City of Elmhurst

Addendum to the Comprehensive Flood Plan

Storm Sewer System Analysis

Elmhurst, Illinois

Prepared for

City of Elmhurst
209 N. York Street
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EXECUTIVE SUMMARY

This report presents the results of an addendum to the comprehensive flood plan previously completed in 2012 by Christopher B. Burke Engineering, Ltd. (CBBEL) at the request of the City of Elmhurst (City). The comprehensive flood plan was developed in response to the widespread flooding experienced throughout the City during the summer of 2010. During the storm events of June 23 and July 23-24, 2010, the City experienced record rainfalls that resulted in hundreds of flooded residences. Homes throughout the City were severely damaged due to overland flooding, sump pump failures, and sanitary sewer backups. On April 18, 2013, another severe storm event occurred that caused even more significant flood damages than the storms of 2010. The storm event of April 2013 was especially damaging since the rainfall occurred on saturated ground due to an especially wet spring. In response to the April 2013 storm event, CBBEL was hired to study three additional flood-prone areas in the City that were not studied as part of the 2012 comprehensive flood plan.

The focus of this study is three additional flood-prone areas that were not studied as part of the 2012 comprehensive flood plan. The methodology used to analyze the drainage systems for these three additional study areas is consistent with the methodology used previously for the comprehensive flood plan. XP-SWMM hydrologic and hydraulic computer models were developed for each study area to determine the cause(s) of the existing flooding and quantify the current level of flood protection. To ensure that the computer models were producing accurate results, they were calibrated to surveyed high water elevations collected from the April 18, 2013 storm event.

Using the calibrated computer models, proposed drainage improvements were simulated to determine their flood reduction benefits. Proposed drainage improvements analyzed in this study included: increased storm sewer sizes, constructing relief sewers, and creating flood storage in open space. The objective of the analysis was to determine the drainage improvements that would be necessary to provide a 100-year level of flood protection for all homes within each of the study areas.

Based on the results of the proposed conditions computer modeling, it is evident that significant expenditures will be required to retrofit the existing drainage system and increase the level of flood protection for these study areas. The conceptual cost estimates for the proposed improvements range from $305,000 to $5.36 million. A more detailed description of the costs and benefits of each project is included in this report.

INTRODUCTION

During the summer of 2010, City-wide flooding occurred during the June 23 and July 23 -24 storm events. The July 23-24' storm event was particularly devastating, when nearly seven inches of rain was measured in twelve hours according to the U.S. Geological Survey (USGS) Salt Creek gage in Elmhurst (Gage 05531300). The depth and duration (intensity) of the precipitation measured during the July 2010 storm event exceeded a 100-year storm event according to rainfall depths and durations published in Bulletin 70. Bulletin 70 is the widely accepted study used to design stormwater management infrastructure in Northeastern Illinois. The 100-year design storm event refers to a storm event that has a 1% chance of occurring in any given year. During the July 2010 storm event, the existing storm sewer system and pumping stations could not handle the large runoff volumes, resulting in the flooding of hundreds of homes. In addition to overland flooding, many houses experienced sanitary sewer backups due to the large volume of stormwater that entered the sanitary sewer system.

In response to the 2010 flooding, the City hired Christopher B. Burke Engineering, Ltd. (CBBEL) to complete a comprehensive flood plan for the City. The main objective of the study was to analyze ten flood problem areas and to develop concept-level drainage improvements to alleviate the flooding in each study area. Concept-level cost estimates for the proposed improvements were also prepared.

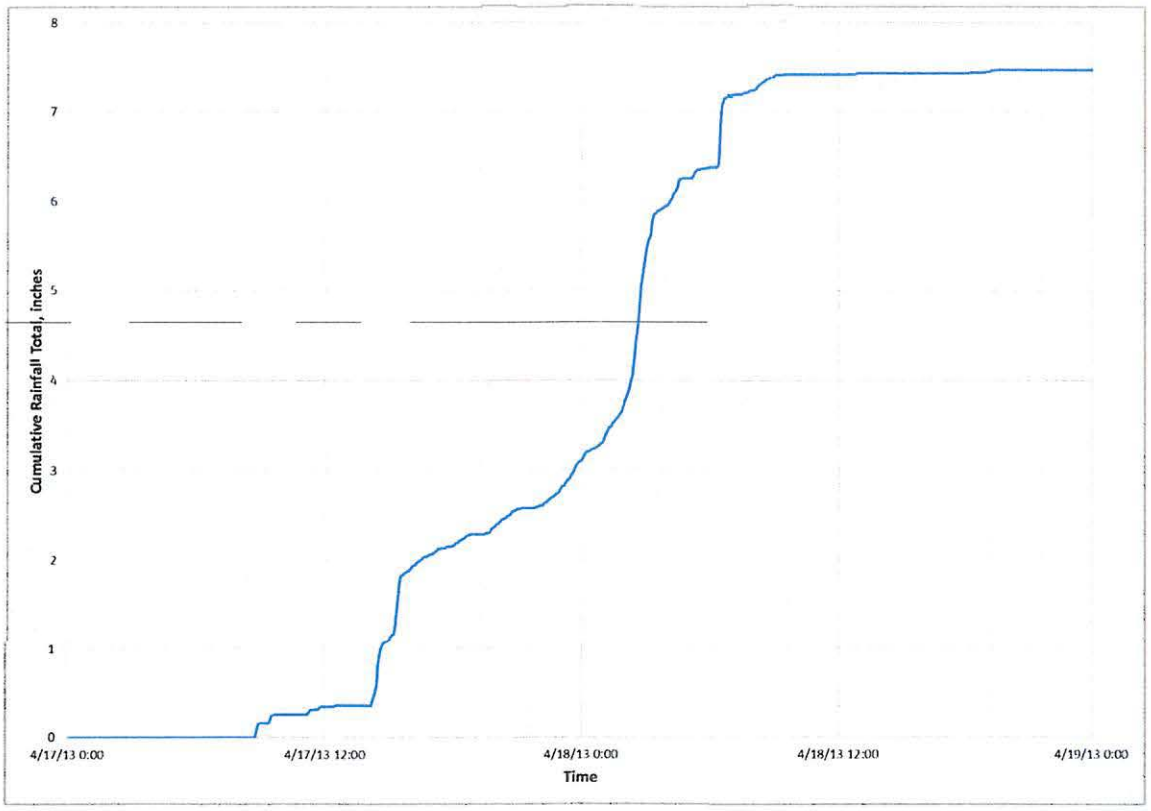


Figure 1. April 18, 2013 Cumulative Rainfall Total – USGS Gage 05531300 in Elmhurst

Following the completion of the comprehensive flood plan, another severe storm event occurred on April 18, 2013 that resulted in unprecedented levels of flooding throughout Elmhurst. During the April 18, 2013 storm event, over 7 inches of rain fell on saturated ground in approximately 18 hours, resulting in even greater flood depths and damages than what were experienced during the storms of 2010. The rainfall total from the April 18, 2013 storm event, as recorded by the USGS gage on Salt Creek in Elmhurst, is shown as Figure 1.

In response to the widespread flooding that occurred during April 2013, CBBEL was hired to study three additional flood problem areas. These three flood problem areas experienced significant overland flooding during April 2013 and were not included in the comprehensive flood plan that was completed by CBBEL in 2012. These three flood study areas (shown on Figure 2 to the right) are located in the northern portion of the City, and consist of the following locations:

1) Walnut/Myrtle/Evergreen Study Area
2) Collegeview Area
3) Crestview Park Study Area

As discussed in more detail later in the report, Study Areas #1 and #2 both drain westward to Salt Creek while Study Area #3 drains eastward to Addison Creek.

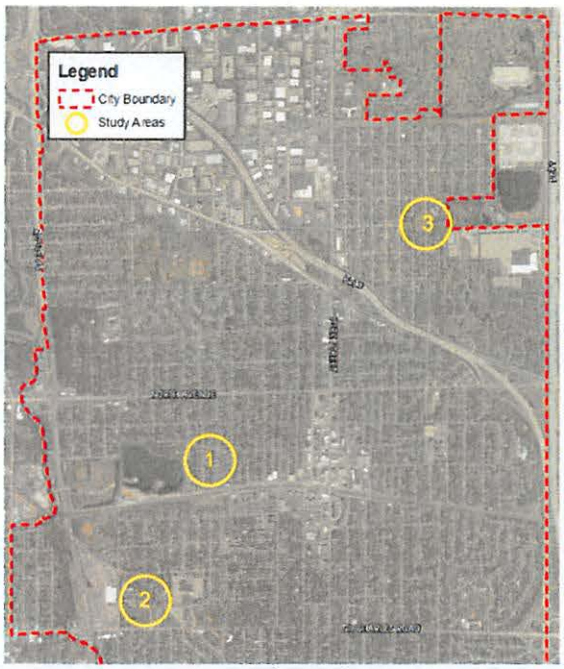


Figure 2
Location Map - Flood Study Areas

STUDY METHODOLOGY

XP-SWMM hydrologic and hydraulic computer software was used to model the existing drainage systems for each of the three study areas. To create the XP-SWMM computer model, detailed information on the storm sewer system (hydraulic component), as well as the tributary area (hydrologic component), is required for each study area. DuPage County two-foot aerial topography was used to delineate the tributary areas for each study area. Required data for the storm sewer system includes manhole locations, rim elevations, storm sewer locations, inverts, pipe material, inverts, and diameters. One of the study areas is serviced by a stormwater pumping station (Collegeview study area, Utley Road stormwater pumping station), which was also included in the computer model. Input data was collected from various sources, including:

- Flooding information from the April 18, 2013 storm event
- City's GIS storm sewer database
- As-built drawings for the storm sewer system
- Pump station plans and operating procedures
- Previous drainage studies completed for the City
- Field investigations/survey completed by CBBEL staff
- DuPage County two-foot aerial topographic mapping

There are two main components to the XP-SWMM model: the hydrologic component (watershed characteristics, impervious area, topography, etc.) and the hydraulic component (sewer size, slope, material, etc.). To develop the hydrologic component, each study area was delineated into subbasins based on topography and storm sewer location. Hydrologic parameters, such as area, Runoff Curve Number (CN), and time of concentration (t_c) were calculated based on topography and the current land use. The CN value is a measure of the imperviousness of each subbasin and is used to predict the runoff response for each subbasin. The time of concentration is the longest time it takes a drop of water to reach the outlet the outlet of the subbasin.

The hydraulic elements of the model, including sewer diameters, lengths, material, slopes, etc., were taken from the City's GIS storm sewer database. Because the database is incomplete for some portions of the study areas, as-built drawings and survey information were used to supplemental this information. In addition to the storm sewer network, overland flow routes and depressional storage areas were entered into the model using the aerial topography. If a sewer does not have sufficient capacity to convey the tributary runoff, the system will surcharge out of the manhole rim. When this occurs, water will flow by gravity along the overland flow routes that follow the topography. Where overland flow routes converge at depressional areas, ponding areas were entered into the model so that the depth and volume of ponding could be determined. Additionally, other hydraulic elements such as stormwater pumping stations and restrictors were added to the model in the appropriate locations.

Using precipitation data from the USGS gage on Salt Creek, the April 2013 storm event was simulated using the XP-SWMM model for each study area. The results of the models were compared to high water marks collected by City staff following the April 2013 storm event from each of the study areas. For the Crestview Study Area, high water marks from the April 2013 storm event were not available; therefore high water marks from the September 19, 2013 storm event were used to calibrate the model for this study area. The hydrologic parameters for each study area were adjusted until the modeled results matched the observed elevations.

Once the models were calibrated, a critical duration analysis was performed for each study area. The critical storm duration was determined for each study area using rainfall depths published in Bulletin 70. The critical duration refers the storm duration that produces the highest flowrates and flood elevations. To determine the existing level of flood protection for each of the study areas, the critical storm duration was simulated for 2-, 5-, 10-, 25-, 50-, and 100-year return intervals. The level of protection is

defined as the highest flood frequency that does not result in flood damage. An example of a 50-year level of protection is shown on Figure 3.

Based on the results of the XP-SWMM modeling, the cause(s) of flooding was identified and the flood reduction benefits for proposed drainage improvements were analyzed for each study area. The proposed drainage improvements analyzed in this study include: increasing storm sewer, constructing relief sewers, creation of flood storage (above-ground and underground), and increasing pumping rates. Using the XP-SWMM existing conditions models as baseline conditions models, the proposed improvements were analyzed to determine the associated flood reduction benefits.

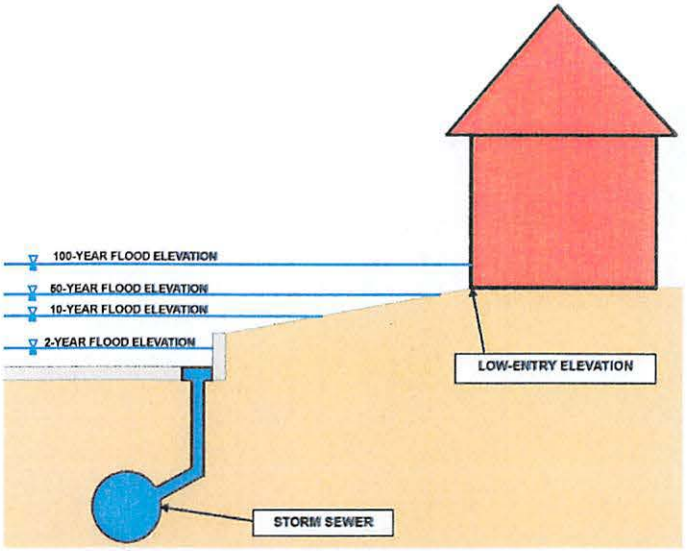


Figure 3
Level of Flood Protection

Concept-level cost estimates were prepared for each proposed drainage alternative. There are many unknowns that can affect the ultimate design and cost of the project, including utility conflicts, soil conditions, and right-of-limits. Due to these uncertainties, a 20% contingency has been added to the engineer's estimate of probable cost. Engineering for each project has also been included in the estimate as 10% of the total cost of the project. The cost estimates do not include such items as land acquisition, temporary/permanent construction easements, relocation of utilities, and the cost of recreational facilities in open space.

The following sections of the report have been organized by study area. Each section details the existing and proposed condition study area and provides the engineer's estimate of probable cost for each proposed alternative.

WALNUT/EVERGREEN/MYRTLE STUDY AREA

The Walnut/Evergreen/Myrtle Study Area is located south of North Avenue, east of Route 83, and north of 1st Street as shown in Figure 4. The total drainage area for the study area measures approximately 568 acres, which outlets to Salt Creek through an existing 72-inch diameter pipe located just north of the railroad tracks adjacent to the Elmhurst Quarry. Unlike the previous study areas that are tributary to Salt Creek, this study area drains to the creek by gravity and does not utilize a

stormwater pumping station. The Salt Creek levee does not extend through this area since the ground elevations in this location are above the 100-year flood elevation of the creek.

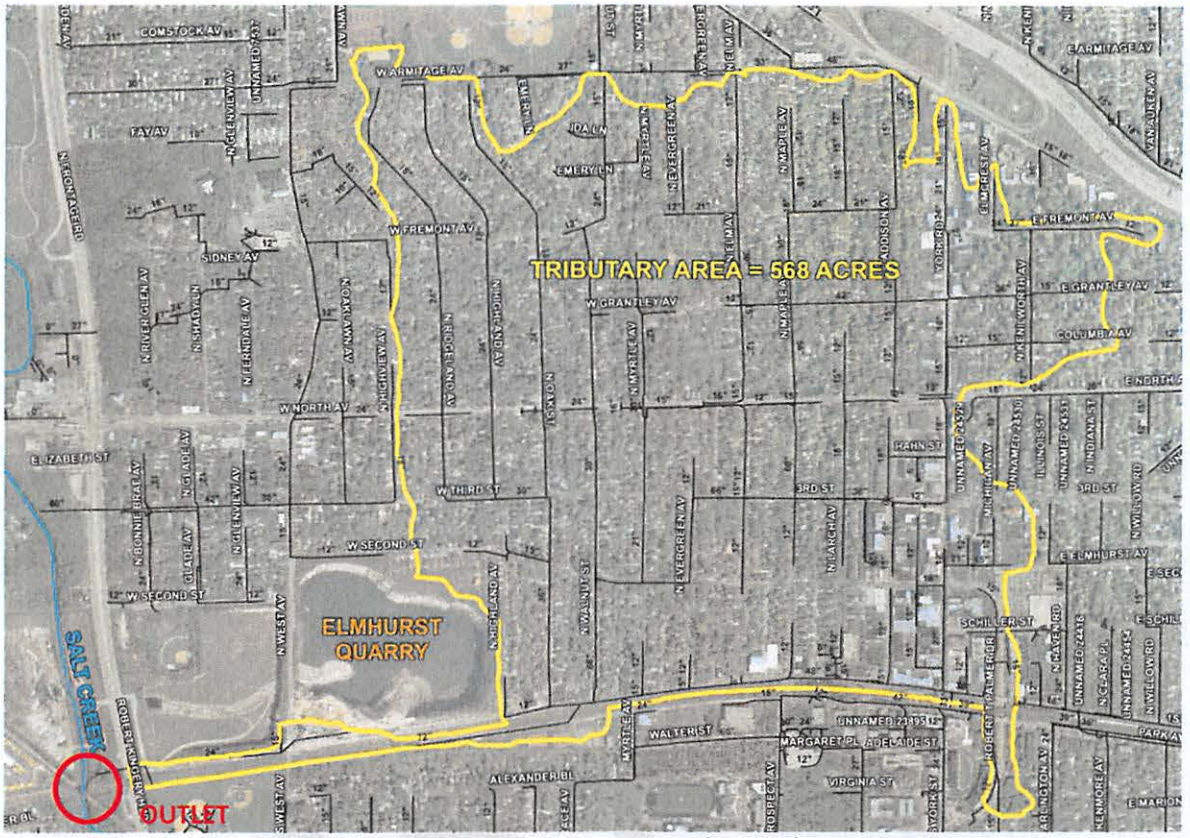


Figure 4. Overall Drainage Exhibit for the Walnut/Myrtle/Evergreen Study Area

1.1 WALNUT/EVERGEEN/MYRTLE EXISTING CONDITIONS

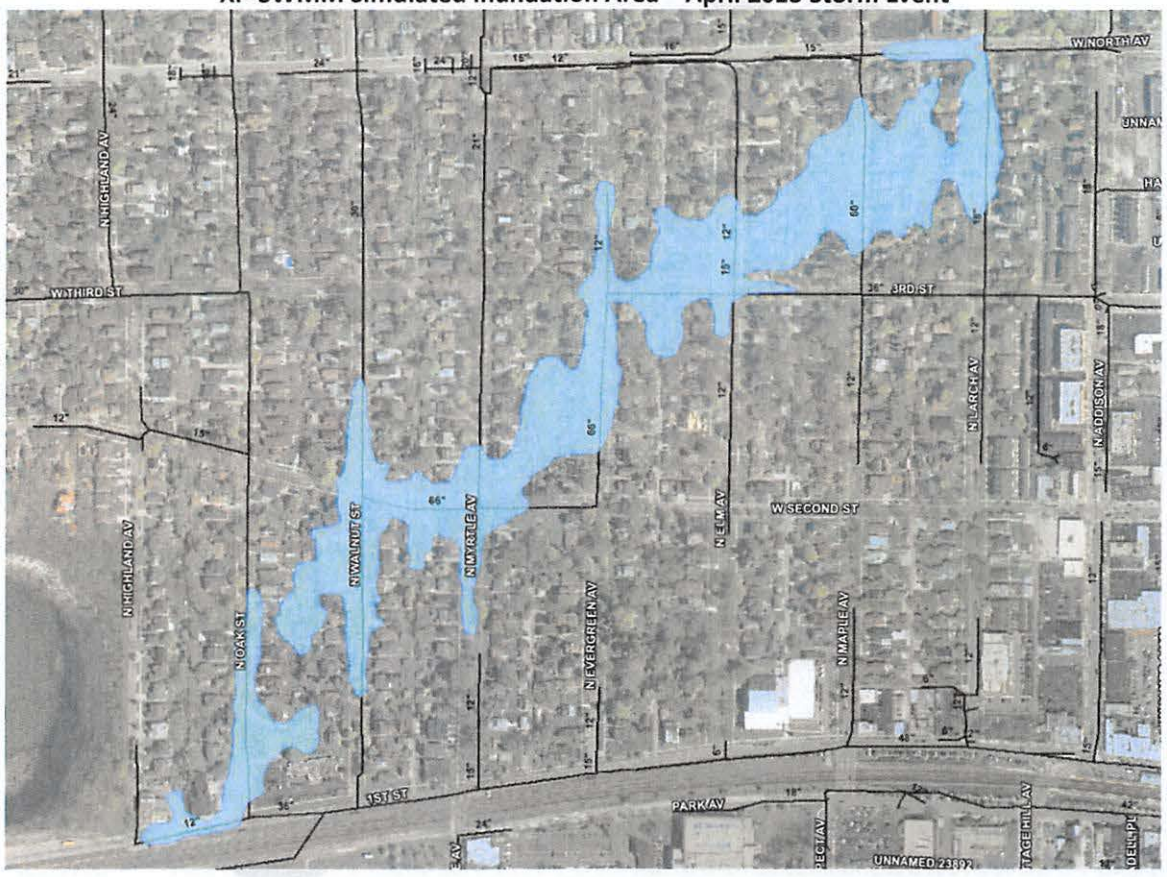
The general drainage patterns in this study area are from north to south and east to west; all stormwater runoff from this area eventually drains to the 72-inch diameter storm sewer that runs parallel to the railroad tracks before emptying into Salt Creek. Although the ground elevations are above the 100-year flood elevation for Salt Creek, the capacity of the storm sewer system is heavily influenced by the tailwater elevation of Salt Creek. During extreme storm events, the water level of Salt Creek rises rapidly, which reduces the capacity of the storm sewer system.

As shown in Figure 4, the main trunk sewer for this area varies between a diameter of 54 inches and 72 inches. The main trunk sewer runs through several local depressional areas, which are the first locations for the storm sewer to surcharge when its capacity is exceeded. During intense rain events, stormwater ponding occurs along the low-lying portions of Larch Avenue, Maple Avenue, Third Street, Elm Avenue, Evergreen Avenue, Second Street, Myrtle Avenue, Walnut Street, and Oak Street. The highly pressurized

storm sewers result in several manhole lids being blown off in these low-lying areas. Excessive street ponding eventually leads to structural flooding for the houses located adjacent to these low-lying areas.

During the April 2013 storm event, significant street and home flooding was reported throughout this study area, particularly along the localized depressional areas located south of North Avenue. Based on the XP-SWMM computer modeling, there was as much as 2.2 feet of flooding on the streets and 76 homes were affected by the flooding. The XP-SWMM simulated inundation area for the April 2013 storm event is shown as Figure 5.

Figure 5
XP-SWMM Simulated Inundation Area – April 2013 Storm Event



Based on the XP-SWMM computer modeling, the storm sewer system surcharges and street ponding occurs for storm events greater than a 10-year return interval. During more significant storm events (greater than a 25-year frequency), the street ponding eventually becomes so severe that structural flooding occurs. As shown in Table 1, 17 homes would experience flooding during a 50-year magnitude storm event while 52 homes would experience flooding during a 100-year magnitude storm event. As described earlier, the majority of these homes are located adjacent to the low-lying portions of Larch

Avenue, Maple Avenue, Third Street, Elm Avenue, Evergreen Avenue, Second Street, Myrtle Avenue, Walnut Street, and Oak Street.

Table 1

Existing Conditions Level of Flood Protection – Walnut/ Evergreen/Myrtle Study Area

Number of Houses Flooded Per Flood Frequency					
2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
0	0	0	0	17	52

1.2 WALNUT/EVERGREEN/MYRTLE PROPOSED CONDITIONS

Several proposed drainage improvements were evaluated to increase the level of flood protection for the study area. The goal of the proposed drainage improvements is to provide a 100-year level of flood protection for the homes in this study area. As described below (and shown in detail on Exhibit 1C and 1D), the proposed drainage improvements consist of the installation of a relief sewer in combination with flood storage created on either a City-owned parcel or within the Elmhurst Quarry.

Alternative #1 – 100-Year Relief Sewer/Creation of Flood Storage on City Parcel

As shown on Exhibit 1C, Alternative #1 provides a 100-year level of protection for the homes in this study area through the following drainage improvements:

- Creation of 15 acre-feet of gravity-drained flood storage on the City-owned parcel located south of the Union Pacific railroad tracks and west of Myrtle Avenue.

- Installation of 3130 linear feet of 60-inch and 84-inch diameter relief sewer that extends from the intersection of Evergreen Avenue/Third Street to the proposed flood storage area located south of the Union Pacific railroad tracks.

- Installation of 100 linear feet of 12-inch diameter storm sewer that outlets the proposed flood storage area to the existing 72-inch diameter storm sewer along the Union Pacific railroad tracks.

Alternative #2 – 100-Year Relief Sewer to Elmhurst Quarry

As shown on Exhibit 1D, Alternative #1 provides a 100-year level of protection for the homes in this study area through the following drainage improvements:

- Installation of 3330 linear feet of 60-inch and 84-inch diameter relief sewer that extends from the intersection of Evergreen Avenue/Third Street to the Elmhurst Quarry.

- Installation of an energy dissipation structure for the proposed storm sewer outlet to Elmhurst Quarry.

A summary of the cost estimates for the Alternatives #1 and #2 is provided in Table 2. The estimates do not include costs for land acquisition, utility relocation, rock excavation, and any recreational facilities. The cost estimate for Alternative #2 does not include the costs of providing compensatory storage or pumping costs for the increase in stormwater volume to the Elmhurst Quarry.

Table 2
Summary of Walnut/Evergreen/Myrtle Alternatives

Alternative ID	Level of Protection	Number of Homes Protected	Engineer's Estimate of Probable Cost
Alternative #1	100-year	52	$5,360,000
Alternative #2	100-year	52	$3,120,000

COLLEGEVIEW STUDY AREA

The Collegeview Study Area is located north of St. Charles Road and west of York Street, as shown in Figure 6. The total drainage area for the study area measures approximately 427 acres, which drain to the main trunk sewer located along Utley Road. The Utley Road trunk sewer, which ranges in size between 60 and 72 inches in diameter, flows westward until it is conveyed to Salt Creek by either gravity (when the level of Salt Creek is low) or the stormwater pumping station (when the water level in the creek is high). Because the water level in Salt Creek rises rapidly during significant storm events, the pump station is typically fully operational shortly after the beginning of the storm. Since the level of Salt Creek is high during these times, the gravity storm sewer outlet does not convey flow. The Utley Road stormwater pumping station has a maximum capacity of approximately 203 cfs, which is adequate for the capacity of the storm sewer feeding into the pump station.

The drainage patterns in this study area are generally from east to west, with storm sewers and overland flow routes conveying stormwater runoff toward Salt Creek. Since the main trunk sewer is located along Utley Road, storm sewers and overland flows routes generally drain either northward or southward toward Utley Road.

Figure 6. Overall Drainage Exhibit for the Collegeview Study Area

2.1 COLLEGEVIEW EXISTING CONDITIONS

There are two main flood problem areas located within the Collegeview study area: (1) the depressional area located along Berkeley Avenue between Utley Road and Elm Park Avenue, and (2): the depressional area located at the intersection at Berkeley Avenue and Alma Avenue (adjacent to York Community High School).

As shown in Figure 7, a 30-inch diameter storm sewer conveys flow northward along Berkeley Avenue to the main trunk sewer on Utley Road. Based on the results of the XP-SWMM computer modeling, the hydraulic grade line (HGL) of the Utley Road storm sewer is above the ground elevations on Berkeley Avenue, which results in the backflow of stormwater through the existing 30-inch storm sewer located along Berkeley Avenue and surcharging through the existing manholes/inlets in this location. This also results in the inability of the Berkeley Avenue storm sewer to convey flow away from this area, which causes excessive stormwater ponding in this location.

The depressional area located at the intersection of Alma Avenue and Berkeley Avenue drains northwesterly to the Utley Road trunk sewer via the Alma Avenue/West Avenue storm sewer, which ranges in size between 21 and 27 inches in diameter. This existing storm sewer has an approximate capacity of a 10-year magnitude storm event, therefore street ponding will occur for storm events greater than a 10-year frequency.

During the April 2013 storm event, significant street and home flooding was reported throughout this study area, particularly along the localized depressional areas located in the low-lying areas of Berkeley Avenue located north and south of Elm Park Avenue. Based on the XP-SWMM computer modeling, there was as much as 2.8 feet of flooding on the streets and 21 homes were affected by the flooding. The XP-SWMM simulated inundation area for the April 2013 storm event is shown as Figure 7.

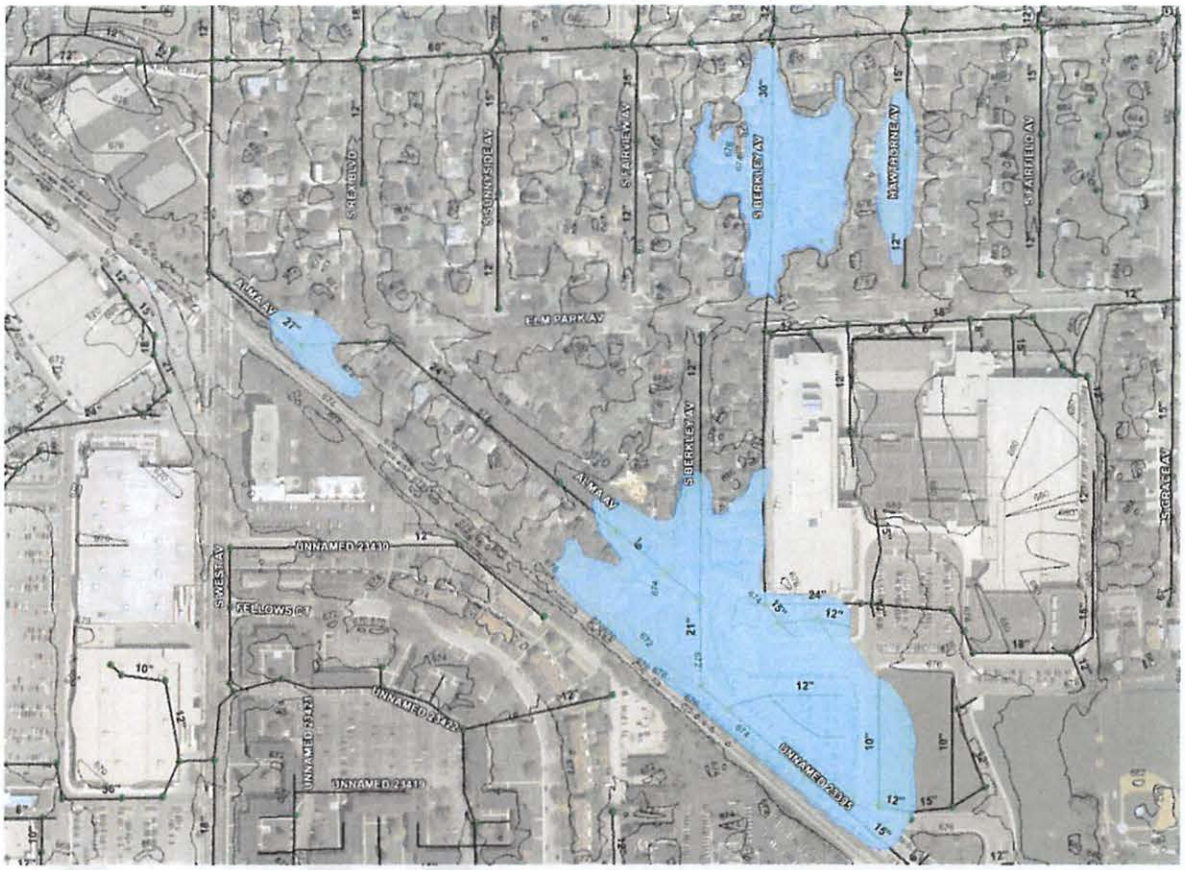


Figure 7. XP-SWMM Simulated Inundation Area – April 2013 Storm Event

Based on the XP-SWMM computer modeling, the storm sewer system surcharges and street ponding occurs for storm events equal to or greater than a 10-year return interval. During more significant storm events (25-year frequency), the street ponding eventually becomes so severe that structural flooding occurs. As shown in Table 3, 6 homes would experience flooding during a 25-year magnitude storm event, with 11 and 17 homes flooded during 50-year and 100-year magnitude storm events, respectively. These homes are all located within the two depressional areas located along Berkeley Avenue (north and south of Elm Park Avenue).

Table 3

Existing Conditions Level of Flood Protection – Collegeview Study Area

Number of Houses Flooded Per Flood Frequency					
2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
0	0	0	6	11	17

2.2 COLLEGEVIEW PROPOSED CONDITIONS

The goal of the proposed drainage improvements is to provide a 100-year level of flood protection for the homes within each of the two flood problem areas along Berkeley Avenue. As described below (and shown in detail on Exhibit 2C), the proposed drainage improvements consist of utilizing flood storage created on two open parcels located on York Commons High School property in conjunction with other drainage improvements.

Alternative #1 – 100-Year Relief Sewers/Creation of Flood Storage on York Commons High School

As shown on Exhibit 2C, Alternative #1 provides a 100-year level of protection for the 17 homes located along Berkeley Avenue. The 100-year level of protection is provided through the following drainage improvements:

- Creation of 8 acre-feet of gravity-drained flood storage on the two open space areas located on the York Commons High School property.

- Installation of 1940 linear feet of 24-inch diameter storm sewer that extends from the intersection of Berkeley Avenue and Alma Avenue to the intersection of Utley Road and West Avenue. The construction of this storm sewer is necessary to provide a gravity outlet for the proposed flood storage areas on York Commons High School property, as the elevations of the existing storm sewer system is too high.

- Installation of 570 linear feet of 2-foot (rise) by 6-foot (span) rectangular storm sewer that connects the proposed flood storage area to the existing Alma Avenue storm sewer system.

- Installation of a backflow preventer on the 30-inch diameter storm sewer along Berkeley Avenue (immediately south of Utley Road).

Table 4
Summary of Collegeview Study Area Alternatives

Alternative ID	Level of Protection	Number of Homes Protected	Engineer's Estimate of Probable Cost
Alternative #1	100-year	17	$3,340,000

CRESTVIEW PARK STUDY AREA

The Crestview Park study area includes two separate flood problem areas: (1) a low-lying section of Howard Street adjacent to Crestview Park, and (2) the low-lying sections of Emroy Avenue, Howard Avenue, and Van Auken Avenue located immediately north of Lake Street. These flood problem areas are shown on Figure 8 below. These flood problem areas are served by two separate drainage systems, although both systems eventually drain eastward under the Tri-State Tollway to Addison Creek.

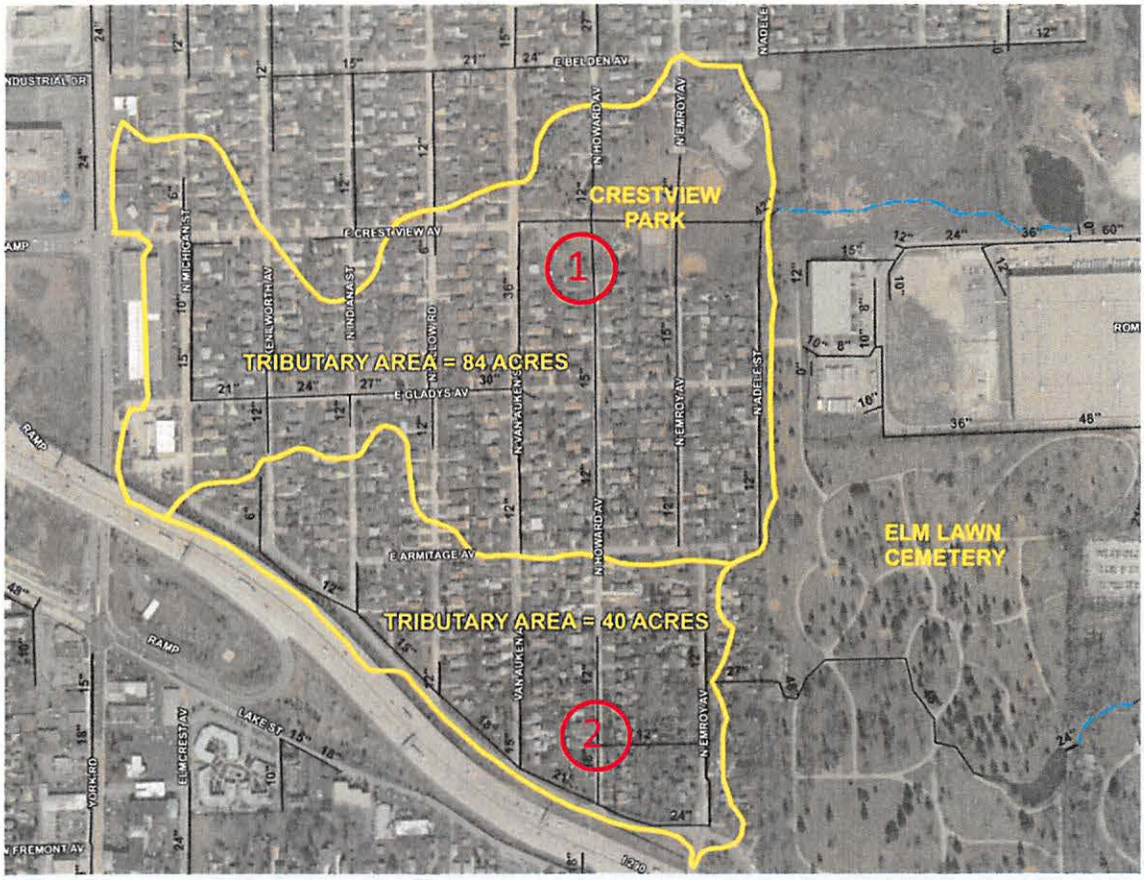


Figure 8. Overall Drainage Exhibit for the Crestview Park Study Area

3.1 CRESTVIEW PARK EXISTING CONDITIONS

North Study Area

As shown on Figure 8, the northern study area (adjacent to Crestview Park) involves an approximately 84-acre drainage area that drains to the drainage ditch through a 42-inch diameter storm sewer located at the northeast corner of the park. Flow in the drainage ditch is eventually intercepted by the storm sewer system located south of Maywood Sportsmen's Club, where it continues to flow eastward toward County Line Road. Low flows continue eastward under County Line Road and the Tri-State Tollway until they reach Addison Creek. High flows are diverted into the Arlington Cemetery reservoir, which is a pumped-evacuated facility that is dewatered after the water levels in Addison Creek are at an acceptable level.

There is an existing depressional area located along the northern section of Howard Avenue, immediately south of Crestview Park. The outlet for this depressional area is an existing 15-diameter storm sewer that drains northward into the park, where it connects to a 36-inch diameter storm sewer that flows eastward until it connects to the 42-inch outlet for this drainage area. The existing 15-inch storm sewer along Howard Avenue has an approximately 2-year capacity; street ponding will occur on Howard Avenue for events equal to or greater than a 5-year return interval. Structural flooding (2 homes) will occur for storm events equal to or greater than a 100-year return interval.

South Study Area

As shown on Figure 8, the south study area consists of an approximately 40-acre area that drains to the 27-inch diameter storm sewer located between two properties on Emroy Avenue. The 27-inch diameter storm sewer drains eastward into Elm Lawn Cemetery, where it becomes a 48-inch diameter storm sewer that flows into a detention pond located on Elm Lawn cemetery, which outlets to a drainage ditch through twin 24-inch diameter pipes. The drainage ditch flows northeasterly through Elm Lawn Cemetery and into Arlington Cemetery, where it then becomes a 24-inch diameter pipe that outlets at County Line Road. Low flows continue eastward under County Line Road and I-294 until they reach Addison Creek. High flows are diverted into the Arlington Cemetery reservoir, which is a pumped-evacuated facility that is dewatered after the water levels in Addison Creek have receded.

Based on the elevations of the pipe/drainage ditch system through the cemeteries, the capacity of the storm sewer system that serves Emroy Avenue, Howard Avenue, and Van Auken Avenue is influenced by the downstream capacity of the pipe/ditch system through the cemeteries.

The existing storm sewer system has an approximately 2-year capacity; street ponding will occur in the low areas for events equal to or greater than a 5-year return interval. Structural flooding will occur for storm events equal to or greater than a 10-year return interval.

Figure 9. XP-SWMM Simulated Inundation Area – April 2013 Storm Event

Table 5 provides a summary of the existing level of flood protection for these two study areas. As shown in table, 1 home would experience flooding during a 10-year magnitude storm event while 15 homes would experience flooding during a 100-year magnitude storm event. Of the 15 homes that would flood during a 100-year magnitude storm event, 2 homes are located along Howard Avenue in the north study area (adjacent to Crestview Park); the other 13 homes are located along the low areas of Van Auken Avenue, Howard Avenue, and Emroy Avenue, north of Lake Street (immediately west of Elm Lawn Cemetery).

Table 5
Existing Conditions Level of Flood Protection – Crestview Park Study Area

Number of Houses Flooded Per Flood Frequency					
2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
0	0	1	8	12	15

3.2 CRESTVIEW PARK PROPOSED CONDITIONS

The goal of the proposed drainage improvements is to provide a 100-year level of flood protection for the homes within each of the two flood problem areas within this study area. As described below (and shown in detail on Exhibits 3C and 3D), the proposed drainage improvements consist of utilizing flood storage created in Crestview Park in conjunction with conveyance improvements. For the south study area (adjacent to Elm Lawn Cemetery), improvements to the existing storm sewer system would have to be constructed in conjunction with downstream conveyance improvements/creation of flood storage on the Elm Lawn cemetery to mitigate the increased flows. Therefore, the improvements focused on utilizing Crestview Park for the creation of flood storage volume.

Alternative #1 – 100-Year Overland Flow Route/Creation of Flood Storage on Crestview Park

As shown on Exhibit 3C, Alternative #1 provides a 100-year level of protection for the two homes located at the north end of Howard Avenue (adjacent to Crestview Park. The 100-year level of protection is provided through the following drainage improvements:

- Creation of 1 acre-foot of gravity-drained flood storage on the open space located in the western portion of Crestview Park.
- Regrading of park/roadway area to create an overland flow route to the proposed flood storage area.
- Relocation of 240 linear feet of 15-inch diameter storm sewer that flows northward through the park.
- Installation of 30 linear feet of 12-inch diameter storm sewer that outlets the proposed flood storage area to the existing 36-inch diameter storm sewer that flows eastward through the park.

Alternative #2 – 100-Year Relief Sewer/Creation of Flood Storage on Crestview Park

As shown on Exhibit 3D, Alternative #2 provides a 100-year level of protection for the 13 homes located in the southern flood problem area within this study area. These homes are located along Van Auken Avenue, Emroy Avenue, and Howard Avenue. The 100-year level of protection is provided through the following drainage improvements:

- Installation of 3880 linear feet of 24-inch to 54-inch diameter relief sewer that extends from the low-lying areas of Van Auken Avenue, Howard Avenue, and Emroy Avenue to the proposed flood storage area located at Crestview Park.
- Creation of 4 acre-feet of gravity-drained flood storage on the open space located in the western portion of Crestview Park.
- Relocation of 460 linear feet of 15-inch diameter storm sewer that flows northward through the park.

- Installation of 40 linear feet of 12-inch diameter storm sewer that outlets the proposed flood storage area to the existing 42-inch diameter storm sewer that flows eastward through the park.

A summary of the cost estimates for the Alternatives #1 and #2 is provided in Table 6 below. The estimates do not include costs for land acquisition, utility relocation, and any recreational facilities.

Table 6
Summary of Crestview Park Alternatives

Alternative ID	Level of Protection	Number of Homes Protected	Engineer's Estimate of Probable Cost
Alternative #1	100-year	2	$305,000
Alternative #2	100-year	13	$3.99M

SUMMARY

Christopher B. Burke Engineering, Ltd. (CBBEL) was hired by the City of Elmhurst (City) to analyze the following three flood-prone areas: (1) the Walnut Avenue/ Evergreen Avenue/Myrtle Avenue study area, (2) the Collegeview study area, and (3) the Crestview Park study area. All three areas are located in the northern portion of the City and experienced significant flooding during the April 18, 2013 storm event. The purpose of the study was to analyze the existing drainage system and identify drainage improvements that would provide a 100-year level of protection for the homes within each study area.

Using XP-SWMM hydrologic and hydraulic computer models, CBBEL analyzed the existing drainage system for each study area. The XP-SWMM models were calibrated to known water surface elevations from past storm events, and based on the modeling results, the existing level of flood protection was quantified for the homes within each study area.

Using the calibrated models, conceptual drainage improvements were simulated to determine solutions to the flooding in these areas. These drainage improvements generally consisted of the construction of relief sewers in conjunction with the creation of flood storage on existing open space areas adjacent to the flood-prone areas. One proposed alternative (Walnut Avenue/ Evergreen Avenue/Myrtle Avenue study area) involved potentially utilizing volume in the Elmhurst Quarry as flood mitigation storage.

Based on the results of the proposed conditions computer modeling, it is evident that significant expenditures will be required to retrofit the existing drainage system and increase the level of flood protection for these study areas. The conceptual cost estimates for the proposed improvements range from $305,000 to $5.36 million.

Appendix 1
Cost Estimates

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
Project# 10-0506
Date: August 26, 2014

Elmhurst Proposed Drainage Improvements
Walnut/Evergreen/Myrtle Study Area - Alternative #1

ITEMS	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
ROADWAY REMOVAL AND REPLACEMENT	FOOT	3230	$300.00	$969,000.00
STORM SEWER, RCP 12"	FOOT	100	$40.00	$4,000.00
STORM SEWER, RCP 60"	FOOT	2430	$140.00	$340,200.00
STORM SEWER, RCP 84"	FOOT	700	$250.00	$175,000.00
PRC FLARED END SECTION WITH GRATE, 84"	EACH	1	$7,000.00	$7,000.00
STORM MANHOLE, 8' DIA	EACH	5	$20,000.00	$100,000.00
TRENCH BACKFILL, SPECIAL	CY	8650	$45.00	$389,250.00
JUNCTION CHAMBER	EACH	3	$30,000.00	$90,000.00
EARTH EXCAVATION	CY	54000	$25.00	$1,350,000.00
STONE RIPRAP, CLASS A4 W/FILTER FABRIC	SQ YD	100	$50.00	$5,000.00
TOPSOIL FURNISH AND PLACE, 8"	SQ YD	16000	$6.00	$96,000.00
SEEDING WITH EROSION CONTROL BLANKET	SQ YD	16000	$3.00	$48,000.00
STEEL CASING PIPE, AUGERED AND JACKED, 84"	FOOT	320	$300.00	$96,000.00
WATER MAIN RELOCATION, 16"	FOOT	800	$200.00	$160,000.00
STORM SEWER PUSHED IN CASING, 60"	FOOT	320	$250.00	$80,000.00
STABILIZED CONSTRUCTION ENTRANCE	EACH	1	$5,000.00	$5,000.00
SITE CLEARING	LSUM	1	$20,000.00	$20,000.00
TRAFFIC CONTROL	LSUM	1	$100,000.00	$100,000.00
CONSTRUCTION LAYOUT	LSUM	1	$25,000.00	$25,000.00

SUB TOTAL =	$4,059,450.00
CONTINGENCY (20%) =	$811,890.00
CONSTRUCTION TOTAL =	$4,871,340.00
ENGINEERING (10%) =	$487,134.00
TOTAL PROJECT COST INCLUDING ENGINEERING =	**$5,358,474.00**

NOTE:
THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, LAND ACQUISITION, TEMPORARY AND/OR CONSTRUCTION EASEMENTS, ROCK EXCAVATION, OR RELOCATING ANY UTILITIES OTHER THAN THE 16" WATER MAIN

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
Project# 10-0506
Date: August 26, 2014

Elmhurst Proposed Drainage Improvements
Walnut/Evergreen/Myrtle Study Area - Alternative #2

ITEMS	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
ROADWAY REMOVAL AND REPLACEMENT	FOOT	3330	$300.00	$999,000.00
STORM SEWER, RCP 60"	FOOT	2470	$140.00	$345,800.00
STORM SEWER, RCP 84"	FOOT	860	$250.00	$215,000.00
PRC FLARED END SECTION WITH GRATE, 84"	EACH	1	$7,000.00	$7,000.00
PLUNGE POOL	EACH	1	$155,000.00	$155,000.00
STORM MANHOLE, 8' DIA	EACH	6	$20,000.00	$120,000.00
TRENCH BACKFILL, SPECIAL	CY	6900	$45.00	$310,500.00
JUNCTION CHAMBER	EACH	2	$50,000.00	$100,000.00
STONE RIPRAP, CLASS A4 W/FILTER FABRIC	SQ YD	40	$50.00	$2,000.00
STABILIZED CONSTRUCTION ENTRANCE	EACH	2	$5,000.00	$10,000.00
SITE CLEARING	LSUM	1	$10,000.00	$10,000.00
TRAFFIC CONTROL	LSUM	1	$50,000.00	$50,000.00
CONSTRUCTION LAYOUT	LSUM	1	$40,000.00	$40,000.00

SUB TOTAL =	$2,364,300.00
CONTINGENCY (20%) =	$472,860.00
CONSTRUCTION TOTAL =	$2,837,160.00
ENGINEERING (10%) =	$283,716.00
TOTAL PROJECT COST INCLUDING ENGINEERING =	**$3,120,876.00**

NOTE: THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, LAND ACQUISITION, TEMPORARY AND/OR CONSTRUCTION EASEMENTS, RELOCATING ANY UTILITIES, ROCK EXCAVATION, COMPENSATORY STORAGE, OR PUMPING COSTS.

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
Project# 10-0506
Date: September 4, 2014

Elmhurst Proposed Drainage Improvements
Collegeview Study Area - Alternative #1

ITEMS	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
ROADWAY REMOVAL AND REPLACEMENT	FOOT	1940	$300.00	$582,000.00
STORM SEWER, RCP 24"	FOOT	1940	$55.00	$106,700.00
STORM MANHOLE, 7' DIA	EACH	5	$15,000.00	$75,000.00
TRENCH BACKFILL, SPECIAL	CY	1820	$45.00	$81,900.00
JUNCTION CHAMBER	EACH	1	$15,000.00	$15,000.00
SITE CLEARING	LSUM	1	$20,000.00	$20,000.00
TRAFFIC CONTROL	LSUM	1	$30,000.00	$30,000.00
CONSTRUCTION LAYOUT	LSUM	1	$25,000.00	$25,000.00

SUB TOTAL =	$935,600.00
CONTINGENCY (20%) =	$187,120.00
CONSTRUCTION TOTAL =	$1,122,720.00
ENGINEERING (10%) =	$112,272.00
SUBTOTAL A PROJECT COST INCLUDING ENGINEERING =	**$1,234,992.00**

Adding additional Storage - Option 3b

ITEMS	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
ROADWAY REMOVAL AND REPLACEMENT	FOOT	740	$300.00	$222,000.00
STORM SEWER, RCP 24"	FOOT	175	$55.00	$9,625.00
36" EQUALIZER PIPE	FOOT	125	$140.00	$17,500.00
2' X 6' STORM SEWER	FOOT	570	$300.00	$171,000.00
PRC FLARED END SECTION WITH GRATE, 84"	EACH	0	$7,000.00	$0.00
JUNCTION CHAMBER	EACH	1	$15,000.00	$15,000.00
STORM MANHOLE, 7' DIA	EACH	4	$15,000.00	$60,000.00
TRENCH BACKFILL, SPECIAL	CY	900	$45.00	$40,500.00
EARTH EXCAVATION	CY	39500	$25.00	$987,500.00
BOX END SECTION	L. SUM	1	$3,500.00	$3,500.00
30" TIDEFLEX BACKFLOW PREVENTER	EACH	1	$5,000.00	$5,000.00
STABILIZED CONSTRUCTION ENTRANCE	EACH	1	$5,000.00	$5,000.00
SITE CLEARING	LSUM	1	$5,000.00	$5,000.00
TRAFFIC CONTROL	LSUM	1	$30,000.00	$30,000.00
CONSTRUCTION LAYOUT	LSUM	1	$25,000.00	$25,000.00

SUB TOTAL =	$1,598,625.00
CONTINGENCY (20%) =	$319,325.00
CONSTRUCTION TOTAL =	$1,915,950.00
ENGINEERING (10%) =	$191,595.00
SUBTOTAL B PROJECT COST INCLUDING ENGINEERING =	**$2,107,545.00**

PROJECT TOTAL (A + B)= $3,342,537.00

NOTE:
THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, LAND ACQUISITION, TEMPORARY AND/OR CONSTRUCTION EASEMENTS, ROCK EXCAVATION, OR RELOCATING ANY UTILITIES.

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
Project# 10-0506
Date: September 4, 2014

Elmhurst Proposed Drainage Improvements
Crestview Park Study Area - Alternative #1

ITEMS	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
ROADWAY REMOVAL AND REPLACEMENT	FOOT	0	$300.00	$0.00
STORM SEWER, RCP 12"	FOOT	30	$40.00	$1,200.00
STORM SEWER, RCP 15"	FOOT	240	$65.00	$15,600.00
STORM SEWER REMOVAL	FOOT	230	$10.00	$2,300.00
CATCH BASIN, 4' DIA	EACH	4	$4,000.00	$16,000.00
STORM MANHOLE, 8' DIA	EACH	1	$20,000.00	$20,000.00
TRENCH BACKFILL, SPECIAL	CY	200	$45.00	$9,000.00
EARTH EXCAVATION	CY	4810	$25.00	$120,250.00
STONE RIPRAP, CLASS A4 W/ FILTER FABRIC	SQ YD		$50.00	$0.00
TOPSOIL FURNISH AND PLACE, 8"	SQ YD	160	$6.00	$960.00
SEEDING WITH EROSION CONTROL BLANKET	SQ YD	160	$3.00	$480.00
STABILIZED CONSTRUCTION ENTRANCE	EACH	1	$5,000.00	$5,000.00
SITE CLEARING	LSUM	1	$20,000.00	$20,000.00
TRAFFIC CONTROL	LSUM	1	$10,000.00	$10,000.00
CONSTRUCTION LAYOUT	LSUM	1	$10,000.00	$10,000.00

SUB TOTAL =	$230,790.00
CONTINGENCY (20%) =	$46,158.00
CONSTRUCTION TOTAL =	$276,948.00
ENGINEERING (10%) =	$27,694.80
TOTAL PROJECT COST INCLUDING ENGINEERING =	**$304,642.80**

NOTE:
THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, LAND ACQUISITION, TEMPORARY AND/OR CONSTRUCTION EASEMENTS, ROCK EXCAVATION, OR RELOCATING ANY UTILITIES.

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
Project# 10-0506
Date: September 4, 2014

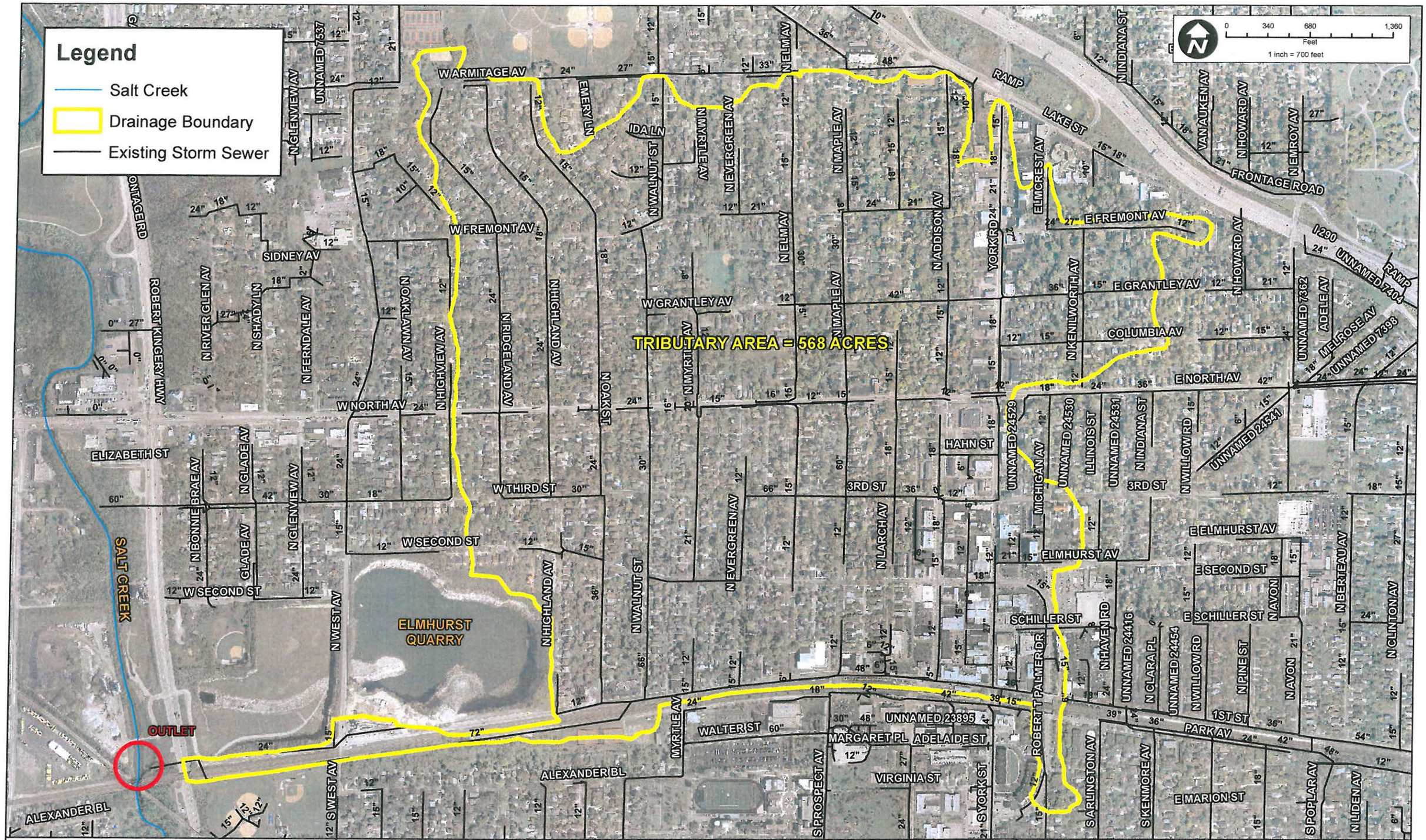
Elmhurst Proposed Drainage Improvements
Crestview Park Study Area - Alternative #2

ITEMS	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
ROADWAY REMOVAL AND REPLACEMENT	FOOT	3879	$300.00	$1,163,700.00
12" OUTLET PIPE	FOOT	50	$40.00	$2,000.00
STORM SEWER REMOVAL	FOOT	350	$10.00	$3,500.00
STORM SEWER, RCP 24"	FOOT	1582	$40.00	$63,280.00
STORM SEWER, RCP 36"	FOOT	1167	$140.00	$163,380.00
STORM SEWER, RCP 54"	FOOT	1365	$250.00	$341,250.00
PRC FLARED END SECTION WITH GRATE, 84"	EACH	0	$7,000.00	$0.00
STORM MANHOLE, 4' DIA	EACH	3	$4,000.00	$12,000.00
STORM MANHOLE, 7' DIA	EACH	6	$15,000.00	$90,000.00
TRENCH BACKFILL, SPECIAL	CY	6200	$45.00	$279,000.00
JUNCTION CHAMBER	EACH	0	$30,000.00	$0.00
EARTH EXCAVATION	CY	22200	$25.00	$555,000.00
STONE RIPRAP, CLASS A4 W/FILTER FABRIC	SQ YD	100	$50.00	$5,000.00
TOPSOIL FURNISH AND PLACE, 8"	SQ YD	22000	$6.00	$132,000.00
SEEDING WITH EROSION CONTROL BLANKET	SQ YD	22000	$3.00	$66,000.00
STABILIZED CONSTRUCTION ENTRANCE	EACH	1	$5,000.00	$5,000.00
SITE CLEARING	LSUM	1	$20,000.00	$20,000.00
TRAFFIC CONTROL	LSUM	1	$100,000.00	$100,000.00
CONSTRUCTION LAYOUT	LSUM	1	$25,000.00	$25,000.00

SUB TOTAL =	$3,026,110.00
CONTINGENCY (20%) =	$605,222.00
CONSTRUCTION TOTAL =	$3,631,332.00
ENGINEERING (10%) =	$363,133.20
TOTAL PROJECT COST INCLUDING ENGINEERING =	**$3,994,465.20**

NOTE:
THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, LAND ACQUISITION, TEMPORARY AND/OR CONSTRUCTION EASEMENTS, ROCK EXCAVATION, OR RELOCATING ANY UTILITIES.

Appendix 2
CD-ROM



CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

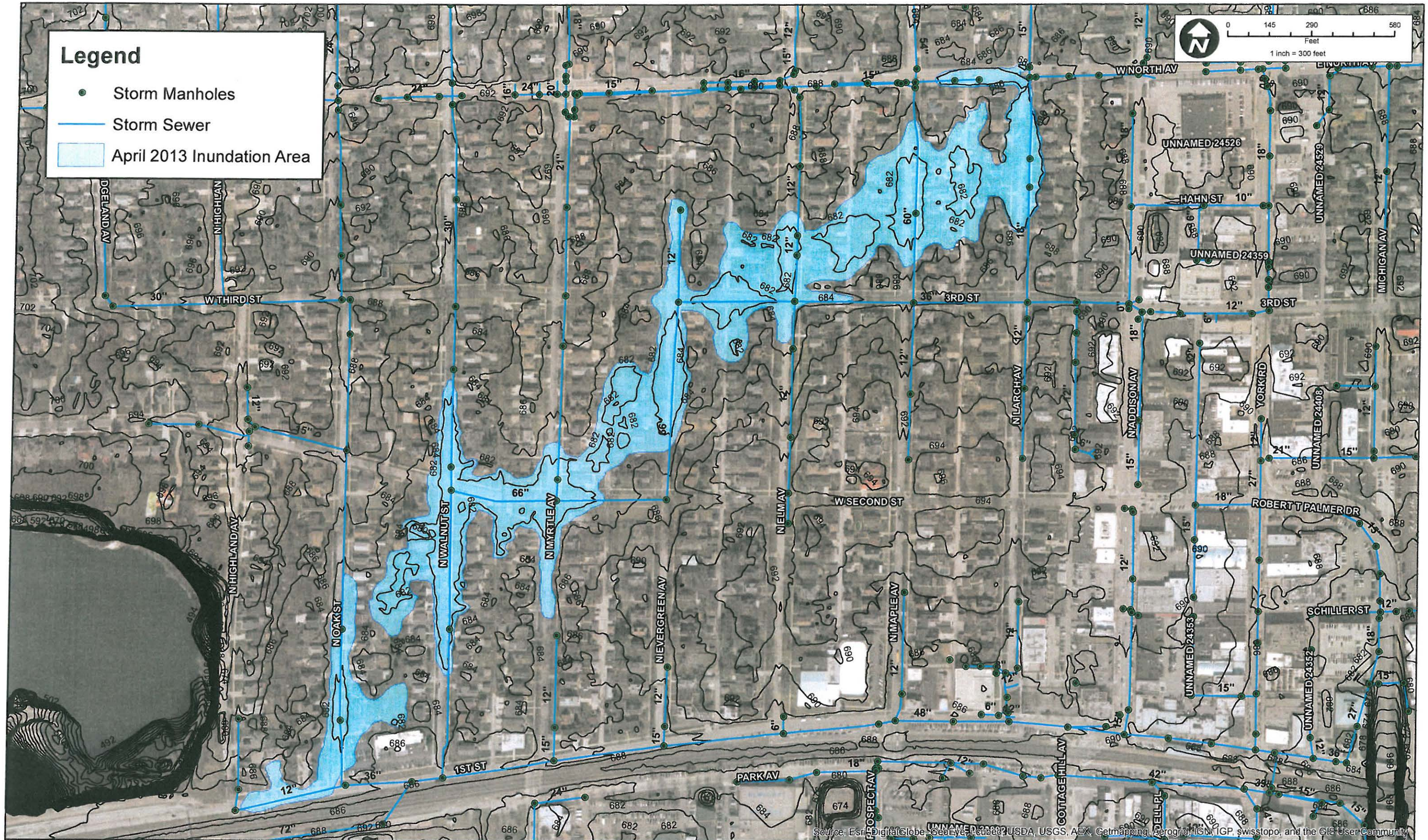
CLIENT:
CITY OF ELMHURST

NO.	DATE	NATURE OF REVISION	CHKD.
FILE NAME			

DSGN.
DWN.
CHKD.
SCALE: 1"=
PLOT DATE:
CAD USER:
MODEL:

TITLE:
WALNUT/EVERGREEN/MYRTLE STUDY AREA
OVERALL DRAINAGE EXHIBIT

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO.
EXH 1A



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CITY OF ELMHURST

NO.	DATE	NATURE OF REVISION	CHKD.

FILE NAME

DSGN.
DWN.
CHKD.
SCALE: 1"=
PLOT DATE:
CAD USER:
MODEL:

TITLE:
WALNUT/EVERGREEN/MYRTLE STUDY AREA
APRIL 2013 INUNDATION AREA

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO.
EXH 1B

Legend

- Proposed Flood Storage Area
- Proposed Storm Sewer
- Existing Storm Sewer
- Existing Storm Manhole

0 120 240 480 Feet

1 inch = 250 feet

CONSTRUCT 60" RELIEF SEWER

CONSTRUCT TWIN 60" RELIEF SEWERS

CONSTRUCT 84" RELIEF SEWER

CONSTRUCT 12" OUTLET PIPE

CREATE 15 ACRE-FEET OF FLOOD STORAGE

THIRD ST
1ST ST
WALTER ST
ALEXANDER BL
W SECOND ST
PARK AV
MARGARET PL
UNNAMED 23892
N HIGHLAND AV
N OAK ST
N WALNUT ST
N MYRTLE AV
S MYRTLE AV
N EVERGREEN AV
N ELM AV
N MAPLE AV
PROSPECT AV
N LARCH AV
COTTAGE HILL AV
ELMHURST COLLEGE

ALTERNATIVE #1 SUMMARY	
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (EXISTING CONDITIONS):	52
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (PROPOSED CONDITIONS):	0
CONCEPTUAL PROJECT COST:	$5.36M

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9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT: **CITY OF ELMHURST**

NO.	DATE	NATURE OF REVISION	CHKD.

FILE NAME

DSGN. | DWN. | CHKD. | SCALE: 1"= | PLOT DATE: | CAD USER: | MODEL:

TITLE: **WALNUT/EVERGREEN/MYRTLE STUDY AREA PROPOSED DRAINAGE ALTERNATIVE #1**

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO. **EXH 1C**

ALTERNATIVE #2 SUMMARY	
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (EXISTING CONDITIONS):	52
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (PROPOSED CONDITIONS):	0
CONCEPTUAL PROJECT COST:	$3.12M

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Rosemont, Illinois 60018
(847) 823-0500

CLIENT: **CITY OF ELMHURST**

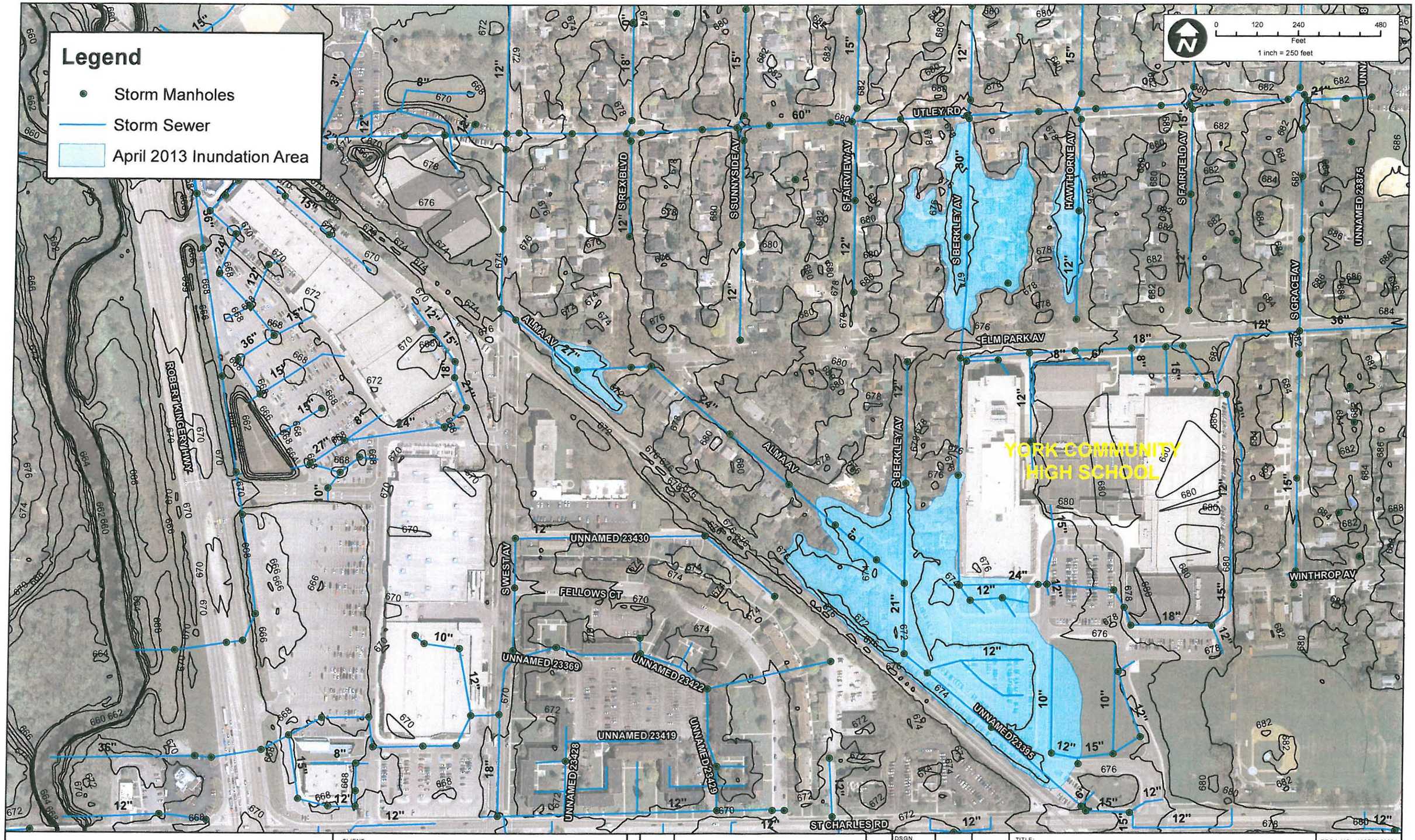
NO.	DATE	NATURE OF REVISION	CHKD.
FILE NAME			

DSGN. | DWN. | CHKD. | SCALE: 1"= | PLOT DATE: | CAD USER: | MODEL:

TITLE: **WALNUT/EVERGREEN/MYRTLE STUDY AREA PROPOSED DRAINAGE ALTERNATIVE #2**

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO. **EXH 1D**

CHRISTOPHER B. BURKE ENGINEERING LTD. 9575 West Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	CLIENT: **CITY OF ELMHURST**
NO. DATE NATURE OF REVISION CHKD. FILE NAME	DSGN. DWN. CHKD. SCALE: 1"= PLOT DATE: CAD USER: MODEL:
TITLE: **COLLEGEVIEW STUDY AREA** **OVERALL DRAINAGE EXHIBIT**	PROJ. NO. 100506.00004 DATE: SHEET 1 OF 1 DRAWING NO. **EXH 2A**



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9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:
CITY OF ELMHURST

NO.	DATE	NATURE OF REVISION	CHKD.

FILE NAME

DSGN.
DWN.
CHKD.
SCALE: 1"=
PLOT DATE:
CAD USER:
MODEL:

TITLE:
COLLEGEVIEW STUDY AREA
APRIL 2013 INUNDATION AREA

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO.
EXH 2B

Legend

- Proposed Storm Sewer
- Proposed Flood Storage Area
- Existing Storm Manhole
- Existing Storm Sewer

0 120 240 480
Feet
1 inch = 250 feet

CONSTRUCT 24" RELIEF SEWER

CONSTRUCT BACKFLOW PREVENTER

CONSTRUCT 24" STORM SEWER

CONSTRUCT 8 ACRE-FEET OF FLOOD STORAGE

CONSTRUCT 2' X 6' STORM SEWER

CONSTRUCT 36" EQUALIZER PIPE

ALTERNATIVE #1 SUMMARY	
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (EXISTING):	17
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (PROPOSED):	0
CONCEPTUAL PROJECT COST:	$3.34M

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9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT: **CITY OF ELMHURST**

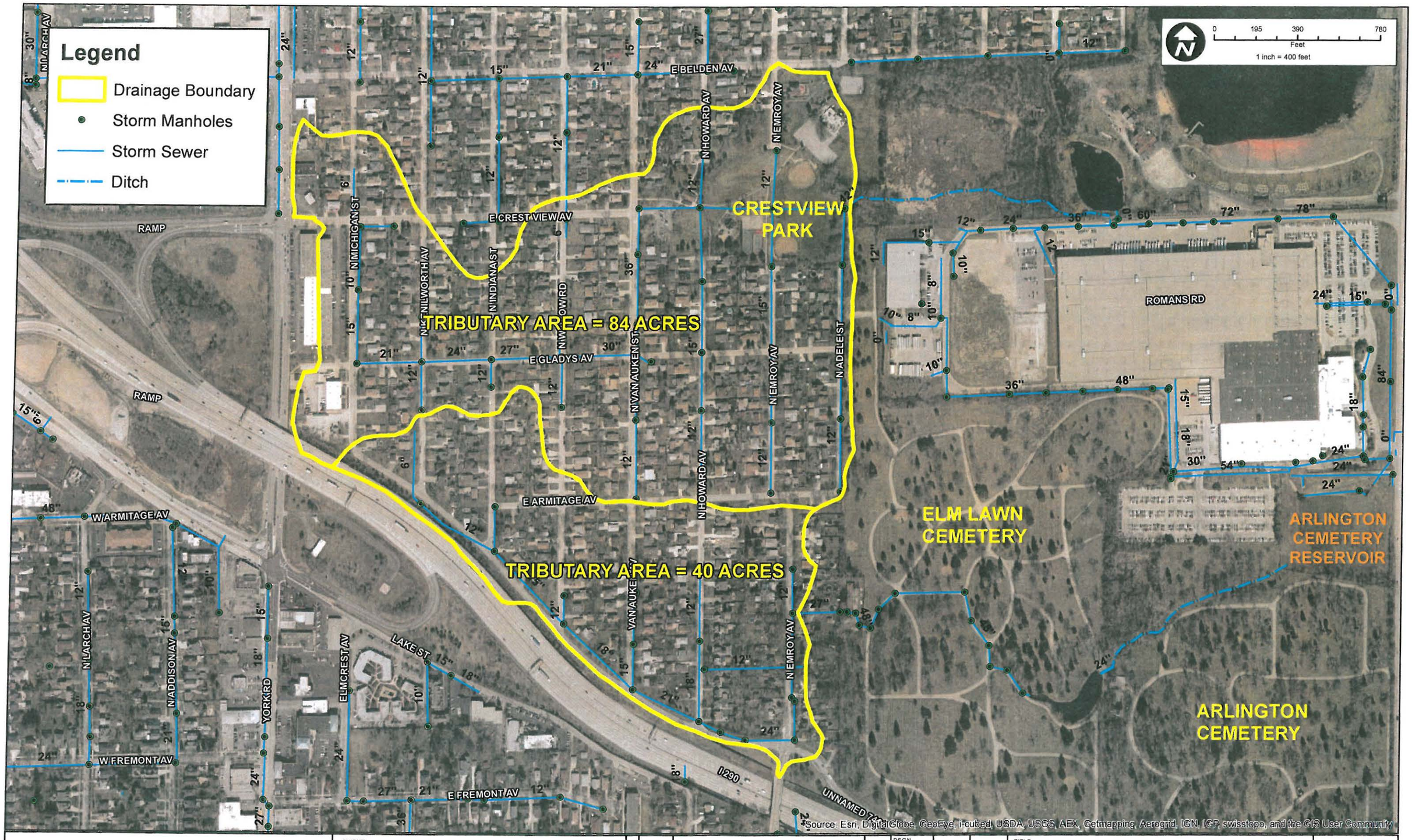
NO.	DATE	NATURE OF REVISION	CHKD.

FILE NAME

DSGN. | DWN. | CHKD. | SCALE: 1"= | PLOT DATE: | CAD USER: | MODEL:

TITLE: **COLLEGEVIEW STUDY AREA PROPOSED DRAINAGE ALTERNATIVE #1**

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO. **EXH 2C**



CHRISTOPHER B. BURKE ENGINEERING LTD. 9575 West Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	CLIENT: **CITY OF ELMHURST**	NO. / DATE / NATURE OF REVISION / CHKD.	DSGN. / DWN. / CHKD. / SCALE: 1"= / PLOT DATE: / CAD USER: / MODEL:	TITLE: **CRESTVIEW PARK STUDY AREA OVERALL DRAINAGE EXHIBIT**	PROJ. NO. 100506.00004 DATE: SHEET 1 OF 1 DRAWING NO. **EXH 3A**

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Rosemont, Illinois 60018
(847) 823-0500

CLIENT:

CITY OF ELMHURST

NO.	DATE	NATURE OF REVISION	CHKD.

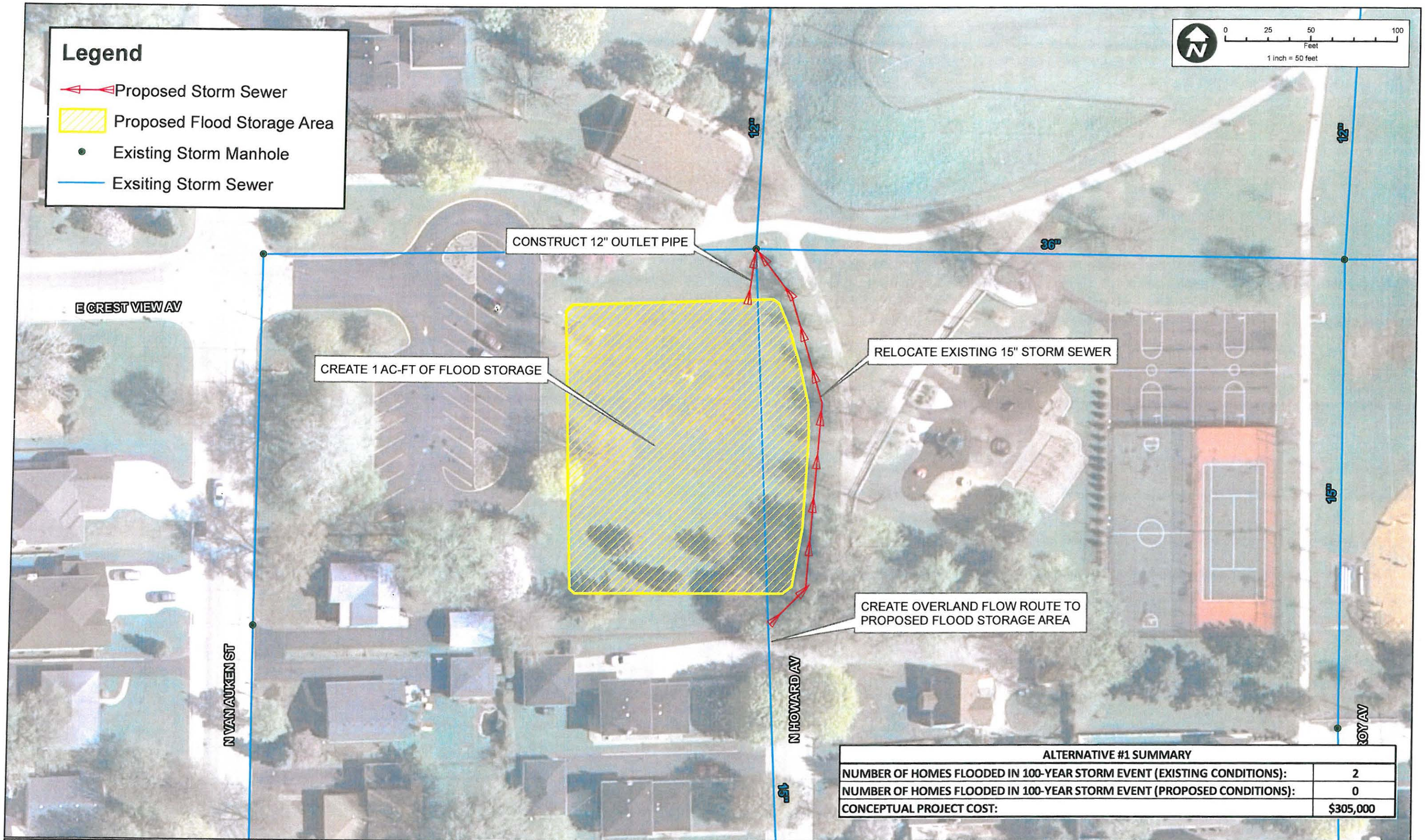
FILE NAME

DSGN.	
DWN.	
CHKD.	
SCALE:	1"=
PLOT DATE:	
CAD USER:	
MODEL:	

TITLE:

CRESTVIEW PARK STUDY AREA
APRIL 2013 INUNDATION AREA

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO.
EXH 3B



ALTERNATIVE #1 SUMMARY	
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (EXISTING CONDITIONS):	2
NUMBER OF HOMES FLOODED IN 100-YEAR STORM EVENT (PROPOSED CONDITIONS):	0
CONCEPTUAL PROJECT COST:	$305,000

CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT: **CITY OF ELMHURST**

NO.	DATE	NATURE OF REVISION	CHKD.
FILE NAME			

DSGN. | DWN. | CHKD. | SCALE: 1"= | PLOT DATE: | CAD USER: | MODEL:

TITLE: **CRESTVIEW PARK STUDY AREA PROPOSED DRAINAGE ALTERNATIVE #1**

PROJ. NO. 100506.00004
DATE:
SHEET 1 OF 1
DRAWING NO. **EXH 3C**

Scale: 1 inch = 150 feet

DSGN.	LJS	CHKD.	

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT: CITY OF ELMHURST

PROJECT NO.: 100506.00004

TITLE: CRESTVIEW PARK STUDY AREA
PROPOSED DRAINAGE ALTERNATIVE #2

DATE: 9/2/14

EXHIBIT 3D