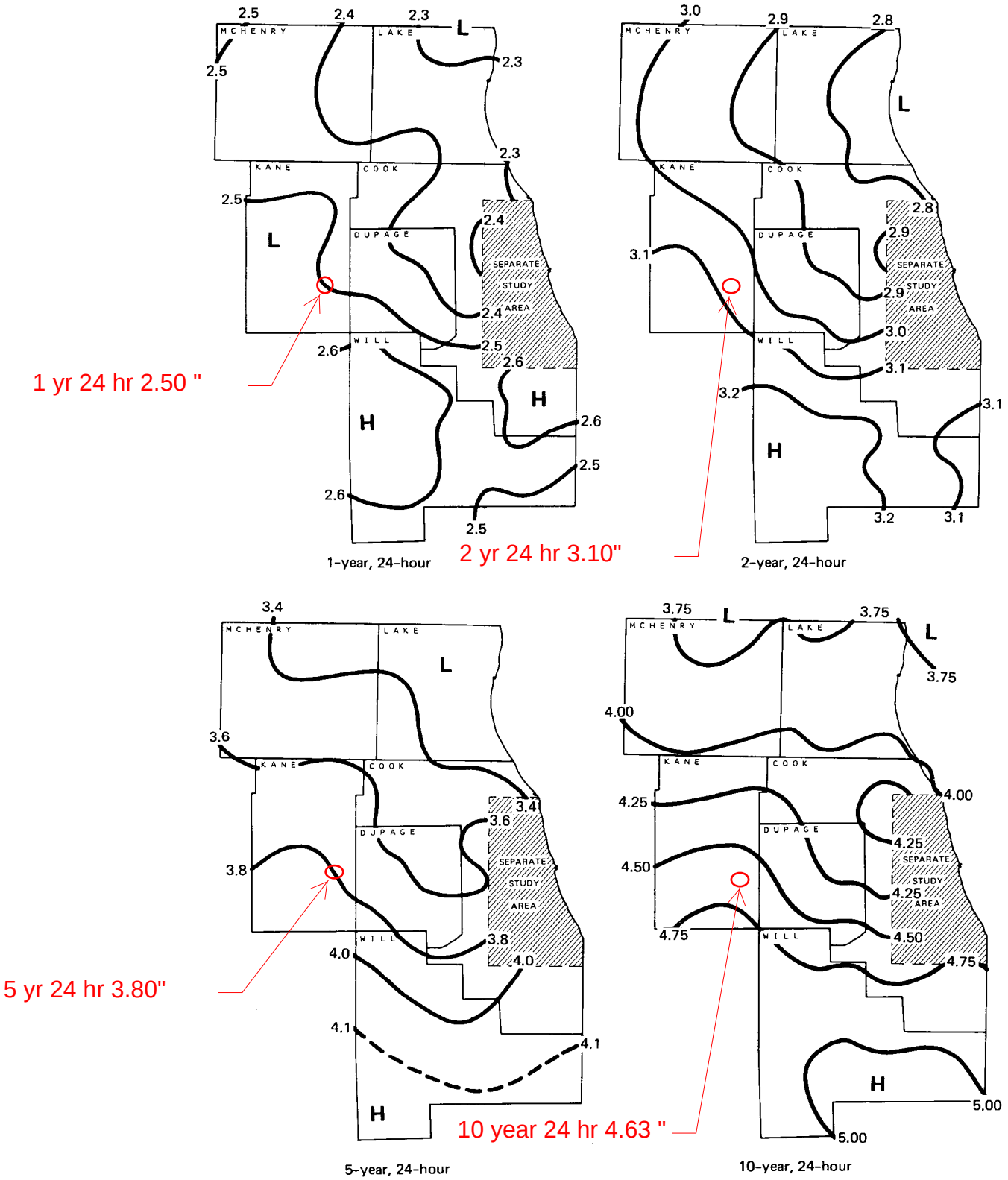


Figure 14. Frequency distribution of 24-hour maximum rainfall (inches), six-county area (adjusted)

Excerpt from ISWS Cir 173/90 Figure 13. “Frequency distribution of 24-hour maximum rainfall (inches), Chicago urban area (adjusted)”

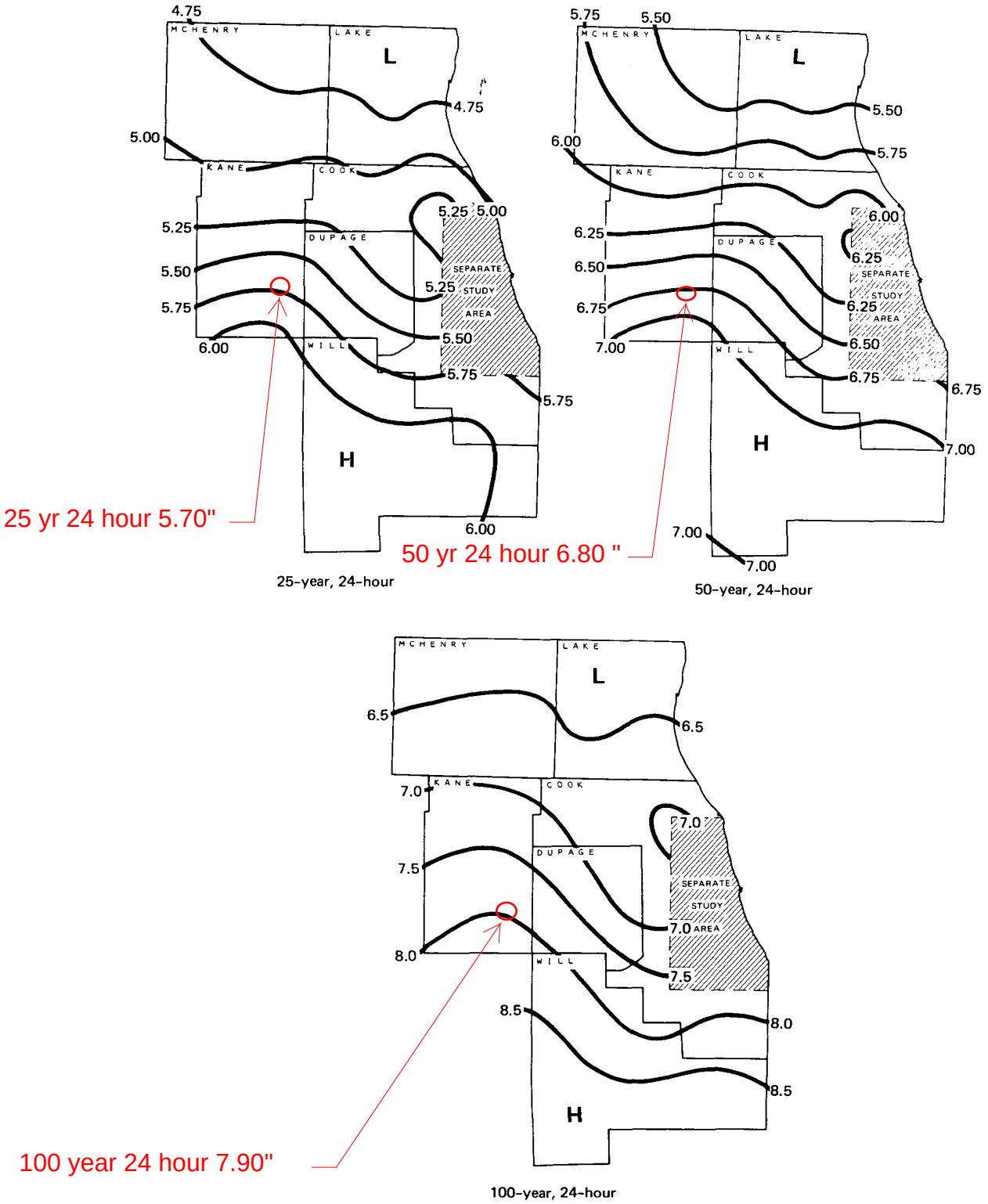


Figure 14. Concluded

Table 2. Average Ratios of X-Hour/24-Hour Rainfall for Illinois

Storm period (hours)	*Ratio, x-hr/24-hr*
0.08 (5 min.)	0.12
0.17 (10 min.)	0.21
0.25	0.27
0.50	0.37
1	0.47
2	0.58
3	0.64
6	0.75
12	0.87
18	0.94
24	1.00
48	1.08
72	1.16

Table 3. Ratios of Illinois Rainfall Amounts for Recurrence Intervals of Less than 1 Year to Rainfall Amounts for Recurrence Intervals of 1 Year, for Various Rainstorm Periods

	Ratio, x-month to 12-month rainfall amount for given rainstorm period				
Storm period	*2 months*	*3 months*	*4 months*	*6 months*	*9 months*
≤24 hours	0.55	0.64	0.70	0.81	0.92
48 hours	0.53	0.62	0.69	0.80	0.92
72 hours	0.52	0.61	0.69	0.80	0.92

Table 3 shows the relationship between 1-year and shorter-interval frequency values for various rain periods (Huff and Angel, 1989). Table 3 can be used if one desires recurrence-interval values for 2 to 9 months.

The following examples illustrate how to use figure 13 or 14 in conjunction with tables 2 and 3 to calculate frequency values for any given situation. Assume that a user wishes to calculate the maximum 6-hour rainfall expected to occur, on the average, once in 25 years at Aurora (figure 12). The 24-hour map for a 25-year recurrence (figure 14) shows a value of 6.00 inches at Aurora. Table 2 shows that the 6-hour/24-hour ratio is 0.75. Multiplying 6.00 by 0.75 gives a value of 4.50 inches for the 6-hour, 25-year storm.

RAINFALL DATA DEVELOPED FROM ISWS CIRCULAR 172 ISOHETS
TOTAL RAINFALL (INCHES) AND CORESPONDING INTENSITY (INCHES/HOUR)
FOR LOCATION: AREA 3 BATAVIA, ILLLINOS

INCHES

Storm Duration	5 minutes	10 minutes	15 minutes	30 minutes	60 minutes	120 minutes	180 minutes	6 hours	12 hours	18 hours	24 hours
6 months	0.24	0.43	0.55	0.75	0.95	1.17	1.30	1.52	1.76	1.90	2.03
1 Year	0.30	0.53	0.68	0.93	1.18	1.45	1.60	1.88	2.18	2.35	2.50
2 Year	0.37	0.65	0.84	1.15	1.46	1.80	1.98	2.33	2.70	2.91	3.10
5 Year	0.46	0.80	1.03	1.41	1.79	2.20	2.43	2.85	3.31	3.57	3.80
10 Year	0.56	0.97	1.25	1.71	2.18	2.69	2.96	3.47	4.03	4.35	4.63
25 Year	0.68	1.20	1.54	2.11	2.68	3.31	3.65	4.28	4.96	5.36	5.70
50 Year	0.82	1.43	1.84	2.52	3.20	3.94	4.14	5.10	5.92	6.39	6.80
100 Year	0.95	1.66	2.13	2.92	3.71	4.58	5.06	5.93	6.87	7.43	7.90

DEVELOPED FROM TABLE 13 ON PAGE 29 OF ISWS CIR 172, 24 HR STORMS, THEN EXTRAPOLATED FOR THE DURATIONS SHOWN USING TABLE 11 ON PAGE 22

INCHES/HOUR

Storm Duration	5 minutes	10 minutes	15 minutes	30 minutes	60 minutes	120 minutes	180 minutes	6 hours	12 hours	18 hours	24 hours
1 Year	3.60	3.15	2.70	1.85	1.18	0.73	0.53	0.31	0.18	0.13	0.10
2 Year	4.46	3.91	3.35	2.29	1.46	0.90	0.66	0.39	0.22	0.16	0.13
5 Year	5.47	4.79	4.10	2.81	1.79	1.10	0.81	0.48	0.28	0.20	0.16
10 Year	6.67	5.83	5.00	3.43	2.18	1.34	0.99	0.58	0.34	0.24	0.19
25 Year	8.21	7.18	6.16	4.22	2.68	1.65	1.22	0.71	0.41	0.30	0.24
50 Year	9.79	8.57	7.34	5.03	3.20	1.97	1.38	0.85	0.49	0.36	0.28
100 Year	11.38	9.95	8.53	5.85	3.71	2.29	1.69	0.99	0.57	0.41	0.33

DEVELOPED FROM THE ABOVE TABLE CONVERTING TOTAL INCHES TO INCHES/HOUR

Table 2-2a Runoff curve numbers for urban areas [1]

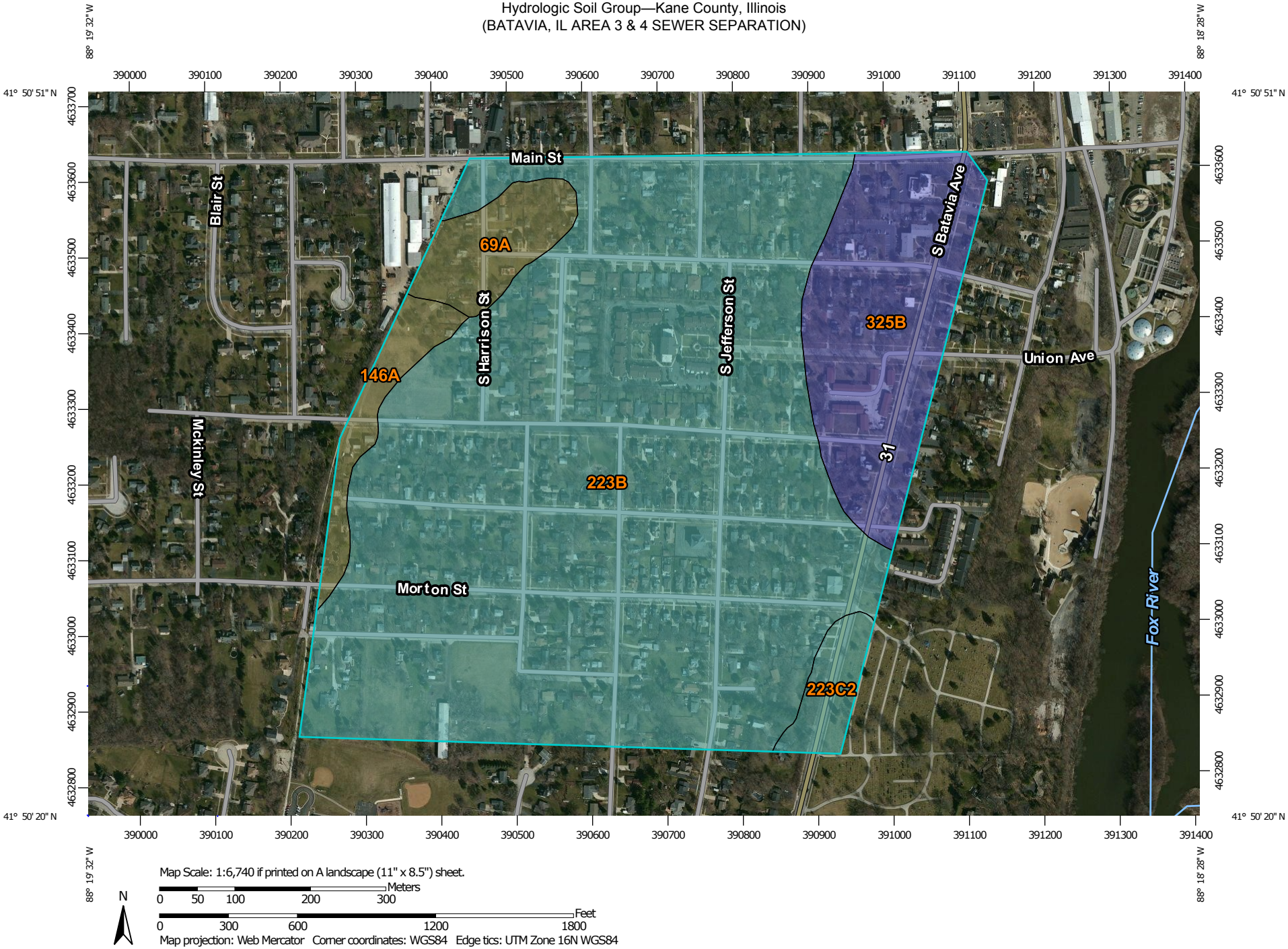
Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1/6 acre lot is average of 1/8 acre and 1/4 acre lot
for "C" soils (90+83)/2 = 86.5, say 87

[1] Average runoff condition, and $I_a = 0.2S$.
[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

APPENDIX C
HYDROLOGIC SOIL GROUP AND CURVE NUMBER CALCULATION

Hydrologic Soil Group—Kane County, Illinois
(BATAVIA, IL AREA 3 & 4 SEWER SEPARATION)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Kane County, Illinois
Survey Area Data: Version 9, Sep 25, 2015

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

Date(s) aerial images were photographed: Mar 13, 2012—Mar 28, 2012

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Kane County, Illinois (IL089)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
69A	Milford silty clay loam, 0 to 2 percent slopes	C/D	5.6	3.9%
146A	Elliott silt loam, 0 to 2 percent slopes	C/D	4.1	2.9%
223B	Varna silt loam, 2 to 4 percent slopes	C	109.7	76.7%
223C2	Varna silt loam, 4 to 6 percent slopes, eroded	C	3.1	2.2%
325B	Dresden silt loam, 2 to 4 percent slopes	B	20.4	14.3%
Totals for Area of Interest			**143.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

APPENDIX D
TC CALCULATION

Time of Concentration

Basin	**Typical (use for all)**
Tc	Exisitng
Project:	Batavia Sewer Separation
Location:	Batavia, IL
By:	BJB
Date:	8/12/2016

SHEET FLOW

Manning's roughness coeff.	N	0.170	(grass)
Flow Length	L	250.000	
Two Year 24 hr Rainfall (in)	P2	3.100	
Land slope	S	0.030	
Tc		0.325	

SHALLOW CONCENTRATED FLOW

Flow Length	L	100
Watercourse Slope	s	0.030
Average Velocity	V	4.000
Tt		0.007

CHANNEL FLOW

Cross-sectional flow areas	A	1.320
Wetted perimeter	Pw	4.199
Hydraulic Radius	r	0.315
Channel slope	s	0.005
Manning's roughness coeff.	n	0.025
Velocity	V	1.951
Flow Length	L	0.000
Tt		0.00

WATERSHED OR SUBAREA Tc or Tt 0.33 hours

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ACTION	NAME
Design	B.B.
Drawn	L.V.
Checked	J.W.

No.	Date	Revisions	By

NOT FOR CONSTRUCTION

REMPE–SHARPE
CONSULTING ENGINEERS
IL P.D.F. LICENSE NO. 184-000895
324 WEST STATE STREET – GENEVA, ILLINOIS 60134
Telephone (630) 232-0827 – Fax (630) 232-1629

PROJECT	SHEET TITLE	SCALE	PROJECT NO.	SHEET
STORM SEWER SEPARATION AREA 3 BATAVIA, ILLINOIS	AERIAL DRAINAGE EXHIBIT	1"=100'	BT-624B	No. 1
			DATE JULY 2016	Of 2

N:\DGN\BT\BT624SEWERSEPARATION\SHEETS\BT624B_DRAINAGEEXHIBIT.DGN
9/1/2016 11:34:40 AM

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ACTION	NAME
Design	B.B.
Drawn	L.V.
Checked	J.W.

No.	Date	Revisions	By

NOT FOR CONSTRUCTION

REMPE–SHARPE CONSULTING ENGINEERS
IL P.D.F. LICENSE NO. 184-000895
324 WEST STATE STREET – GENEVA, ILLINOIS 60134
Telephone (630) 232-0827 – Fax (630) 232-1629

PROJECT: STORM SEWER SEPARATION AREA 3 BATAVIA, ILLINOIS

SHEET TITLE: CONTOUR DRAINAGE EXHIBIT

SCALE: 1"=100'

PROJECT NO.: BT-624B

DATE: JULY 2016

SHEET No. 2 of 2

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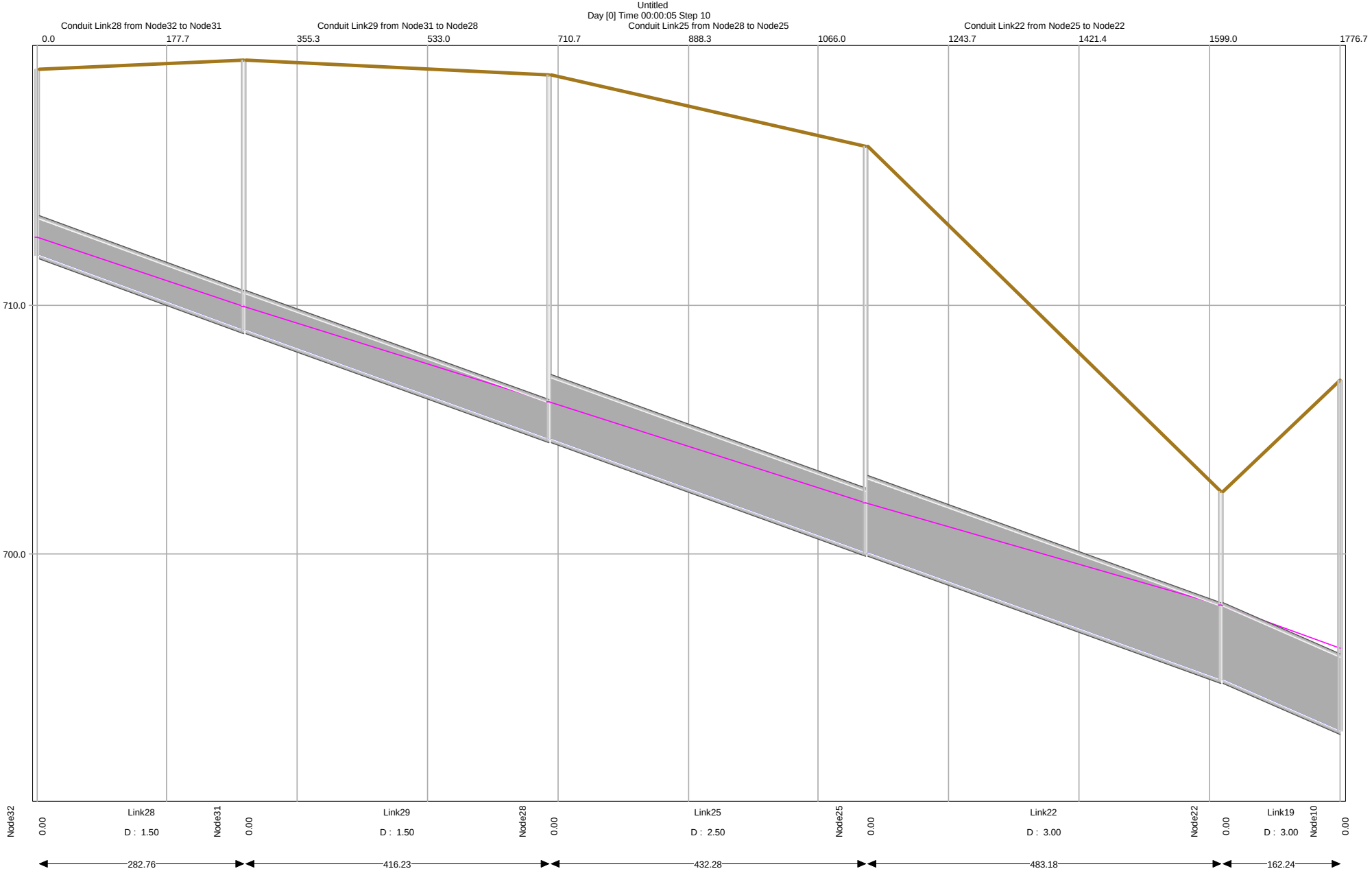
DRAINAGE AREAS

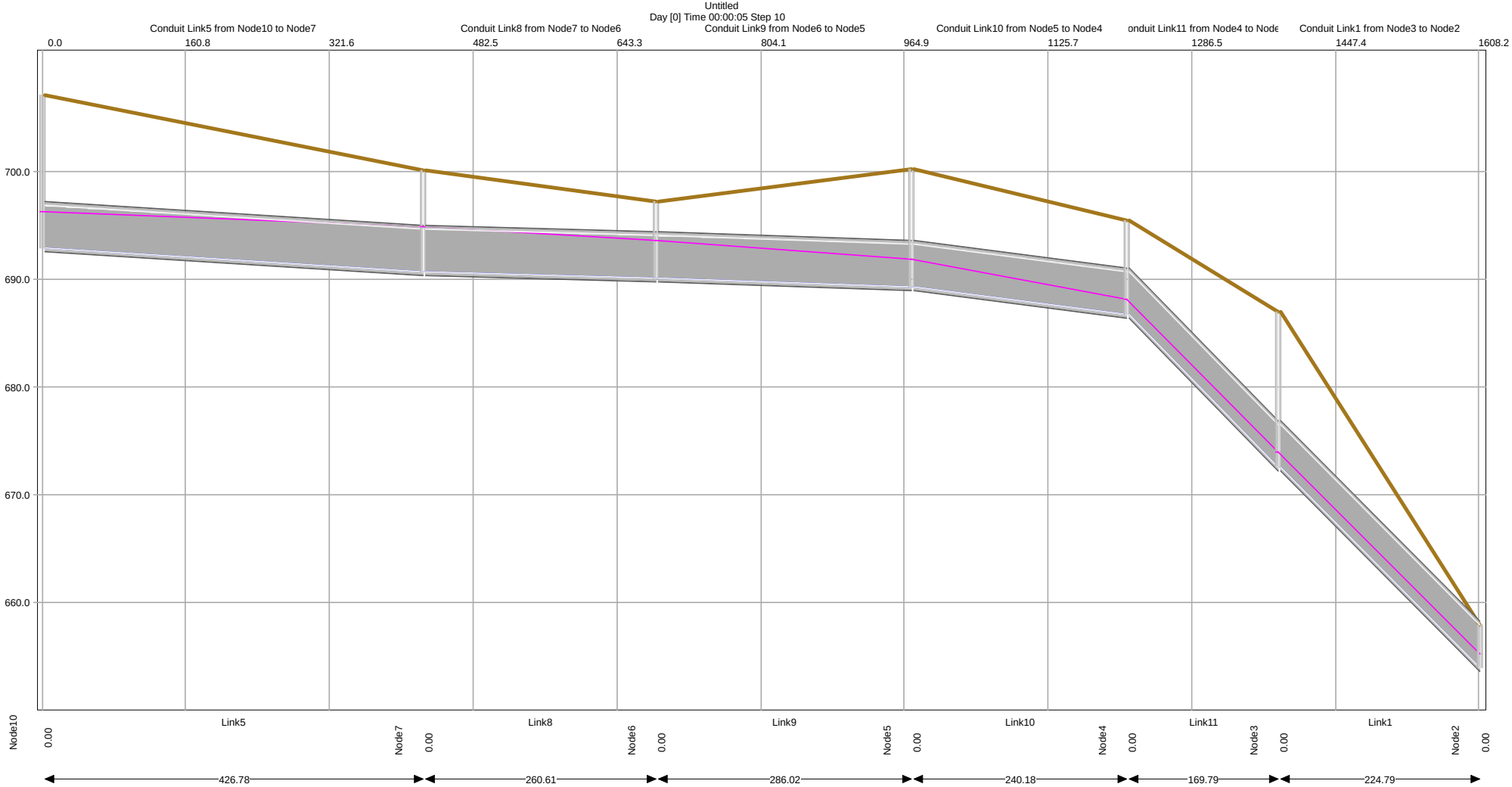
Name	Storm	Subcatchment	Ground Elevation ft	Catchment Max Flow cfs	Catchment Number	Area ac	Time of Concentration min	Pervious Area Curve Number	Catchment Max Flow cfs
Node2	1hr10yr		658.00	0.00		0.00	15	87	0.0
Node3	1hr10yr		687.00	0.00		0.00	15	87	0.0
Node4	1hr10yr		695.38	0.00		0.00	15	87	0.0
Node5	1hr10yr		700.17	0.00		0.00	15	87	0.0
Node6	1hr10yr		697.22	0.00		0.00	15	87	0.0
Node7	1hr10yr		700.11	0.00	1	0.00	15	87	0.0
Node10	1hr10yr	1	707.00	5.78	1	3.30	15	87	5.8
Node13	1hr10yr		712.50	0.00	1	0.89	15	87	0.0
Node15	1hr10yr	1	720.60	0.82	1	0.47	15	87	0.8
Node15		2		3.35	2	1.91	15	87	3.3
Node16	1hr10yr	1	726.60	1.98	1	1.13	15	87	2.0
Node17	1hr10yr	1	726.30	0.30	1	0.17	15	87	0.3
Node18	1hr10yr	1	724.10	1.40	1	0.80	15	87	1.4
Node19	1hr10yr	1	700.11	1.45	1	0.83	15	87	1.5
Node19		2		10.25	2	5.85	15	87	10.2
Node20	1hr10yr	1	705.70	9.65	1	5.51	15	87	9.7
Node21	1hr10yr	1	702.50	6.74	1	3.85	15	87	6.7
Node22	1hr10yr	1	702.50	1.93	1	1.10	15	87	1.9
Node22		2		6.03	2	3.44	15	87	6.0
Node23	1hr10yr	1	712.40	6.53	1	3.73	15	87	6.5
Node24	1hr10yr	1	710.40	6.20	1	3.54	15	87	6.2
Node25	1hr10yr	1	716.40	4.87	1	2.78	15	87	4.9
Node25		2		0.54	2	0.31	15	87	0.5
Node26	1hr10yr	1	723.50	0.68	1	0.39	15	87	0.7
Node27	1hr10yr	1	717.50	4.85	1	2.77	15	87	4.9
Node28	1hr10yr	1	719.30	4.12	1	2.35	15	87	4.1
Node29	1hr10yr	1	726.60	2.68	1	1.53	15	87	2.7
Node30	1hr10yr	1	723.20	3.70	1	2.11	15	87	3.7
Node31	1hr10yr	1	719.90	2.28	1	1.30	15	87	2.3
Node32	1hr10yr	1	719.50	5.40	1	3.08	15	87	5.4

BASIC CONDUIT DATA

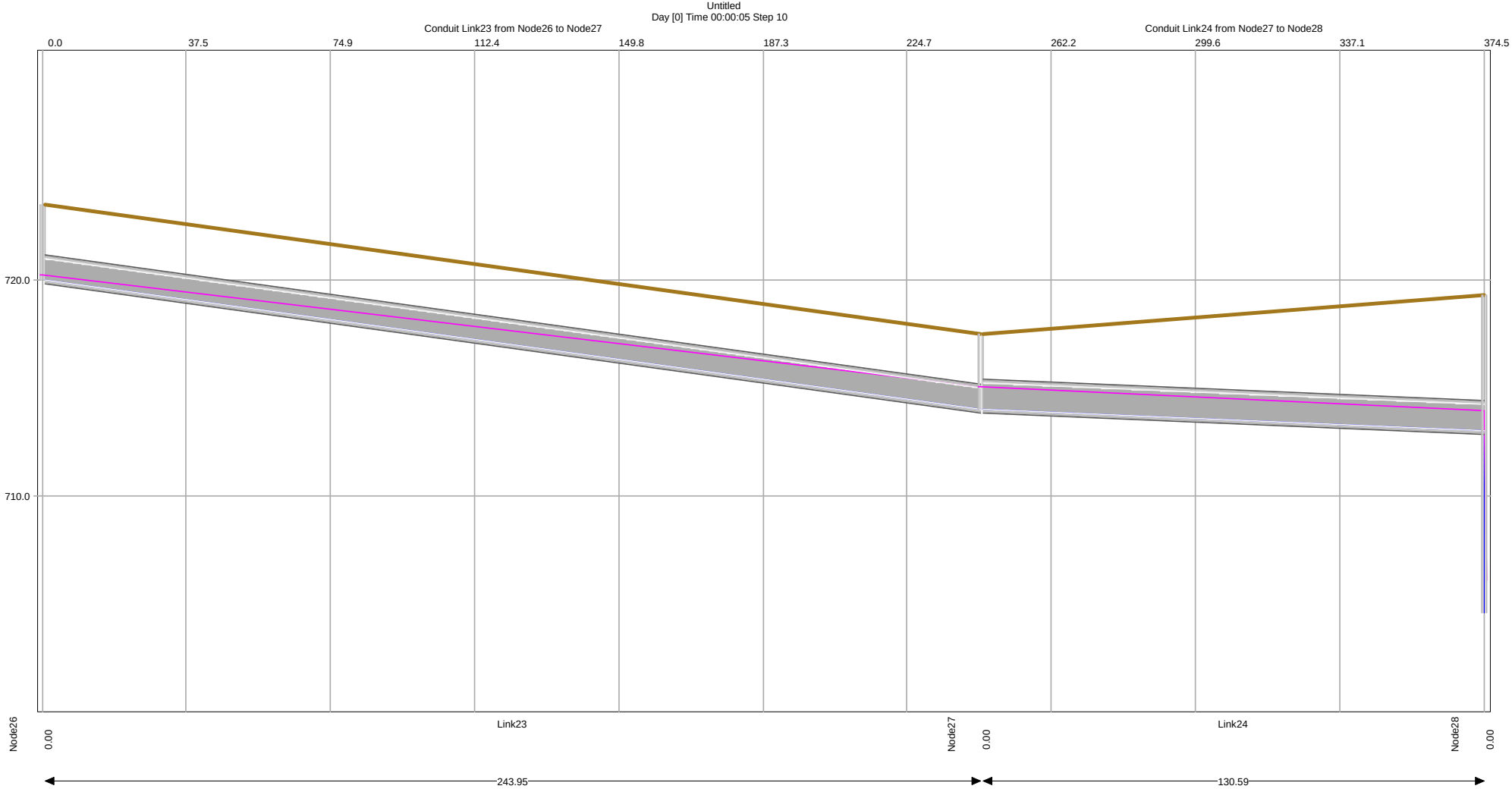
Name	Storm	Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Length ft	Conduit Slope %	Roughness	Design Full Flow cfs	Max Flow cfs	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
Link1	1hr10yr	Link1	Node3	Node2	Circular	4.0	225	8.28	0.013	413	89	672.61	654.00	673.95	655.26
Link11	1hr10yr	Link11	Node4	Node3	Circular	4.0	170	8.34	0.013	415	89	686.76	672.61	688.09	673.95
Link10	1hr10yr	Link10	Node5	Node4	Circular	4.0	240	1.07	0.013	149	89	689.33	686.76	691.89	688.09
Link9	1hr10yr	Link9	Node6	Node5	Circular	4.0	286	0.25	0.013	72	89	690.06	689.33	693.62	691.89
Link8	1hr10yr	Link8	Node7	Node6	Circular	4.0	261	0.25	0.013	72	89	690.71	690.06	694.87	693.62
Link5	1hr10yr	Link5	Node10	Node7	Circular	4.0	427	0.5	0.013	102	78	692.85	690.71	696.21	694.87
Link30	1hr10yr	Link30	Node13	Node10	Circular	2.0	377	0.52	0.013	16	10	694.83	692.85	696.91	696.21
Link15	1hr10yr	Link15	Node15	Node25	Circular	1.0	354	1.41	0.013	4	4	715.00	710.00	715.82	710.80
Link14	1hr10yr	Link14	Node16	Node28	Circular	1.5	361	1.66	0.013	14	10	719.00	713.00	719.98	713.95
Link13	1hr10yr	Link13	Node17	Node16	Circular	1.0	414	0.27	0.013	2	2	720.13	719.00	720.93	719.98
Link12	1hr10yr	Link12	Node18	Node17	Circular	1.0	316	0.27	0.013	2	1	721.00	720.13	721.67	720.93
Link16	1hr10yr	Link16	Node19	Node7	Circular	1.5	56	2.32	0.013	16	12	695.30	694.00	696.37	694.95
Link17	1hr10yr	Link17	Node20	Node13	Circular	2.0	345	0.29	0.013	12	10	700.00	699.00	701.39	700.11
Link18	1hr10yr	Link18	Node21	Node22	Circular	2.0	118	0.6	0.013	17	7	697.00	696.30	698.11	697.95
Link19	1hr10yr	Link19	Node22	Node10	Circular	3.0	162	1.28	0.013	75	63	694.93	692.85	697.95	696.21
Link20	1hr10yr	Link20	Node23	Node24	Circular	1.5	186	0.7	0.013	9	7	709.00	707.71	710.03	708.98
Link21	1hr10yr	Link21	Node24	Node25	Circular	2.0	173	0.7	0.013	19	13	707.71	706.50	708.98	707.70
Link22	1hr10yr	Link22	Node25	Node22	Circular	3.0	483	1.06	0.013	69	49	700.03	694.93	702.07	697.95
Link23	1hr10yr	Link23	Node26	Node27	Circular	1.0	244	2.46	0.013	6	1	720.00	714.00	720.24	715.06
Link24	1hr10yr	Link24	Node27	Node28	Circular	1.3	131	0.77	0.013	6	6	714.00	713.00	715.06	713.95
Link25	1hr10yr	Link25	Node28	Node25	Circular	2.5	432	1.06	0.013	42	27	704.61	700.03	706.12	702.07
Link26	1hr10yr	Link26	Node29	Node30	Circular	1.3	407	0.4	0.013	4	3	722.00	720.39	722.78	721.62
Link27	1hr10yr	Link27	Node30	Node16	Circular	1.5	349	0.4	0.013	7	6	720.39	719.00	721.62	719.98
Link29	1hr10yr	Link29	Node31	Node28	Circular	1.5	416	1.06	0.013	11	8	709.02	704.61	709.98	706.12
Link28	1hr10yr	Link28	Node32	Node31	Circular	1.5	283	1.06	0.013	11	5	712.00	709.02	712.76	709.98



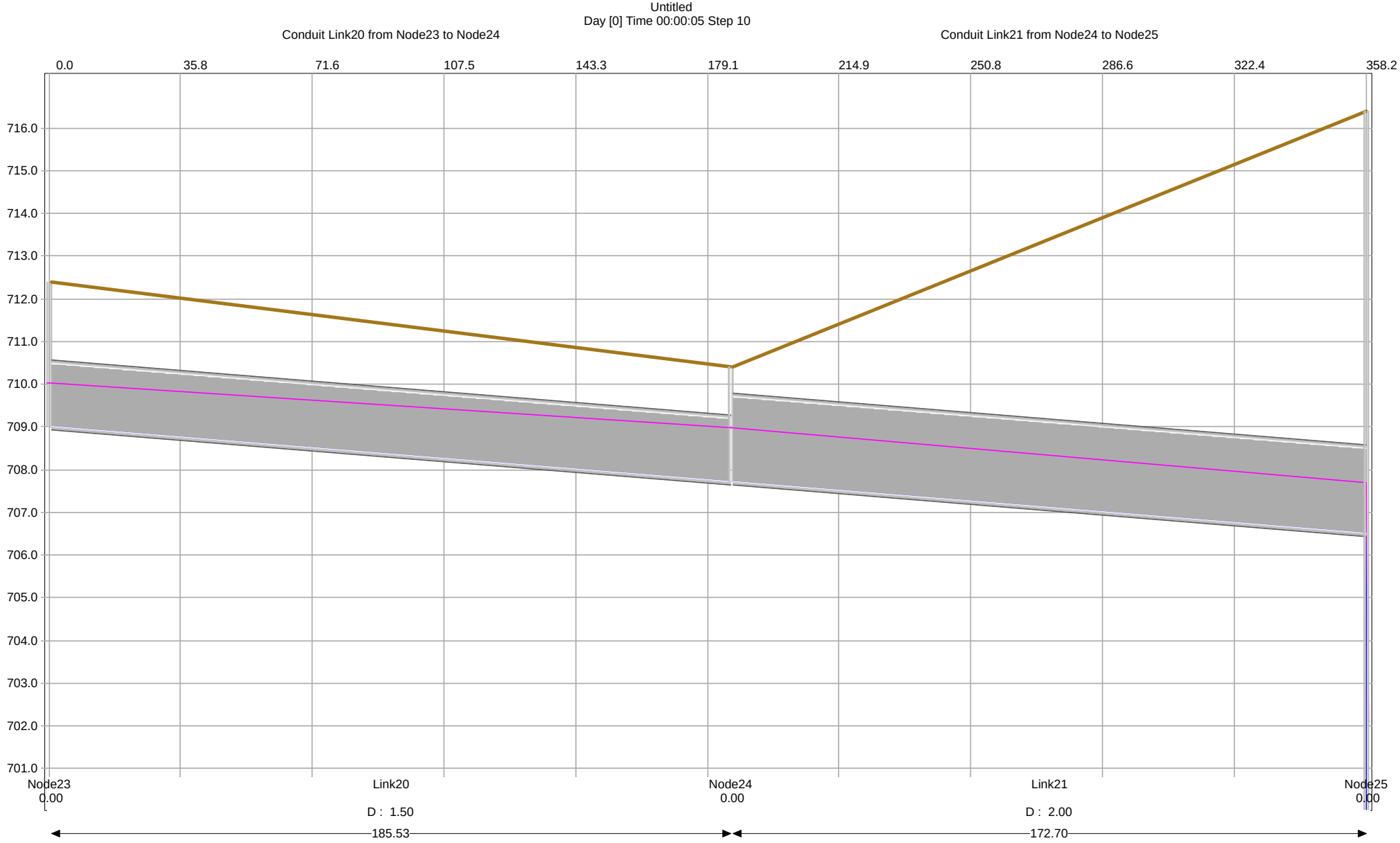
BLAINE STREET, NODE 32 TO NODE 10



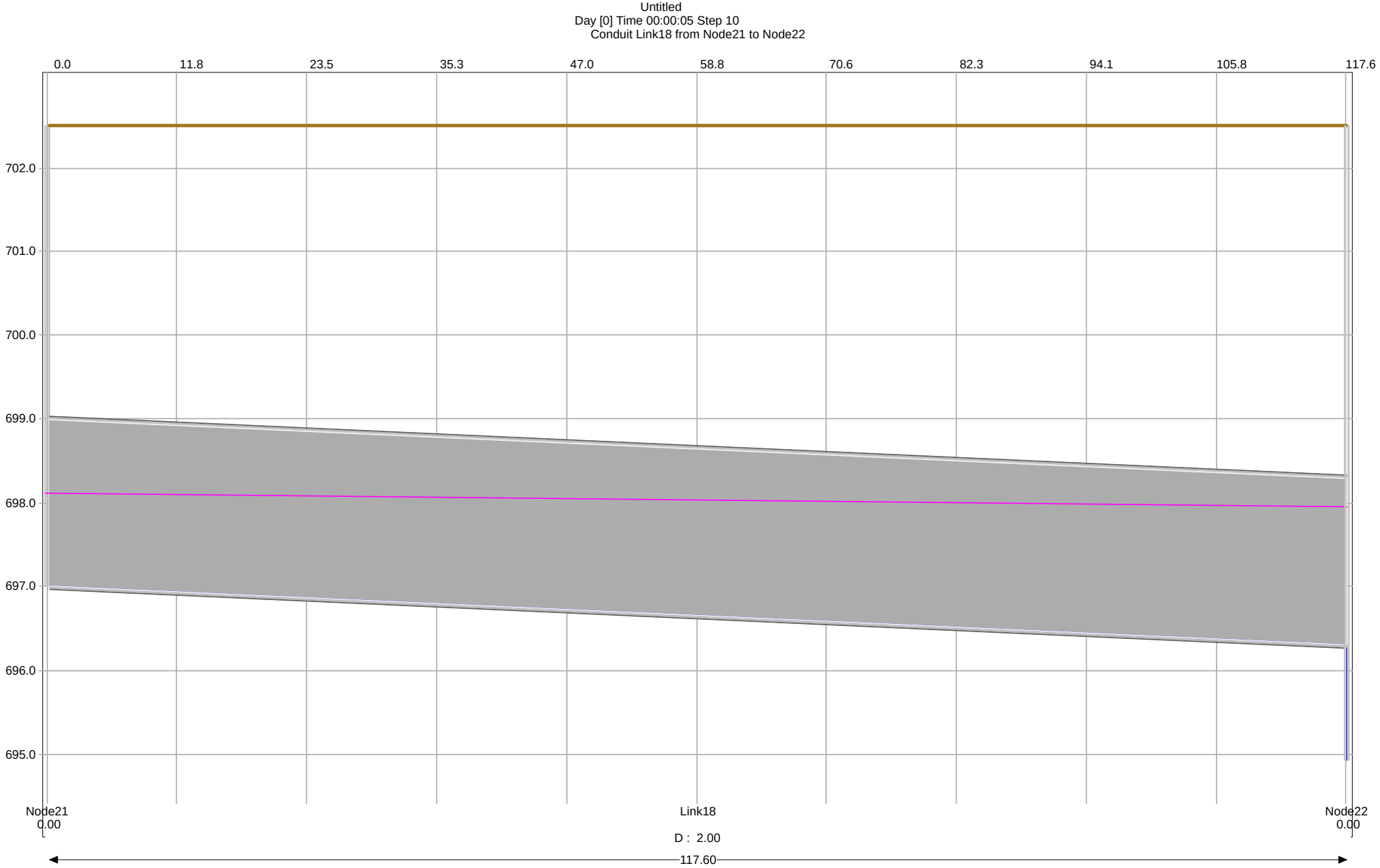
IL RT 31 @ BLAINE TO OUTFALL, NODE 10 TO NODE 2



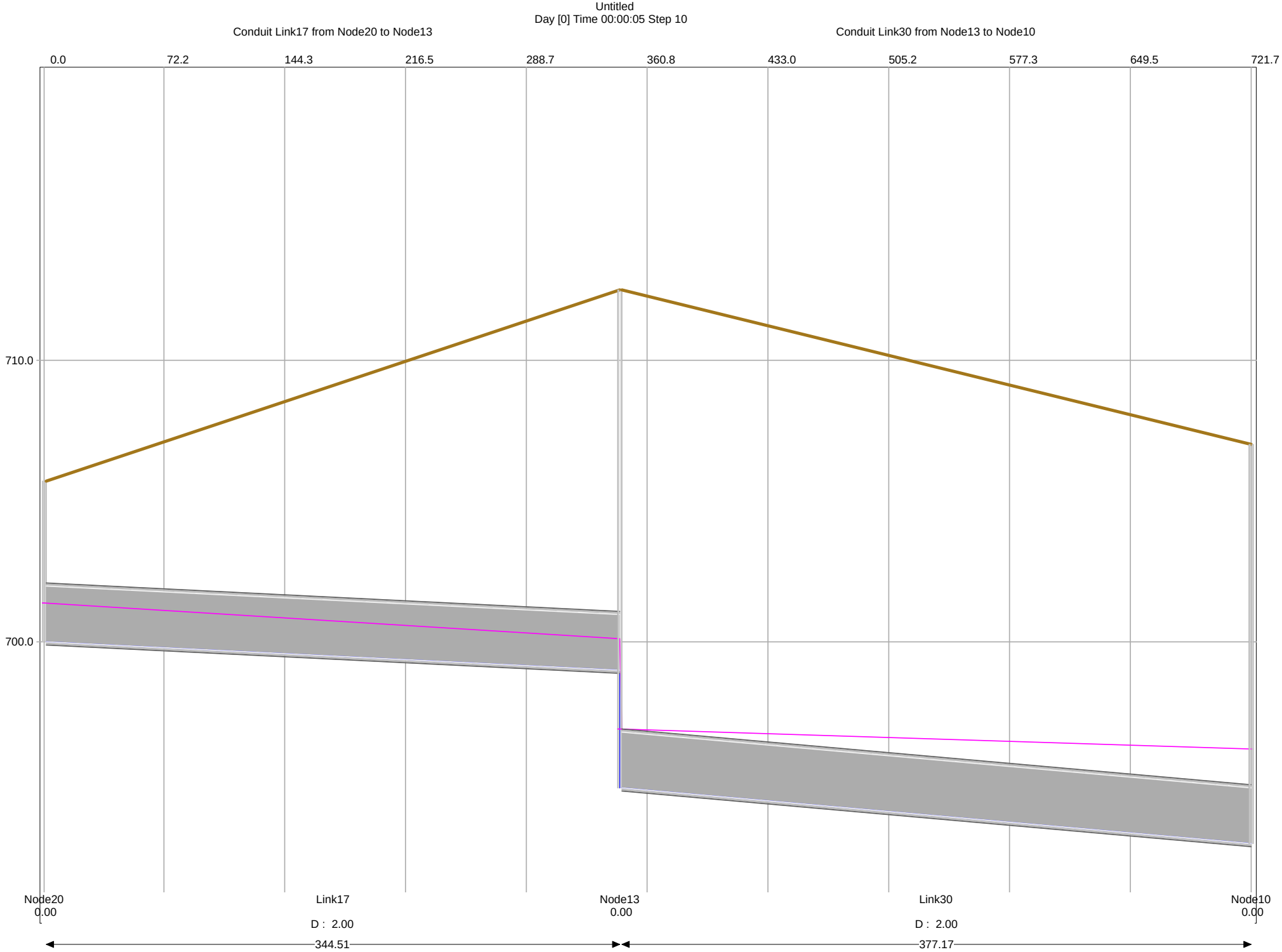
S. JACKSON STREET, NODE 26 TO NODE 28



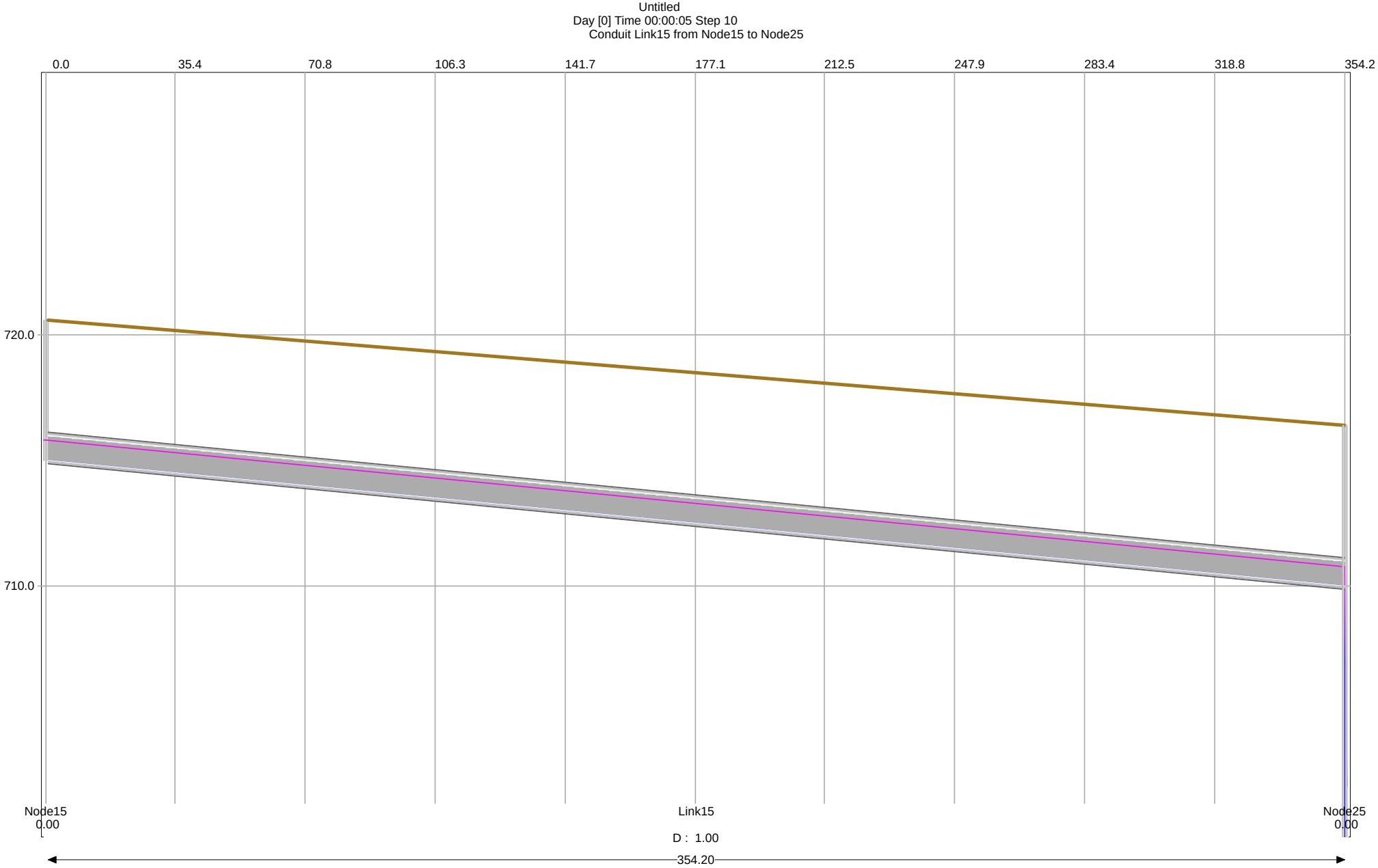
S. JEFFERSON STREET, NODE 23 TO NODE 25



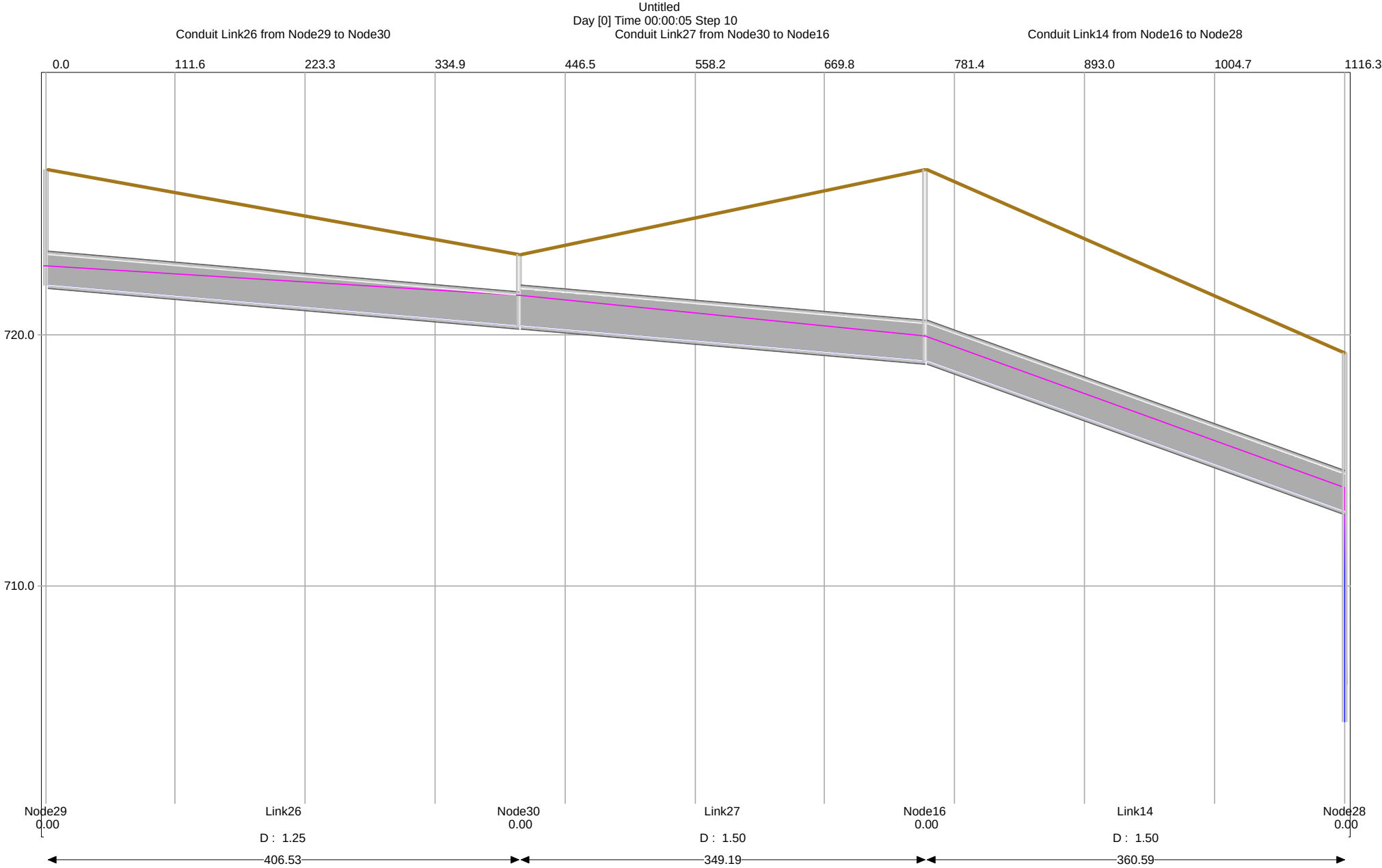
BLAINE STEET ALLEY, NODE 21 TO NODE 22



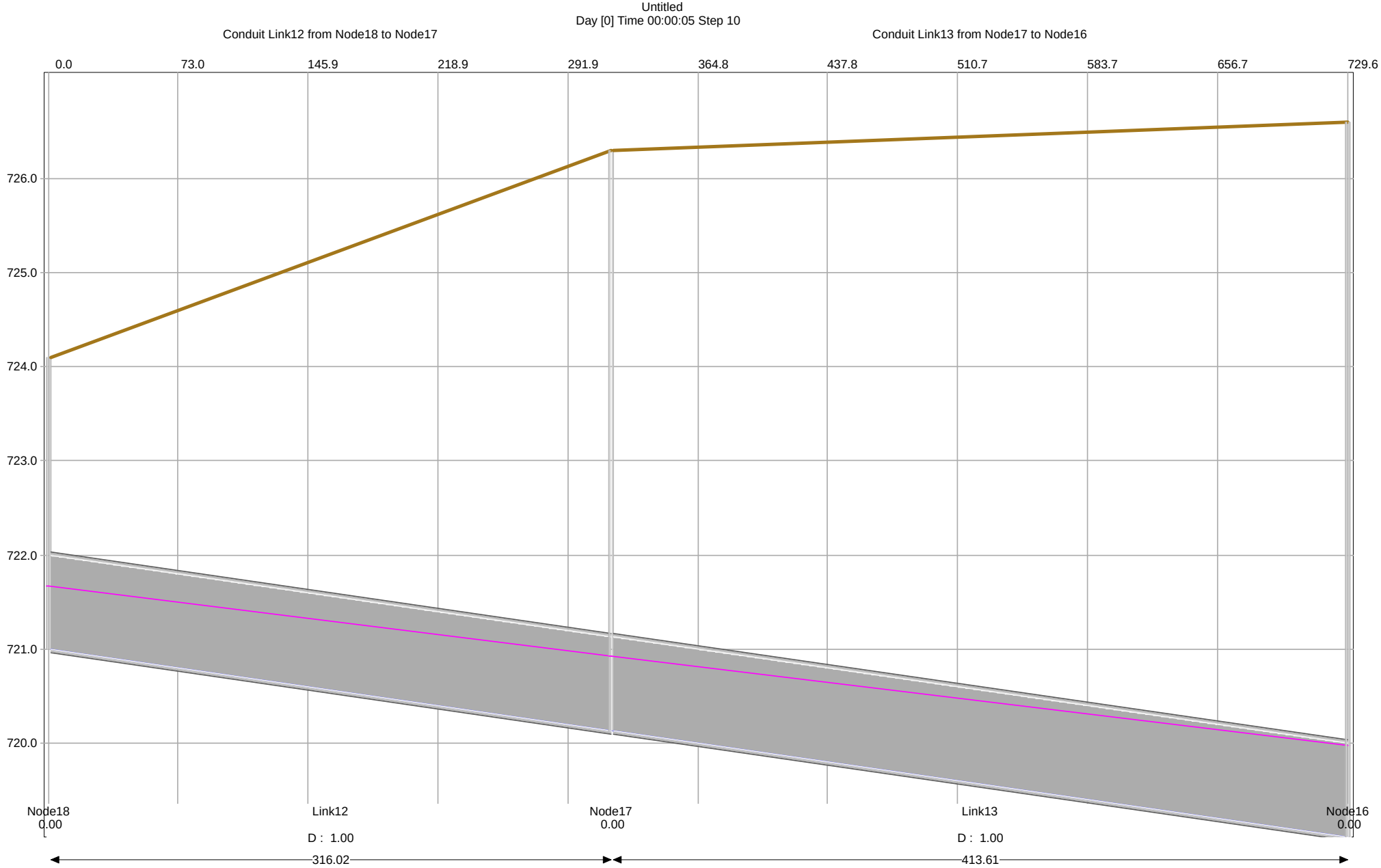
WLNUT STREET AND RT 31, NODE 20 TO NODE 10



S. JEFFERSON STREET, NODE 15 TO NODE 25



GARFIELD AVE. & S. JACSON ST, NODE 29 TO NODE 28



MORTON ST, NODE 18 TO NODE 16

APPENDIX G

CITY OF BATAVIA AREA 3 SEWER SEPARATION
PRELIMINARY CONCEPT ESTIMATE OF STORM SEWER IMPROVEMENTS CONSTRUCTION COST

8/31/2016 BY: BJB

NO.	DESCRIPTION	TOTAL UNITS	UNIT	UNIT PRICE	
	PART A. PRELIMINARY QUANTITIES PER PROPOSED CONCEPT STORM SEWER DESIGN				
1	STORM SEWER 12" RCP, TY 1, CL IV W/ RUBBER GASKETS	4,828	LF	$58.00	$280,011.24
2	STORM SEWER, 15" RCP, TY 1, CL IV W/ RUBBER GASKETS	537	LF	$87.00	$46,729.44
3	STORM SEWER, 18" RCP, TY 1, CL IV W/ RUBBER GASKETS	1,650	LF	$115.00	$189,792.55
4	STORM SEWER, 24" RCP, TY 1, CL IV W/RUBBER GASKETS	1,012	LF	$127.00	$128,521.46
6	STORM SEWER, 30" RCP, TY 1, CL IV W/RUBBER GASKETS	432	LF	$138.00	$59,654.64
7	STORM SEWER, 36" RCP, TY 1, CL IV W/RUBBER GASKETS	645	LF	$144.00	$92,940.48
8	STORM SEWER, 48" RCP, TY 1, CL IV W/RUBBER GASKETS	1,608	LF	$173.00	$278,184.00
9	INLET TY A OR JUNCTION BOX, 2' DIA., W/ FRAME AND GRATE	170	EA	$1,500.00	$255,000.00
10	48 "- MANHOLE W/FRAME AND GRATE	30	EA	$3,500.00	$105,000.00
11	60"- MANHOLE W/FRAME AND GRATE	5	EA	$4,000.00	$20,000.00
12	72"- MANHOLE W/FRAME AND GRATE	7	EA	$6,500.00	$45,500.00
13	TRENCH BACKFILL CA6, SPECIAL	16,330	CY	$35.00	$571,550.00
14	INLET AND PIPE PROTECTION	170	EA	$150.00	$25,500.00
	SUBTOTAL PART A				$2,098,383.81
	PART B. PRELIMINARY QUANTITIES ASSOCIATED WITH POTENTIAL REMOVAL AND REPLACEMENT QUANTITIES NECESSARY FOR CONSTRUCTION				
15	PIPE REMOVAL	4,500	LF	$15.00	$67,500.00
16	INLET TO BE REMOVED	60	EA	$200.00	$12,000.00
17	MANHOLES TO BE REMOVED	20	EA	$500.00	$10,000.00
18	PAVEMENT REPLACEMENT	6,094	SY	$44.00	$268,136.00
19	CURB AND GUTTER REMOVAL AND REPLACEMENT	3,500	SF	$30.00	$105,000.00
20	SANITARY SEWER SERVICES TO BE RECONSTRUCTED	50	EACH	$300.00	$15,000.00
21	TOPSOIL, SEEDING AND EROSION CONTROL BLANKET	4,000	SY	$10.50	$42,000.00
22	SIDEWALK TO BE REMOVED AND REPLACED (ADA COMPLIANCE)	6,240	SF	$8.00	$49,920.00
23	DETECTABLE WARNINGS	1,040	SF	$35.00	$36,400.00
	SUBTOTAL PART B				$605,956.00
	SUBTOTAL C (SUBTOTAL PART A + SUBTOTAL PART B)				$2,704,339.81
	MOBILIZATION 3% (OF SUBTOTAL C)				$81,130.19
	TRAFFIC CONTROL & PROTECTION 5.5% (OF SUBTOTAL C)				$148,738.69
	SUBTOTAL D (SUBTOTAL C + MOBILIZATION + TRAFFIC CONTROL)				$2,934,208.69
	ENGINEERING DESIGN 6.5% (OF SUBTOTAL D)				$190,723.57
	CONSTRUCTION MANAGEMENT 9.5% (OF SUBTOTAL D)				$278,749.83
	CONTINGENCY 20% (OF SUBTOTAL D)				$586,841.74
	GRAND TOTAL (SUBTOTAL D + ENGINEERING + MANAGEMENT + CONTINGENCY)				**$3,991,000.00**

NOTES

1 PART A QUANTITIES ARE BASED ON THE CONCEPT STORM SEWER MODEL QUANTITIES
SEE PAGE 2 FOR XPSWMM QUANTITIES

2 PART B QUANTITIES ARE ESTIMATED BASED ON ANTICIPATED TYPICAL REMOVAL AND REPLACEMENT ITEMS ASSOCATED WITH STORM SEWER CONSTRUCTION,
SOME OF THESE QUANTITIES MAY BE ABLE TO BE ELIMINATED OR REDUCED IF THE SCOPE OF WORK IS COMPLETED CONSURRENTLY WITH OTHER PROJECTS
THESE QUANTITIES ARE DEPENDANT ON FINAL DESIGN, TO BE DETERMINED, THEREFORE ACTUAL QUANTITIES MAY VARY SUBSTANTIALLY FROM THE ESTIMATES ASSUMED
SEE PAGE 3 FOR QUANTITY DEVELOPMENT/ASSUMPTIONS FOR THESE QUANTITIES

3 ESTIMATE DOES NOT INCLUDE WATERMAIN OR SANITARY SEWER MAIN RECONSTRUCTION, MISC. R&R, EXTRAORDINARY OR UNFORSEEN CONDITIONS, I.E. BEDROCK REMOVAL

APPENDIX G

DATA FROM XPSWMM CONCEPT MODEL										DEVELOPED FROM XSWMM DATA			
link	UP node	Down node	size ft	size in	length	up inv	down inv	Up Node rim	Down Node rim	Up Depth	down depth	avg depth	Trench Back fill (CY)
													(entire depth)
Link1	Node3	Node2	4	48	224.79	672.61	654.00	687.00	658.00	14.4	4.0	9.2	579
Link11	Node4	Node3	4	48	169.79	686.76	672.61	695.38	687.00	8.6	14.4	11.5	547
Link10	Node5	Node4	4	48	240.18	689.33	686.76	700.17	695.38	10.8	8.6	9.7	654
Link9	Node6	Node5	4	48	286.02	690.06	689.33	697.22	700.17	7.2	10.8	9.0	721
Link8	Node7	Node6	4	48	260.61	690.71	690.06	700.11	697.22	9.4	7.2	8.3	604
Link5	Node10	Node7	4	48	426.78	692.85	690.71	707.00	700.11	14.2	9.4	11.8	1407
Link30	Node13	Node10	2	24	377.17	694.83	692.85	712.50	707.00	17.7	14.2	15.9	1200
Link15	Node15	Node25	1	12	354.2	715.00	700.03	720.60	716.40	5.6	16.4	11.0	584
Link14	Node16	Node28	1.5	18	360.59	719.00	704.61	726.60	719.30	7.6	14.7	11.1	723
Link13	Node17	Node16	1	12	413.61	720.13	719.00	726.30	726.60	6.2	7.6	6.9	427
Link12	Node18	Node17	1	12	316.02	721.00	720.13	724.10	726.30	3.1	6.2	4.6	220
Link16	Node19	Node7	1.5	18	56.07	695.30	690.71	700.11	700.11	4.8	9.4	7.1	72
Link17	Node20	Node13	2	24	344.51	700.00	694.83	705.70	712.50	5.7	17.7	11.7	805
Link18	Node21	Node22	2	24	117.6	697.00	694.93	702.50	702.50	5.5	7.6	6.5	154
Link19	Node22	Node10	3	36	162.24	694.93	692.85	702.50	707.00	7.6	14.2	10.9	423
Link20	Node23	Node24	1.5	18	185.53	709.00	707.71	712.40	710.40	3.4	2.7	3.0	102
Link21	Node24	Node25	2	24	172.7	707.71	700.03	710.40	716.40	2.7	16.4	9.5	329
Link22	Node25	Node22	3	36	483.18	700.03	694.93	716.40	702.50	16.4	7.6	12.0	1388
Link23	Node26	Node27	1	12	243.95	720.00	714.00	723.50	717.50	3.5	3.5	3.5	128
Link24	Node27	Node28	1.25	15	130.59	714.00	704.61	717.50	719.30	3.5	14.7	9.1	202
Link25	Node28	Node25	2.5	30	432.28	704.61	700.03	719.30	716.40	14.7	16.4	15.5	1477
Link26	Node29	Node30	1.25	15	406.53	722.00	720.39	726.60	723.20	4.6	2.8	3.7	256
Link27	Node30	Node16	1.5	18	349.19	720.39	719.00	723.20	726.60	2.8	7.6	5.2	327
Link29	Node31	Node28	1.5	18	416.23	709.02	704.61	719.90	719.30	10.9	14.7	12.8	958
Link28	Node32	Node31	1.5	18	282.76	712.00	709.02	719.50	719.90	7.5	10.9	9.2	468
					7213.12	LF							**14755** CY

ASSUMPTIONS/DEVELOPMENT OF ASSOCIATED STORM SEWER CONCEPT QUANTITIES

	Mainline	Intersections	midblock	sump connections to mainline	pavement removal width (ft)	pavement removal area (sf)	
length of 48"	1608				7.7	12335	
length of 36"	645				6.5	4195	
length of 30"	432				5.9	2559	
length of 27"	0				5.6	0	
length of 24"	1012				5.3	5394	
length of 18"	1650				4.8	7839	
length of 15"	537				4.5	2396	
length of 12"	1328	2000	500	1000	4.2	20132	
# of main structures	5	20	15			**6094**	SY
# of inlets/sumps	0	80	30	60			
	7213	LF					

# of main intersections	20	estimate 4 inlets/ intersection;estimate 100 lf of 12"/intersection = 2000 lf 12" 80 inlets
# of other main structures	5	cemetary structures (no inlets necessary)
# of other main structures	15	estimate 1 intermediate structure between each intersection
2' dia inlets	30	estimate 1 set of inlets per intermediate structure, = 30 inlets and 12" pipe x 32' x 15, =500 ft 12"
2' dia inlets	60	estimate doubble number of inlets for sump connections = 30 x 2 = 60 , sumps located at curb line, = 32' 12" x 30 = 1000'
# of add main structures	0	estimated additional mainline structures for sump conection to mainlin (say blind tee utilized)

-For estimating purposes say all proposed storm sewer is under pavement; say 6,094 SY per above
-Payment for removal/replacement and TBF based on standard specificatons for water and sewer construction
-Pavement section for replacement per Batavia Street Standard is 12" Base, 4" BAM, 2.25" binder & 1.5" surface
-Estimate half of the main line sewer construction will require curb and gutter R&R = 3500 SF
-Estimate half of homes will require sewer service reconstruction at point of crossing = 105+/- homes/2 = say 50
-Estimate 5 foot wide restoration path along curb to be removed and replaced = 3,500 lf curb*5/9 = 2000 SY
add 15 foot wide path along cemetery route adjacent to pavement = 1200LF*15/9= 2000 SY + 2000 from above = 4,000 SY total
-Add trench backfill for inlets/sump laterals = 3,500 lf (from above) x 3 feet deep = 1575CY, total = 14755 (from previous page)+1575=16330 CY
-Estimate 2 sidewalk ramps = 2x(12'x5' wide) R&R for ADA @ each street coner x 4 corners per intersection = 480 sf X13 intersections = 6,240 sf and ADA detectable warnings @ 10sf each X 8 per intersection x 13 intersections= 1040 sf
-Estimate all inlets and junction boxes will require inlet and pipe protection (erosoin control) as sump structures could likely double as extra inlets

ESTIMATED COST BREAKDOWN BY STREET

LOCATION	SEWER LENGTH	LOCATION COST
BATAVIA WEST CEMETERY	1181	$657,000.00
ILLINOIS ROUTE 31	860	$475,338.20
BLAINE STREET	1894	$1,046,849.47
WALNUT STREET	345	$190,688.00
JEFFERSON STREET	712	$393,535.81
JACKSON STREET	1084	$599,147.21
MORTON STREET	730	$403,484.75
GARFIELD AVENUE	407	$224,956.56
		$3,991,000.00

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9/1/2016

This drawing shall not be used nor reproduced either wholly or in part except when authorized by the engineer- Rempe-Sharpe

ACTION	NAME
Design	B.B.
Drawn	L.V.
Checked	J.W.

No.	Date	Revisions	By

NOT FOR CONSTRUCTION

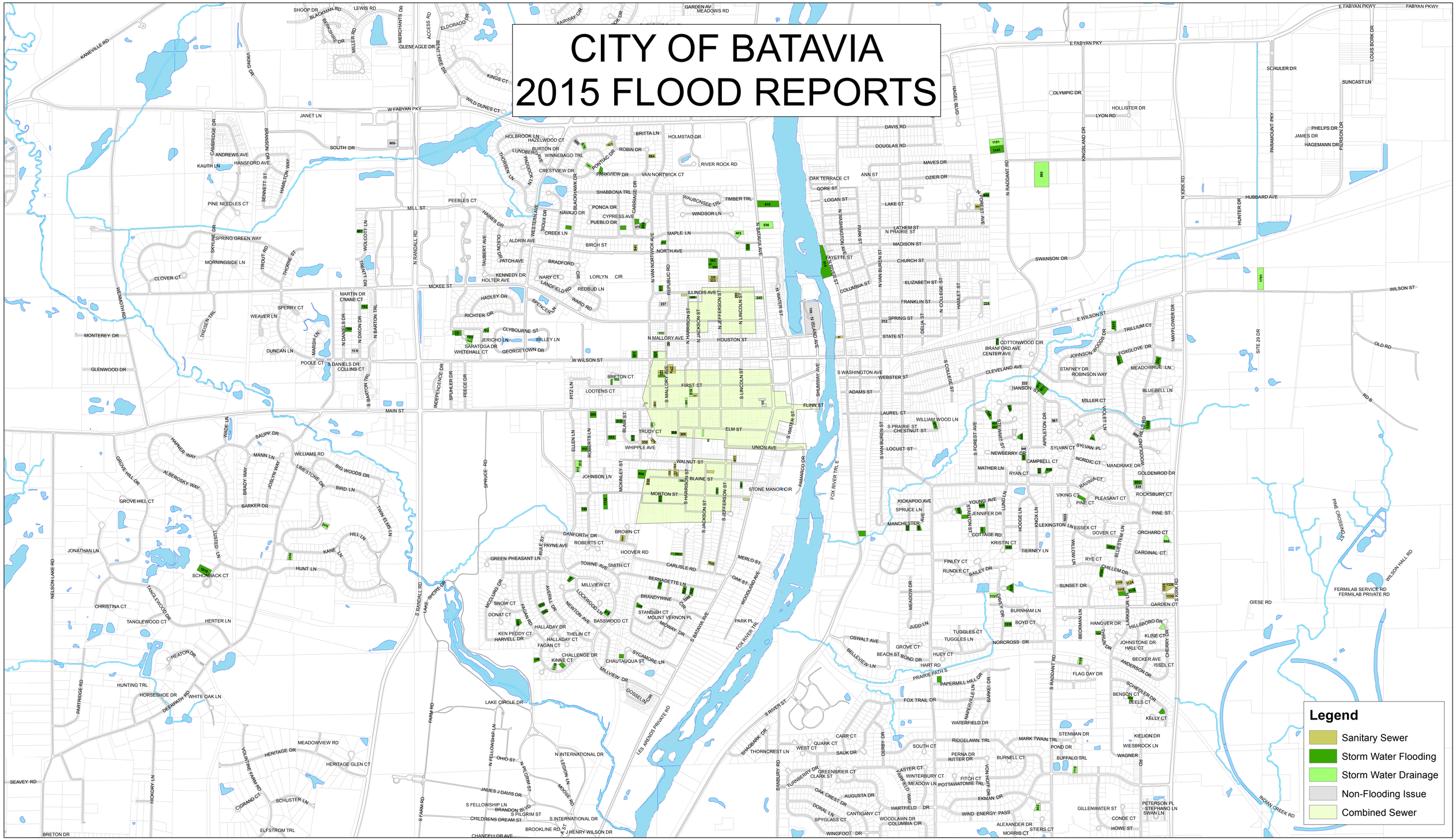
REMPE–SHARPE CONSULTING ENGINEERS
IL P.D.F. LICENSE NO. 184-000895
324 WEST STATE STREET – GENEVA, ILLINOIS 60134
Telephone (630) 232-0827 – Fax (630) 232-1829

PROJECT
STORM SEWER SEPARATION
AREA 3
BATAVIA, ILLINOIS

SHEET TITLE
TOPOGRAPHIC SURVEY EXHIBIT

SCALE	PROJECT NO.	SHEET
1"=100'	BT-624B	No. 1
	DATE	Of 1
	JULY 2016	

CITY OF BATAVIA
2015 FLOOD REPORTS



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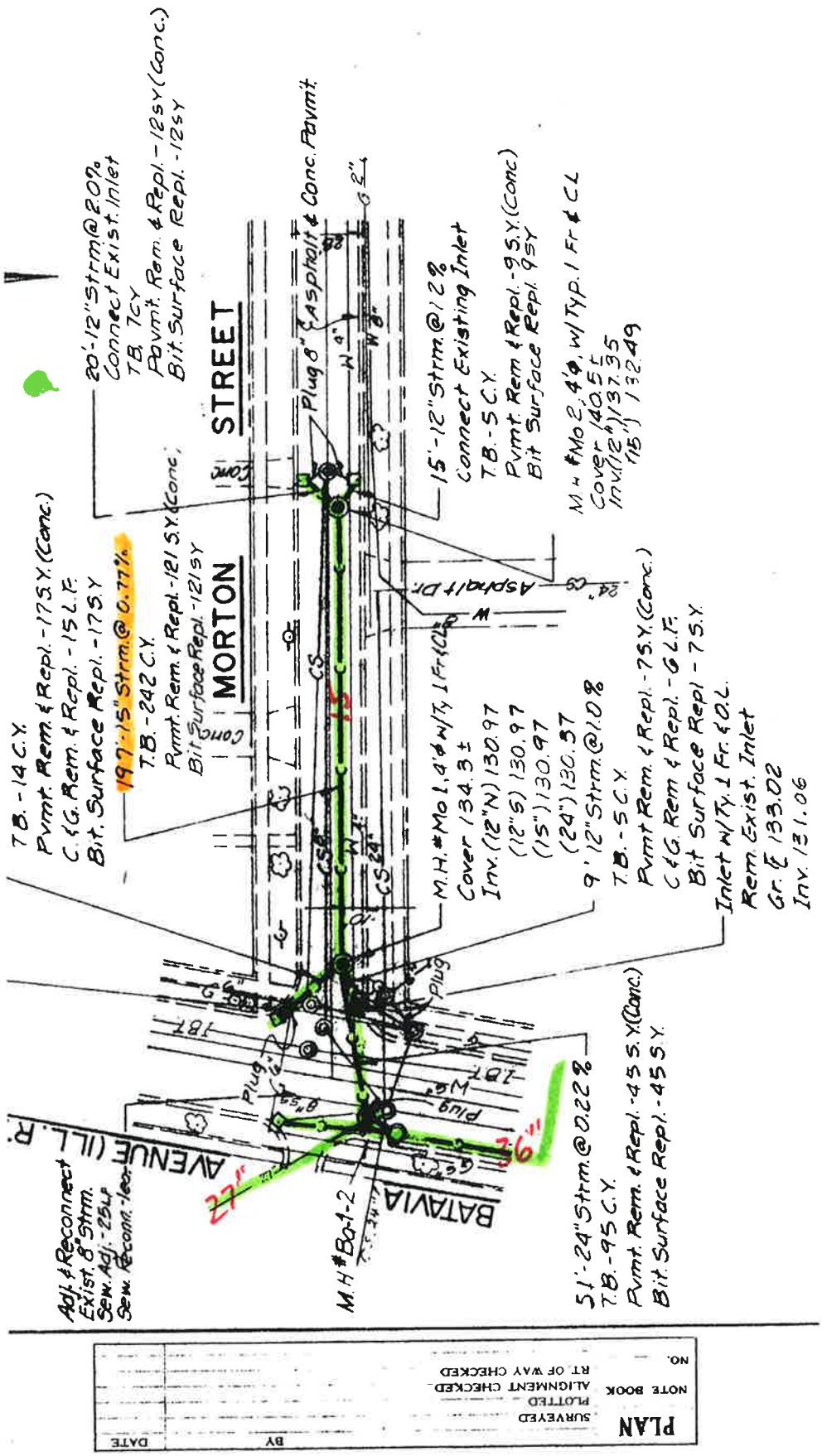
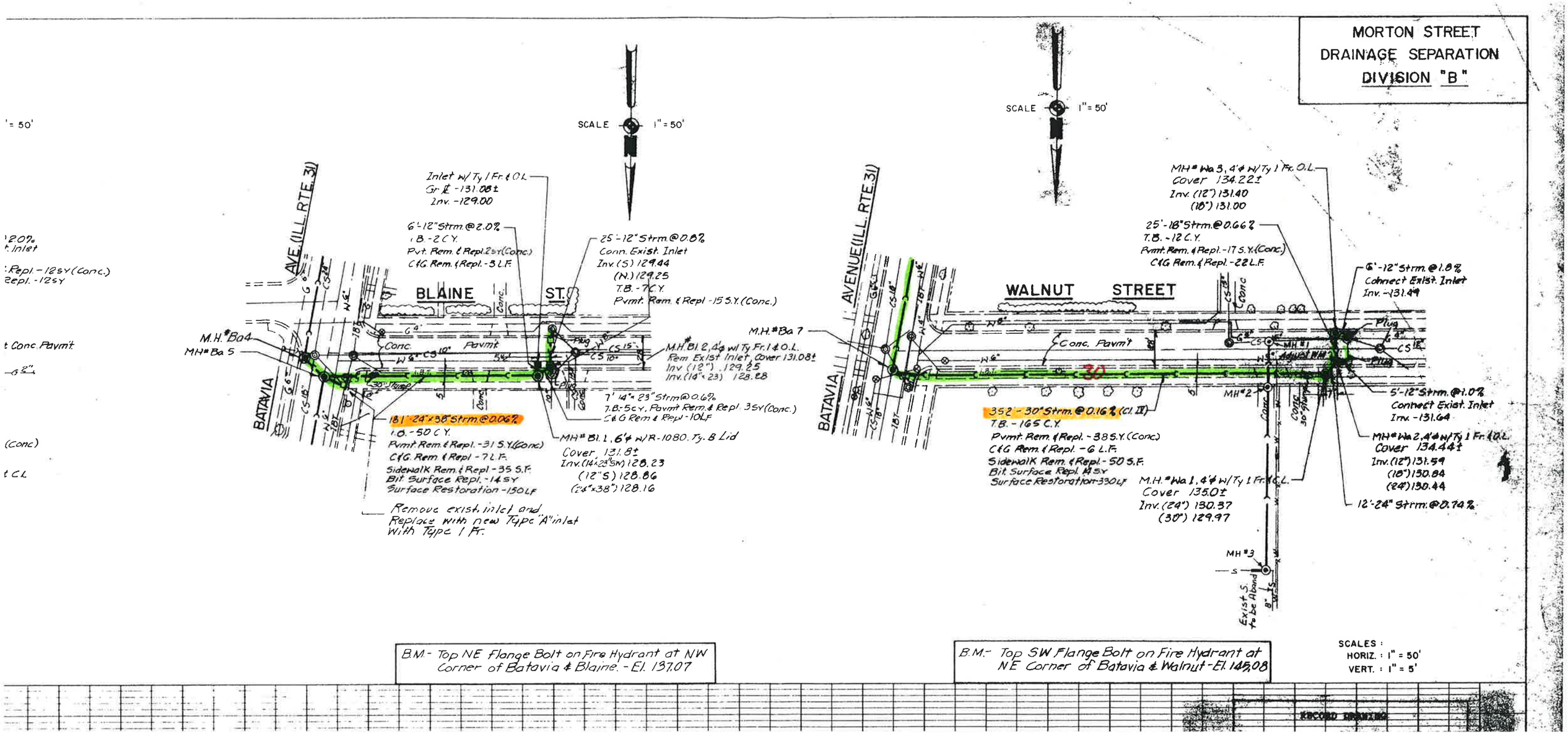
SOURCE: BATGIS, KANEGIS

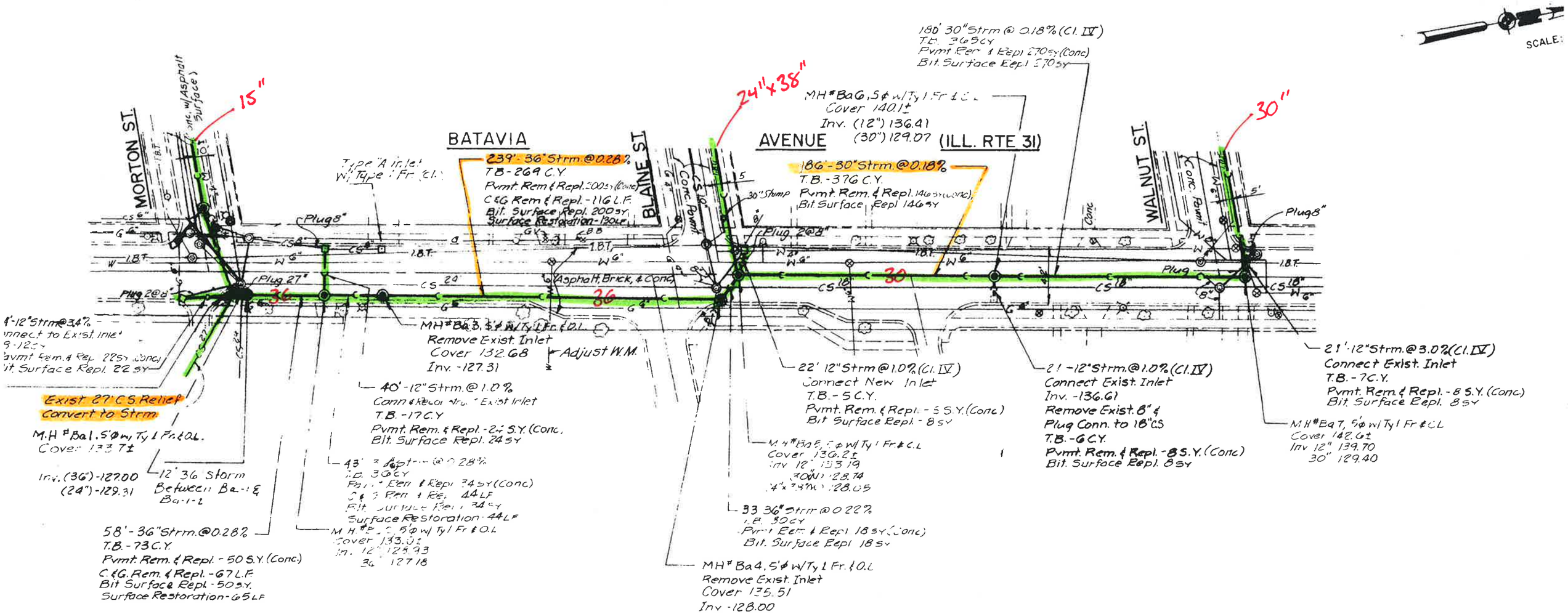
Printed 6/23/2015

Area 3 Street Paving History

Street	Last Paved
Walnut @ Jackson	2000
Walnut @ Jefferson	2000
Blaine	2000
Morton St from Harrison to 31	1993
Morton St from McKinley to Harrison	1999
Garfield	1994
Jackson	2000
Jefferson	2000


20'-12"Strm@2.0%
Connect Exist. Inlet
T.B. 7CY
Pvmt. Rem. & Repl. -12SY (Conc.)
Bit. Surface Repl. -12SY
STREET
MORTON
Plug 8" Asphalt & Conc. Pavmt.
15'-12"Strm.@1.2%
Connect Existing Inlet
T.B. -5 C.Y.
Pvmt. Rem & Repl. -9 S.Y. (Conc)
Bit Surface Repl. 9SY
M.H. #Mo 2, 4'Ø, w/Typ. 1 Fr & CL
Cover (40.5)
Inv. (12") 137.35
(15") 132.49
19.7'-15"Strm.@0.77%
T.B. -242 C.Y.
Pvmt. Rem. & Repl. -121 S.Y. (Conc.)
Bit Surface Repl. -121 SY
T.B. -14 C.Y.
Pvmt. Rem. & Repl. -17 S.Y. (Conc.)
C. & G. Rem. & Repl. -15 L.F.
Bit. Surface Repl. -17 S.Y.
M.H. #Mo 1, 4'Ø w/Ty. 1 Fr & CL
Cover 134.3±
Inv. (12"N) 130.97
(12"S) 130.97
(15") 130.97
(24") 130.37
9'-12"Strm.@1.0%
T.B. -5 C.Y.
Pvmt Rem. & Repl. -7 S.Y. (Conc.)
C & G. Rem & Repl. -6 L.F.
Bit Surface Repl - 7 S.Y.
Inlet w/Ty. 1 Fr. & CL.
Rem. Exist. Inlet
Gr. E 133.02
Inv. 131.06
Asphalt Dr.
Plug
Plug 8"
Plug 2"
BATAVIA AVENUE (ILL. R.
M.H. #Ba1-2
27'
36'
Adj. & Reconnect
Exist. 8" Strm.
Sew. Adj. -25LF
Sew. Recon. -Iec.
51'-24"Strm.@0.22%
T.B. -95 C.Y.
Pvmt. Rem. & Repl. -45 S.Y. (Conc.)
Bit. Surface Repl. -45 S.Y.
PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT OF WAY CHECKED
NOTE BOOK
NO.
BY
DATE


MORTON STREET
DRAINAGE SEPARATION
DIVISION "B"
SCALE 1" = 50'
SCALE 1" = 50'
BLAINE ST.
WALNUT STREET
BATAVIA AVE (ILL. RTE. 31)
BATAVIA AVENUE (ILL. RTE. 31)
Inlet w/ Ty 1 Fr. & O.L.
Gr. E -131.08±
Inv. -129.00
6'-12" Strm. @ 2.0%
T.B. -2 C.Y.
Pvt. Rem. & Repl. 2 S.Y. (Conc.)
C&G Rem. & Repl. -3 L.F.
25'-12" Strm. @ 0.8%
Conn. Exist. Inlet
Inv. (S) 129.44
(N.) 129.25
T.B. -7 C.Y.
Pvmt. Rem. & Repl -15 S.Y. (Conc.)
M.H. #Ba 4
MH # Ba 5
M.H. #Ba 7
M.H. #Bl 2, 4' ϕ w/ Ty. Fr. 1 & O.L.
Rem Exist Inlet, Cover 131.08±
Inv (12") 129.25
Inv. (14" x 23") 128.28
7' 14" x 23" Strm @ 0.6%
T.B. -5 C.Y., Pavmt Rem. & Repl. 3 S.Y. (Conc.)
C&G Rem & Repl -10 L.F.
MH # Bl. 1, 6' ϕ w/ R-1080, Ty. B Lid
Cover 131.8±
Inv. (14" x 23" SW) 128.23
(12" S) 128.86
(24" x 38") 128.16
181 - 24" x 38" Strm. @ 0.06%
T.B. -50 C.Y.
Pvmt. Rem. & Repl. -31 S.Y. (Conc.)
C&G Rem. & Repl -7 L.F.
Sidewalk Rem. & Repl -35 S.F.
Bit. Surface Repl. -14 S.Y.
Surface Restoration -150 L.F.
Remove exist. inlet and
Replace with new Type "A" inlet
with Type 1 Fr.
Conc. Pavmt
MH # Wa 3, 4' ϕ w/ Ty 1 Fr. O.L.
Cover 134.22±
Inv. (12") 131.40
(18") 131.00
25'-18" Strm. @ 0.66%
T.B. -12 C.Y.
Pvmt. Rem. & Repl. -17 S.Y. (Conc.)
C&G Rem. & Repl. -22 L.F.
6'-12" Strm. @ 1.8%
Connect Exist. Inlet
Inv. -131.49
Plug
Conc. Pavmt
MH #1
Adjust MH
MH #2
5'-12" Strm. @ 1.0%
Connect Exist. Inlet
Inv. -131.64
MH # Wa 2, 4' ϕ w/ Ty 1 Fr. & O.L.
Cover 134.44±
Inv. (12") 131.59
(18") 130.84
(24") 130.44
12'-24" Strm. @ 0.74%
352 - 30" Strm. @ 0.16% (Cl. II)
T.B. -165 C.Y.
Pvmt. Rem. & Repl. -38 S.Y. (Conc.)
C&G Rem. & Repl. -6 L.F.
Sidewalk Rem. & Repl. -50 S.F.
Bit. Surface Repl. 4 S.Y.
Surface Restoration -330 L.F.
M.H. # Wa 1, 4' ϕ w/ Ty 1 Fr. & O.L.
Cover 135.0±
Inv. (24") 130.37
(30") 129.97
MH # 3
Exist. S. to be Aband.
B.M. - Top NE Flange Bolt on Fire Hydrant at NW Corner of Batavia & Blaine. - El. 137.07
B.M. - Top SW Flange Bolt on Fire Hydrant at NE Corner of Batavia & Walnut - El. 145.08
SCALES :
HORIZ. : 1" = 50'
VERT. : 1" = 5'
RECORD DRAWING


SCALE:
MORTON ST.
BATAVIA
BLAINE ST.
AVENUE
(ILL. RTE 31)
WALNUT ST.
15"
24"x38"
30"
239' - 36" Strm. @ 0.28%
T.B. - 269 C.Y.
Pvmt. Rem. & Repl. - 200 S.Y. (Conc)
C&G Rem. & Repl. - 116 L.F.
Bit. Surface Repl. 200 SY
Surface Restoration - 130 LF
180' 30" Strm @ 0.18% (Cl. IV)
T.B. - 365 C.Y.
Pvmt. Rem. & Repl. 270 SY (Conc)
Bit. Surface Repl. 270 SY
186' - 30" Strm. @ 0.18%
T.B. - 376 C.Y.
Pvmt. Rem. & Repl. 146 SY (Conc)
Bit. Surface Repl. 146 SY
MH # Ba6, 5' ϕ w/ Ty 1 Fr & C.L.
Cover 140.1±
Inv. (12") 136.41
(30") 129.07
Type "A" Inlet
w/ Type 1 Fr. (Cl. I)
Plug 8"
Plug 27"
Plug 2@8"
Plug 2@8"
Plug 8"
Plug
Asphalt, Brick, & Conc.
30" Stump
Conc. Pvmt.
Conc.
Exist. 27' C.S. Relief
Convert to Strm
M.H # Ba1, 5' ϕ w/ Ty 1 Fr. & O.L.
Cover 133.71±
Inv. (36") - 127.00
(24") - 129.31
12' 36 Storm
Between Ba-1 & Ba-1-2
58' - 36" Strm. @ 0.28%
T.B. - 73 C.Y.
Pvmt. Rem. & Repl. - 50 S.Y. (Conc)
C.&G. Rem. & Repl. - 67 L.F.
Bit Surface Repl. - 50 S.Y.
Surface Restoration - 65 LF
MH # Ba3, 5' ϕ w/ Ty 1 Fr. & O.L.
Remove Exist. Inlet
Cover 132.68
Inv. - 127.31
Adjust W.M.
40' - 12" Strm. @ 1.0%
Connect to Exist. Inlet
T.B. - 17 C.Y.
Pvmt. Rem. & Repl. - 24 S.Y. (Conc.)
Bit. Surface Repl. 24 SY
43' 36" Strm @ 0.28%
T.B. 30 C.Y.
Pvmt. Rem. & Repl. 34 SY (Conc)
C.&G. Rem. & Repl. 44 LF
Bit. Surface Repl. 34 SY
Surface Restoration - 44 LF
MH # Ba2, 5' ϕ w/ Ty 1 Fr. & O.L.
Cover 133.01
Inv. 12" 128.93
36" 127.18
22' 12" Strm @ 1.0% (Cl. IV)
Connect New Inlet
T.B. - 5 C.Y.
Pvmt. Rem. & Repl. - 5 S.Y. (Conc)
Bit. Surface Repl. - 8 SY
MH # Ba5, 5' ϕ w/ Ty 1 Fr. & C.L.
Cover 136.21±
Inv. 12" 133.19
30" 128.74
24" x 34" 128.05
33' 36" Strm @ 0.22%
T.B. 30 C.Y.
Pvmt. Rem. & Repl. 18 SY (Conc)
Bit. Surface Repl. 18 SY
MH # Ba4, 5' ϕ w/ Ty 1 Fr. & O.L.
Remove Exist. Inlet
Cover 135.51
Inv. - 128.00
21' - 12" Strm. @ 1.0% (Cl. IV)
Connect Exist. Inlet
Inv. - 136.61
Remove Exist. 8" & Plug Conn. to 18" CS
T.B. - 6 C.Y.
Pvmt. Rem. & Repl. - 8 S.Y. (Conc)
Bit. Surface Repl. 8 SY
21' - 12" Strm. @ 3.0% (Cl. IV)
Connect Exist. Inlet
T.B. - 7 C.Y.
Pvmt. Rem. & Repl. - 8 S.Y. (Conc.)
Bit. Surface Repl. 8 SY
MH # Ba7, 5' ϕ w/ Ty 1 Fr. & C.L.
Cover 142.61±
Inv. 12" 139.70
30" 129.40