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Storm Water Management Plan

City of Windsor Heights, IA

September 2018

Submitted by:
Bolton & Menk, Inc.
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Certification

Storm Water Management Plan

for

City of Windsor Heights, IA

A13.116140
September 26, 2018

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Justin L. Ernst, P.E.
License No. 23753
My renewal date is December 31, 2019

Date: 9-26-2018

Pages or sheets covered by this seal:

All pages

Table of Contents

Tables

Appendix A

I. Introduction

A. Background

The City of Windsor Heights has contracted with Bolton & Menk, Inc. to complete a Storm Water Management Plan of its existing storm sewer infrastructure. The plan includes an investigation of the existing storm sewer infrastructure, storm water conveyance alternatives and preliminary layout for improvements to the storm sewer system within the corporate limits of the City of Windsor Heights. The recommended solutions are intended to improve the City's drainage characteristics in anticipation of continued street improvement projects. The improvements that were investigated in this study include new storm sewer lines, manholes, and intakes.

The existing storm sewer system within the study area consists of areas with undersized storm sewer mains and inadequate intake spacing. The combination of undersized storm sewer mains and minimal intakes, causes a significant amount of localized flooding throughout the study area.

B. Project Approach

Bolton & Menk conducted a field review and desktop review of the study area for the storm water improvements. The existing storm sewer infrastructure was obtained by GIS information obtained from the City along with GPS field collection by City staff of existing manholes and intakes. A comprehensive model and evaluation of the project area was completed to analyze the existing conditions and evaluate potential solutions to create a future system that will improve localized flooding issues and meet current engineering standards.

II. Methodology

A. Time of Concentration

Times of concentration for each sub-basin were computed using the NRCS Velocity Method for sheet flow and shallow concentrated flow. A minimum time of concentration of 6 minutes was used for all subbasins less than 0.50 acres. Time of concentrations were calculated to be 6.0 to 20.4 minutes.

B. Hydrologic and Hydraulic Model

Precipitation was modeled using the NRCS MSE 3, 24-hour rainfall distribution. The MSE 3 rainfall distribution was developed in 2015 and is based on precipitation-frequency data compiled within NOAA Atlas 14.

Storm water runoff was analyzed for the 5-year, 10-year, and 100-year recurrence intervals with special attention to the 10-year and 100-year event. Rainfall amounts for each design event were selected from Iowa SUDAS *Rainfall Depth and Intensity for Various Return Periods* table. Estimates were taken from Section 5 – Central Iowa. A summary of the values used within the analysis are shown in Table 1: Total Rainfall Amount for Design Event

Table 1: Total Rainfall Amount for Design Event

	Precipitation Frequency Estimate (inches)		
Duration	*5-year*	*10-year*	*100-year*
24-hour	3.81	4.46	7.12

For purposes of this analysis, Walnut Creek was analyzed at low flow conditions.

The SCS Curve Number Method was used to model rainfall losses. Composite curve numbers were calculated for each sub-basin. A curve number value of 72 was used to represent pervious area and a curve number value of 98 was used to represent impervious area.

Autodesk Storm and Sanitary Analysis (SSA) was used to create a complete and comprehensive model of the entire drainage network. The SCS TR-20 Hydrology Method was used to develop watershed runoff hydrographs for each of the sub-basins. This methodology is widely accepted at local and national regulatory agencies as an engineering standard.

III. Existing Conditions Analysis

A. Watershed Area

The primary land use of the study area is urban residential landscape with commercial areas along University Avenue and 73rd Street. After a review of the USDA web soil survey the project area was determined to be composed of 7 different soil types, and of which is mainly composed of Clarion-Urban land complex with a type B hydrologic soil group.

B. Analysis

The first step in analyzing the storm sewer system was to recreate the existing storm sewer system. Existing GIS data from the City was used as a base. As-built data from previous projects and LiDAR were utilized to add critical data to storm sewer structures and pipes. Lastly, field data was gathered for several manholes and intakes throughout the project area by City staff using a portable GPS unit. The field data included pipe sizes and depth to invert of structures. Assumptions were made on structure flowlines, rim elevations, and routing for structures and pipes that were not surveyed nor contained in existing plan sets. Each pipe run was routed to one of 23 outlets contained within the study area, 17 of which discharge into Walnut Creek and 5 of which discharge into the City of Des Moines storm sewer system. Refer to the Existing Conditions map within Appendix A for the existing storm sewer network map and existing subbasins within the study area.

Once the existing storm sewer system was established, sub-basins were delineated from each catch basin or general drainage location. LiDAR was analyzed to determine drainage patterns and delineate sub-basins. In total 263 sub-basins were delineated totaling approximately 725 acres. Each sub-basin was assigned a weighted curve number, time of concentration, and routed to its respective catch basin. This information was then input into the SSA model to create a comprehensive model of the drainage network. The model was run and results were recorded for the existing storm sewer system. These results were used as a basis of comparison for the improvements suggested herein.

C. Results

Two parameters were analyzed from the existing conditions model output: total time flooded of junctions (manhole/intakes) and time surcharged for links (pipes). Iowa SUDAS standards require that the storm sewer system network will operate without surcharge during the 5-year event. Results from the existing conditions model displayed significant flooding and surcharging throughout the project area. As it may not be feasible to eliminate surcharging and flooding, improvements can be implemented to reduce flooding and surcharging of the storm sewer network. See the proposed solutions for areas of improvements identified through the existing conditions model.

IV. Proposed Solutions

Solutions were developed to improve the capacity of the storm sewer system, decrease the duration of flooding at intakes and manholes, and address recurring localized flooding in many identified problem areas. The main cause of flooding and surcharging throughout the project area is undersized storm sewer and the lack of surface intakes. As a result of the existing insufficient spacing of surface intakes, large drainage areas are funneled to a single downstream catch basin that does not have the capacity to capture all the surface runoff. This leads to surface ponding at these locations and can cause excessive runoff to spread over streets. Adequately spaced intakes and storm sewer main sized to facilitate the storm flow will greatly reduce localized flooding at intakes during minor storm events. Refer to the Project Location Map for a vicinity map of each proposed project described below.

A. Allison Avenue Improvements – Figure #1

Through the existing conditions model and input from city staff, localized flooding is occurring at the low spot along Allison Avenue. This localized flooding can be attributed to significant surface runoff coupled with insufficient intake capacity and undersized downstream conduits. Proposed improvements include installing storm sewer along 64th Street and Allison Avenue with adequately spaced intakes along the mains. The proposed improvements are highlighted below:

1. Install 36" storm sewer main along 64th Street from Allison Avenue to the north with new intakes placed along the main. Connection to the existing main will be made at this point to allow removal/abandonment of the current main that is directed through private property.
2. Install 300' of 24" storm sewer along Lincoln Avenue.
3. Install 36" main and 24" main along Allison Avenue with new intakes placed along the main.

The improvements highlighted above will aid in the reduction of flooding along Allison Avenue by installing additional intakes and adequately sized storm sewer. The project will require partial reconstruction of the roadway. Refer to Figure #1 for a preliminary plan and opinion of probable costs of the improvements.

B. 70th/68th Street Improvements – Figure #2

Undersized storm sewer near the intersections of 70th St/Washington Avenue and 68th St/Washington Avenue result in localized flooding in these areas. The main trunk line is under capacity and cannot convey the large amount of runoff from the watershed upstream of this area. Due to the lack of capacity within the main, flooding can be observed throughout this area. Proposed Improvements include increasing the capacity of the storm sewer main and installing new intakes. The proposed improvements are highlighted below:

1. Install 54" storm sewer along Northwest Drive from 68th Street to 69th Street. This will allow the removal/abandonment of the existing main run through private property in this area.
2. Install 54" storm sewer along 69th Street from Northwest Drive to Washington Avenue.
3. Install 60" storm sewer along Washington Avenue from 69th Street to 70th Street.
4. Install 60" storm sewer along 70th to connect to the existing main.

The improvements highlighted above will provide additional capacity in the storm sewer main to convey the runoff in the area. Improvements were also noted upstream of the project area due to the increased capacity within the storm sewer main. This project will require

partial roadway reconstruction. Refer to Figure #2 for a preliminary plan and opinion of probable costs of the improvements.

C. 69th Street Storm Sewer Improvements – Figure #3

69th Street, north of Washington Avenue, experiences significant flooding during the 5-year event due to the lack of surface intakes. The intersection of 69th Street and Washington Avenue contains one set of intakes that captures approximately 9.34 acres of urban runoff. Proposed improvements aim to reduce the amount of surface runoff and include:

1. Installing storm sewer main along 69th with additional surface intakes.
2. The 70th/68th Street Improvements, highlighted above, should be installed prior to this project in order to provide sufficient downstream capacity.

The improvements highlighted above will decrease the amount surface runoff from reaching the intersection of 69th Street/Northwest Drive and therefore reducing surface flooding in this area. This project will require partial roadway reconstruction. Refer to Figure #3 for a preliminary plan and opinion of probable costs of the improvements.

D. 68th Street Storm Sewer Improvements – Figure #4

As seen along 69th Street, 68th Street also lacks surface intakes. The lack of intakes forces large amounts of surface runoff to one set of intakes along this roadway section. The direct result of the lack of surface intakes is localized flooding in this area. To decrease the amount of flooding in this area, it is proposed to install storm sewer along 68th Street with additional intakes along the way. Proposed improvements are highlighted below:

1. Install 24" and 18" storm sewer along 68th Street from Timmons Drive to Lincoln Avenue.
2. Install additional intakes along the main to capture surface runoff.

The improvements highlighted above will distribute surface runoff to several different intakes, reducing localized flooding due to overwhelmed intakes. The proposed improvements will require roadway reconstruction. Refer to Figure #4 for a preliminary plan and opinion of probable costs of the improvements.

E. Wilshire Blvd to Jefferson Avenue Storm Sewer Improvements – Figure #5

The area of Wilshire Blvd to Jefferson Avenue bounded by 73rd St to 70th St, lacks surface intakes and contains under sized storm sewer. This combination is the primary cause of flooding along 73rd Street. Proposed improvements will redistribute surface runoff to additional intakes to reduce flooding along 73rd street. Proposed improvements are highlighted below:

1. Install 42" and 36" storm sewer main along 73rd Street from Wilshire Blvd to El Rancho Avenue.
    a. Install 30", 24", and 18" storm sewer and surface intakes along Wilshire Blvd.
    b. Install 30", 24", and 18" storm sewer and surface intakes along Sunrise Blvd.
    c. Install 36", 30", 24", and 18" storm sewer and surface intakes along El Rancho Avenue.
2. Install 36" Storm sewer main along 73rd from Franklin Avenue to Jefferson Avenue.
    a. Install 36", 30", 24", and 18" storm sewer and surface intakes along Franklin Avenue.

b. Install 30", 24", and 18" storm sewer and surface intakes along Jefferson Avenue.

The improvements highlighted above will increase the capacity of the main trunk line along 73rd Street and limit the amount of surface runoff entering 73rd Street by the installation of storm sewer and intakes along Wilshire Blvd, Sunrise Blvd, El Rancho Avenue, Franklin Avenue, and Jefferson Avenue. The proposed improvements will require partial street reconstruction. Refer to Figure #5 for a preliminary plan and opinion of probable costs of the improvements.

F. College Drive Storm Sewer Improvements – Figure #6

College Drive, west of Walnut Creek, contains no intakes or storm sewer. Surface runoff is conveyed through curb and gutter until it ultimately overland flows into Walnut Creek. Improvements along this area will reduce the amount of surface runoff conveyed through the roadway's curb and gutter. The proposed improvements are highlighted below:

1. Install 42", 36", 30", 24", and 18" storm sewer along with surface intakes along College Drive from Walnut Creek to 78th Street.
2. Install 24", 18", and 15" storm sewer and surface intakes along 76th Street.

Improvements along College Drive will decrease the gutter spread along College Drive and convey runoff safely and efficiently to Walnut Creek. The improvements will require partial street reconstruction. Refer to Figure #6 for a preliminary plan and opinion of probable costs of the improvements.

G. Marilyn Drive Storm Sewer Improvements – Figure #7

Approximately 32 acres of runoff are routed to and through Marilyn Drive in the existing conditions. Marilyn Drive contains minimal storm sewer infrastructure, all of which is under capacity for the given watershed. Proposed improvements will redistribute surface runoff to additional surface intakes and provide adequately sized storm sewer. The proposed improvements are highlighted below:

1. Install 36" storm sewer from Walnut Creek to Marilyn Dr.
2. Install 36" and 30" storm sewer and surface intakes along Marilyn Dr.
    a. Install 24" and 18" storm sewer and surface intakes along 78th, 79th, and 80th Street.

Additional intakes placed along 78th, 79th, and 80th Street will decrease the amount of surface runoff entering Marilyn Dr. Adequately sized storm sewer will then route the runoff to Walnut Creek. The proposed improvements will require partial street reconstruction. Refer to Figure #7 for a preliminary plan and opinion of probable costs of the improvements.

H. 73rd Street Storm Sewer Improvements – Figure #8

Storm sewer along 73rd Street from Bellaire Avenue to Colby Avenue is mainly comprised of 15" and 18" storm sewer. There are minimal intakes placed along Bellaire Avenue, Del Matro Avenue, Reite Avenue, Sunset Terrace, and Colby Avenue. Existing intakes are overwhelmed by the amount of surface runoff through this watershed. Flooding of intakes and surcharging of the storm sewer can be observed during the 5-year storm event.

It is proposed to increase the size of storm sewer main along 73rd to eliminate the flooding of intakes and significantly decrease the time surcharged of pipes. This project will provide the ability to install storm sewer along Bellaire Avenue, Del Matro Avenue, Reite Avenue, Sunset Terrace, and Colby Avenue in the future to further reduce flooding and surcharging along 73rd Street. This project will require partial reconstruction of the roadway. Refer to Figure #8 for a preliminary plan and opinion of probable costs of the improvements.

I. 73rd Street & Washington Street Storm Sewer Improvements – Figure #9

Storm sewer collected at the intersection of 73rd St and Washington Avenue is conveyed to Walnut Creek through an 18" diameter storm sewer main. This storm sewer main is under capacity for runoff directed to this area. During the 5-year storm, significant flooding was noted. The improvements proposed below will reduce the amount of flooding in this area through the reconstruction of the storm sewer infrastructure in the 73rd Street/Washington Avenue intersection:

1. Install 18", 24", and 36" storm sewer with surface intakes in the 73rd Street/Washington Avenue intersection.
2. Install 36" storm sewer main along 73rd Street to 66" storm sewer outlet.

The improvements proposed to increase the size of storm sewer and outlet the runoff through the existing 66" storm sewer will provide the needed capacity to convey runoff during the minor storm events. This project will require the reconstruction of the 73rd Street/Washington Avenue intersection along with partial street reconstruction of 73rd Street. Refer to Figure #9 for a preliminary plan and opinion of probable costs of the improvements.

J. Del Matro Avenue Storm Sewer Extension – Figure #10

Recently, new intakes were added at the intersection of Del Matro Avenue and 66th Street. Additional improvements can be made to further help alleviate localized flooding at the intersection. It is recommended that a pair of intakes and a storm sewer branch line be installed along Del Matro Avenue, east of 66th Street. This addition would help reduce the amount of surface runoff that reaches the intersection and contributes to the localized flooding problem.

Partial roadway reconstruction would be required as part of this project. Refer to Figure #10 for a preliminary plan and opinion of probable costs of the improvements.

K. Colby Avenue & Forest Court Storm Sewer Improvements – Figure #11

This portion of storm sewer serves a large drainage area through central Windsor Heights. Currently, the region served by this sewer system lacks surface intakes, especially at intersections. The storm sewer system also contains a number of undersized mains, many of which are located off-street and through private property, making them a challenge to replace. The recommended improvements are centered around adding new intakes at key intersections, and increasing the capacity of portions of the main line while rerouting them within the street; specifically:

1. Install a 42" storm sewer along 70th Street and Colby Avenue and abandon/remove the existing main through private property.
2. Install new intakes at the intersection of Colby Avenue and 70th Street.
3. Install a 48" storm sewer along Forest Court from 73rd Street to the midblock of 72nd and 71st Street. Abandon existing sewer main located on private property.
4. Install new intakes at the intersections of Forest Court and 71st Street, 70th Street, and 68th Street.
5. Install a branch line east along Forest Court from the midblock of 72nd and 71st Street to 68th Street in order to serve each of the previously mentioned intersections. The storm sewer branch line would consist of 30", 24", and 18" diameter pipe.

These improvements will help reduce localized flooding throughout these neighborhoods and at many intersections. The recommended project can also accommodate the installation of additional surface intakes and branch lines along upstream intersections throughout the watershed. This solution also improves maintenance access to the storm sewer main by abandoning portions that currently lie on private property in residential backyards. Partial roadway reconstruction would be required as part of this project. Refer to Figure #11 for a preliminary plan and opinion of probable costs of the improvements.

L. Colby Park & 69th Street Storm Sewer Network Improvements – Figure #12

This storm sewer network serves a large watershed in the south portion of the City, including an area north of University Avenue between 68th and 64th Street, and an area south of University Avenue between 69th Street, School Street, and 64th Street. The existing storm sewer pipes are undersized and this region also lacks sufficient intake spacing along 68th, 67th, and 66th Streets. The existing storm sewer network discharges directly to Walnut Creek through a 36" main line located in Colby Park, which is also substantially undersized. Another problem area is the existing pipe crossing of University Avenue, which does not have sufficient capacity and may cause some storm sewer back-ups along University Avenue.

This recommended solution aims to primarily address the insufficient pipe capacity problems, specifically in the region south of University Avenue. These improvements are designed to accommodate the future installation of intakes and branch lines along 68th and 67th Street. The pipe crossing at University Avenue is also included in this recommendation, which will help alleviate some of the localized flooding that may occur along University Avenue, east of 68th Street. The proposed improvements are highlighted below:

1. Installation of a 66" storm sewer main from the intersection of 69th Street and School Street, south and west through Colby Park and into Walnut Creek.
2. Installation of new storm sewer main and intakes along School Street from 69th Street to 66th Street. The storm sewer main would consist of 48", 36", and 24" diameter pipes.
3. Installation of new storm sewer main and intakes along 69th Street from School Street to University Avenue. The storm sewer main would consist of 48", 42", 30", and 24" diameter pipe.
4. Installation of new storm sewer main and intakes along Mott Avenue from 69th Street to 66th Street, consisting of 42", 36", 30", and 24" diameter pipe.
5. Reconstruction of the storm sewer crossing at University Avenue with a 30" storm sewer main.

Roadway reconstruction would be required as part of this project. Refer to Figure #12 for a preliminary plan and opinion of probable costs of the improvements.

V. Opinion of Probable Costs

Opinion of probable costs were developed for each improvement presented above. For each cost estimate a construction contingency of 20% was assumed. In general, road replacement was taken to be half of the roadway or enough roadway replacement to conduct proposed work, intersections would be completely reconstructed, and sod restoration would be required along the proposed street reconstruction. The cost estimates created are conservative given the preliminary nature of design and are using 2018 prices since it is not known when construction will occur. Public and private utilities are not known at this time or in the future, additional cost may occur due to construction conflicts with other utilities. As final design is started on a given segment, the cost estimate will be able to be refined to more clearly represent the project. Table 2 below is a summary of the estimated costs for each storm sewer improvement project. Refer to Appendix A for a detailed, itemized break down of the opinions of probable costs and associated layouts.

Table 2: Summary of Opinions of Probable Cost for Storm Sewer Improvement Projects

Proposed Storm Sewer Improvement Project	*Estimated Cost*
Allison Avenue Improvements	$974,592.00
70th/68th Street Storm Sewer Improvements	$1,522,772.00
69th Street Storm Sewer Improvements	$352,116.00
68th Street Storm Sewer Improvements	$298,776.00
Wilshire Blvd to Jefferson Ave Storm Sewer Improvements	$3,101,060.00
College Drive Storm Sewer Improvements	$656,100.00
Marilyn Drive Storm Sewer Improvements	$1,225,940.00
73rd Street Storm Sewer Improvements	$1,174,592.00
73rd Street & Washington Street Storm Sewer Improvements	$317,508.00
Del Matro Avenue Storm Sewer Extension	$282,000.00
Colby Avenue & Forest Court Storm Sewer Improvements	$1,648,420.00
Colby Park & 69th Street Storm Sewer Network Improvements	$3,988,310.00

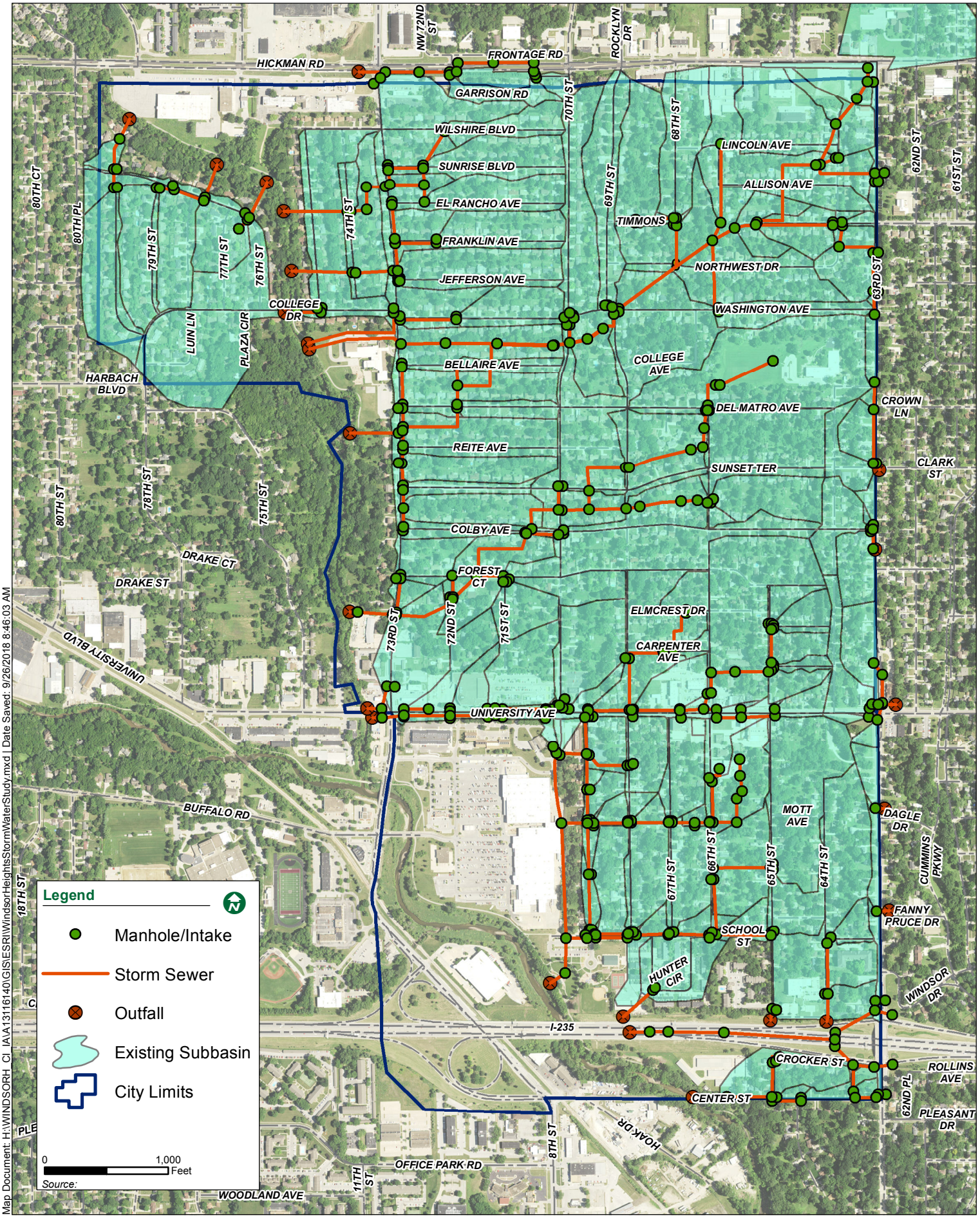
VI. Conclusion

A complete and comprehensive storm water model was created to analyze the existing storm sewer system within the city limits of the City of Windsor Heights. The existing system displayed large drainage areas, few surface intakes, and undersized storm sewer mains. These existing characteristics caused frequent and prolonged surcharging of pipes and flooding of intakes. Proposed solutions were developed to help remedy the current drainage problems and if implemented, the proposed solutions will create an improved storm sewer network for the City of Windsor Heights. The recommendations contained within this report can be used as a planning tool to help guide future infrastructure improvements.

Besides the projects mentioned in this report, other steps can be done to reduce the amount of surface water runoff. This can include support from private landowners to reduce run off from their properties by using rain barrels to collect roof run off, reduce the amount of impervious area on their property, install private rain gardens or install other Best Management Practices (BMPs). Other options to help reduce runoff includes updating the City's storm water ordinance and providing educational opportunities to the public and staff on how they can help reduce runoff. This report doesn't talk about water quality but BMPs can be completed to improve water quality before it gets to the storm sewer system.

Appendix A: Figures/Opinion of Probable Costs

Existing Conditions Map
Project Location Map
Figure #1: Allison Avenue Improvements
Figure #2: 70th/68th Street Storm Sewer Improvements
Figure #3: 69th Street Storm Sewer Improvements
Figure #4: 68th Street Storm Sewer Improvements
Figure #5: Wilshire Blvd to Jefferson Avenue Storm Sewer Improvements
Figure #6: College Drive Storm Sewer Improvements
Figure #7: Marilyn Drive Storm Sewer Improvements
Figure #8: 73rd Street Storm Sewer Improvements
Figure #9: 73rd Street & Washington Street Storm Sewer Improvements
Figure #10: Del Matro Avenue Storm Sewer Extension
Figure #11: Colby Avenue & Forest Court Storm Sewer Improvements
Figure #12: Colby Park & 69th Street Storm Sewer Network Improvements



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Project Location Map

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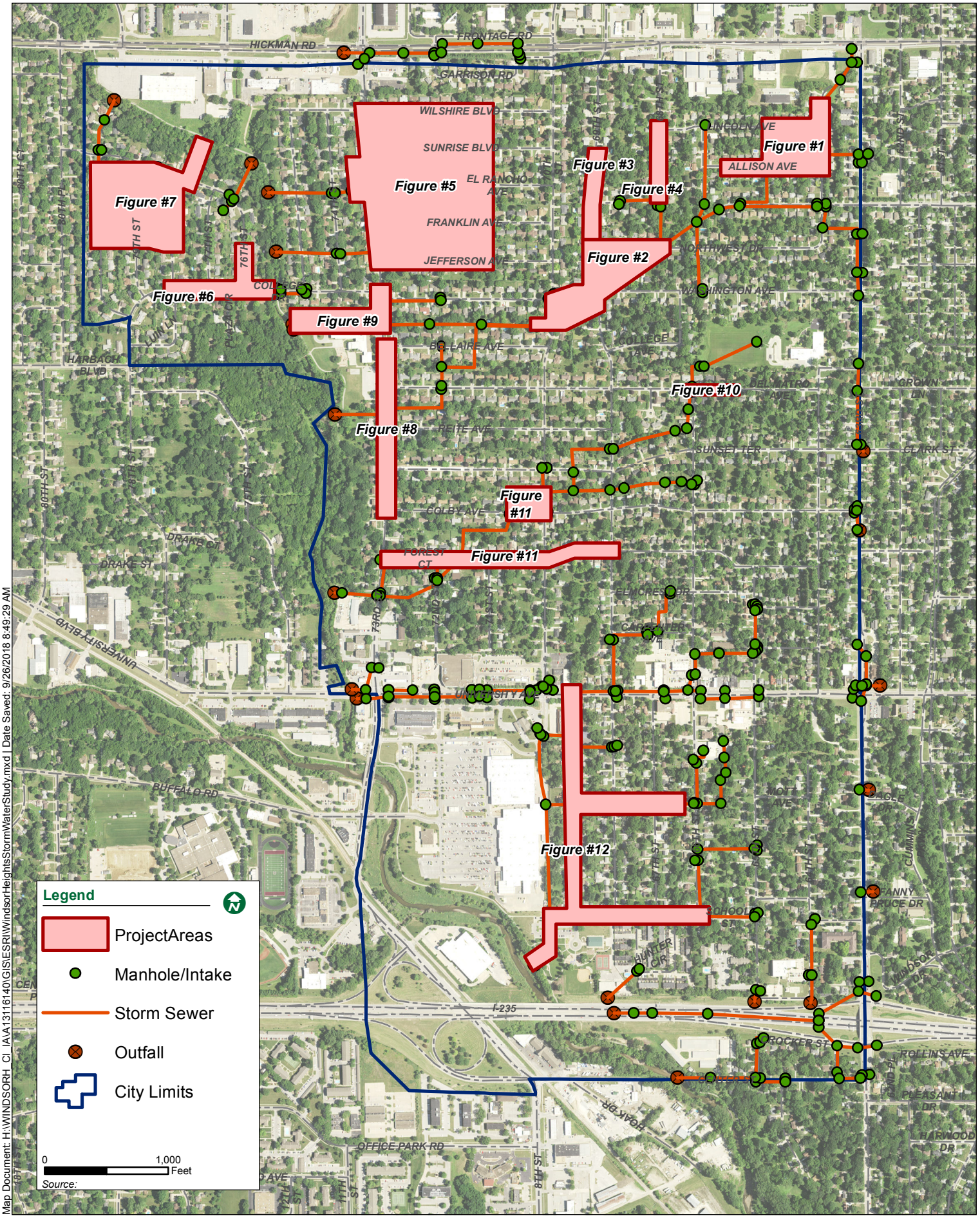


City of Windsor Heights, Iowa

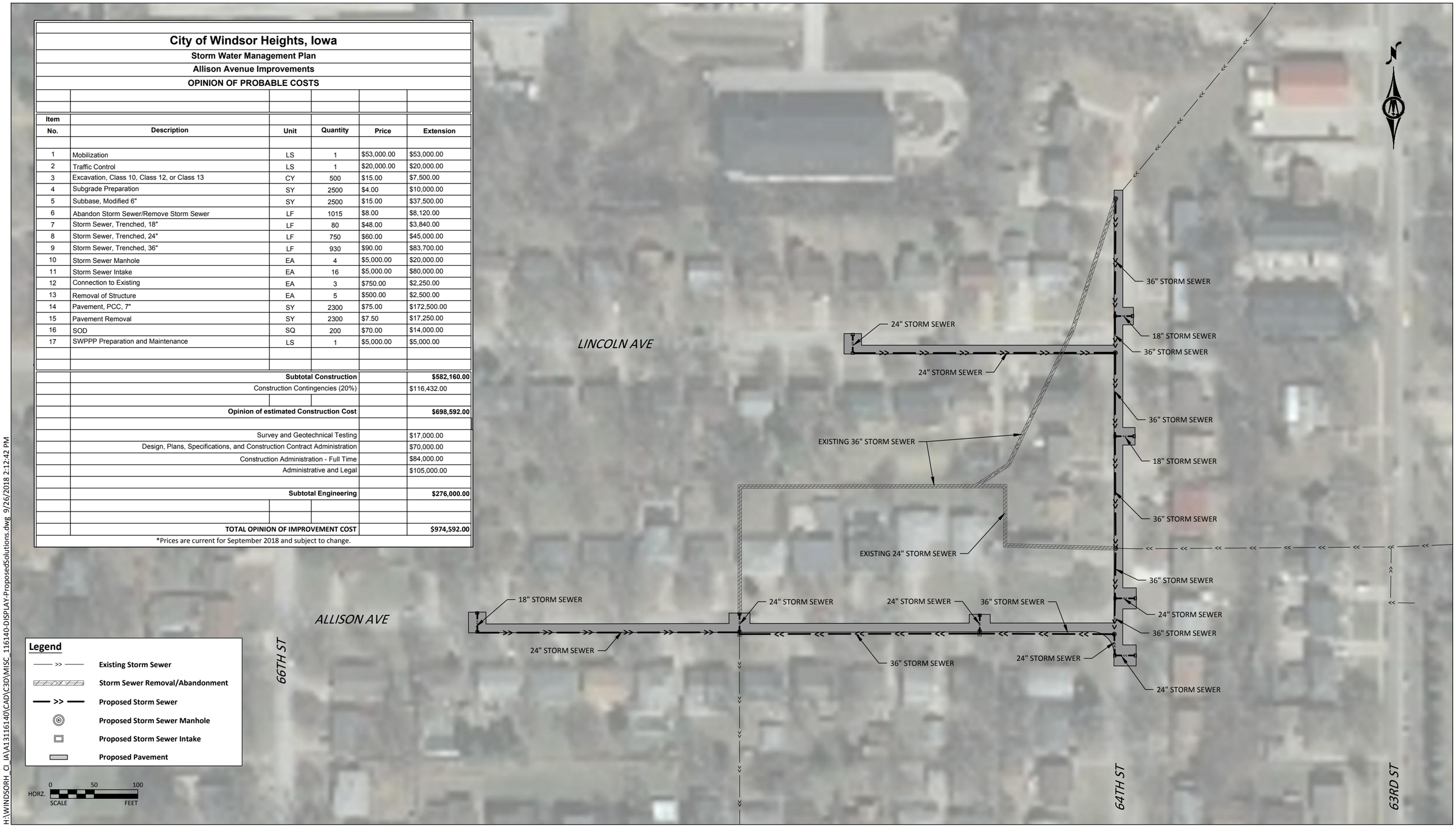
Storm Water Management Plan

Allison Avenue Improvements

OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$53,000.00	$53,000.00
2	Traffic Control	LS	1	$20,000.00	$20,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	500	$15.00	$7,500.00
4	Subgrade Preparation	SY	2500	$4.00	$10,000.00
5	Subbase, Modified 6"	SY	2500	$15.00	$37,500.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	1015	$8.00	$8,120.00
7	Storm Sewer, Trenched, 18"	LF	80	$48.00	$3,840.00
8	Storm Sewer, Trenched, 24"	LF	750	$60.00	$45,000.00
9	Storm Sewer, Trenched, 36"	LF	930	$90.00	$83,700.00
10	Storm Sewer Manhole	EA	4	$5,000.00	$20,000.00
11	Storm Sewer Intake	EA	16	$5,000.00	$80,000.00
12	Connection to Existing	EA	3	$750.00	$2,250.00
13	Removal of Structure	EA	5	$500.00	$2,500.00
14	Pavement, PCC, 7"	SY	2300	$75.00	$172,500.00
15	Pavement Removal	SY	2300	$7.50	$17,250.00
16	SOD	SQ	200	$70.00	$14,000.00
17	SWPPP Preparation and Maintenance	LS	1	$5,000.00	$5,000.00
				Subtotal Construction	**$582,160.00**
				Construction Contingencies (20%)	$116,432.00
				Opinion of estimated Construction Cost	**$698,592.00**
				Survey and Geotechnical Testing	$17,000.00
				Design, Plans, Specifications, and Construction Contract Administration	$70,000.00
				Construction Administration - Full Time	$84,000.00
				Administrative and Legal	$105,000.00
				Subtotal Engineering	**$276,000.00**
				TOTAL OPINION OF IMPROVEMENT COST	**$974,592.00**

*Prices are current for September 2018 and subject to change.



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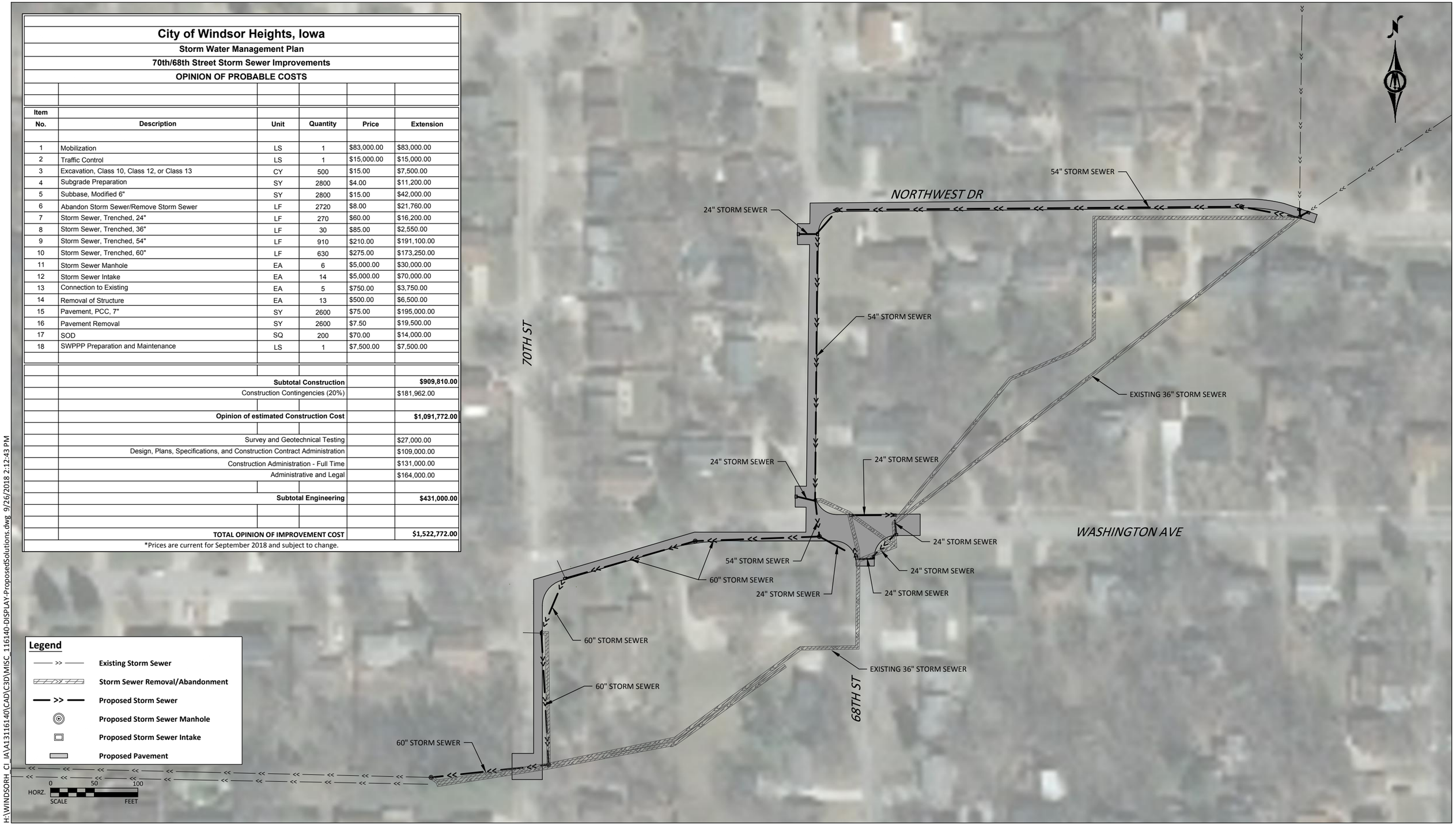
City of Windsor Heights, Iowa
Storm Water Management Plan
70th/68th Street Storm Sewer Improvements
OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$83,000.00	$83,000.00
2	Traffic Control	LS	1	$15,000.00	$15,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	500	$15.00	$7,500.00
4	Subgrade Preparation	SY	2800	$4.00	$11,200.00
5	Subbase, Modified 6"	SY	2800	$15.00	$42,000.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	2720	$8.00	$21,760.00
7	Storm Sewer, Trenched, 24"	LF	270	$60.00	$16,200.00
8	Storm Sewer, Trenched, 36"	LF	30	$85.00	$2,550.00
9	Storm Sewer, Trenched, 54"	LF	910	$210.00	$191,100.00
10	Storm Sewer, Trenched, 60"	LF	630	$275.00	$173,250.00
11	Storm Sewer Manhole	EA	6	$5,000.00	$30,000.00
12	Storm Sewer Intake	EA	14	$5,000.00	$70,000.00
13	Connection to Existing	EA	5	$750.00	$3,750.00
14	Removal of Structure	EA	13	$500.00	$6,500.00
15	Pavement, PCC, 7"	SY	2600	$75.00	$195,000.00
16	Pavement Removal	SY	2600	$7.50	$19,500.00
17	SOD	SQ	200	$70.00	$14,000.00
18	SWPPP Preparation and Maintenance	LS	1	$7,500.00	$7,500.00
				Subtotal Construction	**$909,810.00**
				Construction Contingencies (20%)	$181,962.00
				Opinion of estimated Construction Cost	**$1,091,772.00**
				Survey and Geotechnical Testing	$27,000.00
				Design, Plans, Specifications, and Construction Contract Administration	$109,000.00
				Construction Administration - Full Time	$131,000.00
				Administrative and Legal	$164,000.00
				Subtotal Engineering	**$431,000.00**
				TOTAL OPINION OF IMPROVEMENT COST	**$1,522,772.00**

*Prices are current for September 2018 and subject to change.



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City of Windsor Heights, Iowa					
Storm Water Management Plan					
69th Street Storm Sewer Improvements					
OPINION OF PROBABLE COSTS					
Item No.	**Description**	**Unit**	**Quantity**	**Price**	**Extension**
1	Mobilization	LS	1	$20,000.00	$20,000.00
2	Traffic Control	LS	1	$7,500.00	$7,500.00
3	Excavation, Class 10, Class 12, or Class 13	CY	200	$15.00	$3,000.00
4	Subgrade Preparation	SY	1100	$4.00	$4,400.00
5	Subbase, Modified 6"	SY	1100	$15.00	$16,500.00
6	Storm Sewer, Trenched, 18"	LF	460	$48.00	$22,080.00
7	Storm Sewer, Trenched, 24"	LF	370	$60.00	$22,200.00
8	Storm Sewer Intake	EA	4	$5,000.00	$20,000.00
9	Connection to Existing	EA	1	$750.00	$750.00
10	Pavement, PCC, 7"	SY	1000	$75.00	$75,000.00
11	Pavement Removal	SY	1000	$7.50	$7,500.00
12	SOD	SQ	100	$70.00	$7,000.00
13	SWPPP Preparation and Maintenance	LS	1	$5,000.00	$5,000.00
	Subtotal Construction				**$210,930.00**
	Construction Contingencies (20%)				$42,186.00
	Opinion of estimated Construction Cost				**$253,116.00**
	Survey and Geotechnical Testing				$6,000.00
	Design, Plans, Specifications, and Construction Contract Administration				$25,000.00
	Construction Administration - Full Time				$30,000.00
	Administrative and Legal				$38,000.00
	Subtotal Engineering				**$99,000.00**
	TOTAL OPINION OF IMPROVEMENT COST				**$352,116.00**
*Prices are current for September 2018 and subject to change.					

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

HORZ. SCALE 0 50 100 FEET

City of Windsor Heights, Iowa
Storm Water Management Plan
68th Street Storm Sewer Improvements
OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$17,000.00	$17,000.00
2	Traffic Control	LS	1	$7,500.00	$7,500.00
3	Excavation, Class 10, Class 12, or Class 13	CY	200	$15.00	$3,000.00
4	Subgrade Preparation	SY	1000	$4.00	$4,000.00
5	Subbase, Modified 6"	SY	1000	$15.00	$15,000.00
6	Storm Sewer, Trenched, 18"	LF	410	$48.00	$19,680.00
7	Storm Sewer, Trenched, 24"	LF	230	$60.00	$13,800.00
8	Storm Sewer Intake	EA	4	$3,000.00	$12,000.00
9	Connection to Existing	EA	1	$750.00	$750.00
10	Pavement, PCC, 7"	SY	900	$75.00	$67,500.00
11	Pavement Removal	SY	900	$7.50	$6,750.00
12	SOD	SQ	100	$70.00	$7,000.00
13	SWPPP Preparation and Maintenance	LS	1	$5,000.00	$5,000.00
	Subtotal Construction				**$178,980.00**
	Construction Contingencies (20%)				$35,796.00
	Opinion of estimated Construction Cost				**$214,776.00**
	Survey and Geotechnical Testing				$5,000.00
	Design, Plans, Specifications, and Construction Contract Administration				$21,000.00
	Construction Administration - Full Time				$26,000.00
	Administrative and Legal				$32,000.00
	Subtotal Engineering				**$84,000.00**
	TOTAL OPINION OF IMPROVEMENT COST				**$298,776.00**

*Prices are current for September 2018 and subject to change.

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

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SCALE FEET

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City of Windsor Heights, Iowa

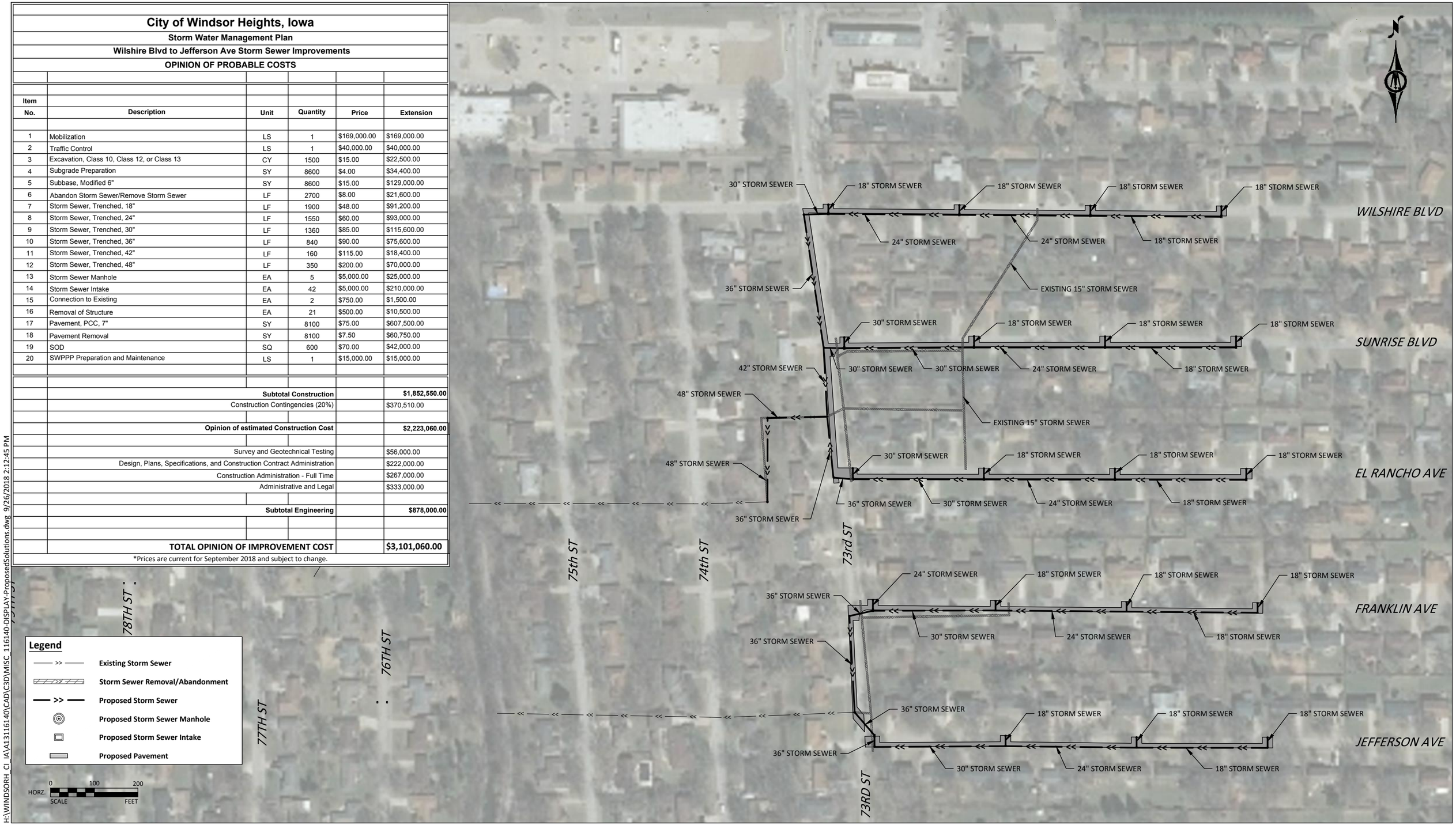
Storm Water Management Plan

Wilshire Blvd to Jefferson Ave Storm Sewer Improvements

OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$169,000.00	$169,000.00
2	Traffic Control	LS	1	$40,000.00	$40,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	1500	$15.00	$22,500.00
4	Subgrade Preparation	SY	8600	$4.00	$34,400.00
5	Subbase, Modified 6"	SY	8600	$15.00	$129,000.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	2700	$8.00	$21,600.00
7	Storm Sewer, Trenched, 18"	LF	1900	$48.00	$91,200.00
8	Storm Sewer, Trenched, 24"	LF	1550	$60.00	$93,000.00
9	Storm Sewer, Trenched, 30"	LF	1360	$85.00	$115,600.00
10	Storm Sewer, Trenched, 36"	LF	840	$90.00	$75,600.00
11	Storm Sewer, Trenched, 42"	LF	160	$115.00	$18,400.00
12	Storm Sewer, Trenched, 48"	LF	350	$200.00	$70,000.00
13	Storm Sewer Manhole	EA	5	$5,000.00	$25,000.00
14	Storm Sewer Intake	EA	42	$5,000.00	$210,000.00
15	Connection to Existing	EA	2	$750.00	$1,500.00
16	Removal of Structure	EA	21	$500.00	$10,500.00
17	Pavement, PCC, 7"	SY	8100	$75.00	$607,500.00
18	Pavement Removal	SY	8100	$7.50	$60,750.00
19	SOD	SQ	600	$70.00	$42,000.00
20	SWPPP Preparation and Maintenance	LS	1	$15,000.00	$15,000.00
				Subtotal Construction	**$1,852,550.00**
				Construction Contingencies (20%)	$370,510.00
				Opinion of estimated Construction Cost	**$2,223,060.00**
				Survey and Geotechnical Testing	$56,000.00
				Design, Plans, Specifications, and Construction Contract Administration	$222,000.00
				Construction Administration - Full Time	$267,000.00
				Administrative and Legal	$333,000.00
				Subtotal Engineering	**$878,000.00**
				TOTAL OPINION OF IMPROVEMENT COST	**$3,101,060.00**

*Prices are current for September 2018 and subject to change.



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City of Windsor Heights, Iowa
Storm Water Management Plan
College Dr Storm Sewer Improvements
OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$36,000.00	$36,000.00
2	Traffic Control	LS	1	$15,000.00	$15,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	300	$15.00	$4,500.00
4	Subgrade Preparation	SY	1700	$4.00	$6,800.00
5	Subbase, Modified 6"	SY	1700	$15.00	$25,500.00
6	Storm Sewer, Trenched, 15"	LF	50	$45.00	$2,250.00
7	Storm Sewer, Trenched, 18"	LF	350	$48.00	$16,800.00
8	Storm Sewer, Trenched, 24"	LF	320	$60.00	$19,200.00
9	Storm Sewer, Trenched, 30"	LF	130	$85.00	$11,050.00
10	Storm Sewer, Trenched, 36"	LF	140	$90.00	$12,600.00
11	Storm Sewer, Trenched, 42"	LF	270	$115.00	$31,050.00
12	Storm Sewer Manhole	EA	3	$5,000.00	$15,000.00
13	Storm Sewer Intake	EA	9	$5,000.00	$45,000.00
14	Pavement, PCC, 7"	SY	1600	$75.00	$120,000.00
15	Pavement Removal	SY	1600	$7.50	$12,000.00
16	SOD	SQ	200	$70.00	$14,000.00
17	SWPPP Preparation and Maintenance	LS	1	$5,000.00	$5,000.00
	Subtotal Construction				**$391,750.00**
	Construction Contingencies (20%)				$78,350.00
	Opinion of estimated Construction Cost				**$470,100.00**
	Survey and Geotechnical Testing				$12,000.00
	Design, Plans, Specifications, and Construction Contract Administration				$47,000.00
	Construction Administration - Full Time				$56,000.00
	Administrative and Legal				$71,000.00
	Subtotal Engineering				**$186,000.00**
	TOTAL OPINION OF IMPROVEMENT COST				**$656,100.00**

*Prices are current for September 2018 and subject to change.

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

HORZ. SCALE 0 50 100 FEET

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City of Windsor Heights, Iowa					
Storm Water Management Plan					
Marily Dr Storm Sewer Improvements					
OPINION OF PROBABLE COSTS					
Item No.	**Description**	**Unit**	**Quantity**	**Price**	**Extension**
1	Mobilization	LS	1	$67,000.00	$67,000.00
2	Traffic Control	LS	1	$20,000.00	$20,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	600	$15.00	$9,000.00
4	Subgrade Preparation	SY	3300	$4.00	$13,200.00
5	Subbase, Modified 6"	SY	3300	$15.00	$49,500.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	750	$8.00	$6,000.00
7	Storm Sewer, Trenched, 18"	LF	150	$48.00	$7,200.00
8	Storm Sewer, Trenched, 24"	LF	1820	$60.00	$109,200.00
9	Storm Sewer, Trenched, 30"	LF	290	$85.00	$24,650.00
10	Storm Sewer, Trenched, 36"	LF	380	$90.00	$34,200.00
11	Storm Sewer Manhole	EA	2	$5,000.00	$10,000.00
12	Storm Sewer Intake	EA	19	$5,000.00	$95,000.00
13	Connection to Existing	EA	1	$750.00	$750.00
14	Removal of Structure	EA	7	$500.00	$3,500.00
15	Pavement, PCC, 7"	SY	3100	$75.00	$232,500.00
16	Pavement Removal	SY	3100	$7.50	$23,250.00
17	SOD	SQ	300	$70.00	$21,000.00
18	SWPPP Preparation and Maintenance	LS	1	$6,500.00	$6,500.00
	Subtotal Construction				**$732,450.00**
	Construction Contingencies (20%)				$146,490.00
	Opinion of estimated Construction Cost				**$878,940.00**
	Survey and Geotechnical Testing				$22,000.00
	Design, Plans, Specifications, and Construction Contract Administration				$88,000.00
	Construction Administration - Full Time				$105,000.00
	Administrative and Legal				$132,000.00
	Subtotal Engineering				**$347,000.00**
	TOTAL OPINION OF IMPROVEMENT COST				**$1,225,940.00**
*Prices are current for September 2018 and subject to change.					

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

HORZ. SCALE 0 50 100 FEET

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City of Windsor Heights, Iowa
Storm Water Management Plan
73rd Street Storm Sewer Improvements
OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$64,000.00	$64,000.00
2	Traffic Control	LS	1	$20,000.00	$20,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	500	$15.00	$7,500.00
4	Subgrade Preparation	SY	2900	$4.00	$11,600.00
5	Subbase, Modified 6"	SY	2900	$15.00	$43,500.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	1440	$8.00	$11,520.00
7	Storm Sewer, Trenched, 18"	LF	30	$48.00	$1,440.00
8	Storm Sewer, Trenched, 24"	LF	730	$60.00	$43,800.00
9	Storm Sewer, Trenched, 30"	LF	490	$85.00	$41,650.00
10	Storm Sewer, Trenched, 36"	LF	180	$90.00	$16,200.00
11	Storm Sewer, Trenched, 42"	LF	230	$115.00	$26,450.00
12	Storm Sewer, Trenched, 60"	LF	70	$275.00	$19,250.00
13	Storm Sewer Manhole	EA	7	$3,500.00	$24,500.00
14	Storm Sewer Intake	EA	18	$6,500.00	$117,000.00
15	Connection to Existing	EA	2	$750.00	$1,500.00
16	Removal of Structure	EA	16	$500.00	$8,000.00
17	Pavement, PCC, 7"	SY	2700	$75.00	$202,500.00
18	Pavement Removal	SY	2700	$7.50	$20,250.00
19	SOD	SQ	200	$70.00	$14,000.00
20	SWPPP Preparation and Maintenance	LS	1	$7,500.00	$7,500.00

Subtotal Construction	**$702,160.00**
Construction Contingencies (20%)	$140,432.00
Opinion of estimated Construction Cost	**$842,592.00**
Survey and Geotechnical Testing	$21,000.00
Design, Plans, Specifications, and Construction Contract Administration	$84,000.00
Construction Administration - Full Time	$101,000.00
Administrative and Legal	$126,000.00
Subtotal Engineering	**$332,000.00**
TOTAL OPINION OF IMPROVEMENT COST	**$1,174,592.00**

*Prices are current for September 2018 and subject to change.

City of Windsor Heights, Iowa

Storm Water Management Plan

73rd Street & Washington Street Storm Sewer Improvements

OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$18,000.00	$18,000.00
2	Traffic Control	LS	1	$10,000.00	$10,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	200	$15.00	$3,000.00
4	Subgrade Preparation	SY	900	$4.00	$3,600.00
5	Subbase, Modified 6"	SY	900	$15.00	$13,500.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	1000	$8.00	$8,000.00
7	Storm Sewer, Trenched, 18"	LF	30	$48.00	$1,440.00
8	Storm Sewer, Trenched, 24"	LF	100	$60.00	$6,000.00
9	Storm Sewer, Trenched, 36"	LF	200	$90.00	$18,000.00
10	Storm Sewer Manhole	EA	1	$5,000.00	$5,000.00
11	Storm Sewer Intake	EA	5	$5,000.00	$25,000.00
12	Connection to Existing	EA	3	$750.00	$2,250.00
13	Removal of Structure	EA	4	$500.00	$2,000.00
14	Pavement, PCC, 7"	SY	800	$75.00	$60,000.00
15	Pavement Removal	SY	800	$7.50	$6,000.00
16	SOD	SQ	40	$70.00	$2,800.00
17	SWPPP Preparation and Maintenance	LS	1	$5,000.00	$5,000.00
		Subtotal Construction			**$189,590.00**
		Construction Contingencies (20%)			$37,918.00
		Opinion of estimated Construction Cost			**$227,508.00**
		Survey and Geotechnical Testing			$6,000.00
		Design, Plans, Specifications, and Construction Contract Administration			$23,000.00
		Construction Administration - Full Time			$27,000.00
		Administrative and Legal			$34,000.00
		Subtotal Engineering			**$90,000.00**
		TOTAL OPINION OF IMPROVEMENT COST			**$317,508.00**

*Prices are current for September 2018 and subject to change.

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

HORZ. SCALE 0 50 100 FEET

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City of Windsor Heights, Iowa

Storm Water Management Plan

Del Matro Avenue Storm Sewer Extension

OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$16,000.00	$16,000.00
2	Traffic Control	LS	1	$7,500.00	$7,500.00
3	Excavation, Class 10, Class 12, or Class 13	CY	200	$15.00	$3,000.00
4	Subgrade Preparation	SY	900	$4.00	$3,600.00
5	Subbase, Modified 6"	SY	900	$15.00	$13,500.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	40	$8.00	$320.00
7	Storm Sewer, Trenched, 24"	LF	360	$60.00	$21,600.00
8	Storm Sewer, Trenched, 30"	LF	40	$85.00	$3,400.00
9	Storm Sewer Intake	EA	4	$5,000.00	$20,000.00
10	Connection to Existing	EA	3	$750.00	$2,250.00
11	Pavement, PCC, 7"	SY	800	$75.00	$60,000.00
12	Pavement Removal	SY	800	$7.50	$6,000.00
13	SOD	SQ	100	$70.00	$7,000.00
14	SWPPP Preparation and Maintenance	LS	1	$5,000.00	$5,000.00
				Subtotal Construction	**$169,170.00**
				Construction Contingencies (20%)	$33,830.00
				Opinion of estimated Construction Cost	**$203,000.00**
				Survey and Geotechnical Testing	$5,000.00
				Design, Plans, Specifications, and Construction Contract Administration	$20,000.00
				Construction Administration - Full Time	$24,000.00
				Administrative and Legal	$30,000.00
				Subtotal Engineering	**$79,000.00**
				TOTAL OPINION OF IMPROVEMENT COST	**$282,000.00**

*Prices are current for September 2018 and subject to change.

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

HORZ. SCALE 0 30 60 FEET

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City of Windsor Heights, Iowa

Storm Water Management Plan

Colby Avenue & Forest Court Storm Sewer Improvements

OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$90,000.00	$90,000.00
2	Traffic Control	LS	1	$20,000.00	$20,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	800	$15.00	$12,000.00
4	Subgrade Preparation	SY	4500	$4.00	$18,000.00
5	Subbase, Modified 6"	SY	4500	$15.00	$67,500.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	800	$8.00	$6,400.00
7	Storm Sewer, Trenched, 18"	LF	590	$48.00	$28,320.00
8	Storm Sewer, Trenched, 24"	LF	480	$60.00	$28,800.00
9	Storm Sewer, Trenched, 30"	LF	330	$85.00	$28,050.00
10	Storm Sewer, Trenched, 36"	LF	40	$90.00	$3,600.00
11	Storm Sewer, Trenched, 42"	LF	440	$115.00	$50,600.00
12	Storm Sewer, Trenched, 48"	LF	610	$200.00	$122,000.00
13	Storm Sewer Manhole	EA	4	$5,000.00	$20,000.00
14	Storm Sewer Intake	EA	19	$5,000.00	$95,000.00
15	Connection to Existing	EA	7	$750.00	$5,250.00
16	Removal of Structure	EA	13	$500.00	$6,500.00
17	Pavement, PCC, 7"	SY	4200	$75.00	$315,000.00
18	Pavement Removal	SY	4200	$7.50	$31,500.00
19	SOD	SQ	300	$70.00	$21,000.00
20	SWPPP Preparation and Maintenance	LS	1	$15,000.00	$15,000.00
				Subtotal Construction	**$984,520.00**
				Construction Contingencies (20%)	$196,900.00
				Opinion of estimated Construction Cost	**$1,181,420.00**
				Survey and Geotechnical Testing	$30,000.00
				Design, Plans, Specifications, and Construction Contract Administration	$118,000.00
				Construction Administration - Full Time	$142,000.00
				Administrative and Legal	$177,000.00
				Subtotal Engineering	**$467,000.00**
				TOTAL OPINION OF IMPROVEMENT COST	**$1,648,420.00**

*Prices are current for September 2018 and subject to change.

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

HORZ. SCALE 0 100 200 FEET

City of Windsor Heights, Iowa

Storm Water Management Plan

Colby Park & 69th Street Storm Sewer Network Improvements

OPINION OF PROBABLE COSTS

Item No.	Description	Unit	Quantity	Price	Extension
1	Mobilization	LS	1	$217,000.00	$217,000.00
2	Traffic Control	LS	1	$40,000.00	$40,000.00
3	Excavation, Class 10, Class 12, or Class 13	CY	1900	$15.00	$28,500.00
4	Subgrade Preparation	SY	11100	$4.00	$44,400.00
5	Subbase, Modified 6"	SY	11100	$15.00	$166,500.00
6	Abandon Storm Sewer/Remove Storm Sewer	LF	5300	$8.00	$42,400.00
7	Storm Sewer, Trenched, 18"	LF	320	$48.00	$15,360.00
8	Storm Sewer, Trenched, 24"	LF	1210	$60.00	$72,600.00
9	Storm Sewer, Trenched, 30"	LF	730	$85.00	$62,050.00
10	Storm Sewer, Trenched, 36"	LF	650	$90.00	$58,500.00
11	Storm Sewer, Trenched, 42"	LF	630	$115.00	$72,450.00
12	Storm Sewer, Trenched, 48"	LF	710	$200.00	$142,000.00
13	Storm Sewer, Trenched, 66"	LF	580	$400.00	$232,000.00
14	Storm Sewer Manhole	EA	6	$5,000.00	$30,000.00
15	Storm Sewer Intake	EA	40	$5,000.00	$200,000.00
16	Connection to Existing	EA	9	$750.00	$6,750.00
17	Removal of Structure	EA	42	$500.00	$21,000.00
18	Pipe Gate Closure	LS	1	$10,000.00	$10,000.00
19	Pavement, PCC, 7"	SY	10500	$75.00	$787,500.00
20	Pavement Removal	SY	10500	$7.50	$78,750.00
21	SOD	SQ	500	$70.00	$35,000.00
22	SWPPP Preparation and Maintenance	LS	1	$20,000.00	$20,000.00
				Subtotal Construction	**$2,382,760.00**
				Construction Contingencies (20%)	$476,550.00
				Opinion of estimated Construction Cost	**$2,859,310.00**
				Survey and Geotechnical Testing	$71,000.00
				Design, Plans, Specifications, and Construction Contract Administration	$286,000.00
				Construction Administration - Full Time	$343,000.00
				Administrative and Legal	$429,000.00
				Subtotal Engineering	**$1,129,000.00**
				TOTAL OPINION OF IMPROVEMENT COST	**$3,988,310.00**

*Prices are current for September 2018 and subject to change.

Legend

- Existing Storm Sewer
- Storm Sewer Removal/Abandonment
- Proposed Storm Sewer
- Proposed Storm Sewer Manhole
- Proposed Storm Sewer Intake
- Proposed Pavement

HORZ. SCALE 0 125 250 FEET