City of

Wood Dale

Citywide Drainage and Flood Improvements Study

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City of Wood Dale, Illinois
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EXECUTIVE SUMMARY

Baxter & Woodman was retained by the City of Wood Dale to evaluate known areas of flooding and inadequate drainage in order to develop a prioritized list of recommended solutions. Exhibit 1 shows the locations of the thirteen areas initially identified by the City for evaluation. Two of the Study Areas include more than one location with a known drainage problem.

During our preliminary analysis of the thirteen Study Areas, the City determined that it would be more appropriate to address several of the Study Areas through separate studies. Generally speaking, the Study Areas with problems that could not be addressed by making improvements to the storm sewer system were excluded from this study. The specific reasons certain Study Areas were excluded are noted below.

- Area 2 - Northeast Tributary (Elmhurst Street to Irving Park Road) – The flooding in this area is the result of inflow and infiltration into the sanitary sewer system.
- Area 3 – Commercial Street – The flooding in this area is due to the flood stages of Salt Creek. Property buyouts are ongoing.
- Area 4 - The Woods - The flooding in this area is the result of inflow and infiltration into the sanitary sewer system.
- Area 7 - Harvey Avenue/Carter Avenue – The flooding in this area is the subject of a separate study. A Phase 1 study was conducted by URS and is the basis for future detailed design to address drainage problems in this area.
- Area 9 - One Wood Dale Place - The flooding in this area is due to the flood stages of Salt Creek. Property buyouts are ongoing.
- Area 12 - Tall Oaks - The flooding in this area is the subject of a separate study.
- Area 13 - Royal Oaks – The flooding in this area is the subject of a separate study.

Recommendations for the other six Study Areas are summarized below, along with the engineer's opinion of probable cost. The recommended projects are listed in order of priority, based on a ranking system that considered factors such as the probable cost of the project; the number of properties that would benefit from the project; and the timing of other capital improvement projects in the area.

Area 10 - South Cedar Avenue

Potential improvements for this Study Area consist of extending storm sewer to the south end of Cedar Avenue and increasing the capacity of existing storm sewers in the area. Alternates 1 and 2 are shown as Exhibits 11 and 12, respectively. The engineer's opinion of probable cost for Alternates 1 and 2 are $162,840 and $417,850, respectively. Alternate 1 is recommended primarily because preliminary coordination with the Forest Preserve District revealed that the District is amenable to Alternate 1, but would be opposed to Alternate 2. Design and construction of Alternate 1 should be timed to coincide with the water main and road improvements along Cedar Avenue planned for FY2014.

Area 11 - Montclare Lane and North Cedar Avenue

The recommended improvements for the North Cedar Avenue location include extending the existing Cedar Avenue storm sewer north to Hiawatha Trail. Three variations of these improvements were considered. Alternates 1-3 are shown as Exhibits 13-15, respectively. Alternate 1 is recommended because it is the alternate with the lowest cost and because preliminary coordination with the Forest Preserve District revealed that the District is amenable to Alternate 1.

The proposed improvements for the Montclare Lane location include constructing a storm sewer connection from the rear yard of the property at 121 Montclare Lane to the existing storm sewer system along Montclare Lane. No alternates were considered at this location. The recommended improvements are shown on Exhibits 13-15.

The engineer's opinion of probable cost for Alternates 1-3 (including the improvements at the North Cedar Avenue location and the Montclare Lane location) are $530,196, $1.6 million and $819,292, respectively. Design and construction of Alternate 1 should be timed to coincide with the water main and road improvements along Cedar Avenue planned for FY2014.

Area 5 - Woodside and Route 83/Oak Meadows Drive

Potential improvements for this Study Area consist of increasing the capacity of existing storm sewers in the area. Alternates 1 and 2 are shown as Exhibits 5 and 6, respectively. The engineer's opinion of probable cost for Alternates 1 and 2 are $194,753 and $897,581, respectively. Alternate 1 is recommended because it is the lower cost option and because the 10-year storm event is the typical design standard for municipal storm sewer systems. Design and construction of Alternate 1 should be timed to occur in advance of, or together with, the street resurfacing planned for Crestwood Road and Spruce Road in FY2016.

Area 8 - Central Avenue/Ethel Lane/Aspen Road

The proposed improvements for this area include increasing the capacity of existing storm sewers in the area and increasing the storage volume of two existing detention basins. Alternates 1 and 2 are shown as Exhibits 9 and 10, respectively. The

engineer's opinion of probable cost for Alternates 1 and 2 are $1.0 million and $1.4 million, respectively. Alternate 2 is recommended because preliminary coordination with the Forest Preserve District indicated that the District would be opposed to Alternate 1. Alternate 2 would not require coordination with the District. Design and construction of Alternate 2 should be timed to occur in advance of, or together with, the street resurfacing planned for Aspen Road in FY2016.

Area 1 - Westside Tributary/Georgetown Area

Potential improvements for this Study Area are shown as Exhibits 2-4. The major differences between these alternates are that Alternate 1 would include a large detention basin within the ComEd right-of-way; Alternate 2 would involve significant improvements to Squaw Creek between Dalewood Avenue and Irving Park Road; and Alternate 3 would install a relief sewer that would connect to the proposed storm sewer improvements along Gilbert Drive. The engineer's opinion of probable cost for Alternates 1-3 are $2.4 million, $2.2 million and $3.6 million, respectively. Alternate 3 is recommended for planning purposes since we have not yet been able to confirm that ComEd is amenable to Alternate 1. (Coordination with ComEd is ongoing.) Alternate 2 is not recommended since the necessary improvements along Squaw Creek would be located on private property.

Area 6 - Central Avenue/Beinoris Drive/Creel Drive

The recommended improvements for this Study Area include increasing the capacity of existing storm sewers in the area. Two variations of these improvements were considered. Alternates 1 and 2 are shown as Exhibits 7-8, respectively. The engineer's opinion of probable cost for Alternate 1 is $3.4 million, while the engineer's

opinion of probable cost for Alternate 2 is $1.9 million. Alternate 2 is recommended because it is the alternate with the lowest cost and because it would not impact downstream properties.

The engineer's opinion of probable cost for potential improvements presented in this Study includes the cost of sanitary sewer and water service relocation or adjustment, trench backfill, pavement or lawn restoration, traffic control, erosion control, construction layout and mobilization. It does not include the cost of right-of-way acquisition, temporary or permanent easements, or relocating utilities other than sanitary sewer and water service lines.

1. INTRODUCTION

On September 12-14, 2008 the City of Wood Dale experienced a significant rain event that resulted in numerous flooding incidents throughout the City. Based on available data from the National Oceanic and Atmospheric Administration (NOAA), the September 2008 event was approximately equivalent to a 100-year storm, or a storm having a 1 percent exceedance probability (probability of being exceeded in any given year). Many of the affected areas are known to have experienced flooding from smaller, or more frequent, storms. For example, photos of flooding that occurred in Area 10 on June 19, 2009 were provided to the City by a resident (see Figure 1 below); this storm was estimated to be between a 10- and 50-year storm, or a storm having between a 10 percent and a 2 percent exceedance probability.

FIGURE 1

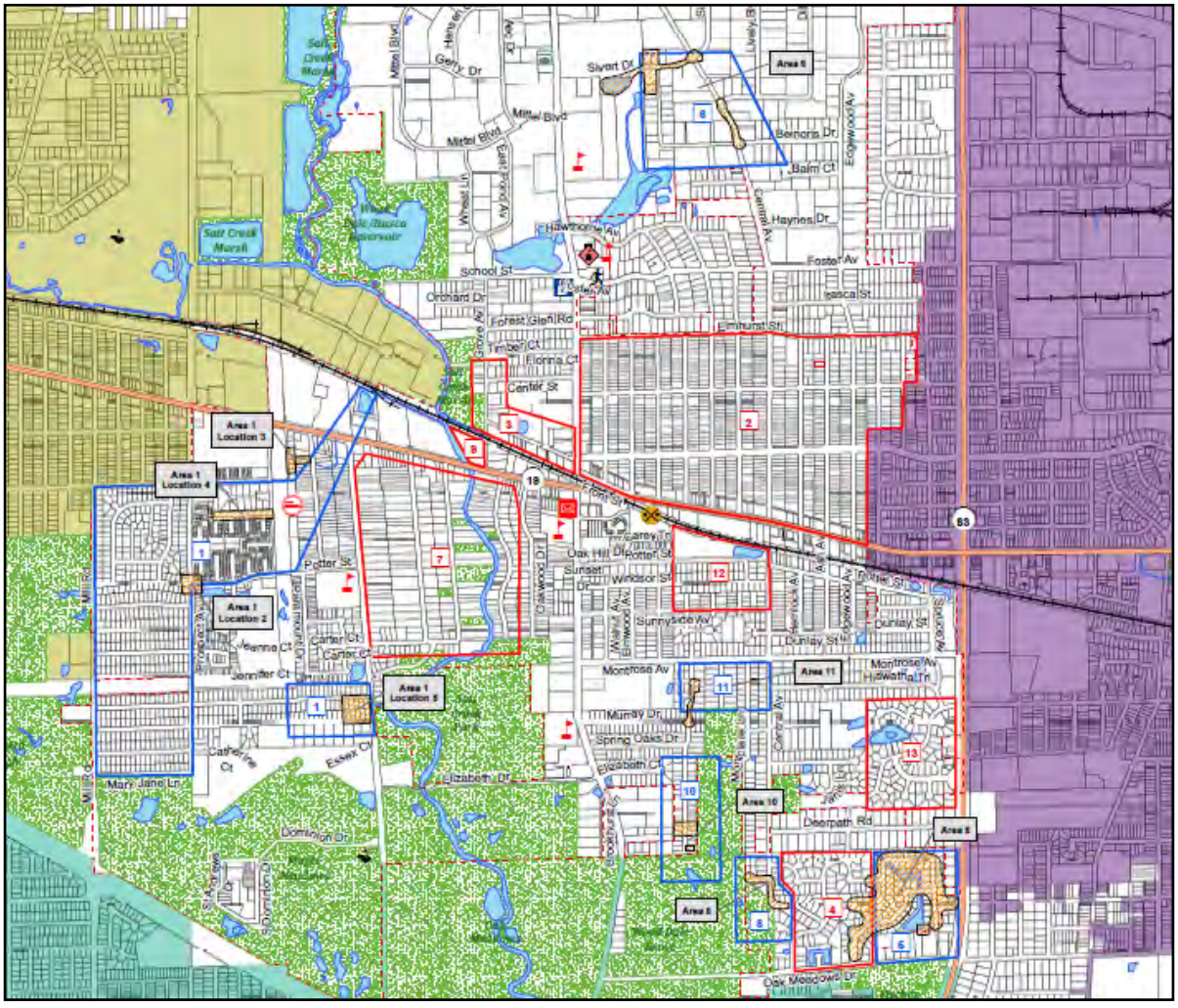
Flooding on June 19, 2009

The above cited events were just two of many events that have caused flooding problems within the City. In response, Baxter & Woodman was retained to evaluate known areas of flooding and inadequate drainage and to develop a prioritized list of recommended solutions.

Below is a list of the thirteen general areas identified by the City for evaluation; these locations are shown below on Figure 2 and also on Exhibit 1. Note that two of the Study Areas include more than one location with a known drainage problem.

FIGURE 2

Study Area Location Map



- Area 1 – Westside Tributary/Georgetown
- Area 2 - Northeast Tributary (Elmhurst Street to Irving Park Road)
- Area 3 – Commercial Street
- Area 4 - The Woods
- Area 5 – Woodside and Route 83/Oak Meadows Drive
- Area 6 – Central Avenue/Beinoris Drive/Creel Drive
- Area 7 - Harvey Avenue/Carter Avenue
- Area 8 – Central Avenue/Ethel Lane/Aspen Road
- Area 9 - One Wood Dale Place
- Area 10 - South Cedar Avenue
- Area 11 – Montclare Lane and North Cedar Avenue
- Area 12 - Tall Oaks
- Area 13 - Royal Oaks

As part of this study, Baxter & Woodman considered the following previously completed studies:

- Area 10, South Cedar Avenue (Completed by ERA in 2010)
- Area 12, Tall Oaks (Completed by URS in 2011)

During our preliminary analysis of the thirteen Study Areas, the City determined that it would be more appropriate to address the following seven Study Areas through separate studies. Descriptions of each area, observed drainage concerns and a recommended course of action are provided in subsequent sections of this report.

- Area 2 - Northeast Tributary (Elmhurst Street to Irving Park Road)
- Area 3 – Commercial Street
- Area 4 - The Woods

- Area 7 - Harvey Avenue/Carter Avenue
- Area 9 - One Wood Dale Place
- Area 12 - Tall Oaks
- Area 13 - Royal Oaks

2. STUDY METHODOLOGY

As stated previously, seven of the thirteen Study Areas shown on Exhibit 1 are being addressed separately. Brief summaries of the issues in each of these areas are provided in subsequent sections of this report. This section describes the study methodology employed for the six Study Areas analyzed in this report.

Tributary areas for each study area were delineated using 2-foot DuPage County contour mapping and the storm sewer atlas data in the City's GIS system.

Tributary areas were then divided into sub-catchment areas, to which hydrologic parameters, such as the Runoff Curve Number (CN) and Time of Concentration (Tc) were assigned. The CN value is based on the ratio of impervious to pervious area within a sub-catchment. It is a function of the current land use, as determined using aerial photography from the County, and the soil type, as determined using soil data published by the Natural Resources Conservation Service (NRCS). The Tc is the length of time it takes for runoff to travel from the farthest point in the sub-catchment to the outlet.

The hydrologic parameters were then entered into XP-SWMM (Stormwater & Wastewater Management Model software by XP Solutions) for each Study Area. XP-SWMM is a two-phase dynamic modeling program that determines the amount of runoff from a storm event and routes the runoff through a sewer network, along overland flow paths and into storage areas, where appropriate. The software generates

runoff rates and volumes, along with high water surface elevations, at each node in the model.

Next, hydraulic aspects of the XP-SWMM models were created. Storm sewer system information from the City's atlas was entered as well as survey data collected by Baxter & Woodman including street cross sections, spot elevations and storm sewer information not present in the City's atlas.

The critical storm duration was determined for each Study Area utilizing Chicago sectional rainfall depths published in the Illinois State Water Survey's *Bulletin 70*. *Bulletin 70* is the preeminent source for rainfall depths and patterns in Northeast Illinois. The critical storm duration refers to the storm duration that produces the maximum runoff rate or water surface elevation for a storm with a given recurrence interval. For example, the critical duration for the 10-year storm event could be a storm with a 0.5-, 1-, 2-, 3-, 6-, 12-, 18- or 24-hour duration.

Modeling the Study Areas was an iterative process. During each iteration, model results were compared with observed flooding depths during various historical events, where such observations were available. Where a design high water level (HWL) for a detention basin was available, the model was calibrated such that the HWL produced by the model reasonably matched the design HWL.

Once the models of each Study Area were determined to be sufficiently representative of the existing conditions, the models were used to identify the cause(s) of flooding within each Study Area. Alternatives to address the problems were optimized through proposed conditions XP-SWMM modeling. Proposed improvements

considered include adding inlets, increasing storm sewer sizes, constructing relief sewers and providing storage.

Proposed improvements are based on conceptual plans and limited information. Because of this, there are many unknowns (i.e. soil conditions, utility conflicts and limited rights-of-way) that will affect the ultimate design and the project cost. In order to account for these uncertainties, the engineer's estimate of probable cost includes a 20 percent contingency. Costs for design engineering (including permitting) and construction engineeering are provided as a percentage of the construction cost.

3. WESTSIDE TRIBUTARY/GEORGETOWN AREA (AREA 1)

The Westside Tributary/Georgetown area is shown as Area 1 on Exhibit 1. There are five locations of concern within this study area: rear yards between 608 and 618 Irmen Drive (Location 1), the intersection of Potter Street and Prospect Avenue (Location 2), the Miller Lane apartments and 336 Dalewood Avenue (Location 3), Park Lane (Location 4), and Gilbert Drive and Forest Preserve Drive (Location 5).

3.1 Rear Yards Between 608 and 618 Irmen Drive (Area 1-1)

Rear yard flooding occurs between 608 and 618 Irmen Drive due to swales and inlets being obstructed by landscaping, fences and sheds. A detailed study in this area was not performed.

3.2 Potter Street and Prospect Avenue Intersection (Area 1-2) Existing Conditions

Storm sewers draining to the intersection of Potter Street and Prospect Avenue collect runoff from Irmen Drive and a small portion of Potter Street. Overland flow is conveyed to the intersection from the south, east and west. The intersection has four inlets which collect and ultimately convey stormwater to the western detention pond of Orchard Lakes via an 18" pipe. The western pond is connected to the eastern pond by two 48" culverts. Water exits the ponds from the east pond through a 12" restrictor pipe and a 60" overflow structure that enters a 36" pipe. This pipe conveys the overflow north along Station Drive and ultimately outlets to Squaw Creek.

FIGURE 3

Study Area 1 – Location 2

City staff has noted that ponding occurs at the intersection and floods the property to the northwest. Our existing conditions XP-SWMM model indicates that flooding occurs for storms with a return frequency of less than 2 years. The primary cause for flooding is limited sewer and inlet capacity at the intersection of Potter Street and Prospect Avenue.

3.3 Potter Street and Prospect Avenue Intersection (Area 1-2) Proposed Conditions

The proposed conditions for the Potter Street and Prospect Avenue intersection include increasing storm sewer and inlet capacity to alleviate the existing drainage

issues. The proposed improvements for this Location are similar for all three Area 1 alternatives and can be seen in Exhibits 2, 3 and 4. Inlet capacity would be increased by installing two high capacity inlets at the intersection of Irmen Drive and Prospect Avenue to capture runoff coming from the south on Prospect Avenue and two curb inlets on Potter Street approximately 150 feet west of the intersection to capture runoff coming from the west on Potter Street. The increased inlet capacity would decrease the overland flow on the road surface but would increase the runoff being conveyed by the storm sewers; therefore, the storm sewer capacity would be increased as well. The existing storm sewers ranging from 12"-18" inches would be increased to 24"-30" storm sewers.

The proposed improvements would eliminate existing flooding (0.8 feet) at the intersection for the 10-year return period storm. The 100-year water surface elevation of the Orchard Lakes ponds would increase by approximately one foot due to these improvements, but this change would not impact adjacent homes.

The total cost of these improvements, including design and construction engineering, is estimated to be $303,365, $303,365 and $298,811 for Alternates 1-3, respectively. A detailed calculation of these costs is included in Appendices 1, 2 and 3.

3.4 Miller Lane Apartments & 336 Dalewood Ave (Area 1-3) Existing Conditions

Two 30" x 44" elliptical storm sewer pipes discharge into Squaw Creek directly behind the apartments on Miller Lane. These two pipes convey runoff from the west across the ComEd right-of-way from a majority of Area 1 (approximately 225 acres). The area contributing to the elliptical pipes is roughly bounded by Irving Park Road to the north, Irmen Drive to the south, Mill Road to the west, and Miller Lane to the east.

The creek runs east from the back of the apartments for approximately 50 feet and flows into a 44" x 66" corrugated metal pipe (CMP), which is partially silted. Furthermore, this short reach of creek has considerable debris and vegetation. A culvert, approximately 105 feet long, is located at the upstream end of the creek before it becomes an open channel for a short distance (60 feet) and then enters another 44" x 66" reinforced concrete pipe (RCP), which conveys flow under Dalewood Avenue. East of Dalewood Avenue, the creek is an open channel that continues flowing east. The creek then turns north and enters a 4' x 8' box culvert that conveys stormwater under Irving Park Road. There is a weir at the entrance to the 4' x 8' box culvert.

FIGURE 4

Study Area 1 – Location 3

City staff has indicated that the apartments on Miller Lane experience basement flooding due to overland flow and that the property north of the creek located at 336 Dalewood Avenue experiences overbank flooding from the creek. Sedimentation, poor culvert condition, debris and obstructive vegetation are creating a loss of conveyance and local flooding issues. Sinkholes appear to be forming over the upstream-most culvert, which indicates deterioration of the CMP.

Our existing conditions XP-SWMM model indicates the creek flooding issues are a result of larger, less frequent storms such as the 100-year storm; however, the limited capacity of the stream induces flooding on Miller Lane by creating an adverse tailwater condition for curb inlets. This adverse tailwater and resulting flooding on Miller Lane occurs for storms with a return frequency of less than 2 years. Furthermore, the adverse tailwater limits the capacity of the sewers crossing the ComEd right-of-way, which contributes to the flooding on Miller Lane. Finally, the culvert under Dalewood Avenue is undersized.

3.5 Miller Lane Apartments & 336 Dalewood Ave (Area 1-3) Proposed Conditions

The proposed improvements for this location differ significantly for all three Area 1 alternatives; however, all three alternatives require some measure of channel improvements to Squaw Creek. The channel improvements for all three alternatives include removing the culvert between the Miller Lane Apartments and Dalewood Avenue, along with removing obstructive vegetation and dredging the channel between the Miller Lane Apartments and Dalewood Avenue. It is also important to note that the

storm sewer and channel efficiency increases produced by the Area 1-3 alternatives aid in alleviating upstream flooding issues in Areas 1-2 and 1-4.

Area 1-3 Alternate 1 proposed improvements consist of building a 3.73 acre-feet dry detention pond and increasing storm sewer capacity on Station Drive to the detention pond (see Exhibit 2). Sewer capacity on Station Drive would be increased by replacing the existing 48" pipe with a 54" pipe. Similarly, the storm sewer capacity from Station Drive to the proposed detention pond would be increased by replacing the 30" x 44" elliptical pipe conveying runoff from the south with a 38" x 60" elliptical pipe. The existing elliptical pipe that conveys runoff from the north to the detention pond would not require additional capacity. No improvements would be required on Miller Lane because the combination of detention and channel improvements is sufficient to decrease the adverse tailwater on Squaw Creek. The proposed detention pond would attenuate the peak flow entering Squaw Creek and the channel improvements would increase channel efficiency in the Creek, thus reducing the flow depth.

Area 1-3 Alternate 2 proposed improvements, in addition to the common channel improvements mentioned previously, would consist of increasing storm sewer capacity on Station Drive and across the ComEd right-of-way, replacing the existing 44" x 66" culvert under Dalewood Avenue with a 4' x 8' box culvert, removing obstructive vegetation and dredging the channel between Dalewood Avenue and Irving Park Road, and removing the weir at Irving Park Road. Without the advantage of detention to attenuate peak flow rates, and the increased storm sewer capacity from Station Drive and the ComEd right-of-way, these additional channel improvements would be required to reduce the flow depth in Squaw Creek. No improvements would be required on Miller Lane.

Area 1-3 Alternate 3 would require the least amount of proposed improvements in this location. In addition to the common channel improvements, inlet capacity would be increased at the low spot on Miller Lane and the storm sewer capacity from the low spot to Squaw Creek would be increased. An additional two curb inlets would be required on Miller Lane and the exiting 12" storm sewers would be increased to 18".

All of the proposed alternatives for Area 1-3 eliminate the existing two feet of flooding on Miller Lane for the 10-year return period storm. The proposed alternatives also lower the 100-year flood depth on Miller Lane by 0.5 feet which is enough to eliminate the impact on adjacent buildings. Each alternative would have a different impact on flow rates and high water surface elevations in Squaw Creek. All of the alternatives would increase the flow rate in Squaw Creek, including the detention alternative (Alternative 1). This can be attributed to the proposed increases in storm sewer capacity at problem locations upstream (Areas 1-2 and 1-4). The largest increase in the 10-year flow rate would be 45 cfs for Alternative 2 and the smallest increase would be 12 cfs for Alternative 3. An increase in flow rates will increase flow velocities, which may pose a safety risk at accessible sections of the Creek during and immediately after extreme storm events. However, all three alternatives would lower the 100-year HWL in the Creek by 0.5-1.0 feet.

The total cost of these improvements, including design and construction engineering, is estimated to be $1.0 million, $922,068 and $108,429 for Alternates 1, 2 and 3, respectively. Detailed calculations of these costs are included in Appendices 1, 2 and 3. The cost estimates do not include the cost of acquiring easements for installing proposed improvements within the ComEd right-of-way or on private property along Squaw Creek.

3.6 Park Lane (Area 1-4) Existing Conditions

Storm sewers along Park Lane receive runoff from a tributary area that extends south to Potter Street and from Prospect Avenue on the west to Station Drive on the east. Park Lane also receives overland flow from the ComEd right-of-way to the east of Station Drive. The storm sewers range in size from 12" to 30" and discharge north to George Street via a 42" pipe. Stormwater is then routed down George Street to Station Drive and eventually outlets to Squaw Creek, passing through Location 1-3.

FIGURE 5

Study Area 1 – Location 4

City staff reports that street flooding occurs along Park Lane between Hoover Drive and Station Drive. Our existing conditions XP-SWMM model indicates that the current storm sewer infrastructure on Park Lane has a 2-year storm capacity. Flooding on the western half of Park Lane is solely the result of adverse tailwater conditions downstream of George Street. In addition to the adverse tailwater conditions, limited sewer capacity on the eastern half of Park Lane and limited inlet capacity on Station Drive contribute to the flooding on the eastern half of Park Lane.

3.7 Park Lane (Area 1-4) Proposed Conditions

The proposed improvements for Park Lane (Area 1-4) Alternates 1 and 2 are the same and consist of storm sewer capacity and inlet capacity increases on the eastern half of Park Lane (see Exhibits 2 and 3). The existing 12" to 18" storm sewers would be increased to 18" and 24" and two curb inlets added on Station Drive, just south of the intersection of Park Lane and Station Drive. These proposed improvements would eliminate the 10-year flooding (0.6 feet) seen on the eastern half of Park Lane. It is important to note the proposed increased storm sewer conveyance on Station Drive and across the ComEd right-of-way are sufficient to eliminate the 10-year flooding (1.0 feet) on the western half of Park Lane for Alternates 1 and 2.

The proposed improvements for Alternate 3 (Relief Sewer) in Area 1-4 are significantly different than the previous two alternatives. Alternate 3 proposes a relief sewer originating in Area 1-4 then running south along Station Drive and the ComEd right-of-way all the way to Gilbert Drive in Area 1-5 (see Exhibit 4). The objective of the relief sewer would be to disconnect this area from the sewer system contributing to Squaw Creek through Area 1-3. The relief sewer would have the benefits of negating

the adverse tailwater effects downstream, as well as reducing flow to Area 1-3 and Squaw Creek, thereby alleviating the flooding in Area 1-3 and Squaw Creek. To produce this effect, the 42" storm sewer conveying runoff from Park Lane to George St. would be blocked and a 36" pipe would route the flow from Park Lane to Area 1-5. The existing 12" to 18" storm sewers on the eastern half of Park Lane would be removed while the existing sewer on the western half would remain intact. These improvements would have the same desired effect as Alternates 1 and 2; they eliminate the 10-year flooding on Park Lane.

The total cost of these improvements, including design and construction engineering, is estimated to be $252,264, $252,264 and $2.8 million for Alternates 1, 2 and 3, respectively. Detailed calculations of these costs are included in Appendices 1, 2 and 3. The cost estimates do not include the cost of acquiring an easement for installing proposed improvements within the ComEd right-of-way for Alternate 3.

3.8 Gilbert Drive and Forest Preserve Drive (Area 1-5) Existing Conditions

Storm sewers ranging in size from 12" to 36" collect runoff on Gilbert and Forest Preserve Drives between Prospect Avenue and Addison Road. Also, a 30"storm sewer conveying runoff from a 70-acre area between Mill Road and Prospect Avenue connects to the Gilbert Drive storm sewer roughly halfway between Brookwood Drive and Addison Road. Runoff from this area is conveyed east to a 60" storm sewer on Addison Road, which outfalls to Salt Creek.

FIGURE 6

Study Area 1 – Location 5

City staff is aware that street flooding occurs along both Gilbert Drive and Forest Preserve Drive. Runoff collects at low points on both streets and at higher stages, the ponded water on Forest Preserve Drive begins to flow north towards Gilbert Drive, where it is collected by a rear yard depression. The runoff in the depression is collected by an inlet and conveyed to the Addison Road storm sewer.

The street flooding on Gilbert Drive and Forest Preserve Drive is caused by limited storm sewer capacity. Our existing conditions XP-SWMM model indicates that the current storm sewer infrastructure on Forest Preserve Drive has a 5-year storm

capacity. The existing storm sewers on Gilbert Drive have less than a 2-year storm capacity.

3.9 Gilbert Drive and Forest Preserve Drive (Area 1-5) Proposed Conditions

The proposed improvements for Gilbert Drive and Forest Preserve Drive (Area 1-5) Alternates 1 and 2 are similar and consist of storm sewer capacity increases for a short distance along the existing sewer on Forest Preserve Drive and a longer section along Gilbert Drive (see Exhibits 2 and 3). The existing 18" pipe on Forest Preserve Drive would be replaced with a 24" pipe. The existing 30" and 36" pipe on Gilbert Drive would be replaced with 36" and 48"pipe. The existing inlet capacity in Area 1-5 is sufficient.

The Alternate 3 improvements in Area 1-5 consist of several key features. Once the proposed 36"relief sewer from Area 1-4 reaches the rear yards along Gilbert Drive, trenchless installation methods would be necessary due to space limitation. When the relief sewer reaches Gilbert Drive trenchless installation methods would no longer be necessary. The proposed relief sewer would run parallel to the existing 30" and 36" pipe with three 24" connecting pipes and a portion of the existing 36"pipe would be replaced with 42"pipe. The relief sewer would increase in size to 48" before eventually connecting with the existing 60" storm sewer on Addison Road.

All three alternatives would eliminate the 10-year flooding at the low spots on Gilbert Drive and Forest Preserve Drive. The alternatives would reduce the flooding on Gilbert Drive and Forest Preserve Drive by 1.2 feet and 0.4 feet, respectively. All the alternatives would increase the 10-year peak flow from this area with Alternative 3

producing the largest increase (47 cfs). Even this increase in outflow would not significantly impact the peak flow of Salt Creek.

The total cost of these improvements, including permitting with the United States Army Corps of Engineers (USACE) and DuPage County Department of Transportation (DuDOT) (for Alternate 3), along with design and construction engineering, is estimated to be $782,184, $782,184 and $434,665 for Alternates 1, 2 and 3, respectively. Detailed calculations of these costs are included in Appendices 1, 2 and 3.

4. NORTHEAST TRIBUTARY (ELMHURST STREET TO IRVING PARK ROAD) (AREA 2)

The Northeast Tributary (Elmhurst Street to Irving Park Road) area is shown as Area 2 on Exhibit 1. The Northeast Tributary area extends from Wood Dale Road on the west to the east limits of the City (approximately Poplar Avenue) and from Irving Park Road on the south to Elmhurst Street on the north.

353 and 359 Cedar Avenue and 335 Ash Avenue are each experiencing sanitary backups as a result of stormwater inflow and infiltration into the sanitary sewer system. City staff believes that there are additional sanitary backups that have gone unreported. The City is planning to raise the rim elevation and seal some of the sanitary structures that are believed to be sources of stormwater inflow. A separate inflow and infiltration study will be required to identify all of the specific problem areas.

5. COMMERCIAL STREET (AREA 3)

Commercial Street area is shown as Area 3 on Exhibit 1. The Commercial Street area extends from west of Grove Avenue on the west along Commercial Street to Wood Dale Road on the east, and from the railroad tracks south of Commercial Street on the south along Grove Avenue to Timber Court on the north.

Several homes in this area are located within the Salt Creek floodplain. The City has already purchased a number of properties that have experienced repetitive flood damage through its buy-out program. Additional buy-outs are expected to occur in the future.

6. THE WOODS (AREA 4)

The Woods Subdivision is shown as Area 4 on Exhibit 1. This area extends from east of Central Avenue and from Edgewood Avenue on the west to the southern-most section of Crestwood Road on the east, and from Oak Meadow Drive on the south to south of Deerpath Road on the north.

Several homes in this area have experienced sanitary sewer backups as a result of stormwater inflow and infiltration into the sanitary sewer system. Additionally, the sanitary lift station at 333 S. Edgewood Avenue surcharges quickly during rain events. A separate inflow and infiltration study will be required to identify all of the specific problem areas and potential solutions.

7. WOODSIDE AND RTE. 83/OAK MEADOWS DR. (AREA 5)

The Woodside Subdivision is shown as Area 5 on Exhibit 1. The areas of concern are along Crestwood Road, Spruce Road, Woodside Drive and 2nd Avenue. Another concern is overtopping of the detention basin at its southeast corner. Storm sewers within the subdivision generally drain toward the detention basin in the middle of the subdivision, which discharges at its southeast corner toward Route 83 and Oak Meadows Drive.

7.1 Existing Conditions

Storm sewers ranging from 6"-24" pipes collect runoff and convey it to the Woodside Drive detention pond. The pond's outlet consists of a 10" restrictor pipe and 9' x 9' overflow inlet structure which conveys flow to the intersection of Route 83 and Oak Meadows Drive via a 44" x 66" elliptical pipe. The flow is then routed east under Route 83. The outlet works also include an overflow spillway which conveys additional flow to Route 83 via a natural ditch in the event that the basin is overtopped. The property southeast of the pond, which conveys the overflow from the pond, is undeveloped and is listed for sale as of the writing of this report.

FIGURE 7

Study Area 5

City staff reports street flooding along Crestwood Road, Spruce Road, Woodside Drive and 2nd Avenue in addition to overtopping of the detention basin at its southeast corner.

According to our existing conditions XP-SWMM model, minor street flooding occurs during the 10-year design event, with flooding depths being greatest in the northeast corner of the study area along Crestwood Road and Spruce Road, and along the southern portion of Woodside Drive. This flooding is due to insufficient storm

sewer capacity. Modeling results from the 100-year event indicate that the detention basin reaches its design HWL but does not inundate any properties.

7.2 Proposed Conditions

Two alternatives were investigated in Area 5. Alternate 1 proposes improvements which would alleviate flooding associated with an event up to the 10-year rainfall event while the Alternate 2 improvements would alleviate flooding associated with an event up to the 100-year rainfall. Alternate 1 proposed improvements include increasing inlet capacity at several locations on Woodside Drive, Crestwood Road and Spruce Road. Furthermore, existing 8" and 12" pipes on Crestwood Road and Spruce Road would be increased to 12" and 18" (see Exhibit 5).

The Alternate 2 proposed improvements include the Alternate 1 improvement and add increased storm sewer capacity on Woodside Drive, Spruce Road and Crestwood Road (see Exhibit 6). The existing 10" to 21" storm sewer on Woodside Drive draining to the pond would be replaced with a 24" sewer. Farther north on Woodside Drive the existing 12" and 15" pipes draining to the pond would be replaced with 18" pipe. The pipe draining Spruce Road to the pond would be increased from 12" to 18". Furthermore, the existing pond overflow elevation produces a HWL making street drainage impossible; therefore, the pond overflow elevation would need to be lowered 1.0 feet.

The proposed improvements for Alternate 1 would decrease the street flooding on Crestwood Road for the 10-year event from 0.5 feet to 0.1 feet without significantly increasing outflow to, and water depth in, the undeveloped property downstream of the pond.

Flooding due to the 100-year event is deeper and more widespread in this area than the 10-year flooding. The Alternate 2 improvements would eliminate all road flooding in Area 5 and would not significantly increase outflow or ponding in the undeveloped property downstream of the pond. Flood depths ranging from 0.9 to 0.5 feet would be completely eliminated while increasing outflow by 9 cfs and increasing the depth of water in the undeveloped property 0.1 feet.

The total cost of these improvements, along with design and construction engineering, is estimated to be $194,753 and $897,581 for Alternates 1 and 2, respectively. Detailed calculations of these costs are included as Appendices 4 and 5.

8. CENTRAL AVENUE/BEINORIS DRIVE/CREEL DRIVE (AREA 6)

The Central Avenue/Beinoris Drive/Creel Drive area is shown as Area 6 on Exhibit 1. The areas of concern are the intersection of Creel Drive and Sivert Drive, as well as the businesses along Creel Drive immediately south of the intersection; also of concern is flooding along Central Avenue from the Sivert Drive all the way south to Beinoris Drive. Storm sewers along Creel Drive and Sivert Drive drain east to Central Avenue, as does the storm sewer along Beinoris Drive. Storm sewers along Central Avenue drain from each direction and then drain east to the sewer along Richert Road.

8.1 Existing Conditions

The Creel Drive storm sewer system begins at 720 Creel Drive as a 15" and flows north increasing to 18" before turning east just north of 769 Creel Drive where it becomes a 36" pipe. There is a storm sewer system on Sivert Drive that begins just west of 770 Creel Drive as a 15" and turns south just east of 830 Sivert Drive, increasing in size to 21" before connecting to the 36" sewer from Creel Drive to the west. There is a dry detention basin south of 830 Sivert Drive which outlets into the sewer from Creel Drive at the junction where the sewer from Sivert Drive connects to it; the sewer then becomes 42" and flows east to the Central Avenue system which flows south from this junction. It is worth noting that the profile of Sivert Drive is pitched to the east starting at Wood Dale Road and continuing downhill to Central Avenue.

FIGURE 8

Study Area 6

The main line on Central Avenue begins roughly 350 feet south of Thorndale Road as a 15" pipe and flows south increasing to 30" before turning east at Richert Road as a 36". At the Beinoris Drive and Central Avenue intersection, three main line systems merge into two interconnected systems - two 12" pipes from the east and west as well as a 24" from the south, continue north as an 18" and 24" to Richert Road. Runoff to the Central Avenue system comes from the commercial areas west of Central Avenue with very little area east of Central Avenue contributing runoff.

The tenants at 760 Creel Drive have indicated that they experience groundwater seepage from the impounded detention basin west of their property.

City staff has noted that street flooding occurs at the intersection of Creel Drive and Sivert Drive. Results from our existing conditions XP-SWMM model indicate that pipes along Sivert Drive surcharge, causing overland flow along the street. The pipe which connects Sivert Drive to the dry detention basin is also flowing full. The model indicates that the dry basin fills over half way during the 10-year design event. During the 100-year design event, the dry basin fills to the top but does not overflow onto the surrounding properties.

City staff also indicates that flooding occurs along Central Avenue from the Sivert Drive intersection all the way south to the Beinoris Drive intersection. According to our existing conditions XP-SWMM model, the street flooding at the Central Avenue and Sivert Drive intersection is due to a sag in the road coupled with a lack of inlet and pipe capacity. Flooding along Central Avenue between Richert Road and Beinoris Drive is caused by a lack of pipe capacity.

8.2 Proposed Conditions

To alleviate street flooding in Area 6, two alternatives were devised. Both alternatives were designed based on the 10-year storm event. The first alternative would increase the existing storm sewer sizes from 15”-24” up to 30” along Sivert Drive leading south to the dry detention basin, completely eliminating road inundation. Adding a 12” pipe behind 706 Creel Drive and connecting to the existing 36” storm sewer would alleviate groundwater seepage to the building and parking lot. Upsizing a portion of storm sewer along Creel Drive from 18” to 24” and increasing the slope of an

18" pipe would eliminate the road flooding at the intersection of Sivert Drive and Creel Drive. The improvements along Central Avenue between Sivert Drive and Beinoris Drive focused on upsizing storm sewer and correcting any significantly back-pitched pipes. The storm sewer on the west side of Central Avenue from Beinoris Drive to Richert Road would be upsized from 18"-24" to 24"-36". A back-pitched pipe should be corrected on the east side at the intersection of Beinoris Drive and Central Avenue. To eliminate road inundation, the portion of Central Avenue's storm sewer upstream of Richert Road should be increased from 27-30" to 36-42". The pipes leaving Area 6 would be increased from 36" to 48" to prevent a system backup from the increased flows. In addition to proposed storm sewer capacity improvements, inlet capacities should be increased throughout Creel Drive, Sivert Drive and Central Avenue. The improvements proposed as Alternate 1 are shown on Exhibit 7.

Similar to Alternative 1, Alternative 2 would correct the flooding along Sivert Drive and Creel Drive by increasing the storm sewer diameter; however, the improvements would require fewer storm sewer size increases along Sivert Drive. A 12" pipe would be installed behind 706 Creel Drive to eliminate groundwater seepage. The two 18"-24" pipes along Creel Drive would be increased to 24". Two pipes along Central Avenue were increased on the west side from 24" to 60". The oversized pipes would provide stormwater detention in the system. The existing 36" pipe exiting Area 6 would act as a restrictor in the system, which would keep the peak outlet flow at 66.50 cfs compared to the existing 64.75 cfs. The improvements would reduce the road flooding completely in most areas. As in Alternative 1, inlet capacity would also be

needed throughout the recommended areas. The improvements proposed as Alternate 2 are shown on Exhibit 8.

The total cost of these improvements, including design and construction engineering, is estimated to be $3.4 million and $1.9 million for Alternates 1 and 2, respectively. Detailed calculations of these costs are included as Appendices 6 and 7.

9. HARVEY AVENUE/CARTER AVENUE (AREA 7)

The Harvey Avenue/Carter Avenue area is shown as Area 7 on Exhibit 1. This area extends from Addison Road on the west, to east of Edgebrook Road on the east, and from south of Carter Avenue on the south to just south of Irving Park Road on the north.

Street flooding occurs in this area due to the inability of runoff to be conveyed to Salt Creek. Conveyance of runoff through properties across roads and to Salt Creek has long been an issue mostly due to homeowner "improvements" that have obstructed overland flow paths. URS completed a Phase I design report in 2010 which called for re-grading swales and roadside ditches, replacing and/or enlarging culverts and adding storm sewer. These improvements will be made as part of the road reconstruction program for this area. Easements will be required in some cases.

10. CENTRAL AVENUE/ETHEL LANE/ASPEN ROAD (AREA 8)

The Central Avenue/Ethel Lane/Aspen Road area is shown as Area 8 on Exhibit 1. The areas of concern are Aspen Road and the intersection of Central Avenue and Ethel Lane. Storm sewers within the subdivision generally drain to the southeast towards the dry detention basin in The Woods subdivision, which discharges at its southeast corner south towards Oak Meadows Drive.

10.1 Existing Conditions

Storm sewers ranging from 8"-36" collect runoff and convey it to two dry detention basins; Travel Air and Oak Meadows. The two detention ponds are hydraulically connected by a pipe running under a gas pipeline, which separates the two ponds. There is a branch of 12" sewer that originates with an inlet in the Forest Preserve west of Aspen Road and connects to the storm sewer on Aspen Road. City staff reports that runoff from the Forest Preserve floods Aspen Road and the intersection of Central Avenue and Ethel Lane. Our existing conditions XP-SWMM model indicates that flooding occurs for storms with a return frequency greater than 2 years. The primary cause for flooding is limited sewer capacity on Aspen Road, Central Avenue and Ethel Lane.

An additional flooding issue reported by City staff indicates the Travel Air detention pond overtops to the north and flows through the rear yards of Woodside residents to Crestwood Court. Examination of the most recent topographic data indicates a low spot around elevation 692 feet on the north side the Travel Air

detention pond. An analysis using XP-SWMM software indicated the detention pond would not overtop during the 10-year event but would overtop during a 100-year event.

FIGURE 9

Study Area 8

10.2 Proposed Conditions

Two alternatives were analyzed for Area 8. As mentioned previously, both detention ponds' storage capacity would be increased and a berm built for both alternatives. The berm constructed to the north of the Travel Air detention pond would be approximately 50 feet long with a top elevation of 694 feet. This would prevent

overtopping for the 10- and 100-year events under existing conditions; however, because both alternatives propose storm sewer capacity increases, the detention ponds' storage capacity will also need to be increased. Both alternatives propose converting the ponds from dry detention basins to wet detention basins, which would give a combined additional storage capacity of 4.0 acre-feet. Special care would have to be used when executing this work to avoid the gas pipeline separating the two ponds.

Alternate 1 would minimize replacement of existing storm sewer by proposing a diversion ditch along the boundary of the Forest Preserve property to capture and convey flow from the Forest Preserve property (see Exhibit 9). The diversion ditch would be approximately 1,020 feet long, 3 feet deep, have a bottom 5 feet wide and 4H:1V side slopes. The diversion ditch would outlet at Roberts Lane where the existing 8" pipe would be increased to 30". This pipe would convey the diversion ditch flow from Roberts Lane to Edgewood Avenue where the existing 18" pipe would also be increased to 30". The proposed 30" pipe improvements would end at the existing 36" pipe that discharges to the Travel Air detention pond.

Alternate 2 would not require coordination with the Forest Preserve, but would require extensive reconstruction of existing storm sewers, as well as adding inlet capacity. Existing 12" to 24" pipe from Aspen Road to and along Edgewood Avenue would have to be replaced with 24" and 30" pipe. The proposed pipe replacement would terminate at the existing 36" pipe that discharges to the Travel Air detention pond.

Both alternatives would completely eliminate the 10-year road flooding on Aspen Road (1.2 feet) and at the Ethel Lane/Central Avenue radius (0.4 ft). While

neither alternative would overtop the Travel Air berm, Alternate 1 reduces the 100-year HWL and Alternate 2 does not. Alternate 1 reduces the 100-year HWL in the Travel Air detention pond from 692.9 to 692.1 because of the additional storage provided by the diversion ditch.

The total cost of these improvements, including design and construction engineering, is estimated to be $1.0 million and $1.4 million for Alternates 1 and 2, respectively. Detailed calculations of these costs are included as Appendices 8 and 9. The cost estimates do not include the cost of acquiring easements for installing proposed improvements on Forest Preserve District property or within the Travel Air detention pond, which is privately owned and maintained.

11. ONE WOOD DALE PLACE (AREA 9)

One Wood Dale Place is shown as Area 9 on Exhibit 1. One Wood Dale Place is a group of apartments situated between Salt Creek on the west and Grove Avenue on the east, and Irving Park Road on the south and the railroad tracks on the north.

All of the apartment buildings are located within the Salt Creek floodplain. The City has considered purchasing these properties through its buy-out program.

12. SOUTH CEDAR AVENUE (AREA 10)

The South Cedar Avenue area is shown as Area 10 on Exhibit 1. The South Cedar Avenue area is located along Cedar Avenue, from south of Spring Oaks Drive to its south terminus. Cedar Avenue is situated between large, wooded parcels to the west and Wood Dale Grove Forest Preserve to the east. Storm sewers along Cedar Avenue drain from each direction and then outlet east to the Forest Preserve District between 261 and 267 Cedar Avenue.

12.1 Existing Conditions

The Cedar Avenue storm sewer system begins at 301 South Cedar Avenue with a 6" pipe which connects to a 12" sewer flowing north. This pipe increases in size to 15" before joining with the branch from the north and discharging to the Forest Preserve through a 22" x 34" elliptical pipe. The branch from the north begins with an 8" pipe at a cul-de-sac just north of Murray Drive, which increases in size to 18". This system primarily collects runoff from the properties along Cedar Avenue. At the upstream end of the south branch, there is also a 30" sewer that flows west from a rear yard structure at 301 South Cedar Avenue. It appears the purpose of the 30" pipe is to convey water away from 301, the lowest point in the neighborhood, and also to function as a relief sewer by allowing water to "bubble up" out of the rear yard structure and into the Forest Preserve to the east.

FIGURE 10

Study Area 10

A resident from 304 South Cedar Avenue indicated that there has been flooding from the wooded property to the west ever since he moved into the house in the 1970s. In an attempt to remedy the problem, he excavated a large side yard swale and installed a yard drain system along with some of his immediate neighbors. However, most of the inlets are now covered by sheds. The resident believes the problem may have escalated after a resident near the wooded property dumped concrete on his property; this could have increased the imperviousness of the ground resulting in additional runoff. Finally,

many residents indicated that a few years ago Cedar Avenue was resurfaced and numerous storm inlets were paved over leading to increased street flooding.

According to City staff, 304, 305 and 298 South Cedar Avenue experience excessive side yard flow from the forested property to the west. Runoff from the wooded property to the west flows overland between 298 and 304 South Cedar Avenue to Cedar Avenue. According to our existing conditions XP-SWMM model, the pipes in the south branch of the Cedar Avenue system do not have enough capacity to handle the flows from the wooded area to the west. Also, the 6" and 30" pipes do not adequately convey water away from 301 South Cedar Avenue, resulting in flooding at that property.

327 South Cedar Avenue was also mentioned by the City for Forest Preserve overflow, but the resident reported that the street in front of her house floods up to the top of curb without inundating her home. From survey data, it appears that this location is one of the lower spots in the neighborhood and receives runoff from nearby properties to the west and north.

12.2 Proposed Conditions

The Alternate 1 improvements were based on the 10-year design storm. Street flooding in the southern portion of Cedar Avenue would be eliminated by adding 12" storm sewer pipes and connecting the new pipes to the existing system at 301 Cedar Avenue. The existing 6"pipes at 301 Cedar Avenue heading north would be increased to 12", and the slopes corrected to prevent water from flowing into the home at 301. The pipe on Cedar Avenue just south of the outlet would be increased from 15" to 18". Ample inlet capacity should be added all along the improved pipe segments. With the

improvements, the street inundation would be completely eliminated in all locations (see Exhibit 11). Because the outlet discharges into the forest preserve, it was imperative to assure that the improvements would cause no negative downstream impacts. The improvements for Alternate 1 would increase the Forest Preserve inundation depth by a mere 2.8" and would increase the peak outlet flow by 1.0 cfs.

The improvements for Alternate 2 were based on the 100-year design storm. As with Alternate 1, Alternate 2 would also add 12" pipes to Cedar Avenue's southern unsewered area and connect it to the existing system. The existing system beginning at 301 Cedar Avenue would be increased to 30" pipes which lead to a newly created outlet heading east into the Forest Preserve about 370 feet south of the existing outlet (see Exhibit 12). The additional outlet structure would behave similar to the large pipe and structure at 301 Cedar Avenue that acts as a restrictor and limits the amount of water flowing to the outlet downstream. The two downstream most pipe diameters would be increased from 15" and 32" to 24" and 36". Inlet capacity would be needed along the improved pipe segments. The 100-year alternative would increase the Forest Preserve inundation depth by 1.7" and would increase the flows by 17 cfs.

The total cost of these improvements, including coordination with the Forest Preserve District of DuPage County for Alternate 2, along with design and construction engineering, is estimated to be $162,840 and $417,850 for Alternates 1 and 2, respectively. Detailed calculations of these costs are included as Appendices 10 and 11. The cost estimates do not include the cost of acquiring easements for installing proposed improvements on private property.

For depressed driveways such as of the one at 301 Cedar Avenue, the resident should consider reconstructing the driveway such that it includes a small berm to provide additional flooding protection.

ERA completed a drainage study of the South Cedar Avenue basin for the City in 2010 and identified a number of alternatives. Two of the ERA alternatives contained major components of the two alternatives currently proposed in this study. These include replacing the existing sewer along Cedar Avenue with a larger sewer and constructing a parallel sewer along Cedar Avenue. Two other alternatives proposed in that study involved purchasing private property to construct detention basins. Appendix 15 includes exhibits showing the ERA alternatives.

13. MONTCLARE LANE AND NORTH CEDAR AVENUE (AREA 11)

The Montclare Lane and North Cedar Avenue area is shown as Area 11 on Exhibit 1. The area of interest on Montclare Lane is 121 South Montclare Lane. Storm sewer along Montclare Lane flows south to a larger system at Murray Drive.

The area of interest on North Cedar Avenue is located along Cedar Avenue between Murray Drive and Hiawatha Trail. The nearest storm sewer is located on Cedar Avenue and drains south.

13.1 121 S. Montclare Lane (Area 11-1) Existing Conditions

The Montclare Lane mainline storm sewer system begins just south of Montrose Avenue with an 18" pipe which flows south to a 38" x 24" elliptical pipe at Murray Drive. The elliptical sewer flows east along Murray Drive and then south down South Central Avenue.

The rear yard of 121 South Montclare Lane is the local low area. Based on contour mapping, there is approximately one half acre draining to this location. In an attempt to alleviate the rear yard drainage problem, the resident installed a rear yard trench drain with two sump pits.

FIGURE 11

Study Area 11 – Location 1

According to our existing conditions XP-SWMM model, the storm sewer system along Montclare Lane has excess capacity, but presently there is not a subsurface connection from the rear yard of the subject property to the sewer.

13.2 121 South Montclare Lane (Area 11-1) Proposed Conditions

A 12" storm sewer connection from the rear yard of 121 South Montclare Lane to the Montclare Lane storm sewer was included in the proposed conditions XP-SWMM model. An inlet with a Type 8 Grate should be added at the upstream end of the

proposed sewer to increase inlet capacity in the rear yard. The modeling demonstrates that for the critical duration storm, the flooding problem can essentially be eliminated.

It is recommended that a check valve be installed near the upstream end of the proposed gravity sewer to prevent the storm sewer from back flowing should a surcharge condition occur; however, the homeowner should be advised of potential maintenance concerns associated with check valves. Additionally, the homeowner should continue to maintain the trench drain and sump system to supplement the proposed gravity outlet.

A temporary easement from the owner of the property at 121 South Montclare Lane will be required in order to construct the proposed improvements.

13.3 Road Flooding along North Cedar Avenue (Area 11-2) Existing Conditions

The North Cedar Avenue storm sewer system begins with an 8" pipe at a cul-de-sac just north of Murray Drive which increases in size to 18" before joining with the branch from the south and discharging to the east to a creek in the Forest Preserve via a 22" x 34" elliptical pipe. The tributary area to the North Cedar Avenue sewer includes the homes along Cedar Avenue and Hiawatha Trail; some of the homes along Murray Drive; and a small portion of Forest Preserve east of Cedar Avenue. The total contributing area is roughly 6.5 acres.

FIGURE 12

Study Area 11 – Location 2

A resident described flooding at the intersection of Hiawatha Trail and Cedar Avenue as covering the road over the entire intersection and encroaching on some of the surrounding residential properties. There are no storm sewers along Hiawatha Trail or along Cedar Avenue from Hiawatha Trail to the cul-de-sac just north of Murray Drive. Topographic survey indicates that there is a low spot at the Hiawatha Trail-Cedar Avenue intersection where runoff becomes trapped and ponds.

The profile along Cedar Avenue slopes down towards Murray Drive and then up towards Spring Oaks Drive, creating another low area at the Cedar Avenue-Murray

Drive intersection. According to our existing conditions XP-SWMM model, the pipes in the north branch of the Cedar Avenue system do not have sufficient capacity to handle the flows along Cedar Avenue, resulting in ponding at the Cedar Avenue-Murray Drive intersection. The modeling also indicates that it takes many hours for the intersection to drain down.

13.4 Road Flooding along North Cedar Avenue (Area 11-2) Proposed Conditions

For Alternate 1, the improvements would completely eliminate street flooding at the Hiawatha Trail and Murray Drive intersections with Cedar Avenue for the 10-year storm event. A 12" storm sewer and increased inlet capacity would be needed in the northern unsewered area of Cedar Avenue beginning at Hiawatha Trail to prevent water from inundating the Hiawatha Trail intersection. The proposed pipes would be connected to the existing system which would be increased from 15" to 24", along with an increase in inlet capacity (see Exhibit 12). The Forest Preserve inundation depth would be increased by 1.7", and the peak outlet flow increased by 7 cfs.

Alternate 2 would also require the addition of 12" storm pipes in Cedar Avenue's northern area. Instead of connecting to the existing system farther south on Cedar Avenue, the proposed pipes would connect northward to Montclare Lane. Because the existing Montclare Lane system flows at almost maximum capacity during the 10-year design storm, the downstream pipes would be increased to accommodate the additional flow from Cedar Avenue. All pipes along Montclare Lane east of Cedar Avenue would be increased from 12-24" to 24-36" (see Exhibit 13). Pipes south of the unsewered area on Cedar Avenue would be increased from 8"-18" to 12"-36" with the downstream most Cedar Avenue pipe proposed as an 18" restrictor. Inlet capacity would be needed all

along the proposed improvements. The inundation depth at the Forest Preserve would be decreased by 1.6" inches and the outlet flow would be increased by 6 cfs.

As in Alternates 1 and 2, Alternate 3 would also have 12" pipes in the unsewered region beginning at Hiawatha Trail. All existing downstream pipes would be increased significantly up to 60" (see Exhibit 14). The large downstream pipes would provide stormwater detention within the system, and a 12" restrictor pipe before the outlet would essentially match the peak flow into the Forest Preserve.

The total cost of these improvements, including coordination with the Forest Preserve District of DuPage County (for Alternate 2), along with design and construction engineering, is estimated to be $530,196, $1.6 million and $819,292 for Alternates 1, 2 and 3, respectively. Detailed calculations of these costs are included as Appendices 12, 13 and 14. The cost estimates do not include the cost of acquiring easements for installing proposed improvements on private property.

14. TALL OAKS (AREA 12)

Tall Oaks is shown as Area 12 on Exhibit 1. The Tall Oaks area extends from Cedar Avenue on the west to Central Avenue on the east, and from Sunnyside Avenue on the south to the railroad tracks on the north.

The intersection of Windsor Avenue and Catalpa Avenue floods during extreme storm events. A separate engineering study was performed in this area by URS in 2009 which identified the causes of the flooding. Baxter & Woodman also evaluated this area in 2011 and reached the same conclusion as URS, with respect to the cause of the flooding. The existing HWL of the detention basin located northeast of the Catalpa Avenue and Potter Street intersection is 0.6 ft higher than the design HWL. Additionally, the underdrain in the basin was found to be clogged with sediment.

15. ROYAL OAKS (AREA 13)

Royal Oaks is shown as Area 13 on Exhibit 1. The Royal Oaks area extends from the west ends of Knollwood Drive and Sherwood Drive on the west to Route 83 on the east, and from north of Deerpath Road on the south to just south of Hiawatha Trail on the north.

During larger storm events, the retention pond encroaches onto adjacent properties and takes a long time to drain down. A separate engineering project is underway which includes converting the streets within the subdivision from a rural cross section to an urban cross section with curb and gutter. As part of that project, the retention basin is being analyzed to determine what improvements may be made.

16. CONCLUSIONS AND RECOMMENDATIONS

Baxter & Woodman was retained by the City of Wood Dale to evaluate known areas of flooding and inadequate drainage in order to develop a prioritized list of recommended solutions. Within six designated Study Areas, multiple alternatives were modeled in order to reduce surface flooding in the problem areas to an acceptable level and below all known low entry elevations for the design storm event. The specific reasons for selecting the recommended alternative in each Study Area are noted below.

- Area 1 – Westside Tributary/Georgetown Area – The most promising alternative for this Study Area is Alternative 1, which would include a large detention basin within the ComEd right-of-way. This alternative would minimize the necessary improvements on private residential properties (along Squaw Creek) compared to Alternative 2 and may be more cost effective than Alternative 3. The Alternative 1 concept plan has been submitted to ComEd for review and consideration. In case ComEd will not allow the proposed detention basin within their right-of-way, or in case the cost of obtaining the necessary easement from ComEd would be more expensive than the incremental cost of Alternative 3, we recommend that the City plan to implement Alternative 3. Alternative 2 is not recommended based on the level of improvements that would be necessary on private residential properties. Coordination with ComEd is ongoing and our recommendation for Area 1 will be updated, if necessary, pending the outcome of our coordination with ComEd.

- Area 5 – Woodside and Route 83/Oak Meadows Drive – Alternate 1 (10-Year Improvements) is recommended over Alternate 2 (100-Year Improvements) based on the probable cost of the improvements. The probable cost of implementing Alternative 2 is more than four times the probable cost of Alternate 1. While the number of properties that would benefit from Alternate 2 would also be greater, this incremental benefit does not outweigh the incremental cost. Furthermore, selecting Alternate 1 is consistent with the (10-year) design standard adopted by nearly all northeast Illinois municipalities for storm sewer systems.

- Area 6 - Central Avenue/Beinoris Drive/Creel Drive – Alternate 2 (Online Detention) is recommended over Alternate 1 (Conveyance

Improvements) for two important reasons: Alternate 2 would maintain the existing peak discharge rate from Area 6 to the downstream storm sewer system; and the probable cost of Alternate 2 is nearly half the probable cost of Alternate 1.

- Area 8 - Central Avenue/Ethel Lane/Aspen Road – Alternate 1 (Diversion Ditch) would be recommended over Alternate 2 (Central/Ethel Storm Sewer) based on probable cost, except that preliminary coordination with the Forest Preserve District revealed that the District is not likely to grant the City an easement for the diversion ditch necessary to implement Alternate 1. The minutes from our January 4, 2013 meeting with the District (Appendix 16) describe the process for, and the conditions under which the easement could be granted. For budgeting purposes, the City should plan to implement Alternate 2; however, based on the potential cost savings offered by Alternate 1, the City should accept the District staff's offer to determine whether or not the diversion ditch could be constructed without disturbing any desirable trees. This could be done prior to initiating detailed design of the Area 8 improvements. If it can, it may be worthwhile for the City to formally request an easement from the District Board of Commissioners, considering that the City's drainage problems in this area are the result of runoff from District land.

- Area 10 - South Cedar Avenue – Alternate 1 (10-Year Improvements) is recommended over Alternate 2 (100-Year Improvements) for two important reasons: preliminary coordination with the Forest Preserve District revealed that the District is amenable to Alternate 1, but is opposed to Alternate 2; and the probable cost of Alternate 2 is more than twice the probable cost of Alternate 1 without any additional properties benefitting from Alternate 2. Furthermore, selecting Alternate 1 would be consistent with the (10-year) design standard adopted by nearly all northeast Illinois municipalities for their storm sewer systems. Prior to this Study, ERA completed a study of South Cedar Avenue. The recommendations from that study are included as Appendix 15. Six alternatives were analyzed with varying levels of protection (25- to 100-year improvements); however, we believe that the 10-year improvements proposed in Alternate 1 of this Study are the most cost-effective approach. The minutes from our January 4, 2013 meeting with the District (Appendix 16) describe several requests that the District has for the City regarding detailed design of the recommended improvements.

- Area 11 - Montclare Lane and North Cedar Avenue - Alternate 1 (South Outlet) is recommended over Alternates 2 (North and South Outlet) and 3 (South Outlet for Online Detention) for three reasons: all three alternates provide a similar level of protection; the probable cost of Alternate 1 is

lower than the probable cost of the other alternates; and preliminary coordination with the Forest Preserve District revealed that the District is amendable to Alternate 1. It should be noted that Alternate 2 would benefit a greater number of properties than Alternates 1 and 3, but this incremental benefit does not outweigh the incremental cost. The minutes from our January 4, 2013 meeting with the District (Appendix 16) describe several requests that the District has for the City regarding detailed design of the recommended improvements.

A priority ranking was determined for each of the recommended improvements considering the number of properties that would benefit from the improvements, the cost of the improvements and the timing of other planned capital improvements in the vicinity of the recommended improvements. When considering the properties that would benefit from the improvements, properties known to experience structural flooding were given the most weight. Properties that would experience yard flooding were assigned less weight, while properties that would only be affected by traffic flow due to road closures received the least weight. Planned water main and road improvements along Cedar Avenue (Areas 10 and 11) in FY2014 and street resurfacing planned for Crestwood Road (Area 5), Spruce Road (Area 5), and Aspen Road (Area 8) in FY2016 were factored into the priority rankings shown in Table 1.

TABLE 1

Recommended Priority by Study Area

Priority	Study Area	Cost (Millions)
1	Area 10 - South Cedar Avenue - Alternate 1	$0.2
2	Area 11 - Montclare Lane and North Cedar Ave. - Alternate 1	$0.5
3	Area 5 - Woodside and Route 83/Oak Meadows Drive - Alt 1	$0.2
4	Area 8 - Central Avenue/Ethel Lane/Aspen Road - Alternate 2	$1.4
5	Area 1 - Westside Tributary/Georgetown Area - Alternate 3	
5.a	Location 1-5 - Gilbert Drive and Forest Preserve Drive	$0.4
5.b	Location 1-4 - Park Lane	$2.8
5.c	Location 1-3 - Miller Ln Apartments and 336 Dalewood Ave	$0.1
5.d	Location 1-2 - Potter Street and Prospect Ave Intersection	$0.3
6	Area 6 - Central Avenue/Beinoris Drive/Creel Drive - Alt 2	$1.9
	Total =	$7.8

The engineer's opinion of probable cost for potential improvements presented in this Study includes the cost of sanitary sewer and water service relocation or adjustment, trench backfill, pavement or lawn restoration, traffic control, erosion control, construction layout and mobilization. It does not include the cost of right-of-way acquisition, temporary or permanent easements, or relocating utilities other than sanitary sewer and water service lines.

City of Wood Dale

Appendix 1 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 1 - Alternate 1

Area 1-2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
24" RCP Storm Sewer	Residential Street	0 - 5	450	Foot	$ 240	$ 108,000
30" RCP Storm Sewer	Side Yard	5 - 8	190	Foot	$ 265	$ 50,350
5' manhole	Residential Street	0 - 5	3	Each	$ 5,000	$ 15,000
6' manhole	Residential Street	0 - 5	1	Each	$ 6,000	$ 6,000
6' manhole	Side Yard	5 - 8	1	Each	$ 7,000	$ 7,000
High Capacity Inlets	Residential Street	N/A	2	Each	$ 3,250	$ 6,500
30" FES	Side Yard	0 - 5	1	Each	$ 1,980	$ 1,980
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 219,830

Area 1-3

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
36" RCP Storm Sewer	ComEd ROW	5 - 8	65	Foot	$ 330	$ 21,450
30"x44" RCP Storm Sewer	ComEd ROW	8 - 12	85	Foot	$ 650	$ 55,250
38"x60" RCP Storm Sewer	Residential Street	0 - 5	85	Foot	$ 650	$ 55,250
38"x60" RCP Storm Sewer	Residential Street	0 - 5	175	Foot	$ 650	$ 113,750
38"x60" RCP Storm Sewer	Residential Street	8 - 12	20	Foot	$ 650	$ 13,000
54" RCP Storm Sewer	Residential Street	8 - 12	245	Foot	$ 550	$ 134,750
8' Diameter Manhole	ComEd ROW	5 - 8	1	Each	$ 9,750	$ 9,750
8' Diameter Manhole	Residential Street	5 - 8	2	Each	$ 9,750	$ 19,500
8' Diameter Manhole	Residential Street	8 - 12	2	Each	$ 11,250	$ 22,500
Construct Detention Pond			3.73	Ac-ft	$ 48,000	$ 179,040
36" FES	ComEd Detention	0 - 5	3	Each	$ 2,310	$ 6,930
Dredge channel	N/A	N/A	74.1	CY	$ 30	$ 2,222
Remove 44”x66” CMP	N/A	N/A	105	Foot	$ 250	$ 26,250
Connect to Existing	N/A	N/A	3	Lump Sum	$ 25,000	$ 75,000
				Location Construction Subtotal=		$ 734,642

Area 1-4

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
18" RCP Storm Sewer	Residential Street	0 - 5	180	Foot	$ 220	$ 39,600
24" RCP Storm Sewer	Residential Street	5 - 8	330	Foot	$ 265	$ 87,450
5' manhole	Residential Street	0 - 5	2	Each	$ 5,750	$ 11,500
5' manhole	Residential Street	5 - 8	3	Each	$ 5,750	$ 17,250
Inlet	Residential Street	0 - 5	2	Each	$ 1,000	$ 2,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 182,800

Area 1-5

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
24" RCP Storm Sewer	Residential Street	0 - 5	175	Foot	$ 240	$ 42,000
36" RCP Storm Sewer	Residential Street	5 - 8	350	Foot	$ 330	$ 115,500
48" RCP Storm Sewer	Residential Street	8 - 12	660	Foot	$ 480	$ 316,800
5' Diameter Manhole	Residential Street	8 -12	2	Each	$ 6,500	$ 13,000
7' Diameter Manhole	Residential Street	5 - 8	2	Each	$ 8,250	$ 16,500
8' Diameter Manhole	Residential Street	5 - 8	4	Each	$ 9,500	$ 38,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 566,800

Construction Subtotal		$ 1,704,072
Construction Contingency	20%	$ 340,814
Construction Total		$ 2,044,887
Design Engineering	7.5%	$ 153,367
Construction Observation	7.5%	$ 153,367
Project Total		**$ 2,351,620**

Notes

1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 2 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 1 - Alternate 2

Area 1-2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
24" RCP Storm Sewer	Residential Street	0 - 5	450	Foot	$ 240	$ 108,000
30" RCP Storm Sewer	Side Yard	5 - 8	190	Foot	$ 265	$ 50,350
5' Diameter Manhole	Residential Street	0 - 5	3	Each	$ 5,000	$ 15,000
6' Diameter Manhole	Residential Street	0 - 5	1	Each	$ 6,000	$ 6,000
6' Diameter Manhole	Side Yard	5 - 8	1	Each	$ 7,000	$ 7,000
High Capacity Inlets	Residential Street	N/A	2	Each	$ 3,250	$ 6,500
30" FES	Side Yard	0 - 5	1	Each	$ 1,980	$ 1,980
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 219,830

Area 1-3

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
38"x60" RCP Storm Sewer	Residential Street	0 - 5	175	Foot	$ 650	$ 113,750
38"x60" RCP Storm Sewer	Comed ROW	5 - 8	180	Foot	$ 750	$ 135,000
38"x60" RCP Storm Sewer	Residential Street	8 - 12	20	Foot	$ 650	$ 13,000
54" RCP Storm Sewer	Residential Street	8 - 12	245	Foot	$ 550	$ 134,750
4'x8' RCP Box Culvert	Residential Street	0 - 5	75	Foot	$ 1,000	$ 75,000
8' Diameter Manhole	Residential Street	8 - 12	3	Each	$ 11,000	$ 33,000
Remove Weir	N/A	N/A	1	Lump Sum	$ 6,000	$ 6,000
Remove 44"x66" CMP	N/A	N/A	105	Foot	$ 250	$ 26,250
Clear Natural Channel	N/A	N/A	675	Foot	$ 75	$ 50,625
Dredge Channel	N/A	N/A	193	CY	$ 30	$ 5,790
Connect to Existing	N/A	N/A	3	Lump Sum	$ 25,000	$ 75,000
				Location Construction Subtotal=		$ 668,165

Area 1-4

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
18" RCP Storm Sewer	Residential Street	0 - 5	180	Foot	$ 220	$ 39,600
24" RCP Storm Sewer	Residential Street	5 - 8	330	Foot	$ 265	$ 87,450
5' Diameter Manhole	Residential Street	0 - 5	2	Each	$ 5,000	$ 10,000
5' Diameter Manhole	Residential Street	5 - 8	3	Each	$ 5,750	$ 17,250
Inlet	Residential Street	0 - 5	2	Each	$ 1,000	$ 2,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 181,300

Area 1-5

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
24" RCP Storm Sewer	Residential Street	0 - 5	240	Foot	$ 250	$ 60,000
36" RCP Storm Sewer	Residential Street	5 - 8	330	Foot	$ 330	$ 108,900
48" RCP Storm Sewer	Residential Street	8 - 12	480	Foot	$ 480	$ 230,400
5' Diameter Manhole	Residential Street	8 -12	2	Each	$ 6,500	$ 13,000
7' Diameter Manhole	Residential Street	5 - 8	2	Each	$ 8,250	$ 16,500
8' Diameter Manhole	Residential Street	5 - 8	4	Each	$ 9,500	$ 38,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 491,800

Construction Subtotal		$ 1,561,095
Construction Contingency	20%	$ 312,219
Construction Total		$ 1,873,314
Design Engineering	7.5%	$ 140,499
Construction Observation	7.5%	$ 140,499
Project Total		**$ 2,154,311**

Notes

1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 3 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 1 - Alternate 3

Area 1-2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
30" RCP Storm Sewer	Side Yard	5 - 8	190	Foot	$ 295	$ 56,050
24" RCP Storm Sewer	Residential Street	0 - 5	450	Foot	$ 220	$ 99,000
5' Diameter Manhole	Residential Street	0 - 5	3	Each	$ 5,000	$ 15,000
6' Diameter Manhole	Residential Street	0 - 5	1	Each	$ 6,000	$ 6,000
6' Diameter Manhole	Side Yard	5 - 8	1	Each	$ 7,000	$ 7,000
High Capacity Inlets	Residential Street	N/A	2	Each	$ 3,250	$ 6,500
30" FES	Side Yard	0 - 5	1	Each	$ 1,980	$ 1,980
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 216,530

Area 1-3

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
18" RCP Storm Sewer	Residential Street	0 - 5	105	Foot	$ 220	$ 23,100
Inlets	Residential Street	N/A	2	Each	$ 1,000	$ 2,000
Remove 44”x66” CMP	N/A	N/A	105	Foot	$ 250	$ 26,250
Dredge Channel	N/A	N/A	74.1	CY	$ 30	$ 2,222
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 78,572

Area 1-4

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
36" RCP Storm Sewer	Residential Street	5 - 8	640	Foot	$ 330	$ 211,200
36" RCP Storm Sewer	Residential Street	8 - 12	1245	Foot	$ 370	$ 460,650
36" RCP Storm Sewer	Side Yard	8 - 12	1545	Foot	$ 340	$ 525,300
42" RCP Storm Sewer	Residential Street	5 - 8	240	Foot	$ 375	$ 90,000
48" RCP Storm Sewer	Residential Street	5 - 8	410	Foot	$ 430	$ 176,300
7' Diameter Manhole	Residential Street	5 - 8	7	Each	$ 8,250	$ 57,750
7' Diameter Manhole	Residential Street	8 - 12	10	Each	$ 9,500	$ 95,000
8' Diameter Manhole	Residential Street	5 - 8	4	Each	$ 9,500	$ 38,000
Directional Boring	Side Yard	8 - 12	145	Foot	$ 2,000	$ 290,000
Connect to Existing	N/A	N/A	2	Lump Sum	$ 25,000	$ 50,000
				Location Construction Subtotal=		$ 1,994,200

Area 1-5

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
24" RCP Storm Sewer	Residential Street	0 - 5	175	Foot	$ 240	$ 42,000
24" RCP Storm Sewer	Residential Street	5 - 8	45	Foot	$ 265	$ 11,925
42" RCP Storm Sewer	Residential Street	5 - 8	30	Foot	$ 375	$ 11,250
42" RCP Storm Sewer	Residential Street	8 -12	390	Foot	$ 420	$ 163,800
5' manhole	Residential Street	8 -12	2	Each	$ 6,500	$ 13,000
7' manhole	Residential Street	5 - 8	2	Each	$ 8,250	$ 16,500
8' manhole	Residential Street	5 - 8	1	Each	$ 9,500	$ 9,500
8' manhole	Residential Street	8 -12	2	Each	$ 11,000	$ 22,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
				Location Construction Subtotal=		$ 314,975

Construction Subtotal		$ 2,604,277
Construction Contingency	20%	$ 520,855
Construction Total		$ 3,125,133
Design Engineering	7.5%	$ 234,385
Construction Observation	7.5%	$ 234,385
Project Total		**$ 3,593,903**

Notes

1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 4 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 5 - Alternate 1

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Street	0 - 5	255	Foot	$ 200	$ 51,000
18" RCP Storm Sewer	Residential Street	0 - 5	165	Foot	$ 225	$ 37,125
4' Diameter Manhole	Residential Street	0- 5	3	Each	$ 4,000	$ 12,000
Inlet	N/A	N/A	16	Each	$ 1,000	$ 16,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000

Construction Subtotal		$ 141,125
Construction Contingency	20%	$ 28,225
Construction Total		$ 169,350
Design Engineering	7.5%	$ 12,701
Construction Observation	7.5%	$ 12,701
Project Total		**$ 194,753**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 5 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 5 - Alternate 2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Street	0 - 5	90	Foot	$ 200	$ 18,000
18" RCP Storm Sewer	Side Yard	0 - 5	163	Foot	$ 200	$ 32,600
18" RCP Storm Sewer	Residential Street	0 - 5	490	Foot	$ 220	$ 107,800
24" RCP Storm Sewer	Residential Street	0 - 5	480	Foot	$ 240	$ 115,200
24" RCP Storm Sewer	Residential Street	5 - 8	765	Foot	$ 265	$ 202,725
4' Diameter Manhole	Residential Street	0 - 5	1	Each	$ 4,000	$ 4,000
5' Diamter Manhole	Residential Street	0 - 5	10	Each	$ 5,000	$ 50,000
5' Diamter Manhole	Residential Street	5 - 8	4	Each	$ 5,750	$ 23,000
Inlet	N/A	N/A	27	Each	$ 1,000	$ 27,000
High Capacity Inlet	N/A	0 - 5	4	Each	$ 3,250	$ 13,000
24" FES	Back Yard	N/A	2	Each	$ 1,898	$ 3,796
18" FES	Side Yard	N/A	2	Each	$ 1,650	$ 3,300
Lower Pond Outlet	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000

Construction Subtotal		$ 650,421
Construction Contingency	20%	$ 130,084
Construction Total		$ 780,505
Design Engineering	7.5%	$ 58,538
Construction Observation	7.5%	$ 58,538
Project Total		**$ 897,581**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

BAXTER & WOODMAN Consulting Engineers

City of Wood Dale

Appendix 6 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 6 - Alternate 1

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Street	0 - 5	87	Foot	$ 275	$ 23,925
18" RCP Storm Sewer	Downtown Street	0 - 5	110	Foot	$ 295	$ 32,450
24" RCP Storm Sewer	Downtown Street	0 - 5	97	Foot	$ 320	$ 31,040
24" RCP Storm Sewer	Downtown Street	5 - 8	577	Foot	$ 350	$ 201,950
27" RCP Storm Sewer	Downtown Street	5 - 8	185	Foot	$ 385	$ 71,225
30" RCP Storm Sewer	Downtown Street	0 - 5	522	Foot	$ 350	$ 182,700
30" RCP Storm Sewer	Downtown Street	5 - 8	364	Foot	$ 385	$ 140,140
36" RCP Storm Sewer	Downtown Street	5 - 8	377	Foot	$ 425	$ 160,225
42" RCP Storm Sewer	Downtown Street	5 - 8	411	Foot	$ 475	$ 195,225
48" RCP Storm Sewer	Downtown Street	5 - 8	2052	Foot	$ 535	$ 1,097,820
5' Diameter Manhole	Downtown Street	0 - 5	4	Each	$ 6,250	$ 25,000
5' Diameter Manhole	Downtown Street	5 - 8	8	Each	$ 7,000	$ 56,000
6' Diameter Manhole	Downtown Street	0 - 5	4	Each	$ 7,500	$ 30,000
6' Diameter Manhole	Downtown Street	5 - 8	1	Each	$ 8,500	$ 8,500
7' Diameter Manhole	Downtown Street	5 - 8	3	Each	$ 9,750	$ 29,250
8' Diameter Manhole	Downtown Street	5 - 8	6	Each	$ 11,500	$ 69,000
Inlet	N/A	N/A	77	Each	$ 1,250	$ 96,250
Connect to Existing	N/A	N/A	1	Lump Sum	$ 10,000	$ 10,000

Construction Subtotal		$ 2,460,700
Construction Contingency	20%	$ 492,140
Construction Total		$ 2,952,840
Design Engineering	7.5%	$ 221,463
Construction Observation	7.5%	$ 221,463
Project Total		**$ 3,395,766**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other
3. Prices are current for 2012.

City of Wood Dale

Appendix 7 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 6 - Alternate 2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Downtown Street	0 - 5	87	Foot	$ 275	$ 23,925
24" RCP Storm Sewer	Downtown Street	0 - 5	633	Foot	$ 350	$ 221,550
24" RCP Storm Sewer	Downtown Street	5 - 8	633	Foot	$ 385	$ 243,705
36" RCP Storm Sewer	Downtown Street	0 - 5	46	Foot	$ 385	$ 17,710
36" RCP Storm Sewer	Downtown Street	5 - 8	29	Foot	$ 425	$ 12,325
48" RCP Storm Sewer	Downtown Street	5 - 8	312	Foot	$ 535	$ 166,920
60" RCP Storm Sewer	Downtown Street	5 - 8	618	Foot	$ 630	$ 389,340
5' Diameter Manhole	Downtown Street	0 - 5	9	Each	$ 6,250	$ 56,250
5' Diameter Manhole	Downtown Street	5 - 8	9	Each	$ 7,000	$ 63,000
7' Diameter Manhole	Downtown Street	0 - 5	1	Each	$ 8,500	$ 8,500
7' Diameter Manhole	Downtown Street	5 - 8	1	Each	$ 9,750	$ 9,750
8' Diameter Manhole	Downtown Street	5 - 8	8	Each	$ 11,500	$ 92,000
Inlet	N/A	N/A	60	Each	$ 1,250	$ 75,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 10,000	$ 10,000

Construction Subtotal		$ 1,389,975
Construction Contingency	20%	$ 277,995
Construction Total		$ 1,667,970
Design Engineering	7.5%	$ 125,098
Construction Observation	7.5%	$ 125,098
Project Total		**$ 1,918,166**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 8 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 8 - Alternate 1

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
30" RCP Storm Sewer	Residential Street	0 - 5	680	Foot	$ 265	$ 180,200
7' Diameter Manhole	Residential Street	5 - 8	4	Each	$ 8,250	$ 33,000
High Capacity Inlet	Side Yard	N/A	1	Each	$ 3,250	$ 3,250
Excavate Channel	Forest Preserve	3	1926	CY	$ 30	$ 57,780
Detention Pond Increase	N/A	N/A	8.9	Ac-ft	$ 48,000	$ 427,200
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000

Construction Subtotal		$ 726,430
Construction Contingency	20%	$ 145,286
Construction Total		$ 871,716
Design Engineering	7.5%	$ 65,379
Construction Observation	7.5%	$ 65,379
Project Total		**$ 1,002,473**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating
3. Prices are current for 2012.

City of Wood Dale

Appendix 9 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 8 - Alternate 2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
24" RCP Storm Sewer	Residential Street	5 - 8	871	Foot	$ 265	$ 230,815
30" RCP Storm Sewer	Residential Street	5 - 8	785	Foot	$ 295	$ 231,575
5' Diameter Manhole	Residential Street	5 - 8	9	Each	$ 5,750	$ 51,750
6' Diameter Manhole	Residential Street	5 - 8	6	Each	$ 7,000	$ 42,000
24" FES	Forest Preserve	N/A	1	Each	$ 1,898	$ 1,898
Inlet	Residential Street	N/A	5	Each	$ 1,000	$ 5,000
Wet Bottom Detention	N/A	N/A	8.9	Ac-ft	$ 48,000	$ 427,200
Connect to Existing	N/A	N/A	1	Lump Sum	$ 25,000	$ 25,000

Construction Subtotal		$ 1,015,238
Construction Contingency	20%	$ 203,048
Construction Total		$ 1,218,286
Design Engineering	7.5%	$ 91,371
Construction Observation	7.5%	$ 91,371
Project Total		**$ 1,401,028**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 10 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 10 - Alternate 1

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" Storm Sewer	Residential Street	0 - 5	347	Foot	$ 200	$ 69,400
18" Storm Sewer	Residential Street	0 - 5	80	Foot	$ 220	$ 17,600
4' Diameter Manhole	Residential Street	0 - 5	4	Each	$ 4,000	$ 16,000
5' Diameter Manhole	Residential Street	0 - 5	1	Each	$ 5,000	$ 5,000
Inlet	N/A	N/A	10	Each	$ 1,000	$ 10,000

Construction Subtotal		$ 118,000
Construction Contingency	20%	$ 23,600
Construction Total		$ 141,600
Design Engineering	7.5%	$ 10,620
Construction Observation	7.5%	$ 10,620
Project Total		**$ 162,840**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other
3. Prices are current for 2012.

City of Wood Dale

Appendix 11 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 10 - Alternate 2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
24"	Residential Street	0 - 5	435	Foot	$ 250	$ 108,750
30"	Residential Street	0 - 5	233	Foot	$ 265	$ 61,745
36"	Residential Street	0 - 5	183	Foot	$ 295	$ 53,985
5' Diameter Manhole	Residential Street	0 - 5	9	Each	$ 5,000	$ 45,000
Inlet	N/A	N/A	31	Each	$ 1,000	$ 31,000
36" FES	N/A	N/A	1	Each	$ 2,310	$ 2,310

Construction Subtotal		$ 302,790
Construction Contingency	20%	$ 60,558
Construction Total		$ 363,348
Design Engineering	7.5%	$ 27,251
Construction Observation	7.5%	$ 27,251
Project Total		**$ 417,850**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 12 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 11 - Alternate 1

Area 11-1

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Side Yard	0 - 5	75	Foot	$ 180	$ 13,500
4' Diameter Manhole	Residential Street	0 - 5	1	Each	$ 4,000	$ 4,000
Inlet	N/A	N/A	1	Each	$ 1,000	$ 1,000
					Location Construction Subtotal=	$ 18,500

Area 11-2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Street	0 - 5	350	Foot	$ 200	$ 70,000
18" RCP Storm Sewer	Residential Street	0 - 5	244	Foot	$ 225	$ 54,900
24" RCP Storm Sewer	Residential Street	0 - 5	745	Foot	$ 240	$ 178,800
4' Diameter Manhole	Residential Street	0 - 5	12	Each	$ 4,000	$ 48,000
Inlet	N/A	N/A	14	Each	$ 1,000	$ 14,000
					Location Construction Subtotal=	$ 365,700

Construction Subtotal		$ 384,200
Construction Contingency	20%	$ 76,840
Construction Total		$ 461,040
Design Engineering	7.5%	$ 34,578
Construction Observation	7.5%	$ 34,578
Project Total		**$ 530,196**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 13 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 11 - Alternate 2

Area 11-1

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Side Yard	0 - 5	75	Foot	$ 180	$ 13,500
4' Diameter Manhole	Residential Street	0 - 5	1	Each	$ 4,000	$ 4,000
Inlet	N/A	N/A	1	Each	$ 1,000	$ 1,000
				Location Construction Subtotal=		$ 18,500

Area 11-2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Street	0 - 5	121	Foot	$ 200	$ 24,200
18" RCP Storm Sewer	Residential Street	0 - 5	957	Foot	$ 220	$ 210,540
24" RCP Storm Sewer	Residential Street	0 - 5	599	Foot	$ 240	$ 143,760
24" RCP Storm Sewer	Residential Street	5 - 8	657	Foot	$ 265	$ 174,105
30" RCP Storm Sewer	Residential Street	5 - 8	280	Foot	$ 295	$ 82,600
36" RCP Storm Sewer	Residential Street	0 - 5	858	Foot	$ 295	$ 253,110
36" RCP Storm Sewer	Residential Street	5 - 8	242	Foot	$ 330	$ 79,860
4' Diameter Manhole	Residential Street	0 - 5	3	Each	$ 4,000	$ 12,000
5' Diameter Manhole	Residential Street	0 - 5	8	Each	$ 5,000	$ 40,000
6' Diameter Manhole	Residential Street	5 - 8	3	Each	$ 7,000	$ 21,000
7' Diameter Manhole	Residential Street	0 - 5	3	Each	$ 7,000	$ 21,000
7' Diameter Manhole	Residential Street	5 - 8	5	Each	$ 8,250	$ 41,250
Inlet	N/A	N/A	15	Each	$ 1,000	$ 15,000
Connect to Existing	N/A	N/A	1	Lump Sum	$ 5,000	$ 5,000
				Location Construction Subtotal=		$ 1,123,425

Construction Subtotal		$ 1,141,925
Construction Contingency	20%	$ 228,385
Construction Total		$ 1,370,310
Design Engineering	7.5%	$ 102,773
Construction Observation	7.5%	$ 102,773
Project Total		**$ 1,575,857**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

City of Wood Dale

Appendix 14 - Engineeer's Opinion of Probable Construction Cost
Proposed Improvements for Area 11 - Alternate 3

Area 11-1

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Side Yard	0 - 5	75	Foot	$ 180	$ 13,500
4' Diameter Manhole	Residential Street	0 - 5	1	Each	$ 4,000	$ 4,000
Inlet	N/A	N/A	1	Each	$ 1,000	$ 1,000
				Location Construction Subtotal=		$ 18,500

Area 11-2

Item	Location Type	Depth, feet	Quantity	Unit	Unit Price	Item Cost
12" RCP Storm Sewer	Residential Street	0 - 5	686	Foot	$ 200	$ 137,200
18" RCP Storm Sewer	Residential Street	0 - 5	229	Foot	$ 220	$ 50,380
24" RCP Storm Sewer	Residential Street	0 - 5	197	Foot	$ 240	$ 47,280
48" RCP Storm Sewer	Residential Street	5 - 8	91	Foot	$ 430	$ 39,130
60" RCP Storm Sewer	Residential Street	5 - 8	315	Foot	$ 630	$ 198,450
4' Diameter Manhole	Residential Street	0 - 5	3	Each	$ 4,000	$ 12,000
5' Diameter Manhole	Residential Street	0 - 5	6	Each	$ 5,000	$ 30,000
8' Diameter Manhole	Residential Street	5 - 8	5	Each	$ 9,750	$ 48,750
Inlet	N/A	N/A	12	Each	$ 1,000	$ 12,000
				Location Construction Subtotal=		$ 575,190

Construction Subtotal		$ 593,690
Construction Contingency	20%	$ 118,738
Construction Total		$ 712,428
Design Engineering	7.5%	$ 53,432
Construction Observation	7.5%	$ 53,432
Project Total		**$ 819,292**

Notes
1. Prices include sanitary sewer and water service relocation/adjustment, trench backfill, pavement or lawn restoration, trafffic control, erosion control, construction layout, mobilization and permitting.
2. Prices do not include right-of-way acquisition, temporary or permanent easements, or relocating other utilities.
3. Prices are current for 2012.

Item #6

CITY OF WOOD DALE
ENGINEERING DEPARTMENT

MEMORANDUM

DATE: February 3, 2010

TO: Public Works Committee

FROM: David Graff, City Engineer

RE: South Cedar Avenue Flooding
CIP T-04

Last year the City hired Engineering Resource Associates to study the flooding problems on South Cedar Avenue and recommend possible solutions. The problem areas are described as follows:

1. The residence at 301 S. Cedar Avenue experiences flooding of the lower level when water flows down the driveway into the garage, which is located below the street.

2. The street itself floods deep enough so that traffic can not pass through.

3. A stream of water flows between 304 and 310 South Cedar which encroaches over much of the lawns and brings water close to the houses.

Attached are alternative designs and updated cost estimates for alleviating the flooding. A summary of the different alternatives is shown in the following table:

Alt. No.	Description	Cost	Level of Protection[1]	Comments[2]
1	Construct a detention basin upstream of the flood prone areas	$397,000	25 year	Requires acquisition of property and incorporation into Wood Dale
2	Replace the existing storm sewer on Cedar with a larger one	$355,000	100 year	Would increase flows downstream
3	Construct a drainage swale at 301 S. Cedar	$337,000	50 year	Requires acquisition of property, would increase flows downstream
4	Construct a detention pond at 301 S. Cedar	$471,000	25 year	Requires acquisition of property

5	Construct a new parallel storm sewer on Cedar	$322,000	100 year	Similar to Alt. 2, would increase flows downstream
6	Reconstruct the south end of Cedar at a lower elevation	$312,000	50 year	Would increase flows to the south, flat street could still have localized drainage problems

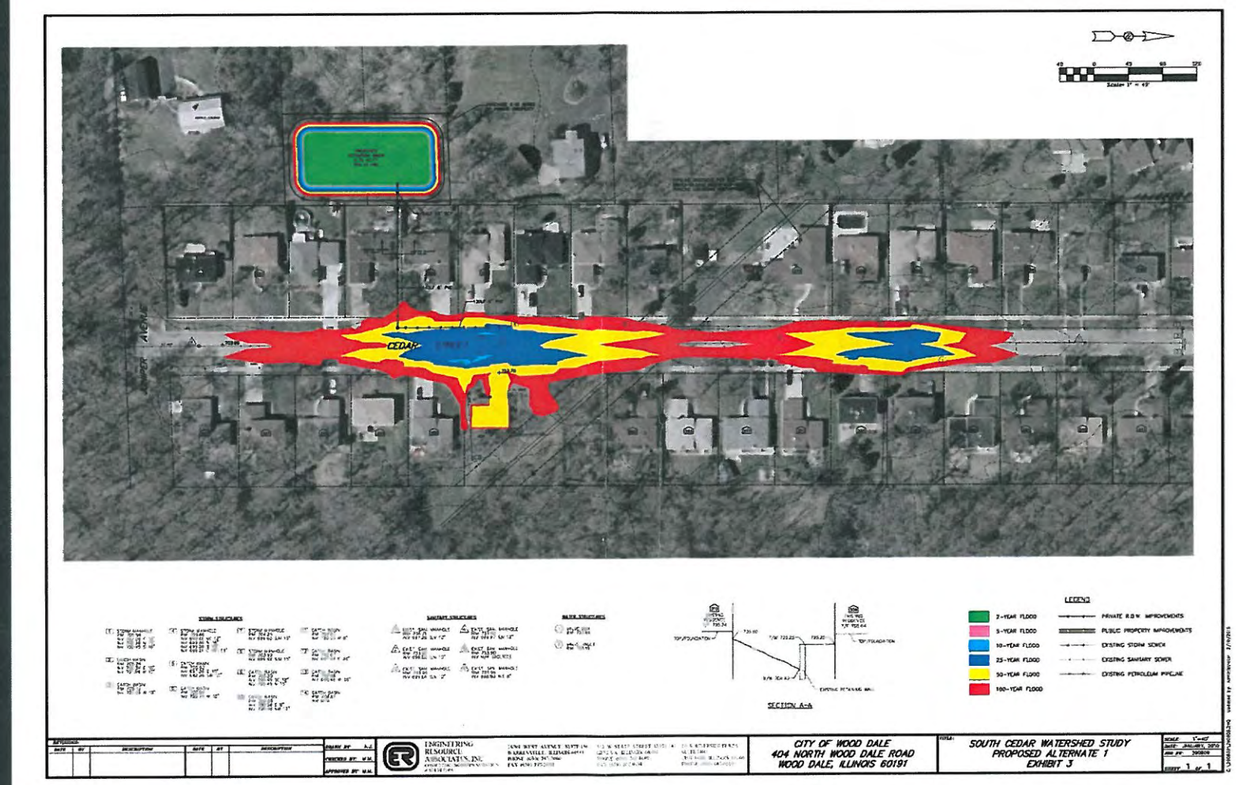
Notes:

1. This is a measure of the protection against flooding for the structure at 301 S. Cedar, expressed as the average recurrence interval between flood events.

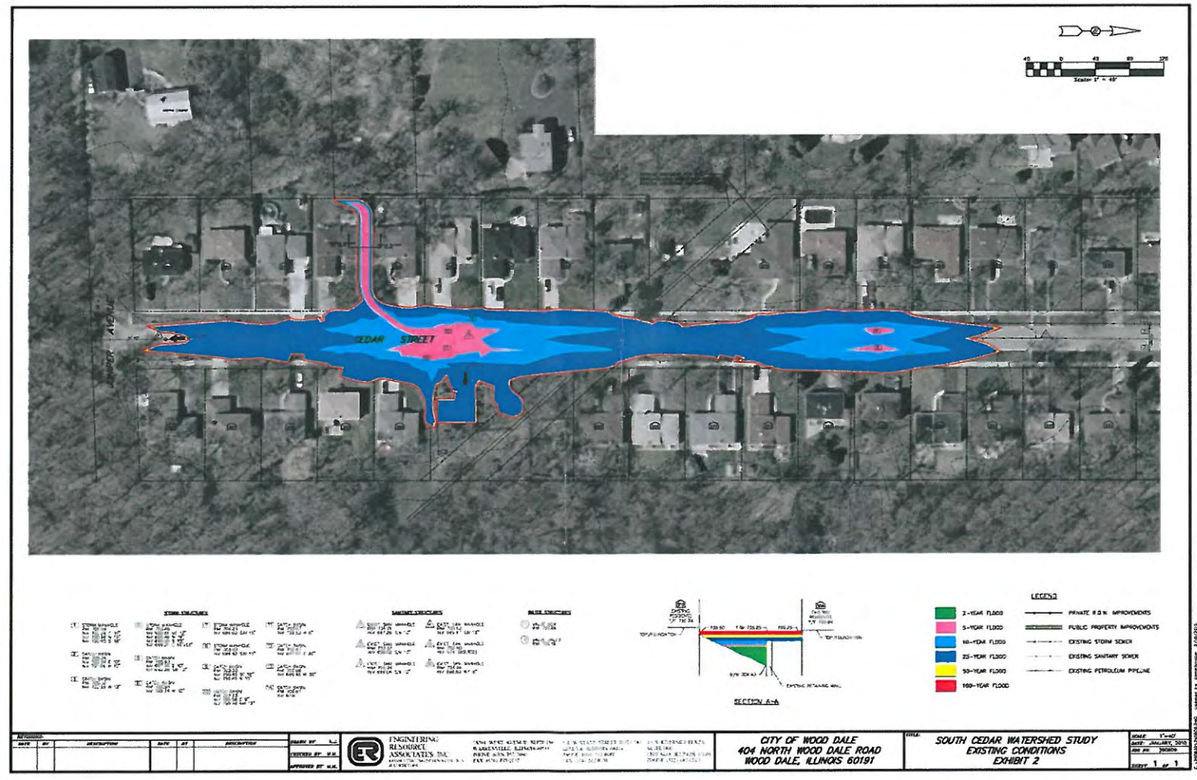
2. The cost estimates for alternatives 3 and 4 assume that the house is re-sold following completion of the improvements.

A representative from Engineering Resource Associates will be at the committee meeting of February 11, 2010 to discuss the improvement alternatives and answer questions.

South Cedar

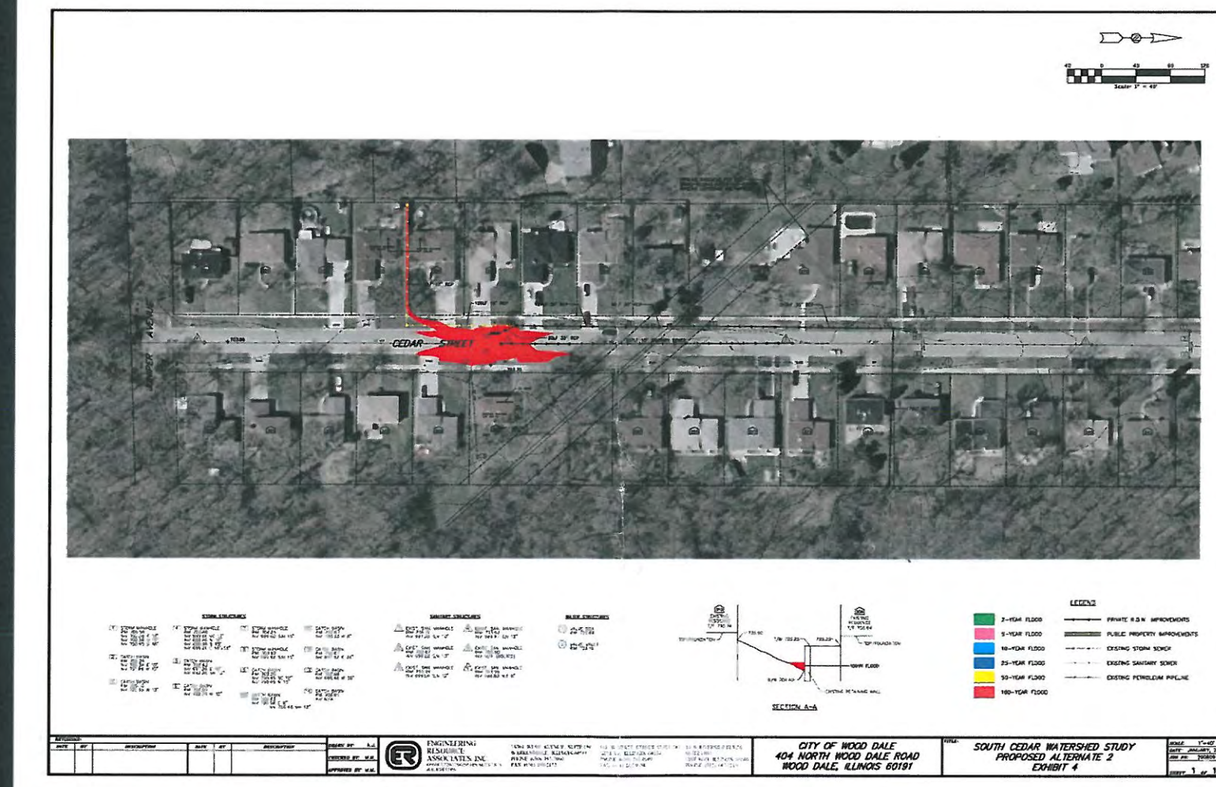

CEDAR
CITY OF WOOD DALE
404 NORTH WOOD DALE ROAD
WOOD DALE, ILLINOIS 60191
SOUTH CEDAR WATERSHED STUDY
PROPOSED ALTERNATE 1
EXHIBIT 3
ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

South Cedar



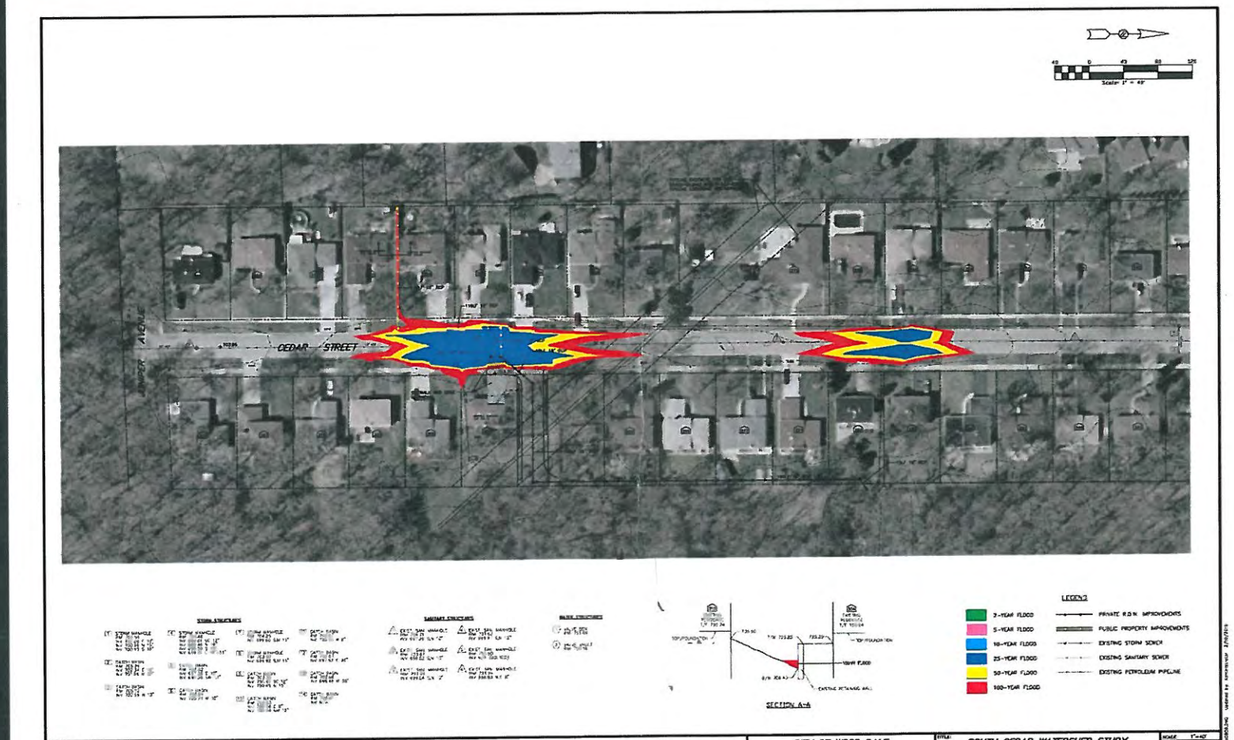
ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

South Cedar

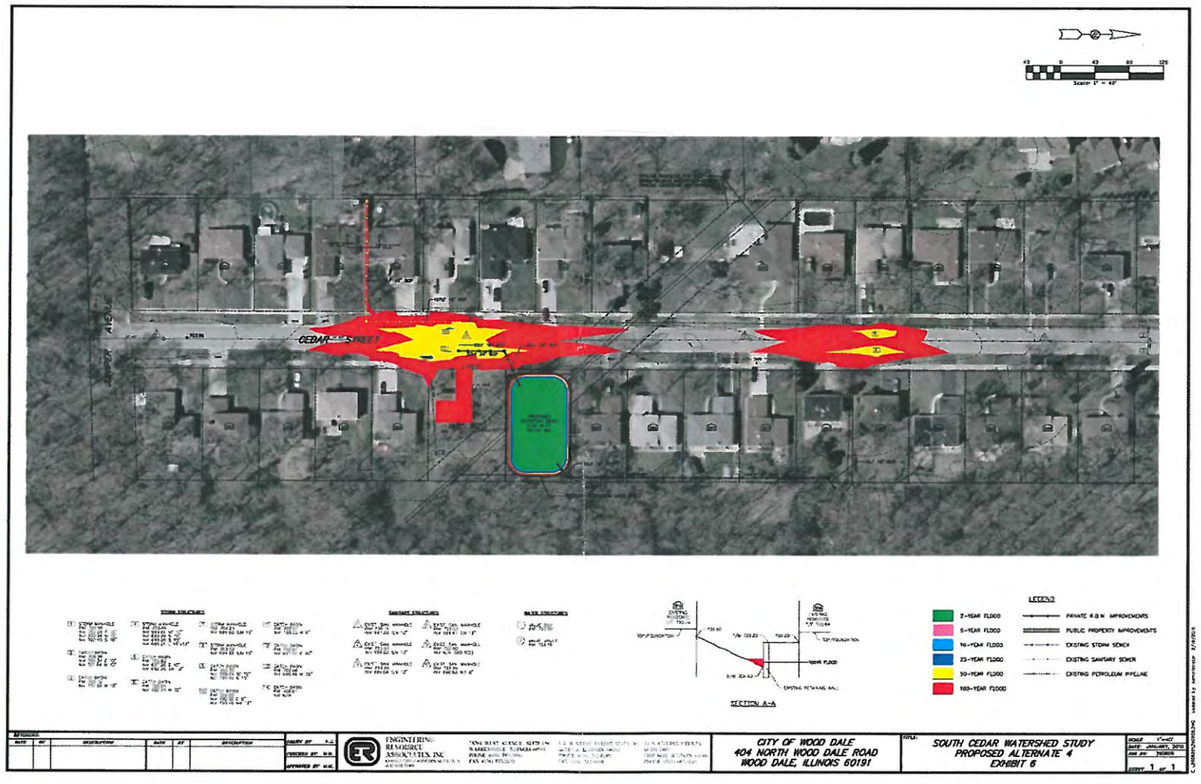


ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

South Cedar


CEDAR STREET
CITY OF WOOD DALE
404 NORTH WOOD DALE ROAD
WOOD DALE, ILLINOIS 60191
SOUTH CEDAR WATERSHED STUDY
PROPOSED ALTERNATE 3
EXHIBIT 5
ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

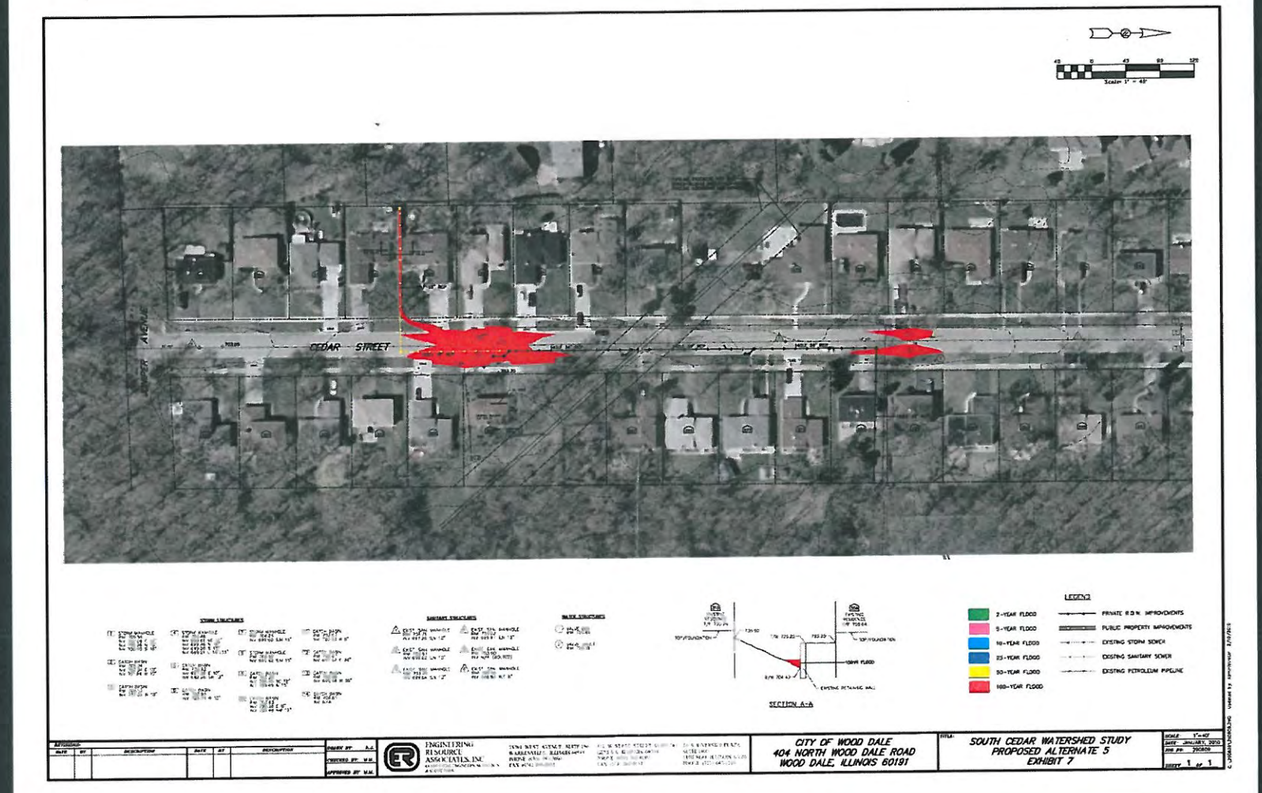
South Cedar



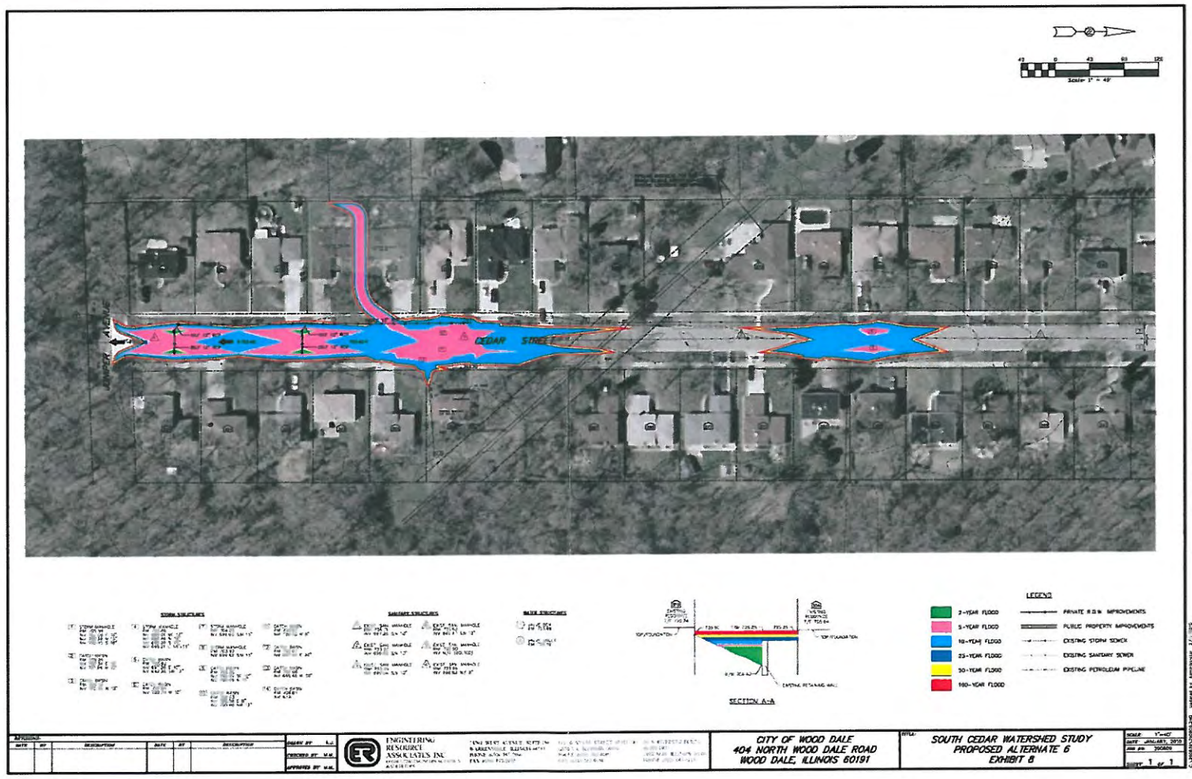
WOOD DALE ESR 1928 ILLINOIS

ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

South Cedar


CEDAR STREET
CITY OF WOOD DALE
404 NORTH WOOD DALE ROAD
WOOD DALE, ILLINOIS 60191
SOUTH CEDAR WATERSHED STUDY
PROPOSED ALTERNATE 5
EXHIBIT 7
ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

South Cedar



ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

BAXTER WOODMAN Consulting Engineers

MEETING MINUTES
WOOD DALE CONCEPTUAL DRAINAGE IMPROVEMENTS

DATE:	January 4, 2013, 1:00pm
LOCATION:	Forest Preserve District of DuPage County, Wheaton
LOCAL AGENCY:	City of Wood Dale
PROJECT:	Citywide Drainage and Flood Improvements Study
ATTENDEES:	Forest Preserve District: Brock Lovelace
	Baxter & Woodman: Mark Phipps

1. Project Background

The City of Wood Dale is nearing completion of the Citywide Drainage and Flood Improvements Study. Concept level plans have been developed showing potential drainage improvements for each study area. Many of the concept plans would not affect the Forest Preserve District; however, three of the study areas are adjacent to a property owned by the Forest Preserve District and each of these study areas either drains to the Forest Preserve District property or receives runoff from the Forest Preserve District Property. Prior to making our final recommendations regarding the potential drainage improvements, we are requesting feedback from the Forest Preserve District on several concept plans.

2. Area 8 – Alternate 1 "Diversion Ditch"

Area 8 is a residential neighborhood at the south end of Central Avene, generally located north of Oak Meadows Drive and west of Edgewood Ave (see Exhibit 1). The Forest Preserve District property is located west of Area 8 and a large portion of this property drains into Area 8 at the west end of the Aspen Road cul-de-sac. The existing storm sewers along Aspen Road, Central Avenue, Ethel Lane, and Edgewood Avenue do not have capacity for the offsite runoff so the streets in Area 8 flood frequently, particularly along Aspen Road.

A potential solution to this problem would be to intercept the runoff from the Forest Preserve District property at the west end of Aspen Road and divert the runoff south through a proposed drainage ditch to the west end of Roberts Lane. Stormwater runoff would be conveyed from the west end of Roberts Lane to an existing detention basin through storm sewers that would be increased in size. The proposed drainage ditch would run along the east line of the Forest Preserve District property and would likely require a 15-foot drainage easement from the Forest Preserve District (see Exhibit 9).

The Forest Preserve District is not likely to grant a drainage easement for the proposed drainage ditch unless the ditch could be constructed without disturbing any desirable trees. Even then, granting the easement would require action by the Board of Commissioners. Prior to preliminary design, Forest Preserve District staff would walk along the alignment of the proposed drainage ditch and determine whether any desirable trees would be disturbed. If no desirable trees would be disturbed, the City could appeal to the Board of Commissioners to grant the easement so that the City could address a drainage problem resulting from runoff from the Forest Preserve District property.

3. Area 10 – Alternate 1 "10-Year Improvements"

Area 10 is a residential neighborhood at the south end of Cedar Street. This area is bounded by a Forest Preserve District property on the east and the south (see Exhibit 1). The south end of Cedar Street is not drained by storm sewers and the existing storm sewers further north are undersized. This section of Cedar Street floods in several locations and one location often results in a flooded residential structure. The existing storm sewers in Area 10 discharge to the Forest Preserve District property through two outlet pipes.

A potential solution to this problem would be to extend storm sewer to the south end of Cedar Street and increase the storm sewer capacity in critical locations (see Exhibit 11). These improvements would prevent street flooding for storm events up to and including the 10-year event.

The Forest Preserve District is amenable to these improvements because they are discharging stormwater to the Forest Preserve through existing outlet pipes and because the improvements can be constructed without encroaching upon Forest Preserve District property. The Forest Preserve District's only requests of the City are to:

- control the velocity of stormwater discharged to the Forest Preserve so that it does not result in erosion; and
- add water quality improvements with the storm sewer capacity improvements.

4. Area 10 – Alternate 2 "100-Year Improvements"

The improvements proposed in this Alternate are similar to those proposed in Alternate 1, except that the proposed storm sewer sizes would be increased to prevent street flooding for storm events up to and including the 100-year event. This Alternate would also add a third outlet pipe to the Forest Preserve District property (see Exhibit 12).

The Forest Preserve District is not supportive of this Alternative since it would likely have a greater impact on the Forest Preserve, particularly with the construction of two outlets near the Forest Preserve District property (one new outlet and one outlet increased in size).

5. Area 11 – Alternate 1 "South Outlet"

Area 11 is a residential neighborhood near the north end of Cedar Street. This area is bounded by a Forest Preserve District Property on the east (see Exhibit 1). The intersection of Hiawatha Trail and Cedar Street is not drained by storm sewers, so the street floods frequently. Several adjacent residential structures have been known to flood, as well. The existing storm sewers in Area 11 discharge to the Forest Preserve District property through an outlet pipe shared with Area 10.

A potential solution to this problem would be to extend storm sewer north to the intersection of Hiawatha Trail and Cedar Street and increase the storm sewer capacity along Cedar Street (see Exhibit 13). These improvements would prevent street flooding for storm events up to and including the 10-year event.

The Forest Preserve District is amenable to these improvements because they are discharging stormwater to the Forest Preserve through an existing outlet pipe and because the improvements can be constructed without encroaching upon Forest Preserve District property. The Forest Preserve District's only requests of the City are to:

- control the velocity of stormwater discharged to the Forest Preserve so that it does not result in erosion; and
- add water quality improvements with the storm sewer capacity improvements.

The preceding constitutes our understanding of the items discussed and conclusions and agreements reached. Participants are requested to advise the author of any omissions, clarifications or discrepancies within five working days of receipt of this summary.

CITY OF WOOD DALE, ILLINOIS

Study Area Location Map

Legend

- Study Areas
- Study Areas as Part of Separate Project
- Areas of Concern

- Addison
- Bensenville
- Elk Grove
- Itasca

Exhibit 1

1 inch = 1,500 feet

BAXTER WOODMAN Consulting Engineers

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CITY OF WOOD DALE, ILLINOIS

Area 1

Proposed Conditions

Alternate 1

"ComEd Detention"

10-YR Inundation Depth (FT)	
Existing	0.8
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.0
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.6
Proposed	0.0

100-YR Inundation Depth (FT)		10-YR Inundation Depth (FT)	
Existing	2.6	Existing	2.0
Proposed	2.1	Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.2
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.4
Proposed	0.0

Install two section of elliptical RCP. 38"x60" conveys runoff from the South, 30"x44" conveys runoff from the North to detention.

Install one section of 38"x60" elliptical RCP.

Remove 105' section of 44"66" elliptical CMP. Replace with clear, open channel.

Remove obstructive vegetation and dredge to restore original slope.

- Location 2
- Location 3
- Location 4
- Location 5

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Existing Channel
- Proposed Detention Basin
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $2,351,620

Exhibit 2

1 inch = 325 feet

BAXTER WOODMAN Consulting Engineers

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CITY OF WOOD DALE, ILLINOIS

Area 1

Proposed Conditions

Alternate 2

"Squaw Creek Improvements"

Location 2

Location 3

Location 4

Location 5

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Proposed 4'x8' Culvert
- Proposed Channel
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $2,154,311

Exhibit 3

1 inch = 325 feet

BAXTER WOODMAN Consulting Engineers

10-YR Inundation Depth (FT)	
Existing	0.8
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.0
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.6
Proposed	0.0

100-YR Inundation Depth (FT)	
Existing	2.6
Proposed	2.1

10-YR Inundation Depth (FT)	
Existing	2.0
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.2
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.4
Proposed	0.0

Install 38"x60" elliptical RCP.

Remove 105 ft section of 44"x66" elliptical CMP. Replace with clean, open channel.

Remove existing 44"x66" culvert and replace with 4'x8' Box culvert.

Remove obstructive vegetation and dredge to restore original slope of existing open channel.

Remove weir.

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CITY OF WOOD DALE, ILLINOIS

Area 1

Proposed Conditions

Alternate 3

"Relief Sewer"

Location 2

Location 3

Location 4

Location 5

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Proposed Channel
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $3,593,903

Exhibit 4

1 inch = 325 feet

BAXTER WOODMAN Consulting Engineers

Path: I:\Mokena\WDDLC\General\GIS\Map\Exhibit_110872_FloodStudyAreas_Nov2012\FinalExhibits_Round2\WDDLC_110872_1_Alt3.mxd

10-YR Inundation Depth (FT)	
Existing	0.8
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.0
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.6
Proposed	0.0

100-YR Inundation Depth (FT)		10-YR Inundation Depth (FT)	
Existing	2.6	Existing	2.0
Proposed	2.1	Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.2
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.4
Proposed	0.0

Directional boring required for installation.

Seal pipe to the North and redirect flow to the East.

Remove 105 ft section of 44"x66" elliptical CMP. Replace with clean, open channel.

Remove obstructive vegetation and dredge to restore original slope of existing open channel.

Parallel 48" and 42" storm sewer connected by 24" storm sewer.

Montrose Av
Victoria Ln
Sarah Dr
Victoria Dr
Sarah Ct
W Jason Ln
Brookwood Dr
Forest Pres
Jennifer Ct
Jeanne Ct
Juliann Dr
Clare Ct
Fishing Ln
Congress Ct
Duckun
Bay St
Park Ln
Lafayette St
Monroe Pl
Robin Ln
Hoover Dr
George St
Station Dr
Miller Ln
Dalewood Av
Addison Rd
Paramount Dr
Heritage Dr
Gilbert Dr
Charmille Ln

10-YR Inundation Depth (FT)	
Existing	0.5
Proposed	0.1

Crestwood Rd
Hackberry Ct
Butternut Av
Woodbine Dr
Edgewood Av
Crestwood Ct
Woodside Dr
Ethel Ln
Royal Ct
Oak Meadows Dr
Spruce Rd
Robert Kingery Highway
2nd Av
3rd Av
Briar Ln

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CITY OF WOOD DALE, ILLINOIS

Area 5

Proposed Conditions

Alternate 1

"10-Year Improvements"

Area 5

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $194,753

Exhibit 5

1 inch = 200 feet

BAXTER WOODMAN Consulting Engineers

CITY OF
WOOD DALE,
ILLINOIS

Area 5

Proposed Conditions

Alternate 2

"100-Year Improvements"

Area 5

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $897,581

Exhibit 6

1 inch = 200 feet

BAXTER WOODMAN Consulting Engineers

100-YR Inundation Depth (FT)	
Existing	0.8
Proposed	0.1

100-YR Inundation Depth (FT)	
Existing	0.6
Proposed	0.0

100-YR Inundation Depth (FT)	
Existing	0.9
Proposed	0.0

100-YR Inundation Depth (FT)	
Existing	0.7
Proposed	0.0

100-YR Inundation Depth (FT)	
Existing	0.5
Proposed	0.0

100-YR Inundation Depth (FT)		10-YR Inundation Depth (FT)	
Existing	2.2	Existing	1.5
Proposed	2.3	Proposed	1.5

Lower the detention basin overflow elevation by 1.0 ft

Edgewood Av
Hackberry Ct
Crestwood Rd
Robert Kingery Highway
Butternut Av
Woodbine Dr
Crestwood Ct
Woodside Dr
Ethel Ln
Spruce Rd
2nd Av
Oak Meadows Dr
Royal Ct
3rd Av
Briar Ln

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10-YR Inundation Depth (FT)	
Existing	1.2
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.5
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.6
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.5
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.3
Proposed	0.2

Sivert Dr
Creel Dr
Central Av
Richert Rd
Lively Blvd
North St
Beinoris Dr

CITY OF WOOD DALE, ILLINOIS

Area 6

Proposed Conditions

Alternate 1

"Conveyance Improvements"

Area 6

Legend

- Proposed Storm Sewer
- Proposed Inlet
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $3,395,766

Exhibit 7

1 inch = 200 feet

BAXTER WOODMAN Consulting Engineers

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CITY OF WOOD DALE, ILLINOIS

Area 6

Proposed Conditions

Alternate 2

"Online Detention"

Area 6

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $1,918,166

Exhibit 8

1 inch = 200 feet

BAXTER & WOODMAN Consulting Engineers

10-YR Inundation Depth (FT)	
Existing	1.2
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.5
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.6
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.5
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	1.3
Proposed	0.2

Sivert Dr
Creel Dr
Beinoris Dr
North St
Central Av
Richert Rd
Lively Blvd

Path: I:\Mokena\WDDLC\General\GIS\Map\Exhibit_110872_FloodStudyAreas_Nov2012\FinalExhibits_Round2\WDDLC_110872_6_Alt2.mxd

CITY OF WOOD DALE, ILLINOIS

Area 8

Proposed Conditions

Alternate 1

"Diversion Ditch"

Area 8

Legend

- Proposed Inlet
- Wet Detention Pond
- Proposed Berm
- Proposed Swale
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $1,002,473

Exhibit 9

1 inch = 150 feet

BAXTER WOODMAN Consulting Engineers

10-YR Inundation Depth (FT)	
Existing	1.2
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.4
Proposed	0.0

100-YR Inundation Depth (FT)		10-YR Inundation Depth (FT)	
Existing	692.9	Existing	691.7
Proposed	692.1	Proposed	690.3

100-YR Inundation Depth (FT)		10-YR Inundation Depth (FT)	
Existing	692.2	Existing	691.6
Proposed	691.9	Proposed	690.2

Construct berm to 694' to prevent Travel Air overtopping.

Install new inlet and 30" pipe connecting the swale to the Roberts Ln storm sewer.

Increase Travel Air storage by 0.5 ac-ft and make wet detention pond.

Increase Oak Meadows storage by 4.4 ac-ft and make wet detention pond.

Woodbine Ct
Aspen Rd
Woodbine Dr
Butternut Av
Central Av
Ethel Ln
Edgewood Av
Crestwood Ct
Roberts Ln

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CITY OF WOOD DALE, ILLINOIS

Area 8

Proposed Conditions

Alternate 2

"Central / Ethel Storm Sewer"

Area 8

Legend

- Proposed Inlet
- Wet Detention Pond
- Proposed Berm
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $1,401,028

Exhibit 10

1 inch = 150 feet

BAXTER WOODMAN Consulting Engineers

10-YR Inundation Depth (FT)	
Existing	1.2
Proposed	0.0

10-YR Inundation Depth (FT)	
Existing	0.4
Proposed	0.0

100-YR Inundation Depth (FT)		10-YR Inundation Depth (FT)	
Existing	692.9	Existing	691.6
Proposed	692.9	Proposed	690.1

100-YR Inundation Depth (FT)		10-YR Inundation Depth (FT)	
Existing	692.2	Existing	691.6
Proposed	692.6	Proposed	690.1

Construct berm to 694' to prevent Travel Air overtopping.

Increase Travel Air storage by 0.5 ac-ft and make wet detention pond.

Increase Oak Meadows storage by 4.4 ac-ft and make wet detention pond.

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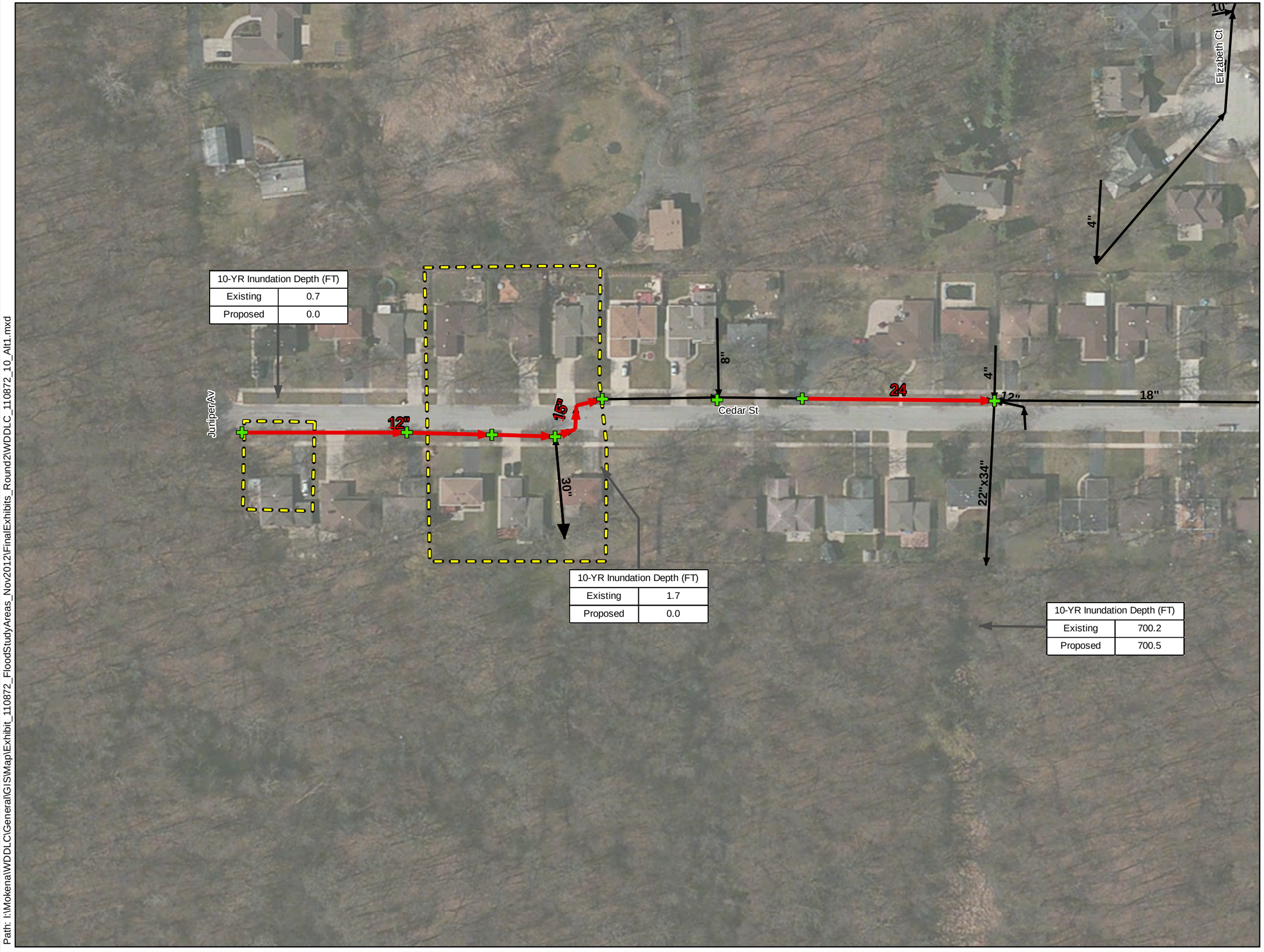


CITY OF WOOD DALE, ILLINOIS

Area 10

Proposed Conditions

Alternate 1

"10-Year Improvements"

Area 10

Legend

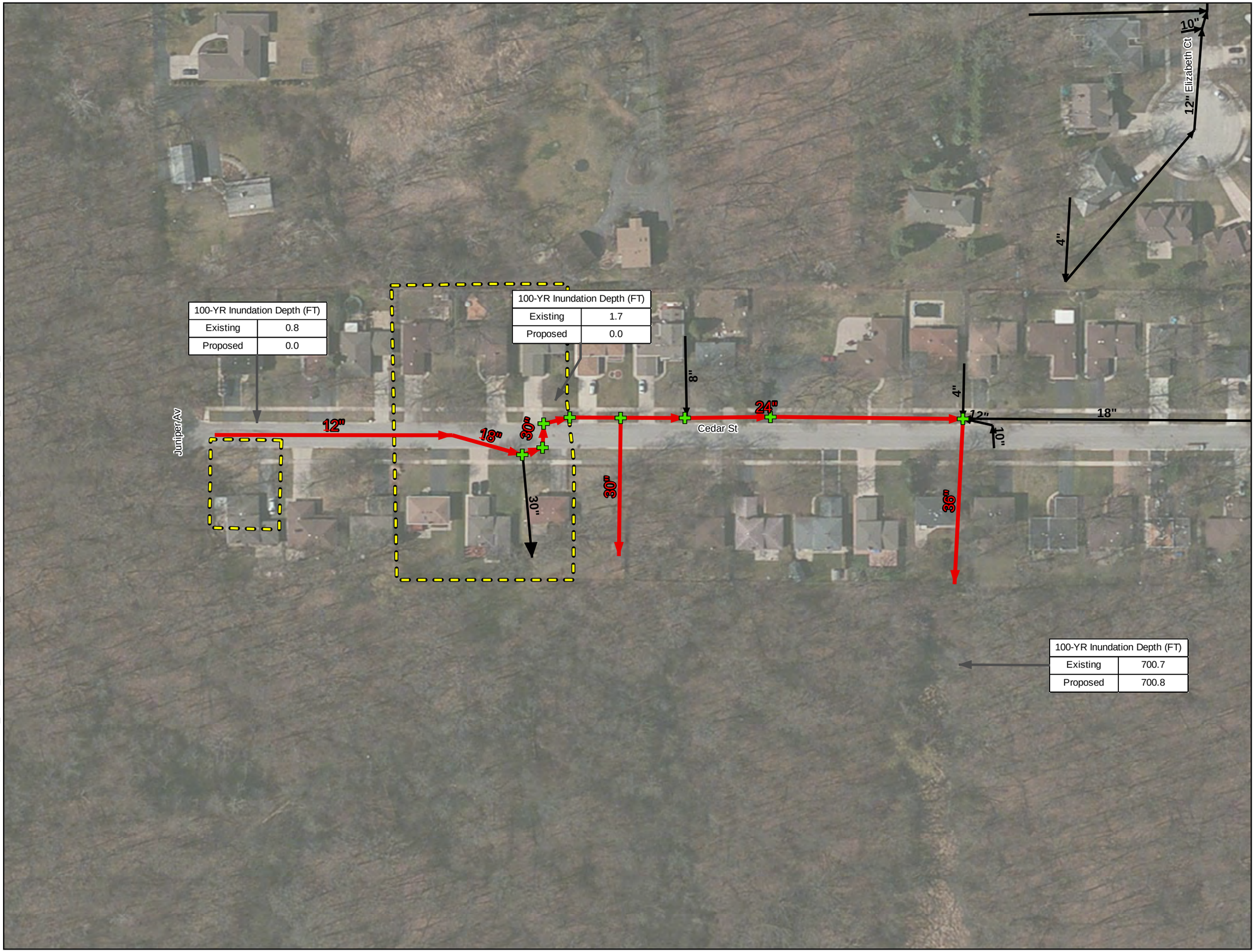
- Proposed Inlet
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $162,840

Exhibit 11

1 inch = 100 feet

BAXTER & WOODMAN Consulting Engineers



CITY OF WOOD DALE, ILLINOIS

Area 10

Proposed Conditions

Alternate 2

"100-Year Improvements"

Area 10

Legend

- Proposed Storm Sewer
- Proposed Inlet
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $417,850

Exhibit 12

1 inch = 100 feet

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CITY OF WOOD DALE, ILLINOIS

Area 11

Proposed Conditions

Alternate 1

"South Outlet"

10-YR Inundation Depth (FT)	
Existing	700.24
Proposed	700.38

10-YR Inundation Depth (FT)	
Existing	0.40
Proposed	0.00

10-YR Inundation Depth (FT)	
Existing	0.22
Proposed	0.00

Area 11

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $530,196

Exhibit 13

1 inch = 150 feet

BAXTER WOODMAN Consulting Engineers

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10-YR Inundation Depth (FT)	
Existing	0.40
Proposed	0.00

10-YR Inundation Depth (FT)	
Existing	0.22
Proposed	0.00

100-YR Inundation Depth (FT)	
Existing	700.24
Proposed	700.10

CITY OF WOOD DALE, ILLINOIS

Area 11

Proposed Conditions

Alternate 2

"North and South Outlet"

Area 11

Legend

- Proposed Inlet
- Proposed Storm Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $1,575,857

Exhibit 14

1 inch = 350 feet

BAXTER WOODMAN Consulting Engineers

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CITY OF WOOD DALE, ILLINOIS

Area 11

Proposed Conditions

Alternate 3

"South Outlet with Online Detention"

10-YR Inundation Depth (FT)	
Existing	0.40
Proposed	0.00

10-YR Inundation Depth (FT)	
Existing	700.24
Proposed	700.20

10-YR Inundation Depth (FT)	
Existing	0.22
Proposed	0.00

Area 11

Legend

- Proposed Inlet
- Proposed Sewer
- Existing Storm Sewer

Engineer's Estimate of Probable Cost = $819,292

Exhibit 15

1 inch = 150 feet

BAXTER & WOODMAN Consulting Engineers

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