Levee 37 Drainage Study

Mount Prospect, IL

Prepared for

Village of Mount Prospect, IL
50 South Emerson Street
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CBBEL Project No. 15-0225

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EXECUTIVE SUMMARY

The Levee 37 Tributary Area Drainage Study was initiated by the Village of Mount Prospect (Village) following the April 17-18, 2013 storm event to address residential flooding in areas protected from Des Plaines River (DPR) overbank flooding by the Levee 37 floodwall. The Levee 37 project was designed by the US Army Corps of Engineers-Chicago District (USACOE) to prevent DPR floodwater from entering Village residential areas and City of Prospect Heights areas west of River Road. The Levee 37 project consists of several integrated components including a concrete-capped floodwall, earthen levees, road raising, and internal drainage pump stations.

The majority of the April 2013 storm event rainfall occurred while the DPR water level was rising but prior to it reaching its peak elevation. The rising DPR water level reduced and ultimately prevented outflow from the Village's gravity storm sewers to the DPR. Once the DPR reached an elevation that prevented outflow, the Village's stormwater could only be evacuated by the two (2) Levee 37 pump stations; Pump Stations #1 and #2. These pump stations were constructed concurrently with Levee 37 and were designed to drain residual stormwater in the storm sewer system when the DPR water level was high. According to the USACOE, the pumps **were not** designed to have capacity that equals the existing capacity of the sewer system with free-outfall conditions (when the DPR is at normal elevation). As reported by Village staff, the limited capacity of the pump stations initially resulted in street inundation in low areas, followed by yard flooding and overtopping of sidewalks allowing floodwaters to enter below-grade garages, and also basement seepage during the April 2013 storm event.

The Village retained Christopher B. Burke Engineering, Ltd. (CBBEL) to perform a conceptual level feasibility study that included:

- An analysis of the Village's storm sewer system and the Levee 37 pump stations to identify the condition that lead to the flooding that occurred during the April 2013 storm event.
- Determine the existing level of protection provided by the storm sewer system with the levee and the pump stations in place for the residential area.
- Develop and analyze potential improvement alternatives to raise the level of protection by increasing the pumping rate and through other improvements.

The study determined that the Village's storm sewer system has approximately a 10-year storm event capacity with a free-outflow condition (DPR is low). The study also confirmed Village staff's opinion that the capacity of the existing storm sewer system was degraded during the April 2013 storm event because of the rising DPR water level and the inability of the two (2) Levee 37 pump stations to provide sufficient capacity to discharge Village stormwater at a rate necessary to prevent flooding in the residential area.

Prior to the development of the existing residential subdivision within the study area, the land drained overland directly to the DPR. Once developed and prior to the construction of Levee 37, during periods when the residential subdivision's storm sewers surcharge ponding would initially

occur within low-lying areas until flooding levels filled the streets and stormwater would flow overland down the streets until crossing River Road and into the DPR. Levee 37 blocks overland flow from reaching the DPR. Currently, the Levee 37 pump stations are the only means to convey the overland flow to the DPR. Therefore, to alleviate flooding within the interior of the levee when the DPR is high, the Levee 37 pump stations would need to be upgraded to replicate the historic overland flow to the DPR.

In order to determine an "allowable" pumping rate for the system to replicate historic overland flow values, a few factors were considered:

- First, the existing combined pumping rate of all three pumping stations (Pumping Stations #1, #2, and #3) is approximately 60 cfs.
- A rising DPR degrades the ability of the storm sewers to discharge stormwater.
- Levee 37 protects the interior residential area from overbank flooding for DPR flooding events at or greater than the 10-year event.
- The capacity of the interior area's storm sewer system under low flow DPR conditions is approximately the 10-year event.
- Prior to the Levee 37 construction, events at and greater than the 10-year flood along the DPR would begin to flood the interior area, accessing floodplain storage that the levee now blocks. However, the interior area had an unobstructed overland flow path to the DPR.
- Hydraulic modeling determined that prior to the construction of the levee the overland flow (generated by the 10-year interior event) reaching the DPR was 240 cfs when the DPR water level is at its 10-year flood level.

Considering these hydraulic conditions, the DPR was always subject to receiving the overland flow from the interior area for up to the 10-year event without the benefit of significant overbank floodplain storage. The construction of Levee 37 blocked this overland flow capacity, but the pumps constructed as part of the levee project did not maintain this flow capacity, reducing the overland flow discharge capacity (via pumping) to only 60 cfs, significantly lower than the pre-levee condition of 240 cfs as described above. This means that the pumping rate can be increased by 180 cfs and still maintain the pre-Levee 37 condition. An operating rule would need to be established for events greater than the 10-year flood to maintain pre-levee downstream conditions.

CBBEL developed nine (9) improvement alternatives to modify the interior drainage system to achieve the allowable pre-Levee 37 overland flow. All nine (9) improvement alternatives provide increased pumping capacity at one of the Levee 37 project pump stations that serve the Village. The increased pumping capacity would be achieved by constructing a new pump station adjacent to the existing pump station. This would allow the existing pump station to continue operating during the construction process. A few of the improvement alternatives also evaluated the use of flood storage to reduce the required pumping capacity. Some improvement alternatives

evaluated storm sewer improvements to increase the efficiency of stormwater flow conveyance to the Levee 37 project pump stations.

A 25-year level-of-protection alternative (Alternative 9) was also developed and evaluated to determine how this level can be achieved. This was done at the request of the Village to be consistent with the Board directive to achieve, where possible, the 25-year level of protection on all new projects. The total pump capacity will be limited to 240 cfs. Two proposed stormwater facilities, providing 18 and 12 acre-feet, are necessary to reduce the flow to the pump stations. Diversion sewers are required to divert stormwater from adjacent main sewer lines. Floodproofing will be necessary for two at-risk homes. The opinion of probable construction cost for the 25-year level of protection without off-site mitigation is $7.5 million based on 2015 unit costs.

Based on the results of this conceptual feasibility study, CBBEL is recommending two (2) improvements (Alternatives 3 and 6) that provide the 10-year level of protection. These alternatives increase the total pumping rate to 205 cfs, which is lower than the 240 cfs mentioned above. This is due to the addition of stormwater storage within the two school properties that provide a reduction in the flowrate reaching the pumping stations. However, the Village can modify these alternatives to achieve the 240 cfs rate. The Village staff has indicated they will be approaching the USACOE about funding the proposed pump station improvements. The opinion of probable construction cost for recommended Alternatives 3 and 6 are $3.6 million and $2.1 million, respectively, based on a 2015 cost estimate.

The following is brief description of the recommended alternatives for a 10-year level of protection:

Alternative 3

- Construct new pump station adjacent to Levee 37 Pump Station #2 with pumping capacity of 105 cfs.
- Proposed 11.6 acre-foot stormwater storage basin located within an existing open space at Robert Frost Elementary School property.

Alternative 6

- Construct new pump station adjacent to Levee 37 Pump Station #1 with pumping capacity of 40 cfs.
- Proposed 7.0 acre-foot stormwater storage basin located within an existing open space at the Indian Grove Elementary School property.

CHAPTER 1 INTRODUCTION

The Des Plaines River (DPR) is the largest natural waterway in Cook County and has produced multiple historic flood events in the adjacent communities. The residential subdivision in the northeast portion of the Village of Mount Prospect (Village) along the DPR is one area that has been historically impacted by riverine flooding (Figure 1 below). To reduce the risk of riverine flooding along the DPR, the United States Army Corps of Engineers-Chicago District (USACOE) received congressional approval and funding in 1999 to design and construct six features for flood control in the Upper DPR Watershed. One of those projects was Levee 37.

The design for Levee 37 was developed by the USACOE in conjunction with the Illinois Department of Transportation (IDOT), Cook County Forest Preserve District (CCFPD) and the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR). The Levee 37 project consists of approximately 9,000 linear feet of floodwall including a small portion of earthen levee, three interior drainage pumping stations, a number of gravity outlet structures, a roadway closure structure and a road raise. The Levee 37 project was constructed by the USACOE to prevent DPR floodwaters from reaching residential and commercial properties west of River Road in the Village and the City of Prospect Heights (City). The floodwall runs along the east side of River Road from just north of Euclid Avenue to Milwaukee Avenue, continues along the east side of Milwaukee Avenue from River Road to Palatine Road Expressway, and then west along the north side of the Palatine Road Expressway to high ground. Levee 37 project also included the raising of Milwaukee Avenue by IDOT to complete the line of flood protection.

The entire protected side of the floodwall consists of both Village and City residential and commercial development with two (2) schools and park district property. Three (3) Levee 37 pump stations are used to evacuate interior stormwater from these areas when the DPR water levels restrict the gravity discharge of the storm sewer system. During this condition, Tideflex check valves close to prevent DPR water from inundating interior properties through the storm sewer system. Village Staff indicated that back-flow through the storm sewers was the major cause of the record flooding during DPR flood events in 1986 and 1987.

By displacing the floodwaters that inundated 64 acres of land in the Village, the Levee 37 project would have resulted in an increased in DPR flood stages above the regulatory limit. However, the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) took the lead to design and construct the Heritage Park Flood Control project in the Village of Wheeling to provide mitigation to prevent stage increases along the DPR above the regulatory limit. The Heritage Park Flood Control Project was completed at the end of 2013, which allowed for the completion of the floodwall in November 2014 as the original floodwall was constructed with a gap that temporarily prevented downstream impacts.

While Levee 37 does provide a great benefit for the Village study area from DPR overbank flooding, it cuts off an existing overland flow route for internal drainage to the DPR. The overland flow route can be seen on the 1963 USGS Hydrologic Atlas on Figure 2. The overland flow route consisted of two small tributaries that flowed east and converge prior to overtopping River Road

and flowing to the DPR. Prior to Levee 37, if a storm event took place while the DPR stage restricted or eliminated outflow from the storm sewers, low lying depressions in the study area would fill and ultimately ponding water would be conveyed overland to the DPR. For the same condition with the Levee 37 floodwall in place, that overland flow route to the DPR is cutoff and all stormwater generated in the study area must be pump evacuated into the DPR.

The Levee 37 project, including the floodwall, earthen berm, closure structures and the three (3) pump stations, was constructed in 2011. Pump Stations #1, #2, and #3 are located along the south, middle, and north portion of the floodwall, respectively. Pump Station #1 drains stormwater exclusively from the Village, while Pump Station #2 drains areas of both the Village and the City, and Pump Station #3 drains water exclusively from the City.

During the April 17-18, 2013 storm event, Village and City Staff temporary blocked the floodwall gap with Jersey Barriers preventing DPR floodwaters from reaching the interior areas. The Levee 37 Pump Stations #1 and #2 were functioning during this storm event along with portable pumps operated by Village Public Works personnel. According to Village Staff the Levee 37 Pump Stations did not have sufficient capacity to prevent street inundation in low areas, yard flooding and overtopping of sidewalks allowing floodwaters to enter below-grade garages during the April 2013 storm event.

The Village retained Christopher B. Burke Engineering, Ltd. (CBBEL) to perform a conceptual level feasibility study that included:

- Determine the pre-Levee 37 floodwall overland flow rate to the DPR assuming a 10-year storm event over the study area and the DPR at a 10-year flood elevation.
- An analysis of the Village's storm sewer system and the Levee 37 pump stations to identify any conditions that lead to the flooding that occurred during the April 2013 storm event.
- Determine the existing level of protection for the residential area.
- Develop and analyze potential improvement alternatives to raise the level of protection when the pump stations are operating.

During a July 28, 2015 meeting, USACOE personnel indicated that the design of the Levee 37 Pump Stations was based on non-coincident peaks between the DPR and the interior storm sewer system. Their analysis was based on rainfall data and DPR levels recorded prior to 1990. As a consequence, the Levee 37 Pump Stations were designed to primarily rely on gravity discharge to dewater the storm sewer system. The objectives of the conceptual level Levee 37 drainage study are as follows:

- Identify any conditions in the drainage system that lead to the April 2013 flooding.
- Identify the capacity of the existing storm sewer system under both free-flow (no tailwater) conditions and pumped flow (with tailwater) conditions.

- Develop improvement concepts to increase the capacity of the drainage system when DPR tailwater is present.
- Analyze the effect of the proposed improvement projects on the hydraulics of the DPR.
- Recommend improvement alternatives to the Village Board.

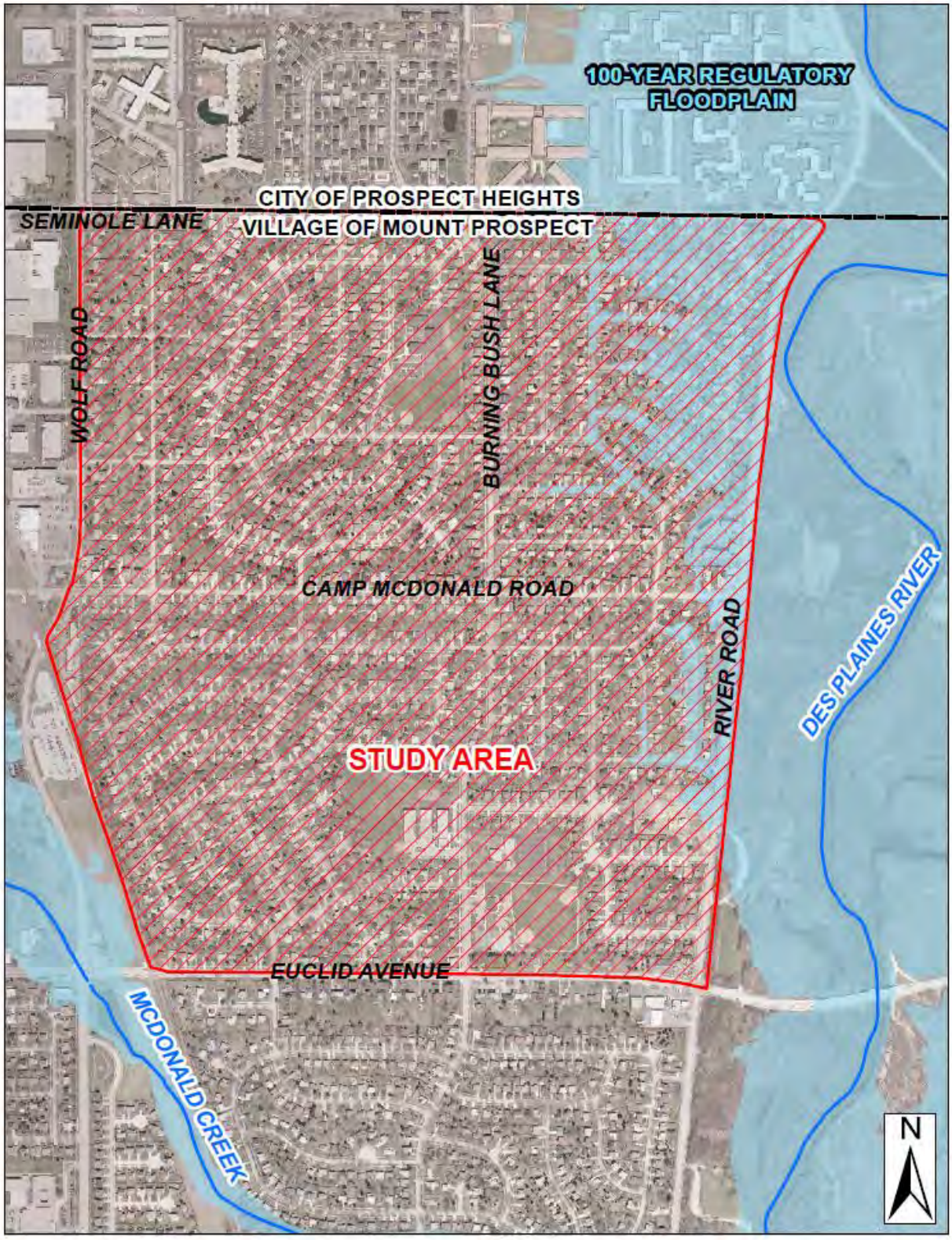


Figure 1. Study Area Location Map

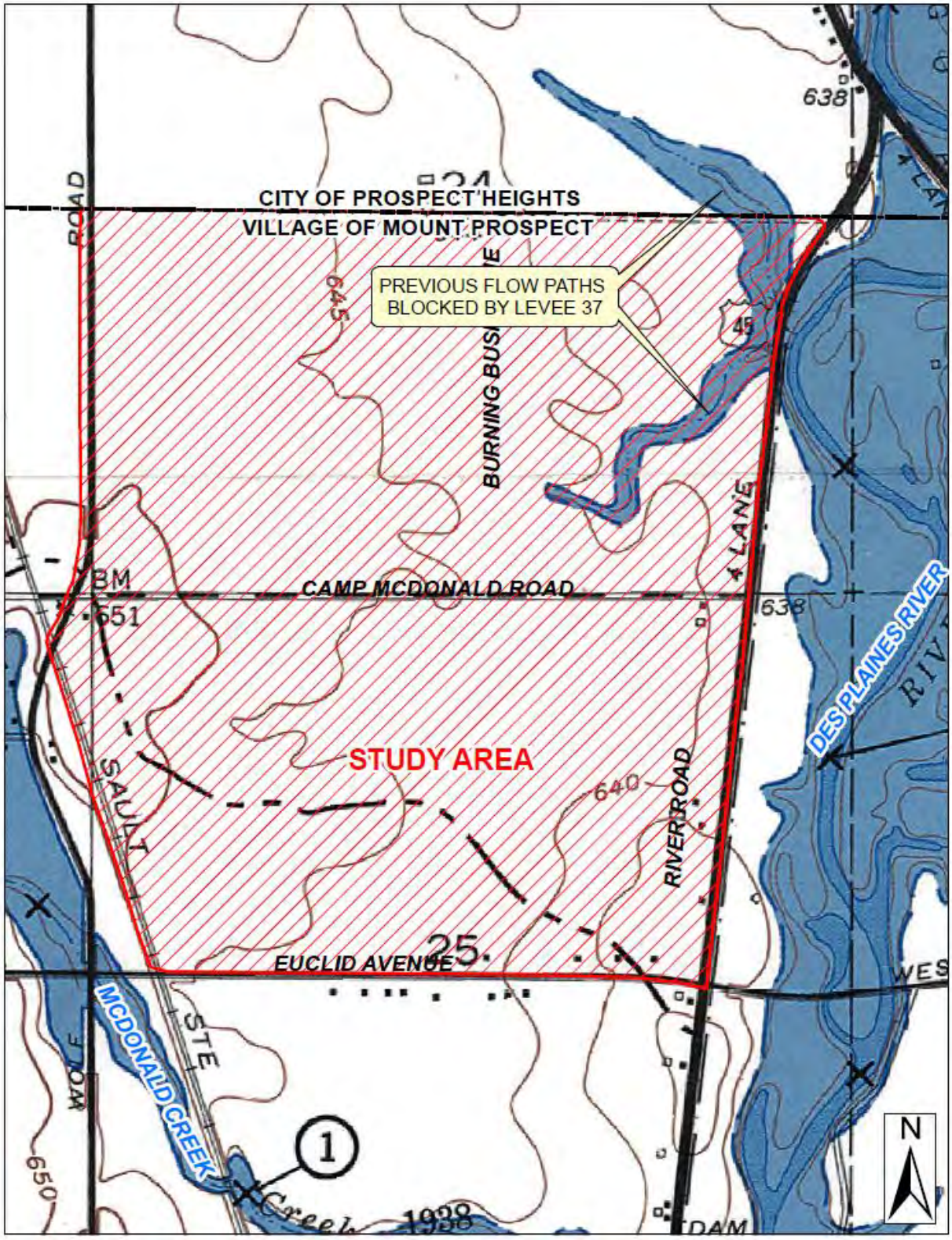


Figure 2. 1963 USGS Hydrologic Atlas

CHAPTER 2 EXISTING CONDITIONS

To analyze the existing stormwater drainage system behind Levee 37, CBBEL developed an XPSWMM model for the drainage areas to Pump Stations #1, #2, and #3. Pump Stations #1 and #2 are located in the Village while Pump Station #3 is located in the City. It was necessary to model Pump Station #3 and its tributary area because when this system surcharges, overland flow is conveyed south into the Pump Station #2 Watershed.

The study area was analyzed using XPSWMM computer software, which is a proprietary program based on the US Environmental Protection Agency's Storm Water Management Model (SWMM). XPSWMM is a dynamic hydrologic and hydraulic modeling program that is well-suited for analyzing urban stormwater management systems. XPSWMM simulates rainfall-runoff responses for user specified storm events (hydrologic component) and analyzes the performance of the stormwater management system (hydraulic component).

2.1 EXISTING CONDITIONS DESCRIPTION

The general drainage pattern for the study area is from west to east, with multiple gravity flow outlets and pump discharges draining to the DPR. Prior to the development of the existing residential subdivision within the study area, the land drained naturally overland directly to the DPR as shown on the 1963 USGS Hydrologic Atlas on Figure 2 (above). When the residential subdivision's storm sewers surcharge, ponding would initially occur within low-lying areas until flooding levels filled the street and stormwater runoff was designed to flow overland down the streets until crossing River Road and into the DPR. This overland flow path reduced the risk of homes flooding when street flooding occurred. The construction of the Levee 37 floodwall blocked this overland flow capacity, but the pumps constructed as part of the Levee did not maintain this flow capacity. An XPSWMM simulation was performed for pre-Levee 37 conditions to analyze the amount of overland flow to the DPR for a 10-year storm in the study area while the DPR is at the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) 10-year flood elevation. **As shown on Figure 3, the maximum overland flowrate over River Road to the DPR is approximately 240 cfs.** The existing pump stations have a combined capacity of 60 cfs. Currently, the Levee 37 pump stations are the only means to convey the overland flow to the DPR. **This means that the Village could increase the pumping capacity up to this flow rate with any future enhancements to the pump stations.**

Main trunk storm sewer lines to the Levee 37 Pump Stations were identified, surveyed, and entered into the XPSWMM model. The Levee 37 Pump Stations controls (on/off elevations) were identified in the USACOE Levee 37 Engineering Plans and the manufacturer pump curves were input into XPSWMM to define the relationship between flowrate and head. As the head decreases the pump flow increases with a maximum pumping rate of 8.5 cfs for a single pump. Pump Stations #1 and #3 each have two (2) pumps with total capacity of 17 cfs. Pump Station #2 houses three (3) pumps with a total capacity of 25.5 cfs. All pumps are identical in capacity. The pump controls indicate that the pumps are only activated when the DPR water level has already

limited flow from the storm sewer outfalls. Figure 4 shows the drainage area to the three (3) Levee 37 Pump Stations.

Figure 3. 10-Year Storm with FEMA FIS 10-Year DPR Tailwater Prior to Levee 37 Construction

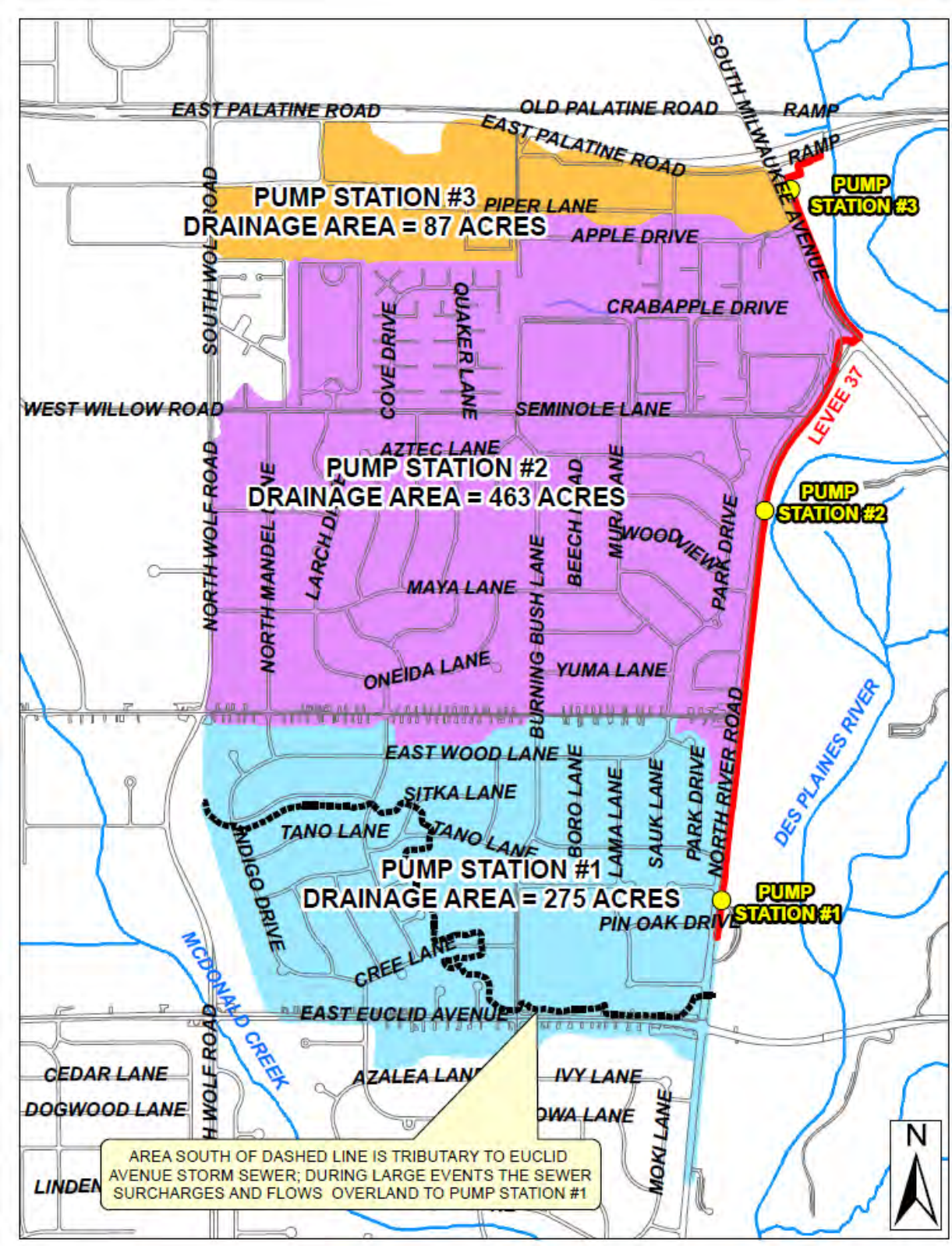


Figure 4. Pump Station Drainage Areas

2.1 MODEL DEVELOPMENT

The drainage area for the entire study area was broken down into smaller subbasins. One hundred (100) subbasins were delineated using the Cook County 1-foot aerial topography. The average area for the subbasins is approximately eight (8) acres. The hydrologic parameters that define each subbasin were determined based on methodology outlined in *TR-55*: *Urban Hydrology for Small Watersheds* (U.S. Department of Agriculture, 1986). In the XPSWMM model, the following information was input for each subbasin:

- Drainage Area
- Runoff Curve Number (RCN)
- Time of Concentration (Tc)

The RCN was defined based on the land use using current aerial photography (2014) for each of the subbasins. The RCN value calculated for each subbasin is based on the ratio of impervious to pervious area in each subbasin. The Tc is a calculation of the longest time it takes a drop of water to reach the outlet of the subbasin. A hydrologic map with subbasin delineations and hydrologic parameters is included as Exhibit 1.

The hydraulic elements of the model, including storm sewer diameters, lengths, materials, slopes, etc., were obtained from a CBBEL field survey. In addition to the major systems of the storm sewer network, overland flow and low lying storage were modeled. If a storm sewer does not have sufficient capacity to convey the tributary runoff, the system surcharges resulting in street inundation and overland flow. To effectively analyze the interaction between the storm sewer system and overland flow, XPSWMM 2D hydraulic surface modeling was utilized. The hydrology and subsurface hydraulics are analyzed using the standard 1D methods while the catch basins act as the connection between the 1D and 2D surface interface. The surface is modeled using a Digital Terrain Model (DTM) created from Cook County Lidar data. When storm sewers exceed capacity, the excess stormwater enters the 2D model surface and flood water flows naturally based on topography, as determined by the DTM. This method provides a more accurate analysis of flood depths and limits along overland flow routes, and accounts for storage in low lying areas, as well as providing a comprehensive graphic representation of the flooding.

2.2 MODEL CALIBRATION

The primary reason that the Village initiated the flood study was the significant flooding that occurred during the April 2013 storm event in the residential subdivisions west of the Levee 37 floodwall. For this reason, the April 2013 storm was selected for model calibration and also because it is the largest storm that has occurred since the Levee 37 project was constructed. Approximately 5.5 inches of the rainfall fell over a 24 hour period beginning at 9:00 AM on April 17th. The rainfall data for the April 2013 storm was obtained from the Illinois State Water Survey (ISWS) gage in the City of Des Plaines near Oakton Street. A gap in the floodwall near Pump Station #2 still existed during this storm event, but Village and City Staff undertook emergency

measures and used Jersey Barriers to temporary close the gap and multiple portable pumps were brought in to help drain water at Pump Station #2. Village Staff indicated that residential and street flooding occurred along Park Drive in both the Pump Station #1 and #2 tributary areas as well as significant flooding along River Road near Seminole Lane.

Based on the XPSWMM model results, the peak flooding (west of the Levee 37 floodwall) occurred between 4:00 AM and 11:00 AM on April 18th. A summary of the simulated maximum flood depths for the storm is provided in Table 1, and a flood inundation map is shown on Exhibit 2.

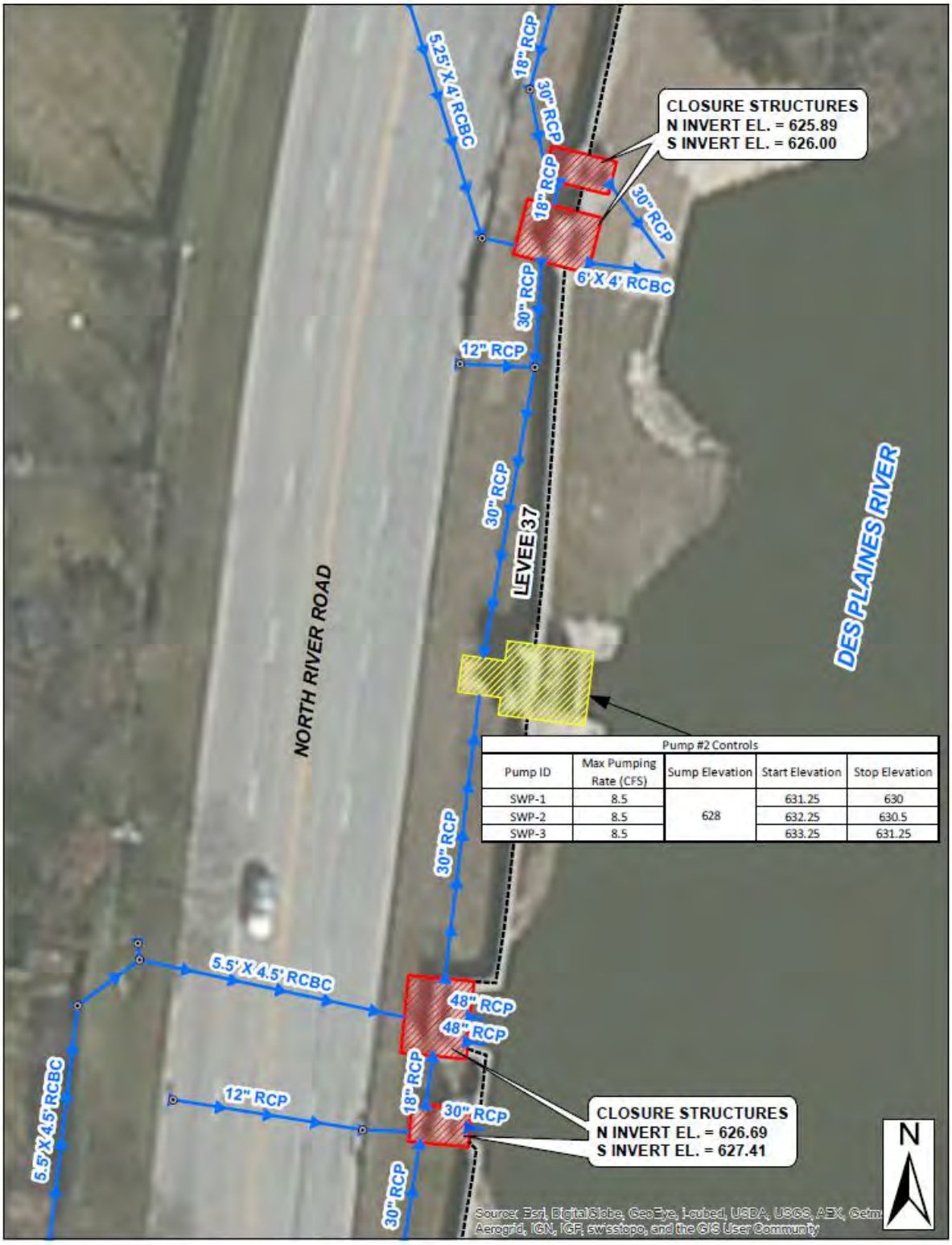
Table 1. April 2013 Flood Summary

Location	Description	Rim El. (FT)	Maximum Inundation Elevation (FT)	Maximum Inundation Depth (FT)
North Park Drive	Intersection of Park Drive & Woodview Drive	635.2	636.7	1.5
South Park Drive	240 feet north of intersection of Park Drive & Tano Ln	636.2	637.7	1.5
River Road	Adjacent to Pump Station #2	634.3	636.5	2.2

The Village provided CBBEL with a sketch of measured water elevations near the intersection of Seminole Lane and River Road. The elevations on the sketch were measured between 9:00 AM and 3:30 PM on April 19th around the time the DPR reached its maximum stage. The XPSWMM model results show water elevations approximately 1-foot higher than the measured water elevations at this time. The lower, measured water elevation may be attributed to the additional portable pumps that were brought in to help drain the floodwater. These temporary pumps were not accounted for in the XPSWMM model.

2.3 PUMP ANALYSIS

During the April 2013 event, the XPSWMM modeling shows the existing Levee 37 Pump Stations #1 and #2 pumps were not able to keep up with the inflow from the storm sewer system which was confirmed by eyewitness accounts of Village Staff. As previously mentioned, the maximum pumping capacity of a single pump is 8.5 cfs based on the manufacturer pump curves. Pump Station #1 contains two (2) pumps and drains stormwater from a 60-inch trunk sewer with an invert elevation of 627.75 feet. Farther upstream, Pump Station #2 contains three (3) pumps that drain two large trunk storm sewers when the DPR is high: A 5.25-foot by 4-foot reinforced concrete box culvert (RCBC) to the north and a 5.5-foot by 4.5-foot RCBC to the south. Both trunk storm sewer lines have separate gravity outfalls to the DPR. All gravity storm sewer outfalls to the DPR drain through closure structures that have manually operated sluice gates that can be lowered in the event the Tideflex backflow preventer fails. Both trunk storm sewers are connected to the Pump Station by 30-inch diversion sewers that convey flow to the Pump Station well. Figure 5 provides an illustration of the storm sewer configuration upstream of Pump Station #2, and Table 2 provides pump control information for all three (3) pump stations.



Pump #2 Controls

Pump ID	Max Pumping Rate (CFS)	Sump Elevation	Start Elevation	Stop Elevation
SWP-1	8.5	628	631.25	630
SWP-2	8.5		632.25	630.5
SWP-3	8.5		633.25	631.25

Figure 5. Pump Station #2 Storm Sewer Schematic

Table 2. Pump Controls

Pump Station ID	Sump Elevation	Pump ID	Max Pumping Rate (CFS)	Start Elevation	Stop Elevation
#1	627.5	SWP-1	8.5	631.75	629.75
		SWP-2	8.5	634.00	631.00
#2	628.0	SWP-1	8.5	631.25	630.00
		SWP-2	8.5	632.25	630.50
		SWP-3	8.5	633.25	631.25
#3	629.08	SWP-1	8.5	633.00	631.50
		SWP-2	8.5	635.00	632.50

2.4 SYSTEM CAPACITY

To analyze the storm sewer system capacity, CBBEL evaluated the effect of the April 2013 rainfall in the study area assuming that the storm sewer gravity outlets where not limited by the DPR stage and no Levee 37 pump stations were functioning. Exhibit 3 depicts the results of this simulation. The model results indicate that during the April 2013 storm some street flooding would have still occurred, but the extent and depth of flooding would be greatly reduced when compared to the levels that occured with actual DPR water level elevation and pumping scenario that occurred. **This confirms the Village Staff's observation that the Levee 37 project pump station's capacities are not sufficient to maintain the existing storm sewer gravity flow capacity when the DPR water level elevation has an influence.** Excess stormwater runoff that could not enter the storm sewer system was conveyed overland down the streets to River Road where it ponded because Levee 37 blocked the overland flow path. A storm inundation map for the April 2013 event with no tailwater (DPR at non-flood levels and pumps not operating) is provided in Exhibit 3.

To further analyze the storm sewer system, design storms were modeled with free-flow gravity outlet conditions (DPR at normal pool). First, a critical duration analysis was performed and it was determined that the 2-hour storm produced the maximum flows and flood stages within the study area. Model results from the 100-year, 2-hour storm event indicate significant flooding along both north and south Park Avenue as well as other low-lying areas in the study area. A storm inundation map for the 100-year, 2-hour storm is provided in Exhibit 4.

To better define the existing sewer system capacity, 2-hour critical duration storms with 2-, 5-, 10-, 25-, and 50-year recurrence intervals were simulated with the model. **Based on the model results, the existing storm sewer system has approximately a 10-year storm event capacity, though some surcharging occurs**. The 10-year, 2-hour storm inundation map, shown on Exhibit 5, demonstrates the storm sewer system is generally capable of handling the runoff from this storm with the exception of some areas where street flooding occurs. Based on the Cook County Lidar DTM, this street flooding appears to not impact building structures (this study is focused on Village areas, so unless otherwise specified, it does not apply to City areas).

Exhibit 6 shows the same 10-year, 2-hour storm but with a tailwater equal to the FEMA FIS 10-year DPR flood elevation. Overland flow of stormwater runoff that cannot enter the storm sewer system flows down the streets to River Road where the Levee 37 Floodwall blocks its path to the DPR. The overland flow path is shown by arrows in Figure 6. This scenario does not allow for any gravity storm sewer outflow, forcing all stormwater behind the Levee 37 floodwall to be pumped. When pumps are activated because gravity outfalls can no longer drain, floodwater ponds in the low lying areas along roads just west of the Levee 37 floodwall. The most significant flooding is in the Pump Station #2 drainage area as shown in Figure 6. When stormwater cannot drain through the gravity outfalls adjacent to Pump Station #2, the pumps are unable to keep up with the inflow, surcharging the sewer system and filling the low-lying areas on and around Park Drive. Two main low lying areas that result in the deepest flooding are located at Park Drive and Seneca Lane (2.3 feet) and Park Drive and Woodview Drive (1.9 feet).

The Village provided CBBEL with GIS data identifying homes with reverse slope driveways and homes that reported flooding following the April 2013 storm event. This information was used in conjunction with the inundation map for the 10-year storm event with FEMA FIS 10-year DPR flood elevation to identify residential structures with the highest potential for flooding. In total, forty-four (44) residential structures were surveyed for low overtop elevations or low entry elevations. These elevations were then compared with results from the existing conditions XPSWMM model to identify homes at risk of flooding for a design storm event. The 1-, 2-, 5-, and 10-year existing conditions design storms were simulated with XPSWMM with the FEMA FIS 10-year tailwater, which results in eliminating flow from gravity sewers. Model results indicate there is no significant flooding for the 1-year event. In total, Figure 6 shows nine (9) structures at risk of flooding during the 2-year event, 13 (thirteen) structures at-risk during the 5-year event, and 19 (nineteen) structures at-risk during the 10-year event in the Pump Station #2 drainage area. Please note that if a structure floods for the 2-year event, it will also flood for all larger events. Additionally, significant street flooding occurs on both River Road and Seminole Lane for the 2-year event and greater.

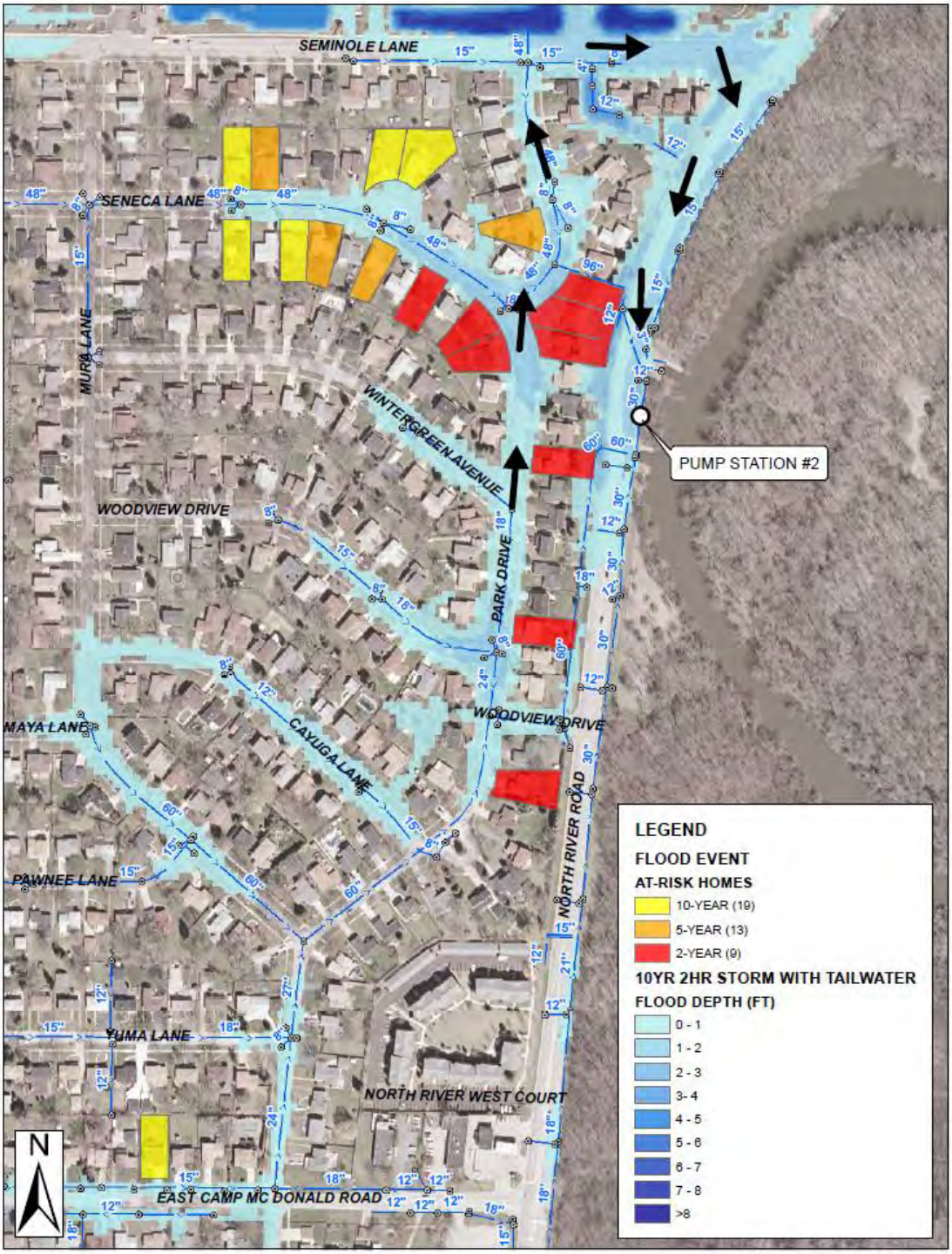


Figure 6. Pump Station #2 Drainage Area At-Risk Structures

Flooding also occurs in low-lying areas along and around Park Drive in the Pump Station #1 drainage area. Figure 7 shows at risk of flooding structures for the 2-, 5- and 10-year storm event as one (1), three (3) and four (4), respectively in the Pump Station #1 drainage area.

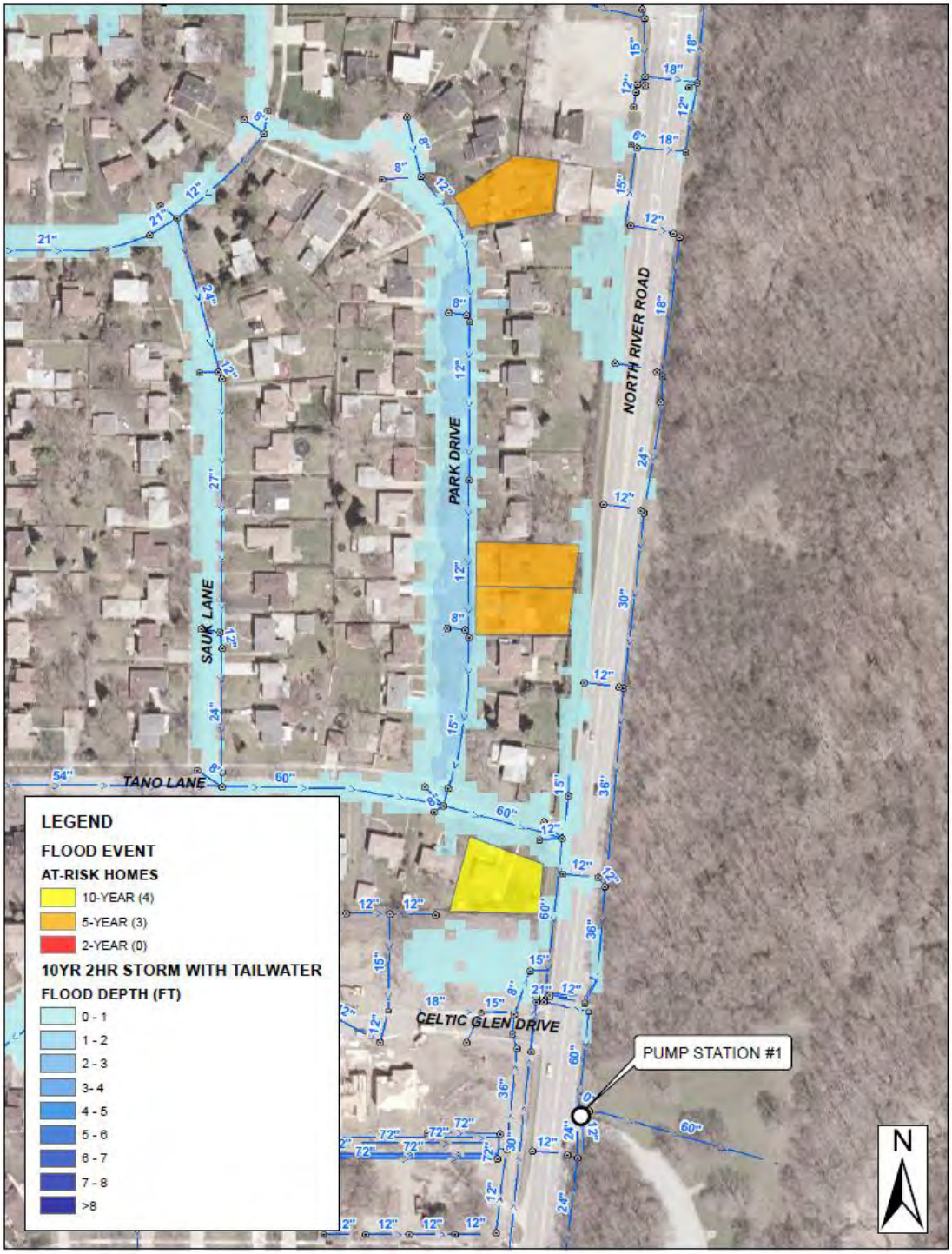


Figure 7. Pump Station #1 Drainage Area At-Risk Structures

This analysis was performed using the Village's GIS data to identify potential at-risk structures in low-lying areas and may not include all structures potentially at risk of flooding. Additional survey is recommended in the future studies to identify elevations for all structures adjacent to the low-lying areas. The additional survey will also help to completely understand the benefits provided by the improvement alternatives discussed in Chapter 3.

CHAPTER 3 PROPOSED CONDITIONS

The existing conditions XPSWMM modeling analysis indicates that the storm sewer system in the study area has approximately 10-year storm event capacity under free-outfall (no tailwater) conditions. However, this level of service is not achievable when the gravity outfalls are impacted by the DPR water level elevation. When the storm sewer system has to rely on the Levee 37 project pump stations to evacuate the 10-year storm event flows, significant flooding results in low-lying areas in the study area. Conceptual level improvement alternatives were developed to improve the level of protection when the DPR stage reduces the gravity storm sewer outflow while maintaining the maximum allowable pumping rate of 240 cfs from the study area. **Since the three (3) existing Levee 37 pump stations have a cumulative maximum capacity of 60 cfs, this means 180 cfs of additional proposed pumping capacity is allowable.** Improvement projects analyzed include:

- Increasing pumping capacity at Pump Stations #1 and #2
- A new pump station for the City drainage
- Providing upstream flood storage with Pump Station #1 and #2 pumping capacity increase to improve the level of protection
- Storm sewer improvements to improve conveyance in known flood prone areas

3.1 ALTERNATIVE 1 – PUMP STATION #2 UPGRADE

Alternative 1 consists of increasing the pumping capacity at Pump Station #2. Under current conditions, Pump Station #2 can achieve a maximum pumping capacity of 25.5 cfs. The existing 10-year storm event cumulative maximum flowrate from the gravity outfalls tributary to Pump Station #2 is 274 cfs. Results from the modeling analysis indicate that in order to maintain the 10-year storm event flow capacity during conditions where the DPR water level elevation degrades the gravity outflow, an additional 225 cfs of pumping capacity is required. Because only 180 cfs of cumulative additional pumping capacity is allowed (for both Pump Station #1 and #2), the proposed additional rate for Alternative 1 at Pump Station #2 was calculated to be 120 cfs. To obtain this additional pumping capacity, this alternative consists of constructing a new pump station adjacent to the existing pump station to house **three (3) new 40 cfs pumps**. Section 3.9 of this report includes a discussion on the feasibility of upgrading the existing pump station. To convey the additional flow to the pump station, **two (2) 5-foot by 5-foot RCBCs** are proposed to replace the existing 30-inch RCP diversion sewers that currently convey flow from the north and south trunk storm sewers to Pump Station #2. The wet well for the proposed pump station would be connected to the existing wet well so stormwater can be conveyed to both pump stations and the pump controls can be modified to utilize all six (6) pumps. The modeling analysis also shows that the existing start control elevations are set too high to start evacuating water before ponding along North Park Drive begins. Therefore, this and all alternatives include modifying the controls of existing pumps so that pumping begins earlier that it currently does. The proposed pump start control elevations for both the existing and proposed pumps are provided in Table 3.

Table 3. Pump Station #2 Proposed Pump Controls

Pump Station ID	Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
Pump Station #2	SWP-1	8.5	631.25	629
	SWP-2	8.5	632.25	630
	SWP-3	8.5	633.25	631
Proposed Pump Station	Prop 1	40	-	629
	Prop 2	40	-	630
	Prop 3	40	-	631

Exhibit 7 shows the configuration of Alternative 1 and the resulting 10-year inundation map. This alternative reduces the risk of flooding for a number of structures currently at-risk of flooding during the 2-, 5-, and 10-year storms. Table 4 provides the number of structures at-risk of flooding for existing conditions and those removed from the inundation area with Alternative 1 improvements.

Table 4. Alternative 1 – At-Risk Structures Summary Table

Storm Event	Existing Conditions At-Risk Homes	Alternative 1 At-Risk Homes	At-Risk Homes Removed from Inundation Area
2-Year	9	0	9
5-Year	13	1	12
10-Year	19	10	9

Alternative 1 is not recommended because it does not remove all 19 at-risk structures in the Pump Station #2 drainage area from the 10-year inundation area. This alternative does produce a significant improvement of the level of protection during non-gravity sewer outflow conditions.

The estimated cost of Alternative 1 is $1.8 million.

3.2 ALTERNATIVE 2 – PUMP STATION #2 UPGRADE & PROPOSED PROSPECT HEIGHTS PUMP STATION

As previously mentioned, a 48-inch storm sewer conveys water across Seminole Lane from the City to the Village and into the Village's storm sewer system on Park Drive just south of Seminole Lane. This 48-inch storm sewer combines with another trunk storm sewer along Seneca Lane and then heads southeast towards Pump Station #2. Alternative 2 proposes to disconnect this 48-inch storm sewer from the Village's sewer system and provide a new gravity storm sewer outfall and pump station to the DPR in the City. The proposed 48-inch storm sewer configuration is shown in Figure 8 starting at the Willow Woods Condominium detention ponds. A new pump station with a 20 cfs capacity is required at this outfall to evacuate stormwater when the DPR is high.

The simulation results indicate that a new pump station would still be required at Pump Station #2 to adequately evacuate stormwater from the Village's drainage area. The new pump station

adjacent to Pump Station #2 would be limited to a maximum pumping rate of 100 cfs provided in **three (3) 33 cfs pumps** to meet the 120 cfs maximum allowable pumping rate for this pump station's drainage area. The configuration of the proposed pump station is identical to Alternative 1, with the exception of the reduced pumping rate. The proposed start control elevations for the existing and proposed pump stations are the same as Alternative 1 and are shown in Table 3. The total cumulative maximum pumping rate from both proposed pump stations is 120 cfs, which is equivalent to the maximum pumping rate provided in Alternative 1. Benefits provided in Alternative 2 are nearly identical to the benefits provided by Alternative 1.

Alternative 2 is not recommended due to the higher cost of constructing two (2) separate pump stations to pump the same 120 cfs flowrate. Figure 8 provides a schematic for the Alternative 2.

The estimated cost of Alternative 2 is $2.7 million.

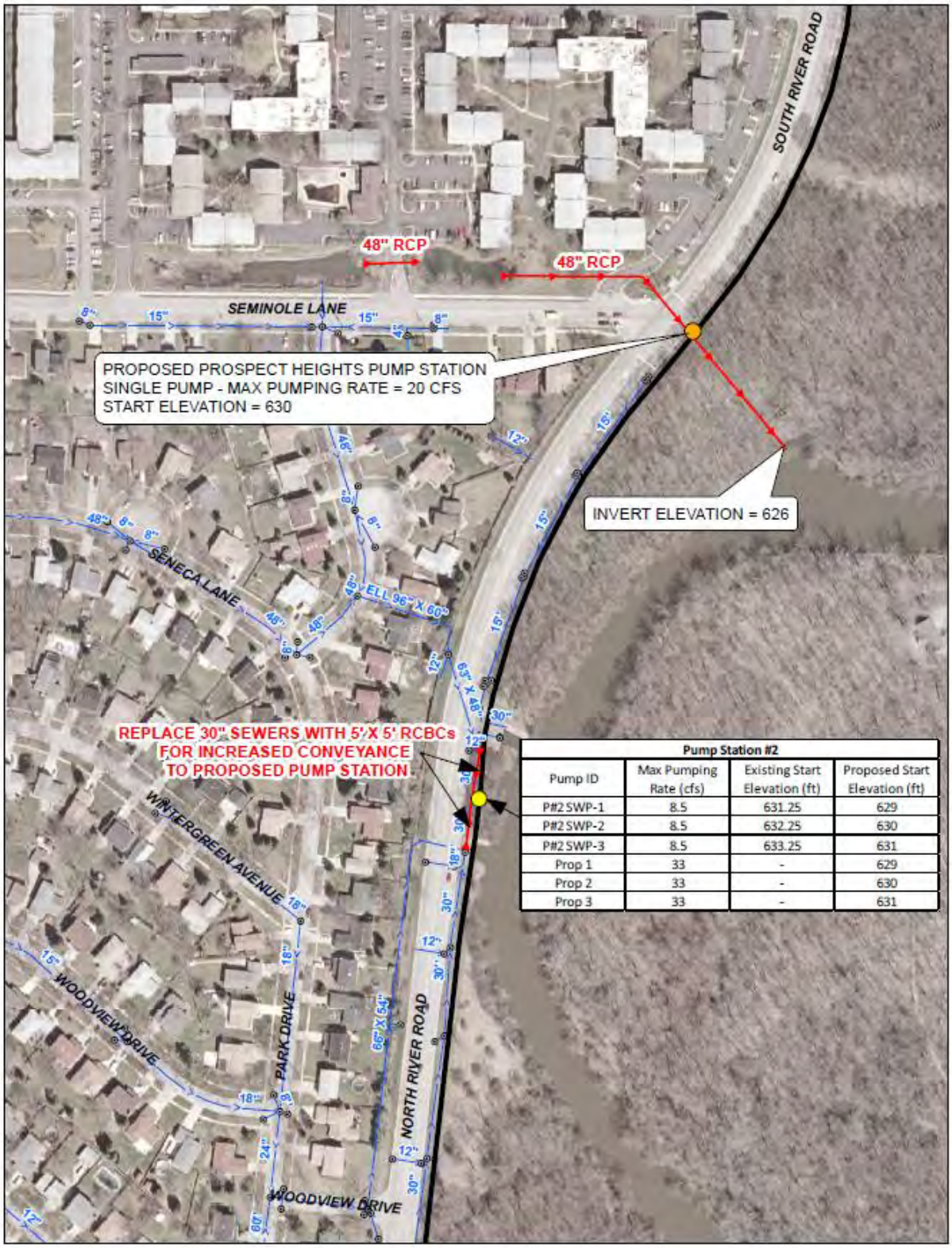


Figure 8. Alternative 2 Schematic

3.3 ALTERNATIVE 3 – PUMP STATION #2 UPGRADE & PROPOSED UPSTREAM STORAGE

The purpose of Alternative 3 is to further refine Alternative 1 by providing stormwater storage in an open space upstream of Pump Station #2 to increase the level of protection with the increase in capacity for Pump Station #2. The proposed stormwater storage location is within an open space at Robert Frost Elementary School property. This area was selected for stormwater storage due to its location relative to adjacent trunk storm sewers that would allow a larger diversion of storm flow, and the availability of open space.

Alternative 3 proposes to intercept flow from two (2) trunk sewers flowing west to east in the Pump Station #2 drainage area. A proposed 48-inch storm sewer will intercept flow from the 42-inch trunk storm sewer at the intersection of Aztec Lane and Oneida Lane, and convey it south to the proposed excavated stormwater storage area. A 6-inch diameter restrictor is proposed on the existing trunk storm sewer to allow low flows to continue east and higher flows to be diverted south to the proposed stormwater storage area. This improvement also conveys stormwater flow from the intersection of Maya Lane and Oneida Lane, where a 48-inch storm sewer combines with a 27-inch storm sewer, into the stormwater storage area through a proposed 60-inch storm sewer. A 12-inch diameter restrictor on the Maya Lane trunk storm sewer allows water to back up into the stormwater storage area and drain by gravity (no pump station) following the storm event. It was found that approximately **11.8 acre-feet of storage volume** could be achieved within the shown footprint on Exhibit 8.

The Alternative 3 improvements reduce the flowrates on the Aztec and Seneca Lane trunk storm sewer from about 46 cfs to 1 cfs, and on the Maya Lane trunk storm sewer from about 49 cfs to 7 cfs. Although flows to Pump Station #2 are greatly reduced with the proposed stormwater storage, additional pumping capacity is still required to reduce the flooding within the low-lying areas. The pump controls and configuration are the same as Alternative 1, with the exception of a reduced pumping rate. The proposed pump station requires a maximum pumping rate of 105 cfs which is provided by **three (3) 35 cfs pumps** (Alternative 1 pump rate is 120 cfs). Only 105 cfs of pumping capacity is required to eliminate the risk of flooding for homes up to the 10-year storm event. Alternative 3 reduces the flood depth at Park Drive and Seneca Lane from 2.3 feet to 0.6 feet, and eliminates ponding at Park Drive and Woodview Drive for a 10-year storm event. **All homes at-risk of flooding during the 2-, 5-, and 10-year storm events are removed from the existing inundation area with this improvement.** Exhibit 8 shows the conceptual layout for Alternative 3 and the resulting inundation map.

Currently, the proposed excavated stormwater storage for Alternative 3 is shown in the southern portion of open space within the school property. The location of the stormwater storage area can be adjusted to accommodate the needs of the Robert Frost Elementary School and the Village. Another viable, but more costly option, would be to provide the stormwater storage in an underground vault and restore the open space to its current condition.

Alternative 3 is recommended because it provides the best flood reduction benefit of all the Pump Station #2 alternatives, removing all at-risk homes from the 10-year inundation area.

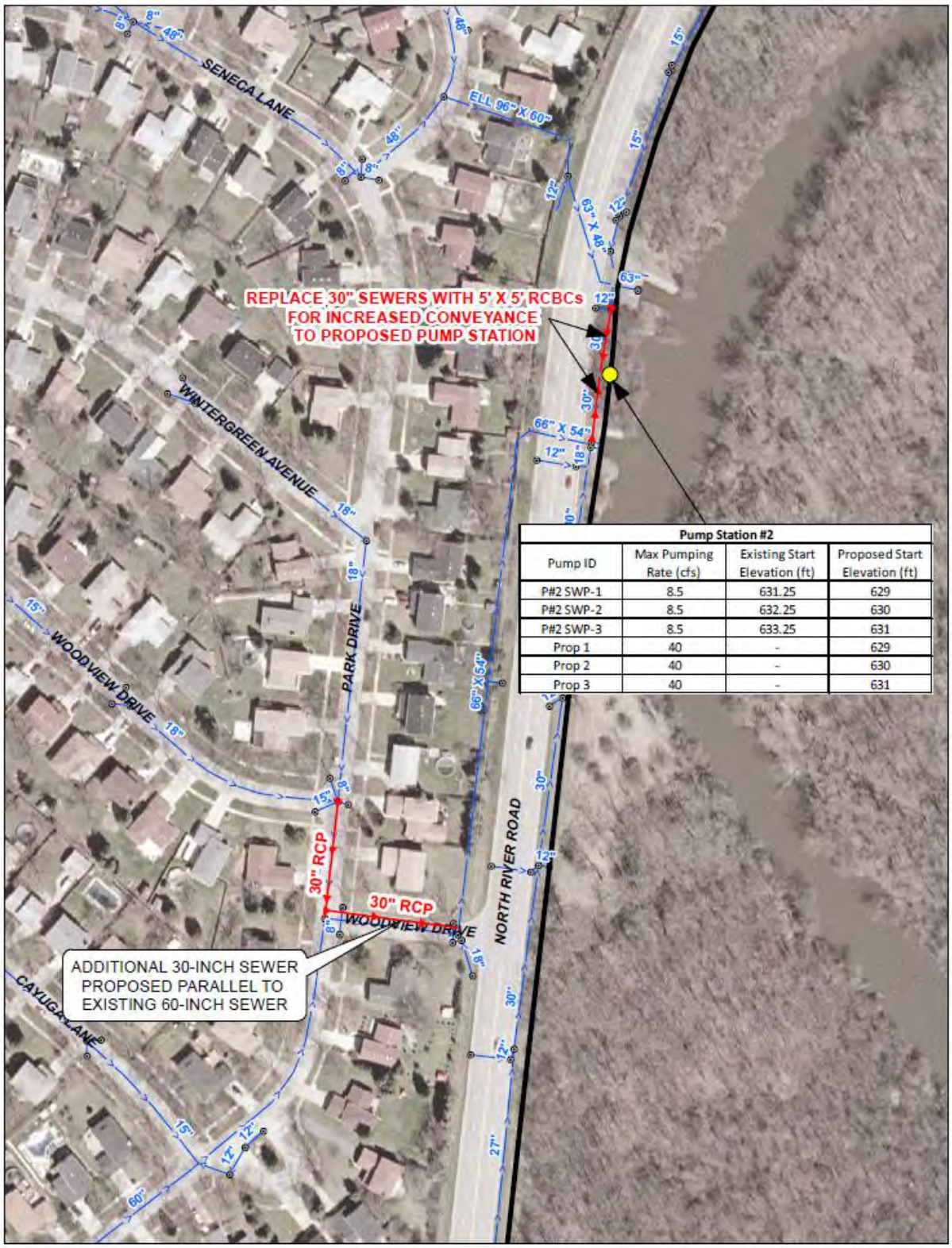
The estimated cost of Alternative 3 is $3.6 million.

3.4 ALTERNATIVE 4 – PUMP STATION #2 UPGRADE & PROPOSED SEWER IMPROVEMENTS

Alternative 4 is identical to Alternative 1 except that Alternative 4 includes storm sewer improvements along Park Drive and Woodview Drive. Under existing conditions, an 18-inch storm sewer drains south down Park Drive between Wintergreen Avenue and West Woodview Drive, and drains to a "back-pitched" 24-inch storm sewer for a short distance between West Woodview Drive and East Woodview Drive. The 24-inch storm sewer combines with a 60-inch storm sewer from the south and drains into a 60-inch trunk storm sewer draining east down East Woodview Drive. Alternative 4 is intended to relieve this restriction at Park Drive and East Woodview Drive and eliminate the "back-pitched" pipe on Park Drive. The proposed improvement, as shown on Figure 9, provides an additional 30-inch storm sewer adjacent to the 60-inch trunk storm sewer on East Woodview Drive. The existing "back-pitched" 24-inch storm sewer is proposed to be replaced with a positive sloped 30-inch storm sewer. These improvements result in an additional 0.1-foot flood depth reduction at the intersection of Park Drive and Woodview Drive for the 10-year storm event. The conveyance improvements also show minimal benefits for the 2- and 5-year storm.

Alternative 4 is not recommended because the cost of the additional sewer conveyance improvements outweighs the minimal benefit. Figure 9 provides a schematic for the Alternative 4.

The estimated cost of Alternative 4 is $2.0 million.



Pump Station #2			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.25	629
P#2 SWP-2	8.5	632.25	630
P#2 SWP-3	8.5	633.25	631
Prop 1	40	-	629
Prop 2	40	-	630
Prop 3	40	-	631

Figure 9. Alternative 4 Schematic

Table 5 below provides a comprehensive summary of the modeling results for all Pump Station #2 drainage area improvement alternatives.

Table 5. Pump Station #2 Drainage Area Improvement Alternatives – 10-Year Storm Results Summary Table

Improvement Alternative	Additional Maximum Required Pumping Rate (cfs)	Proposed Flood Storage Volume (ac-ft)	Park Drive and Seneca Drive		Park Drive and Woodview Drive		At-Risk Homes Removed from 10-year Inundation Area[2]
			Resulting Flood Depth (ft)	Flood Depth Reduction (ft)	Resulting Flood Depth (ft)	Flood Depth Reduction (ft)	
1	120	-	1.5	0.8	1.7	0.2	9
2	120	-	1.5	0.8	1.7	0.2	9
3	105	11.8	0.6	1.7	0.0	1.9	19
4[1]	120	-	1.5	0.9	1.6	0.3	9

[1]Includes storm sewer upgrades as described in Section 3.5

[2]Based on low overtopping or low entry elevations provided in the field survey (existing conditions at-risk homes is 19)

3.5 ALTERNATIVE 5 – PUMP STATION #1 UPGRADE

Alternative 5 consists of increasing the pumping capacity at Pump Station #1. Under current conditions, Pump Station #1 can achieve a maximum pumping capacity of 17 cfs. Because only 180 cfs of cumulative additional pumping capacity is allowed for both Pump Station #1 and #2, the proposed additional rate for Alternative 5 at Pump Station #2 is 60 cfs. To obtain the additional pumping capacity, this alternative consists of constructing a new pump station adjacent to the existing pump station to house **two (2) new 30 cfs pumps**. The wet well for the proposed pump station would be connected to the existing wet well so stormwater can be conveyed to both pump stations and the pump controls can be modified to utilize all four (4) pumps. The proposed pump start control elevations for both the existing and proposed pumps are provided in Table 6.

Table 6. Pump Station #1 Proposed Pump Controls

Pump Station ID	Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
Pump Station #1	P#2 SWP-1	8.5	631.75	630.00
	P#2 SWP-2	8.5	634.00	631.00
Proposed Pump Station	Prop 1	30	-	630.00
	Prop 2	30	-	631.00

Exhibit 9 shows the resulting inundation map with the Alternative 5 improvement**. This alternative reduces the risk of flooding for two (2) structures currently at-risk of flooding during the 5-year storm. There are minimal flood reduction benefits with this alternative for the 10-year storm.**

Table 7. Alternative 5 – At-Risk Structures Summary Table

Storm Event	Existing Conditions At-Risk Homes	Alternative 5 At-Risk Homes	At-Risk Homes Removed from Inundation Area
2-Year	0	0	0
5-Year	3	1	2
10-Year	4	4	0

Alternative 5 is not recommended because it of the minimal number of the nineteen (19) at-risk structures from the 10-year inundation area.

The estimated cost of Alternative 5 is $1.0 million.

3.6 ALTERNATIVE 6 – PUMP STATION #1 UPGRADE & PROPOSED UPSTREAM STORAGE

The purpose of Alternative 6 is to provide stormwater storage in an open space upstream of Pump Station #1 to increase the level of protection with the increase in pump capacity for Pump Station #1. Alternative 6 proposes to provide stormwater storage within open space located on the Indian Grove Elementary School property. This school property was selected for stormwater storage due to its location relative to adjacent trunk storm sewers that would allow a larger diversion of flow, and the availability of open space. This improvement allows stormwater flows from the intersection of Burning Bush Lane and Tano Lane, where trunk storm sewers combine, to back up into the stormwater storage area through a proposed 54-inch storm sewer. Approximately **7.0 acre-feet of stormwater storage volume** was created for this alternative within the footprint shown on the open space portion of the school property in Exhibit 10. The stormwater storage is provided in the northern portion of the open space on the school property and drains completely by gravity (no pump station is required). A 12-inch diameter restrictor on the trunk storm sewer just downstream of proposed 54-inch storm sewer allows low flows to pass through and higher flows to back up into the stormwater storage area and ultimately drain when the storm event has ended. The proposed stormwater storage reduces the flowrate on the Tano Lane trunk storm sewer from about 53 cfs to 15 cfs.

While flows to Pump Station #1 are reduced, a proposed pump station is still required to prevent the low-lying areas along Park Avenue from flooding. The pump controls and configuration are the same as Alternative 5, with the exception of a reduced pumping rate (Alternative 5 pumping rate is 60 cfs). The proposed pump station requires a maximum pumping rate of 40 cfs which is provided in **two (2) 20 cfs pumps**. Alternative 6 reduces the flood depth at South Park Drive from 2.0 feet to 0.8 feet. Exhibit 10 shows the conceptual layout for Alternative 6 and the resulting inundation map.

Currently, the proposed excavated stormwater storage for Alternative 6 is shown in the northern portion of open space at the school. The location of the stormwater storage area can be adjusted to accommodate the needs of Indian Grove Elementary School and the Village. Another viable,

but more costly option, would be to provide the stormwater storage in an underground vault and restore the open space to its current condition.

Alternative 6 is recommended because it provides the best flood reduction benefit of all the Pump Station #1 alternatives, removing all at-risk structures from the 10-year inundation area.

The estimated cost of Alternative 6 is $2.1 million.

3.7 ALTERNATIVE 7 – PUMP STATION #1 UPGRADE & PROPOSED SEWER IMPROVEMENTS

Alternative 7 is identical to Alternative 5 with the addition of sewer improvements along South Park Drive. Under existing conditions, a 12- to 15-inch storm sewer drains south down Park Drive between Eastwood Lane and Tano Lane. The section of 15-inch storm sewer just south of the lowest catch basin in the low lying area is "back-pitched". This 15-inch storm sewer drains into the into the 60-inch trunk storm sewer draining east down Tano Lane. Based on the existing conditions analysis, the storm sewer on South Park Drive is undersized for the 10-year storm event, even under free-flow gravity outfall conditions, resulting in street inundation. Alternative 7 proposes to increase the storm sewer size on South Park Drive and eliminate the "back-pitched" section of storm sewer. The proposed improvement replaces the existing storm sewer with an 18- to 24-inch storm sewer. This alternative provides minimal benefits (< 0.1 foot WSEL reduction) for the 5- and 10-year storms because the allowed pump capacity increase of 60 cfs at Pump Station #1 cannot adequately drain all stormwater, resulting in a level pool along the South Park Drive depression. Figure 10 shows the conceptual layout for Alternative 7.

Alternative 7 is not recommended because the cost of the additional sewer conveyance improvements outweighs the minimal benefit.

The estimated cost of Alternative 7 is $1.3 million.

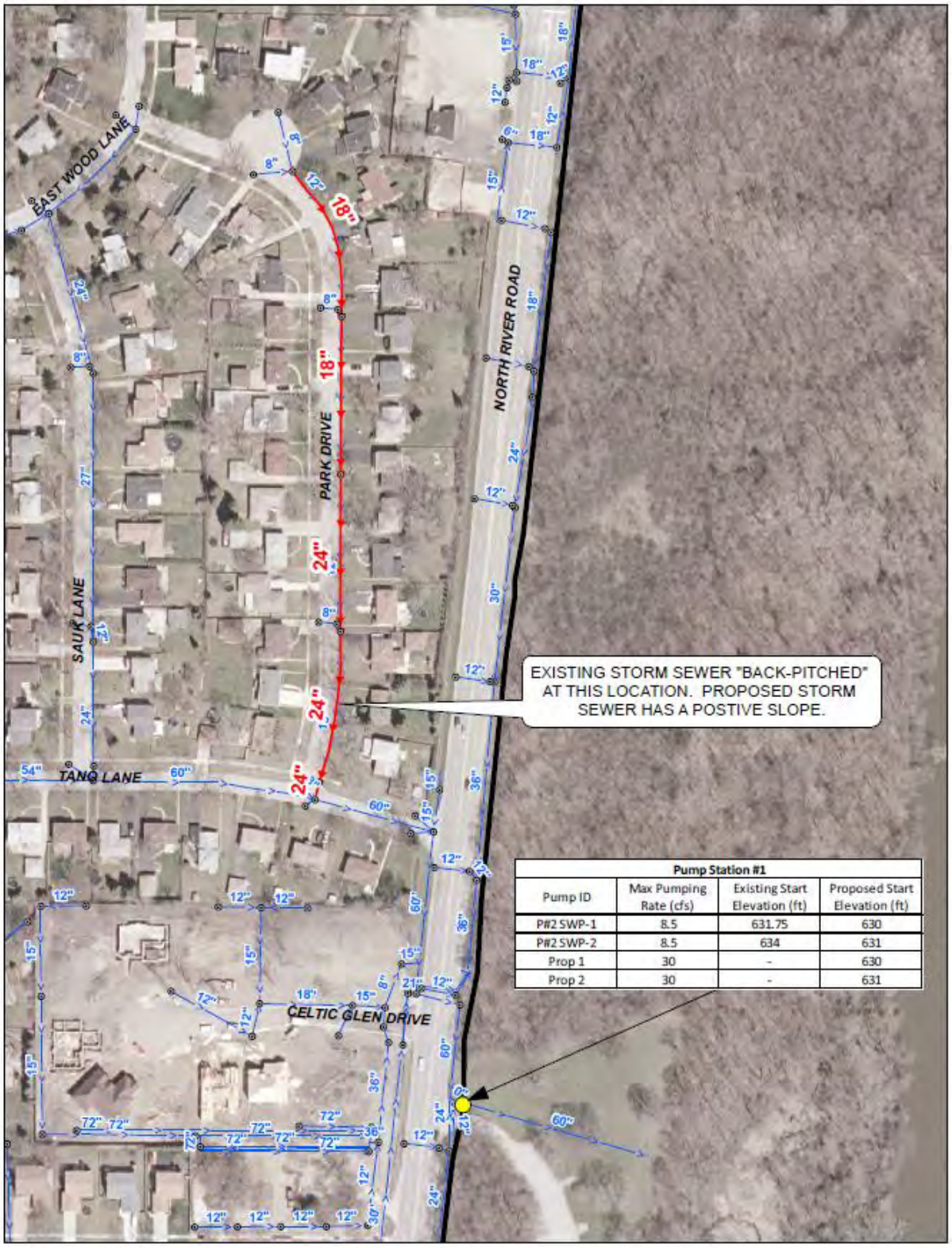


Figure 10. Alternative 7 Schematic

Table 8 below provides a comprehensive summary of results for all Pump Station #1 drainage area improvement alternatives.

Table 8. Pump Station #1 Drainage Area Improvement Alternatives – 10-Year Storm Results Summary Table

Improvement Alternative	Additional Maximum Required Pumping Rate (cfs)	Proposed Flood Storage Volume (ac-ft)	South Park Drive		At-Risk Homes Removed from 10-year Inundation Area[2]
			Resulting Flood Depth (ft)	Flood Depth Reduction (ft)	
5	60	-	1.9	0.1	0
6	40	7.0	0.8	1.2	4
7[1]	60	-	1.9	0.1	0

[1]Includes storm sewer upgrades as described in Section 3.7

[2]Based on low overtopping or low entry elevations provided by field survey (existing condition at-risk homes is 4)

3.8 ALTERNATIVE 8 – 25-YEAR LEVEL OF PROTECTION IMPROVEMENT

Existing Conditions

The 25-year storm event was simulated for existing conditions for both free-flow gravity outfall conditions and for the 10-year Des Plaines River (DPR) tailwater. Based on the critical duration analysis, the 2-hour storm produced the maximum flows and flood stages within the study area. Previously, it was determined that the existing storm sewer system has approximately a 10-year storm event capacity, although some surcharging occurs. The existing conditions XPSWMM model was simulated with free-flow gravity outfall conditions. Results from this 25-year storm event analysis indicate that more significant sewer surcharging and flooding occurs in the low-lying areas. As seen in Exhibit 11, seven (7) homes are at-risk of flooding.

The existing conditions XPSWMM model was simulated with the FEMA FIS 10-year DPR flood elevation, which eliminated all gravity flow from the sewer outfalls and forced all stormwater to be evacuated with the pump stations. The maximum pumping capacity of Pump Station #1 and Pump Station #2 are 17 cfs and 25.5 cfs, respectively. Results from this simulation show flooding of at risk structures due to the limited capacity of the storm sewer system and the limited capacity of the pump stations. A flood inundation map for the 25-year storm event with a 10-year FEMA FIS tailwater is provided in Exhibit 12. CBBEL identified thrity (30) homes at-risk of flooding for this storm event.

25-Year Improvement Alternative

An improvement alternative was developed to provide a 25-year storm event level of protection with additional storm sewer conveyance and increased pumping capacity. This alternative did not include creating additional stormwater storage. First, the 25-year storm event with free-flow gravity outfall conditions was used to identify conditions in the storm sewer system that lead to

flooding. Once these conditions were identified, additional storm sewer conveyance was provided to effectively reduce flooding for the 25-year storm event. In the Pump Station #2 drainage area, a new 36-inch relief sewer is proposed to run parallel along an existing trunk sewer starting at the intersection of Maya Lane and Burning Bush Lane. The 36-inch relief sewer continues on the same route as the existing trunk sewer to a new outfall to the DPR. Additionally, the existing storm sewer flowing south down Park Drive is proposed to be replaced with a larger sewer to provide increased conveyance from a low-lying flood prone area.

Additional storm sewer conveyance is also required in the Pump Station #1 drainage area. A new 36-inch relief sewer begins on Eastwood Lane west of Burning Bush Lane. The new relief sewer continues south along Burning Bush Lane and increases to a 42-inch sewer when it heads west down Tano Lane. The relief sewer continues to follow the alignment of the existing trunk sewer and ultimately drains to a new 42-inch outfall to the DPR. Additionally, the existing storm sewer flowing south down Park Drive is proposed to be replaced with a larger sewer to provide increased conveyance from a low-lying flood prone area. The proposed outfalls will result in increased flows to the DPR from existing conditions only when the DPR is low. Once the DPR begins to rise, these flows will be significantly reduced. A summary of these flow increases is provided in Table 9.

Table 9. 25-Year Improvement Alternative Proposed Outfall Flowrate Increases (No Tailwater)

Drainage Area	Existing Maximum Flowrate From Outfalls (cfs)	Proposed Maximum Flowrate From Outfalls (cfs)	Flowrate Increase (cfs)
Pump Station #1	149	184	35
Pump Station #2	309	346	37
Total	458	530	72

The storm improvements described above were analyzed for a 25-year storm event with FEMA FIS 10-year tailwater conditions to determine the required pump station capacity upgrades. The amount of additional required pumping capacity was determined based on achieving 25-year storm event level of protection for all at-risk homes. The proposed additional pumping rate for Pump Station #2 was calculated to be 330 cfs. To obtain this additional pumping capacity, a new pump station must be constructed adjacent to the existing pump station to house three (3) new 110 cfs pumps. The proposed additional pumping rate for Pump Station #1 was calculated to be 160 cfs which can be provided in a new pump station constructed adjacent to the existing pump station to house two (2) new 80 cfs pumps. The total cumulative proposed pump capacity increase from the study area for the 25-year storm event level of protection improvement alternative is 490 cfs. Exhibit 13 shows the proposed sewer schematic with pump station upgrades and the resulting 25-year storm event inundation area. This improvement alternative removes all at-risk homes from the 25-year storm event inundation area. A summary of the 25-year storm event improvement alternative is provided in Table 10.

Table 10. 25-Year Improvement Alternative Results Summary (With Tailwater)

Location	Existing Flood Depth (ft)	Proposed Flood Depth (ft)	Flood Depth Reduction (ft)
Park Drive and Seneca Drive	2.6	0.5	2.1
Park Drive and Woodview Drive	2.0	0.9	1.1
South Park Drive	2.3	0.0	2.3

A summary of pump station capacity upgrades from existing to proposed conditions is shown in Table 11.

Table 11. 25-Year Improvement Alternative Pump Capacity Increases

Drainage Area	Existing Pump Capacity Flowrate (cfs)	Proposed Pump Capacity Flowrate Increase (cfs)
Pump Station #1	17	160
Pump Station #2	25.5	330
Total	42.5	490

25-year Improvement Conclusion

At the request of the Village, CBBEL developed a 25-year storm event level of protection improvement alternative to remove all at-risk structures for FEMA FIS 10-year DPR tailwater conditions. Two proposed sewer outfalls are required for the Pump Station #1 and #2 drainage areas, which increase flowrates to the DPR under free-flow gravity outfall conditions. Additionally, pump station capacity upgrades are necessary to maintain a 25-year storm event level of protection during the FEMA FIS 10-year DPR tailwater conditions which eliminates all flow from the gravity sewer outfalls. The cumulative pump capacity flowrate increase from the study area was calculated to be 490 cfs.

Based on the pre-Levee 37 analysis (see Section 2.1), CBBEL determined the amount of historic overland flow to the DPR for a 10-year storm in the study area while the DPR is at the FEMA FIS 10-year flood elevation to be 240 cfs. The existing three (3) pump stations have a combined capacity of 60 cfs, therefore the allowable increase in pumping capacity is 180 cfs. **Because the 25-year improvement alternative proposes to pump an additional 490 cfs, the proposed pump station upgrades may not be feasible from a permitting standpoint.** Because new sewer outfalls are required for the 25-year improvement alternative, additional permitting may be required. Permits required, but not limited to, may include:

- A floodway construction permit from the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR)
- A regulatory permit from the US Army Corps of Engineers (USACOE)
- Authorization from the Cook County Forest Preserve (CCFP)

The estimated cost of Alternative 8 is $12.3 million.

3.9 ALTERNATIVE 9 – 25-YEAR LEVEL-OF-PROTECTION IMPROVEMENT WITH ALLOWABLE PUMPING RATE

At the request of the Village, CBBEL analyzed an additional 25-year storm event level of protection improvement alternative using the allowable pump rate of 240 cfs from the study area. This alternative was developed to determine how much storage volume needed to be created to achieve a 25-year level of protection while maintaining the 240 cfs flowrate. As previously discussed the allowable pump rate increase is 180 cfs. Similar to Alternatives 3 and 6, the storage areas are proposed at Robert Frost Elementary in the Pump Station #2 drainage area and at Indian Grove Elementary in the Pump Station #1 drainage area because these are the only availbale open spaces in hydraulically effective locations. Approximately 18.0 acre-feet of flood storage is proposed in the open space at Robert Frost Elementary, and 12.0 acre-feet at Indian Grove Elementary. Similar to Alternatives 3 and 6, both storage areas are intended to divert flow from the adjacent trunk sewers with the use of restrictors on the existing downstream pipes. This reduces the amount of flow conveyed downstream to the pump stations.

Pump capacity increases are required to achieve a 25-year storm event level of protection. The proposed additional pumping rate for Pump Station #2 was calculated to be 120 cfs which can be provided in a new pump station constructed adjacent to the existing pump station to house three (3) new 40 cfs pumps. The proposed additional pumping rate for Pump Station #1 was calculated to be 60 cfs which can be provided in a new pump station constructed adjacent to the existing pump station to house two (2) new 30 cfs pumps.

Exhibit 14 shows the proposed improvement schematic with pump station upgrades and the resulting 25-year storm event inundation area. This improvement alternative removes all but two (2) at-risk homes from the 25-year storm event inundation area during a DPR tailwater condition. The modeling indicates that the simulated flood elevations for these two homes are approximately 0.5-feet higher than their low entry elevation. CBBEL recommends that floodproofing measures, such as raising the sidewalk, be used to protect these two homes from flooding during the 25-year storm event. A summary of the 25-year storm event level of protection improvement alternative benefits is provided in Table 12.

Table 12. 25-Year Improvement Alternative Results Summary (With Tailwater)

Location	Existing Flood Depth (ft)	Proposed Flood Depth (ft)	Flood Depth Reduction (ft)
Park Drive and Seneca Drive	2.6	1.1	1.5
Park Drive and Woodview Drive	2.0	1.6	0.4
South Park Drive	2.3	1.1	1.2

The estimated cost of Alternative 9 is $7.5 million.

3.10 PUMP STATION DESIGN CONSIDERATIONS

The pump station upgrades discussed in the previous sections are summarized in Table 13. The existing pump stations' effectiveness can be increased by lowering the existing pump setpoints. The limits of the existing pumps' minimum submergence levels will need to be reviewed during design with the pump manufacturer. It is assumed that modifications to the existing pump tubes will be required which may include formed suction intakes, tube extensions, and other ancillary components.

Table 13. Summary of Pump Station Upgrades

Alternative	Additional Pump Capacity (cfs)	No. of Pumps & Capacity
1	120	(3) @ 40 cfs/pump
2	20	(2) 10 cfs/pump
	100	(3) 33 cfs/pump
3	105	(3) @ 35 cfs/pump
4	120	(3) @ 40 cfs/pump
5	60	(2) @ 30 cfs/pump
6	40	(2) @ 20 cfs/pump
7	60	(2) @ 30 cfs/pump
8	490	PS #2 (3) @ 110 cfs/pump PS #1 (2) @ 80 cfs/pump
9	180	PS #2 (3) @ 40 cfs/pump PS #1 (2) @ 30 cfs/pump

Depending on the alternative selected, it is assumed that a new poured in place concrete pump station structure will be constructed adjacent to or in the vicinity of existing Pump Stations #1 and #2 to house the proposed additional capacity pumps. The pump station's layout will be similar to the existing Pump Stations which utilize submersible, axial flow propeller pumps mounted in a steel discharge tube; cast iron flap gates mounted to the discharge tube; and a concrete deck to locate the NEMA 3R motor control center (MCC) and pump station electrical controls. A new three phase, 480 volt electric utility (ComEd) service will be required and sized for the load to be served dependent on pump motor size. Standby power has not been considered for this analysis but should be considered during the design phase for backup in case of loss of utility power.

The existing pump station structure is not large enough to accommodate the larger pumps and still satisfy Hydraulic Institute (HI) Standards for sump dimensions (for the larger capacity pumps). It is recommended to keep the existing station in service during construction of the new station and incorporate it into the permanent alternative solution to handle smaller storm events, and provide a stepped or ramped pumping capacity.

CHAPTER 4 DPR DOWNSTREAM IMPACTS ANALYSIS

To analyze the potential hydraulic impact to the DPR from the proposed pumping rate increase, a conceptual level hydraulic modeling analysis was performed. The unsteady HEC-RAS hydraulic model developed as part of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) Detailed Watershed Plan (DWP) for the Lower DPR was used for this analysis. The unsteady HEC-RAS model references flow hydrographs from a previously created HEC-HMS model to simulate stage versus time along the DPR. Design storms were analyzed to assess potential DPR hydraulic impacts.

4.1 DESIGN STORMS DOWNSTREAM IMPACTS ANALYSIS

Based on the relatively large size of the DPR watershed and its long flow paths, previous modeling determined the critical design storm to be the 10-day event. The critical design storm for the study area, as determined by the existing condition XPSWMM analysis, is the 2-hour storm. To conservatively analyze the effect of the increased pump rates from the study area on the DPR, Alternative 1 and Alternative 5 were analyzed for the 2-, 10-, and 100-year storms with FEMA FIS 10-year flood event elevation. This DPR elevation eliminates all flow from the gravity storm sewer outfalls. Alternatives 1 and 5 proposed the largest pump capacity increases of 120 cfs and 60cfs, respectively, for a total flow increase of 180 cfs to the DPR. The pump outfall hydrographs from each pump station were input into the HEC-RAS model at the nearest downstream cross section as lateral inflow hydrographs. Inputting the pump outfall hydrographs directly into the HEC-RAS model is a conservative estimate of impacts; because the area drained by the pump stations is also included in the HEC-HMS model. Next, the resultant hydrographs at cross sections near the study area were compared to the baseline conditions hydrographs. The proposed pumps cause a small increase in the DPR elevation at the beginning of the simulation, approximately ten (10) days before the maximum stage in the DPR occurs. The area of the river reach with the largest increase is located at the cross section accepting flows from Pump Station #2. Figure 11 shows the 100-year proposed hydrograph at this cross section compared to the baseline hydrograph.

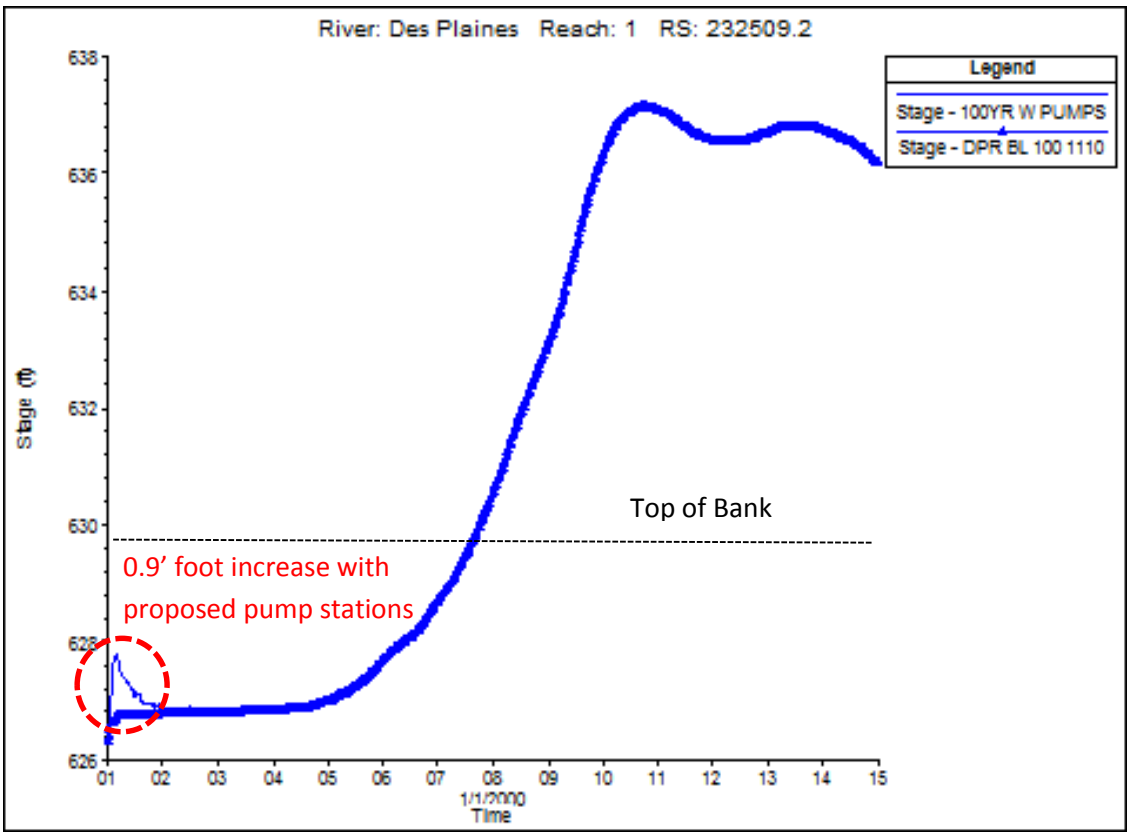


Figure 11. 100-Year DPR Hydrograph at Pump Station #2

The lowest contour elevation along the DPR bank at Pump Station #2 is 628 feet, therefore the potential stage increase from the proposed pump station is contained completely within the channel.

4.2 DOWNSTREAM IMPACTS ANALYSIS CONCLUSION

Based on the HEC-RAS analysis of downstream impacts, CBBEL believes the allowable increase in proposed pump station capacity of 180 cfs to the DPR would be acceptable with a defined operating procedure in place. The proposed pump stations capacity increase have minimal impact on the DPR flood elevations when analyzing design storms. The difference in critical durations between the DPR and the study area results in a minor stage increase 10 days before the peak of the DPR.

There are potential scenarios when the DPR has risen to a point where the addition of the full 180 cfs proposed pump capacity could result in an increase in the DPR flood stage that could cause an adverse impact to downstream roadways, properties and structures. The United States Geological Service (USGS) stream gage #05529000 - Des Plaines River near Des Plaines is located at Euclid Avenue approximately 5,000 feet and 1,200 feet downstream of Levee 37 Pump Stations #2 and #1, respectively. The National Weather Service (NWS) uses this gage with their Advance Hydrologic Prediction Service to forecast the DPR stage during flood conditions. The NWS has

established stage elevations at this gage that reflect Flood Stage, Moderate Flood Stage and Major Flood Stage based on potential downstream roadway, property and structure inundation.

An operational protocol should be developed that would determine how many and when the proposed pumps could be operational. We recommend a Supervisory Control and Data Acquisition (SCADA) system be employed to take the current gage information control the on and off functions of the proposed pumps. This would be an automated system that would optimize the level of protection for the Village residential areas while reducing the risk of adversely impacting DPR flooding at risk downstream roadways, properties and structures

The development of this operational protocol is beyond CBBEL's current scope of services but should be develop if the Village pursues any of the improvement alternatives that include an increase in pumping capacity.

CHAPTER 5 CONCLUSION

The purpose of the Levee 37 project is to protect the Village's study area and a portion of the City from DPR overbank flooding. Based on the existing conditions analysis discussed in Chapter 2, the storm sewer system in the study area has approximately a 10-year storm event capacity under free-flow outfall conditions (no flow capacity reduction from the DPR water level elevation).

Based on discussions with the USACOE, the existing pump stations were designed for sewer flows assuming non-coincident hydrograph peaks between the study area discharge and the flows in the DPR. One of the implications of non-coincident peaks is that runoff during a storm event from the study area would be receding before the rise in the DPR is significant enough to reduce or eliminate flows from the gravity sewer outfalls. The CBBEL analysis performed in this study confirmed that the assumption of negligible impact to the storm sewer system from the DPR water level elevations is a reasonable assumption for design storms. However, the analysis for the historic April 2013 storm demonstrated that the DPR stage hydrograph reduces the ability of the storm sewer system to discharge flow during the rainfall event resulting in the pump stations to be turned on. The analysis further demonstrated that the level of the DPR does not need to reach a peak level to degrade the capacity of the gravity storm sewer system. Events at and below the DPR 2-year flood event level have a significant adverse impact.

The pumps are programmed to activate mostly to evacuate any residual stormwater in the storm sewer system while the DPR stage is elevated. This design methodology results in the existing design capacity of the pump stations being low compared to the capacity of the gravity storm sewer outfalls during a free outfall condition. Because of the limited capacity of the existing pump stations, the capacity of the storm sewer system is quickly degraded when the DPR water level elevation rises and a storm event is occurring in the study area simultaneously.

Prior to the development of the existing residential subdivision within the study area, the land drained overland directly to the DPR. Once developed, during periods when the residential subdivision's storm sewers surcharge, ponding would initially occur within low-lying areas until flooding levels filled the streets and stormwater would flow overland down the streets until crossing River Road and into the DPR prior to the construction of the Levee 37 floodwall.

The construction of the Levee 37 floodwall blocked this overland flow capacity, but the pumps constructed as part of the Levee did not maintain this flow capacity. An XPSWMM simulation was performed for pre-Levee 37 conditions to analyze the amount of overland flow to the DPR for a 10-year storm in the study area while the DPR is at the FEMA FIS 10-year flood elevation. The maximum overland flowrate over River Road to the DPR is approximately 240 cfs. The existing pump stations have a combined capacity of 60 cfs. This means that the Village could increase the pumping capacity up to this flow rate with any future enhancements to the pump stations. Because the three (3) existing Levee 37 pump stations have a maximum capacity of 60 cfs, the allowable increase in pumping rate is 180 cfs.

CBBEL analyzed nine (9) proposed improvement alternatives to improve the level of protection when the DPR stage restricts the gravity storm sewer outfall capacity. Table 14 summarizes the components, benefits and costs of the nine (9) proposed improvement alternatives.

A conceptual level downstream hydraulic impacts analysis was performed to assess potential adverse increases in the DPR water level elevation. Alternatives 1 and 5 were used for the downstream impacts analysis because they increase the three Levee 37 (3) pump stations capacity to the allowable 240 cfs. Based on this conceptual level analysis, it is CBBEL's opinion the maximum flowrate increases from the proposed pump stations (180 cfs) to the DPR would be acceptable with defined operating protocols. These operating protocols would determine when the pumping rate for new pump stations should be limited or "shut-off" depending on the DPR water level elevation recorded at the nearby downstream USGS gage. The existing pumps would remain on and continue pumping a lesser flow from the study area to the DPR. We recommend that pump station operational protocol be developed when the Village selects and pursues an improvement alternative.

After analyzing all the improvement alternatives, CBBEL recommends the Village pursue Alternatives 3 and 6. The recommended improvements, Alternatives 3 and 6, opinion of probable cost are $3.6 million and $2.1 million, respectively based on a 2015 cost estimate.

As previously described in Sections 3.3 and 3.6, these alternatives include providing storage at upstream open space properties to provide a 10-year level of protection. At this point of the study, CBBEL believes that **Alternatives 3 and 6** should be recommended because:

- They provide the best flood reduction benefit of all the alternatives identified in this study, removing all twenty-three (23) at-risk homes from the 10-year inundation area.
- They involve adding flood storage on school and/or park district property. Village staff previously indicated that both the school district and park district may not be receptive to the idea repurposing their open space for flood storage. Therefore, this design is preliminary and flexible and can be adjusted to best meet the needs of both the Village, school district, and park district. Potential options include re-locating the storage area on the property or providing the storage in underground vaults at an increased cost.
- If Alternatives 3 and 6 and not feasible from the Village's standpoint, we would then recommend Alternatives 1 and 5 which are Levee 37 Pump Stations #1 and #2 capacity upgrades.
- These alternatives increase the cumulative pumping capacity to the DPR by 145 cfs. The study found the allowable flowrate increase to the DPR to be 180 cfs.
- Based on the initial findings of the downstream impacts analysis, CBBEL believes increasing the cumulative pump capacity to the DPR by a maximum of 180 cfs would be acceptable with an operating protocol in place. If the project goes forward, conversations with the CCFPD, MWRDGC and IDNR-OWR should occur.

Table 14. Master Summary Table

Pump Station Drainage Area Improvements	Improvement Alternative	Additional Maximum Required Pumping Rate (cfs)	Proposed Flood Storage Volume (ac-ft)	Park Drive and Seneca Drive		Park Drive and Woodview Drive		South Park Drive		At-Risk Homes Removed from 10-year Inundation Area[2]	Estimated Cost[3]
				Resulting Flood Depth (ft) [1]	Flood Depth Reduction (ft)	Resulting Flood Depth (ft) [1]	Flood Depth Reduction (ft)	Resulting Flood Depth (ft) [1]	Flood Depth Reductio n (ft)		
#2	1	120	-	1.5	0.8	1.7	0.2	-	-	9	$1.8 Million
	2	120	-	1.5	0.8	1.7	0.2	-	-	9	$2.7 Million
	3	105	11.8	0.6	1.7	0.0	1.9	-	-	19	$3.6 Million
	4	120	-	1.5	0.8	1.6	0.3	-	-	9	$2.0 Million
#1	5	60	-	-	-	-	-	1.9	0.1	0	$1.0 Million
	6	40	7.0	-	-	-	-	0.8	1.2	4	$2.1 Million
	7	60	-	-	-	-	-	1.9	0.1	0	$1.3 Million
#2 & #1	8[4]	490	-	0.5	2.1	0.9	1.1	0.0	2.3	30[5]	$12.3 Million
	9[4]	180	30.0	1.1	1.5	1.6	0.4	1.1	1.2	30[5]	$7.5 Million

[1]At the lowest catch basin in the depression
[2]Based on low overtopping or low entry elevations provided through field survey
[3]Based on 2015 dollar estimates
[4]Improvements alternatives 8 and 9 were developed for 25-year storm event level of protection
[5]Number of homes removed from 25-year inundation area

MJB/ELG/DRD/TTB

N:\MOUNTPROSPECT\150225\Water\Docs\R.Levee 37 Drainage Study 092215 Village

N

0 300 600 1,200

Feet

1 inch = 300 feet

Pump #3 Controls				
Pump ID	Max Pumping Rate (CFS)	Sump Elevation	Start Elevation	Stop Elevation
SWP-1	8.5	629.08	633	631.5
SWP-2	8.5		635	632.5

48" STORM SEWER CONVEYS FLOW FROM PROSPECT HEIGHTS TO MOUNT PROSPECT

Pump #2 Controls				
Pump ID	Max Pumping Rate (CFS)	Sump Elevation	Start Elevation	Stop Elevation
SWP-1	8.5	628	631.25	630
SWP-2	8.5		632.25	630.5
SWP-3	8.5		633.25	631.25

Pump #1 Controls				
Pump ID	Max Pumping Rate (CFS)	Sump Elevation	Start Elevation	Stop Elevation
SWP-1	8.5	627.5	631.75	629.75
SWP-2	8.5		634	631

CITY OF PROSPECT HEIGHTS

VILLAGE OF MOUNT PROSPECT

LEGEND

- STORM MANHOLE
- STORM SEWER
- LEVEE 37
- PUMP #1 SUBBASINS
- PUMP #2 SUBBASINS
- PUMP #3 SUBBASINS
- MUNICIPAL BOUNDARY

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

CLIENT: *VILLAGE OF MOUNT PROSPECT*

No.	DATE	NATURE OF REVISION		
			DSN.	MJB
			CHKD.	ELG
			SCALE	
			GIS USER	
			MODEL	ArcGIS 9.2
FILE NAME:				
DATE:				

TITLE: *STUDY AREA SUBBASIN & STORM SEWER MAP*

PROJ. NO. 15-0225

SHEET 1 OF 1

DRAWING NO. *EX 1*

0 300 600 1,200
Feet
1 inch = 600 feet

EAST PALATINE ROAD
SOUTH MILWAUKEE AVENUE
RAMP
PUMP STATION #3
SOUTH WOLF ROAD
PIPER LANE
LOVE DRIVE
WIMBLEDON CIRCLE
PLAZA DRIVE
APPLE DRIVE
CIDER LANE
TREE LANE
CRABAPPLE DRIVE
SEMINOLE LANE
COVE DRIVE
QUAKER LANE
SEMINOLE LANE
AZTEC LANE
ARALIA DRIVE
ASPEN DRIVE
SENECA LANE
(PUMP #2) N PARK DRIVE LOW C. B.
RIM EL. = 633.88
EX FLOOD WSEL = 636.84
EX FLOOD DEPTH = 2.96 FT
PUMP STATION #2
MOHAWK LANE
NORTH WOLF ROAD
NORTH MANDEL LANE
LAUREL DRIVE
LARCH DRIVE
MAYA LANE
WOODVIEW DRIVE
PARK DRIVE
CAYUGA LANE
(PUMP #2) S PARK DRIVE LOW C. B.
RIM EL. = 634.78
EX FLOOD WSEL = 636.88
EX FLOOD DEPTH = 2.10 FT
COLUMBINE DRIVE
EAST CAMP MC DONALD ROAD
NORTH RIVER ROAD
SOUTH WOLF ROAD
EAST WOOD LANE
EAST CARIB LANE
SITKA LANE
(PUMP #1) PARK DRIVE LOW C. B.
RIM EL. = 635.67
EX FLOOD WSEL = 637.71
EX FLOOD DEPTH = 2.04 FT
DES PLAINES RIVER
BURR OAK DRIVE
PUMP STATION #1
PIN OAK DRIVE
CHINKAPIN OAK DRIVE
CREE LANE
PIMA LANE
EAST EUCLID AVENUE
AZALEA LANE
IVY LANE
BASSWOOD LANE
KIOWA LANE
CHOLO LANE
BITTERSWEET LANE
PECOS LANE
MOKI LANE

LEGEND

- Pump Station
- Levee 37

APRIL 2013 STORM
FLOOD DEPTH (FT)

- 0 - 1
- 1 - 2
- 2 - 3
- 3- 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- >8

DSGN.	MJB	CHKD.	ELG

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CLIENT: VILLAGE OF MOUNT PROSPECT
PROJECT NO.: 15-0225
TITLE: APRIL 2013 STORM INUNDATION MAP WITH USGS GAGE TAILWATER & PUMPS
DATE: 8/11/15
EX 2

0 300 600 1,200
Feet
1 inch = 600 feet

EAST PALATINE ROAD
SOUTH MILWAUKEE AVENUE
RAMP
PUMP STATION #3
SOUTH WOLF ROAD
PIPER LANE
LOVE DRIVE
WIMBLEDON CIRCLE
PLAZA DRIVE
APPLE DRIVE
CIDER LANE
TREE LANE
CRABAPPLE DRIVE
SEMINOLE LANE
COVE DRIVE
QUAKER LANE
SEMINOLE LANE
AZTEC LANE
SENECA LANE
ARALIA DRIVE
ASPEN DRIVE
(PUMP #2) N PARK DRIVE LOW C. B.
RIM EL. = 633.88
EX FLOOD WSEL = 633.16
EX FLOOD DEPTH = 0.00 FT
PUMP STATION #2
MOHAWK LANE
NORTH WOLF ROAD
NORTH MANDEL LANE
LAUREL DRIVE
BEECH R
WOODVIEW DRIVE
PARK DRIVE
CAYUGA LANE
MAYA LANE
LARCH DRIVE
(PUMP #2) S PARK DRIVE LOW C. B.
RIM EL. = 634.78
EX FLOOD WSEL = 635.68
EX FLOOD DEPTH = 0.90 FT
EAST CAMP MC DONALD ROAD
COLUMBINE DRIVE
NORTH RIVER ROAD
SOUTH WOLF ROAD
EAST WOOD LANE
DES PLAINES RIVER
EAST CARIB LANE
SITKA LANE
(PUMP #1) PARK DRIVE LOW C. B.
RIM EL. = 635.67
EX FLOOD WSEL = 636.65
EX FLOOD DEPTH = 0.98 FT
BURR OAK DRIVE
PUMP STATION #1
PIN OAK DRIVE
ACHTREE LANE
CREE LANE
CHINKAPIN OAK DRIVE
PIMA LANE
EAST EUCLID AVENUE
AZALEA LANE
IVY LANE
IVY LANE
BASSWOOD LANE
KIOWA LANE
PECOS LANE
MOKI LANE
CHOLO LANE
BITTERSWEET LANE

LEGEND

- Pump Station
- Levee 37

APRIL 2013 STORM FLOOD DEPTH (FT)

- 0 - 1
- 1 - 2
- 2 - 3
- 3- 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- >8

DSGN.	MJB	CHKD.	ELG

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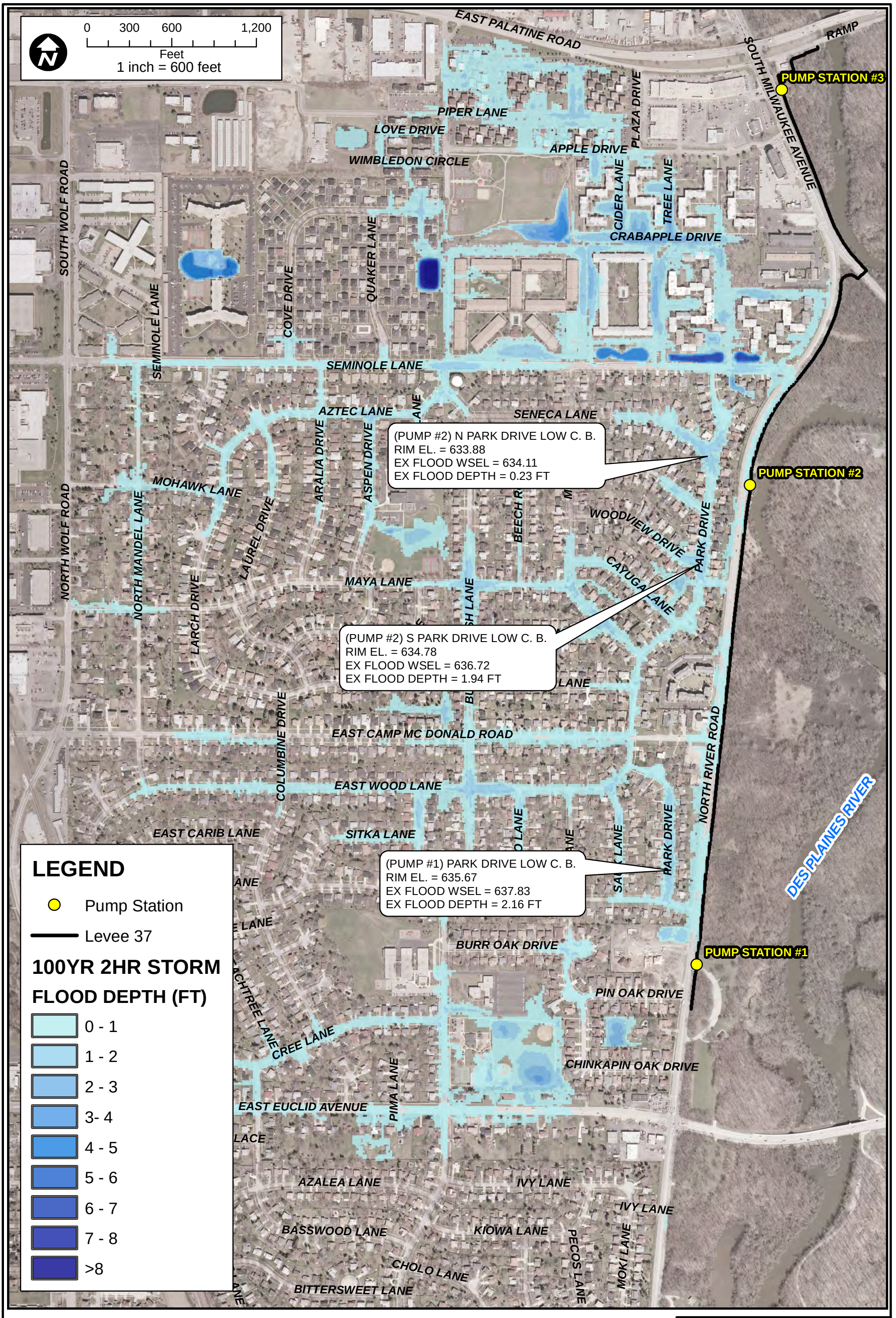
(847) 823-0500

CLIENT: VILLAGE OF MOUNT PROSPECT
PROJECT NO.: 15-0225
TITLE: APRIL 2013 STORM INUNDATION MAP WITHOUT TAILWATER & PUMPS
DATE: 8/11/15
EX 3



DSGN.	MJB	CHKD.	ELG

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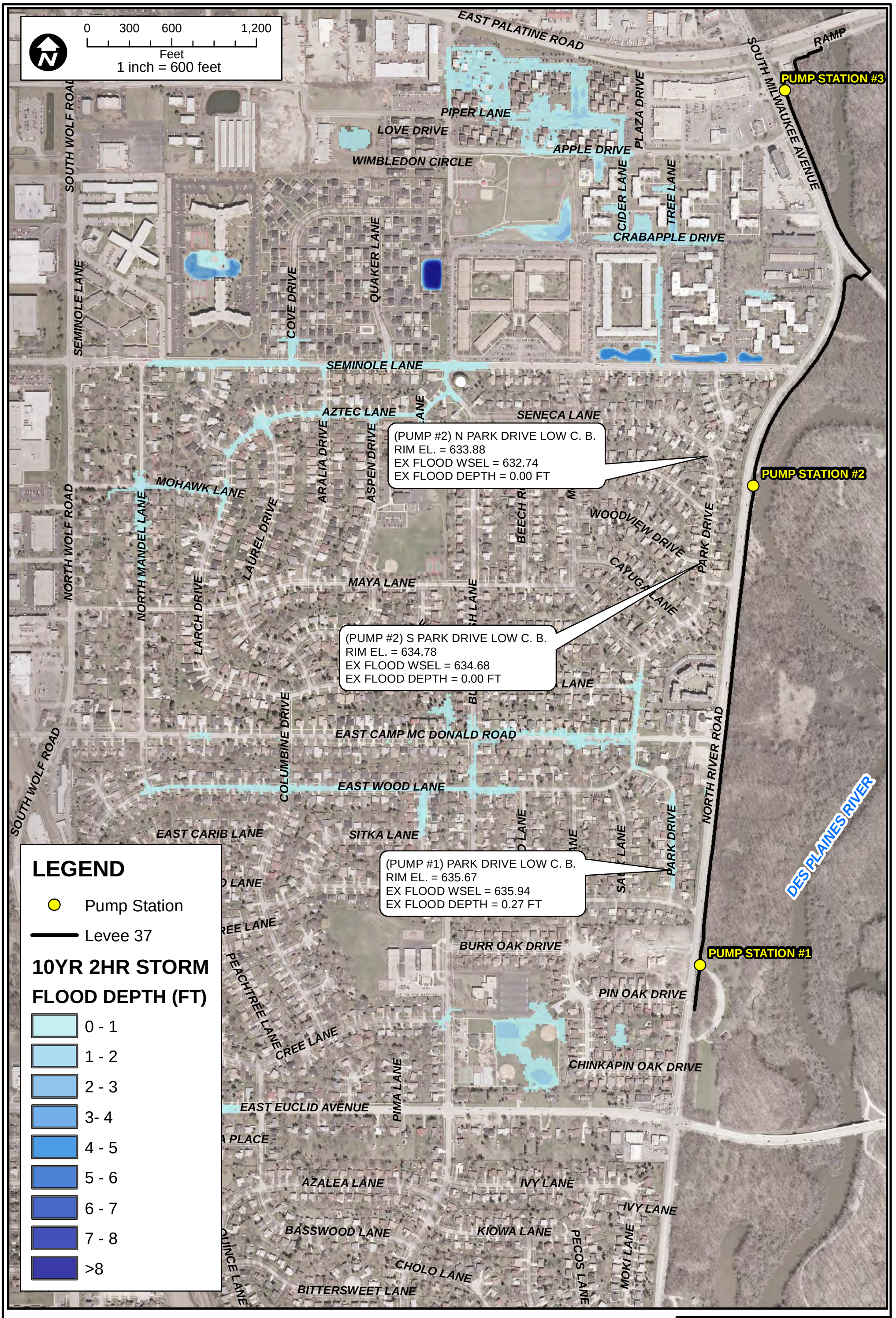
CLIENT: VILLAGE OF MOUNT PROSPECT

PROJECT NO.: 15-0225

TITLE: 100-YR 2-HR STORM INUNDATION MAP
WITHOUT TAILWATER & PUMPS

DATE: 8/11/15

EX 4



DSGN.	MJB	CHKD.	ELG

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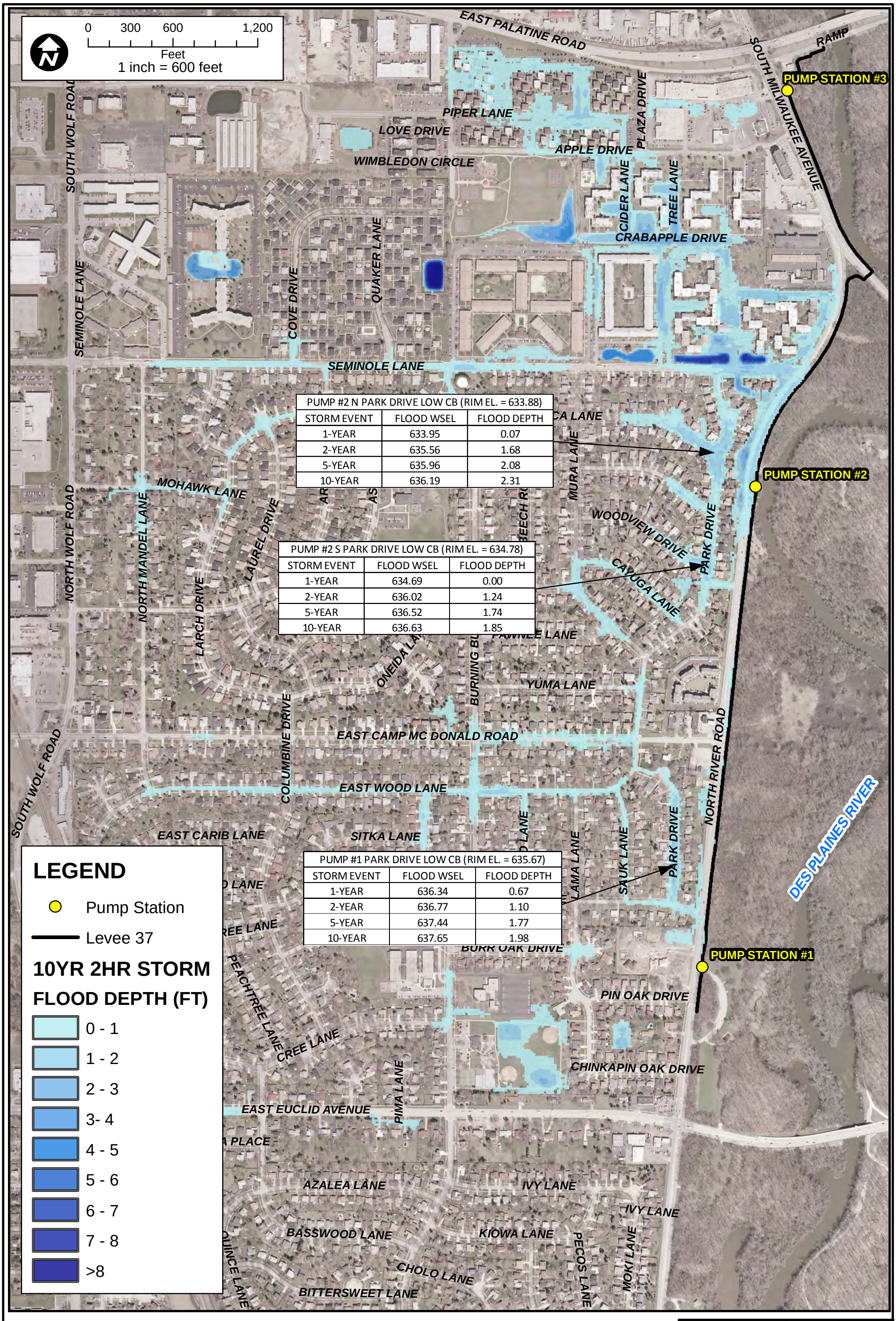
Rosemont, Illinois 60018
(847) 823-0500

CLIENT	VILLAGE OF MOUNT PROSPECT	PROJECT NO.	15-0225
TITLE	10-YR 2-HR STORM INUNDATION MAP WITHOUT TAILWATER & PUMPS	DATE	8/11/15
			EX 5



PUMP #2 N PARK DRIVE LOW CB (RIM EL. = 633.88)		
STORM EVENT	FLOOD WSEL	FLOOD DEPTH
1-YEAR	633.95	0.07
2-YEAR	635.56	1.68
5-YEAR	635.96	2.08
10-YEAR	636.19	2.31

PUMP #2 S PARK DRIVE LOW CB (RIM EL. = 634.78)		
STORM EVENT	FLOOD WSEL	FLOOD DEPTH
1-YEAR	634.69	0.00
2-YEAR	636.02	1.24
5-YEAR	636.52	1.74
10-YEAR	636.63	1.85

PUMP #1 PARK DRIVE LOW CB (RIM EL. = 635.67)		
STORM EVENT	FLOOD WSEL	FLOOD DEPTH
1-YEAR	636.34	0.67
2-YEAR	636.77	1.10
5-YEAR	637.44	1.77
10-YEAR	637.65	1.98

LEGEND

- Pump Station
- Levee 37

10YR 2HR STORM

FLOOD DEPTH (FT)

- 0 - 1
- 1 - 2
- 2 - 3
- 3- 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- >8

DSGN. MJB | CHKD. ELG

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CLIENT: VILLAGE OF MOUNT PROSPECT

PROJECT NO.: 15-0225

TITLE: 10-YR 2-HR STORM INUNDATION MAP WITH 10-YEAR FIS TAILWATER & PUMPS

DATE: 8/11/15

EX 6

0 100 200 400
Feet
1 inch = 200 feet

Pump #2 Park Drive Low CB (Rim El. = 633.88)		
Storm Event	Ex Flood WSEL	Pr Flood WSEL
2-Year	635.56	632.45
5-Year	635.96	634.96
10-Year	636.19	635.36

Pump #2 Park Drive Low CB (Rim El. = 634.78)		
Storm Event	Ex Flood WSEL	Pr Flood WSEL
2-Year	636.02	632.35
5-Year	636.52	635.63
10-Year	636.63	636.45

REPLACE 30" SEWERS WITH 5' X 5' RCBCs
FOR INCREASED CONVEYANCE
TO PROPOSED PUMP STATION

Pump Station #2			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.25	629
P#2 SWP-2	8.5	632.25	630
P#2 SWP-3	8.5	633.25	631
Prop 1	40	-	629
Prop 2	40	-	630
Prop 3	40	-	631

SEMINOLE LANE
SENECA LANE
SOUTH RIVER ROAD
ELL 96" X 60"
63" X 48"
66" X 54"
GREEN AVENUE
WOODVIEW DRIVE
CAYUGA LANE
MOIRA LANE
NORTH RIVER ROAD
YUMA LANE
PARK DRIVE
NORTH RIVER WEST COURT
EAST CAMP MC DONALD ROAD

LEGEND

- PROPOSED STORM SEWER
- LEVEE 37
- STORM MANHOLE
- STORM SEWER

FLOOD EVENT

AT-RISK HOMES

- 10-YEAR (10)
- 5-YEAR (1)
- 2-YEAR (0)

10YR 2HR STORM

FLOOD DEPTH (FT)

- 0 - 1
- 1 - 2
- 2 - 3
- 3- 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- >8

DSGN.	MJB	CHKD.	ELG

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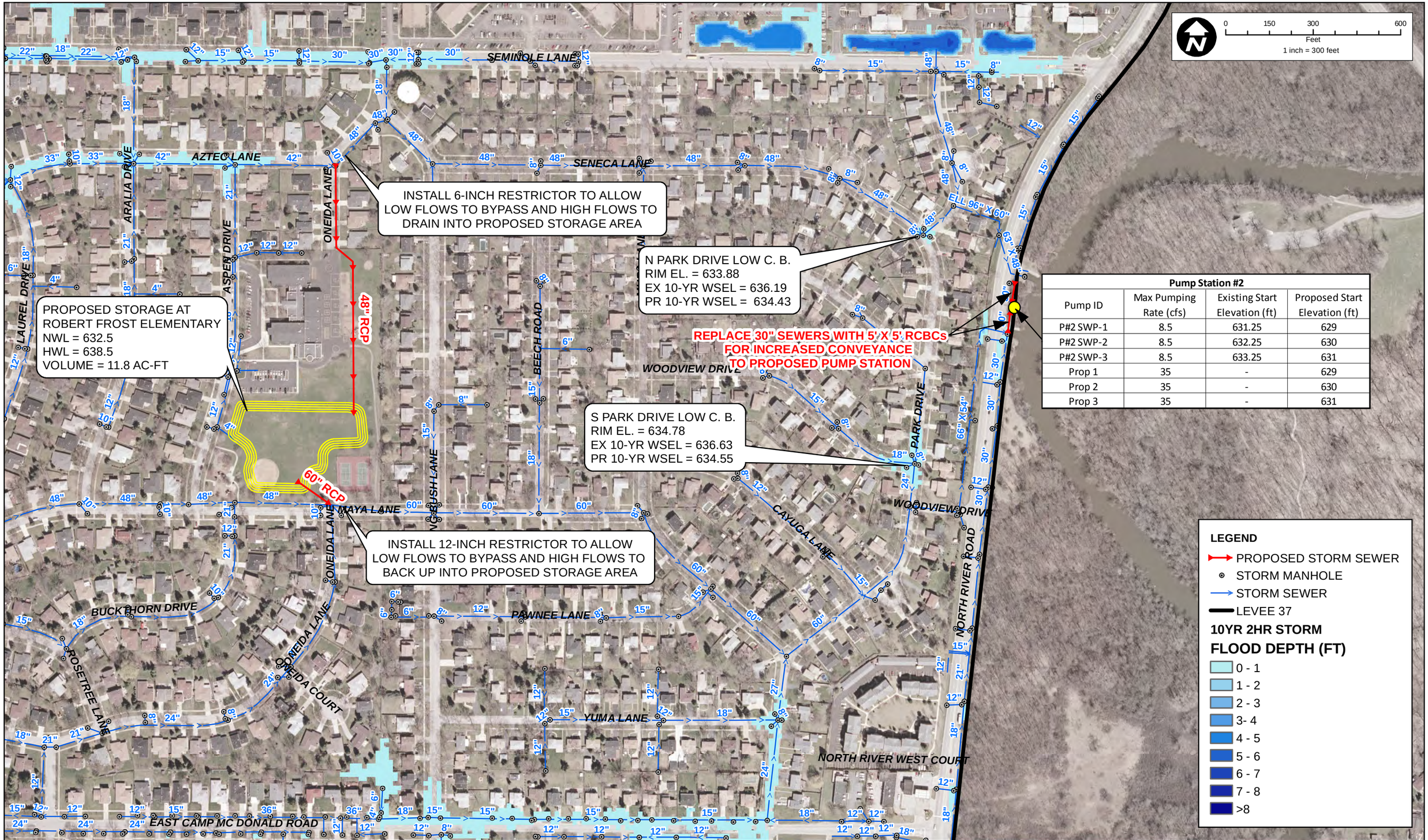
CLIENT: VILLAGE OF MOUNT PROSPECT
PROJECT NO.: 15-0225
TITLE: ALTERNATIVE 1 - PUMP STATION #2 UPGRADE
DATE: 8/10/15
EX 7



Pump Station #2

Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.25	629
P#2 SWP-2	8.5	632.25	630
P#2 SWP-3	8.5	633.25	631
Prop 1	35	-	629
Prop 2	35	-	630
Prop 3	35	-	631

LEGEND

- PROPOSED STORM SEWER
- STORM MANHOLE
- STORM SEWER
- LEVEE 37

10YR 2HR STORM

FLOOD DEPTH (FT)

- 0 - 1
- 1 - 2
- 2 - 3
- 3- 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- >8

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

CLIENT:

VILLAGE OF MOUNT PROSPECT

NO.	DATE	NATURE OF REVISION	CHKD.

FILE NAME

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

TITLE:

ALTERNATIVE 3 - PUMP STATION #2 UPGRADE & PROPOSED UPSTREAM STORAGE

PROJ. NO. 15-0225
DATE:
SHEET 1 OF 1
DRAWING NO.
EX 8

0 100 200 400
Feet
1 inch = 200 feet

EAST CAMP MC DONALD ROAD
EAST WOOD LANE
NORTH RIVER ROAD
LAMA LANE
SAUK LANE
PARK DRIVE
TANO LANE
CELTIC GLEN DRIVE
PIN OAK DRIVE
CHINKAPIN OAK DRIVE
EAST EUCLID AVENUE

Pump #1 Park Drive Low CB (Rim El. = 635.67)		
Storm Event	Ex Flood WSEL	Pr Flood WSEL
2-Year	636.77	634.43
5-Year	637.44	637.12
10-Year	637.65	637.58

Pump Station #1			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.75	630
P#2 SWP-2	8.5	634	631
Prop 1	30	-	630
Prop 2	30	-	631

LEGEND

PROPOSED STORM SEWER
LEVEE 37
STORM MANHOLE
STORM SEWER

FLOOD EVENT

AT-RISK HOMES

10-YEAR (4)
5-YEAR (1)
2-YEAR (0)

10YR 2HR STORM

FLOOD DEPTH (FT)

0 - 1
1 - 2
2 - 3
3- 4
4 - 5
5 - 6
6 - 7
7 - 8
>8

DSGN.	MJB	CHKD.	ELG

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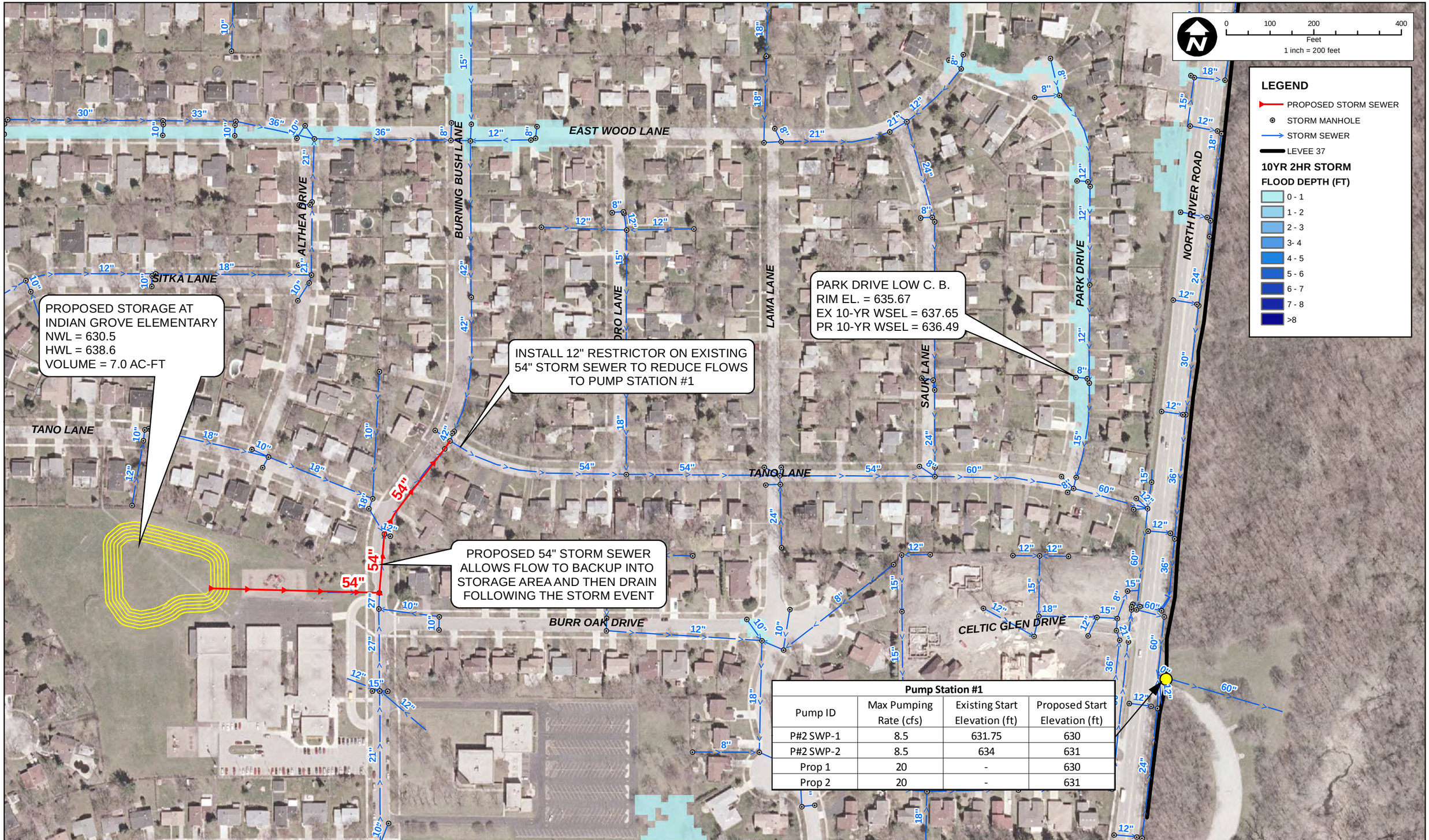
Rosemont, Illinois 60018
(847) 823-0500

CLIENT: VILLAGE OF MOUNT PROSPECT
PROJECT NO.: 15-0225
TITLE: ALTERNATIVE 5 - PUMP STATION #2 UPGRADE
DATE: 8/10/15
EX 9



Pump Station #1			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.75	630
P#2 SWP-2	8.5	634	631
Prop 1	20	-	630
Prop 2	20	-	631

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

CLIENT:
VILLAGE OF MOUNT PROSPECT

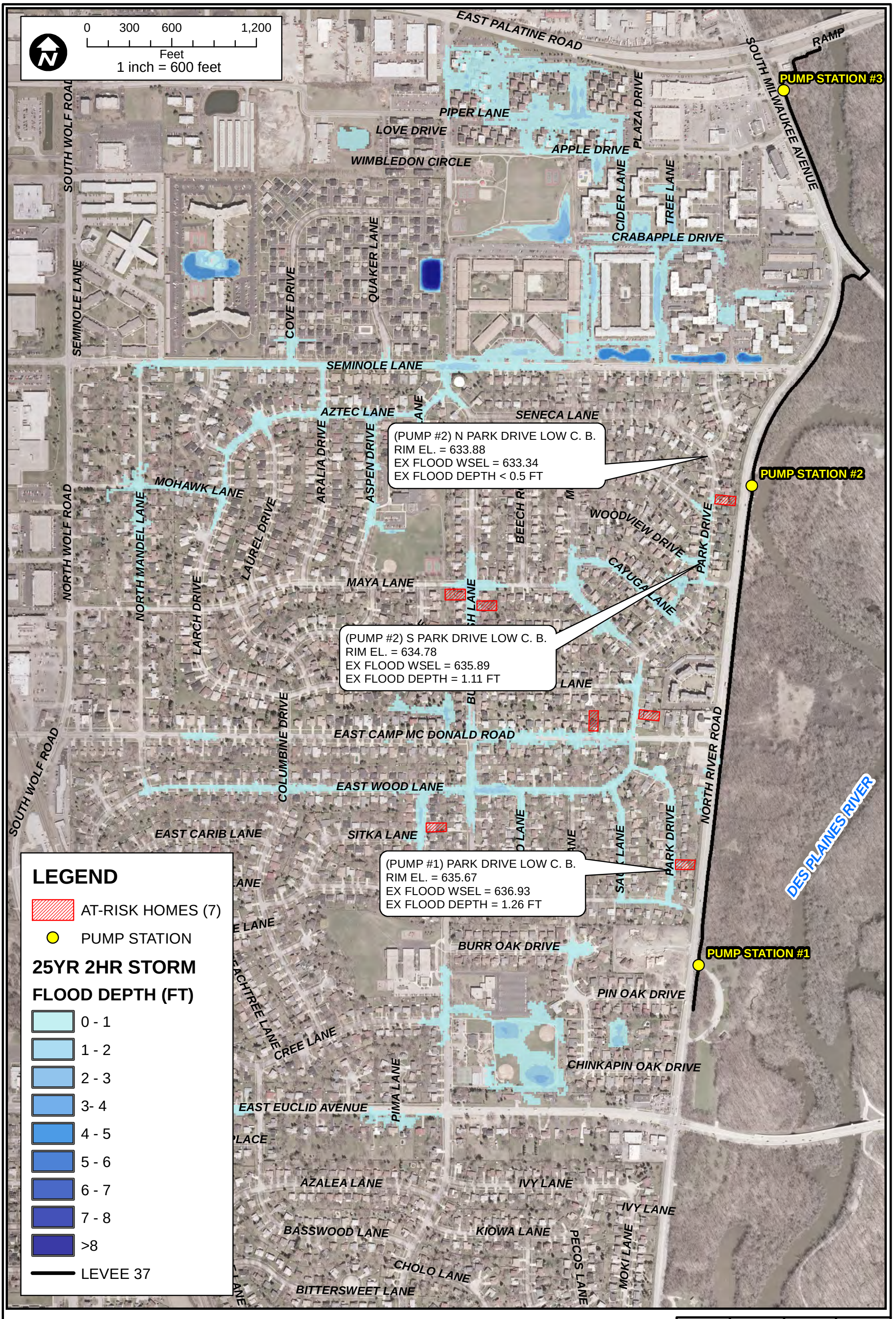
NO.	DATE	NATURE OF REVISION	CHKD.

FILE NAME

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

TITLE:
ALTERNATIVE 6 - PUMP STATION #1 UPGRADE & PROPOSED UPSTREAM STORAGE

PROJ. NO. 15-0225
DATE:
SHEET 1 OF 1
DRAWING NO.
EX 10



DSGN.	MJB	CHKD.	ELG

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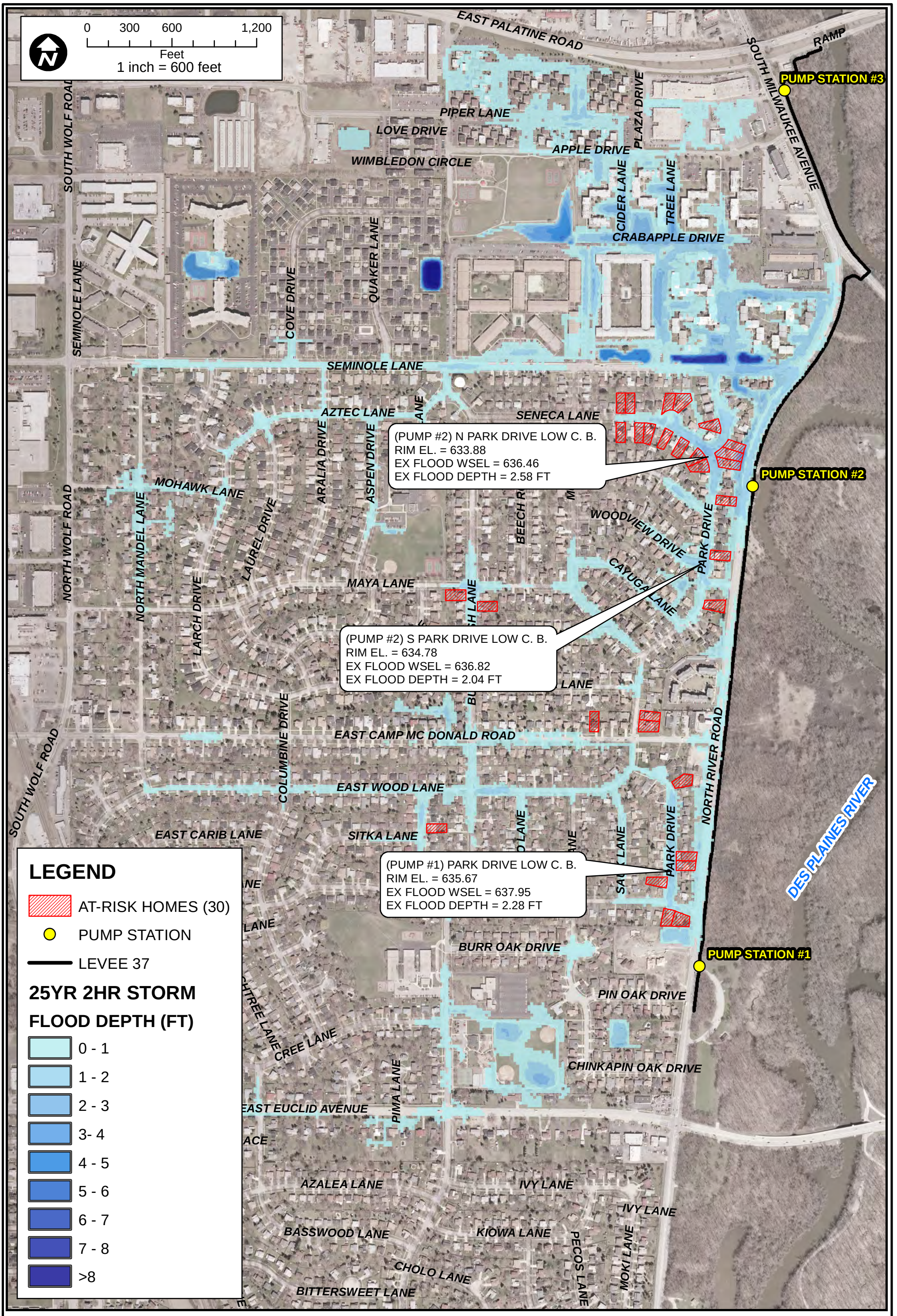
CLIENT: VILLAGE OF MOUNT PROSPECT

PROJECT NO.: 15-0225

TITLE: 25-YEAR STORM INUNDATION MAP WITHOUT TAILWATER & PUMPS

DATE: 9/16/15

EX 11



DSGN.	MJB	CHKD.	ELG

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Rosemont, Illinois 60018
(847) 823-0500

CLIENT	VILLAGE OF MOUNT PROSPECT	PROJECT NO.	15-0225
TITLE	25-YEAR STORM INUNDATION MAP WITH 10-YEAR FIS TAILWATER & PUMPS	DATE	9/16/15
			EX 12

0 150 300 600
Feet
1 inch = 300 feet

(PUMP #2) N PARK DRIVE LOW C. B.
RIM EL. = 633.88
EX FLOOD WSEL = 636.46
PR FLOOD WSEL = 634.37

Pump Station #2			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.25	629
P#2 SWP-2	8.5	632.25	630
P#2 SWP-3	8.5	633.25	631
Prop 1	110	-	629
Prop 2	110	-	630
Prop 3	110	-	631

5' X 5' RCBC

6' X 5.5' RCBC

PROPOSED STORM SEWER ON PARK DRIVE
REPLACES EXISTING STORM SEWER

(PUMP #2) S PARK DRIVE LOW C. B.
RIM EL. = 634.78
EX FLOOD WSEL = 636.82
PR FLOOD WSEL = 635.66

PROPOSED STORM SEWER PROVIDES
RELIEF TO EXISTING TRUNK SEWER.

PROPOSED ADDITIONAL 36"
SEWER OUTLET TO THE DPR

PROPOSED STORM SEWER ON PARK DRIVE
REPLACES EXISTING STORM SEWER

(PUMP #1) PARK DRIVE LOW C. B.
RIM EL. = 635.67
EX FLOOD WSEL = 637.95
PR FLOOD WSEL = 634.85

PROPOSED 42" STORM SEWER PROVIDES
RELIEF TO EXISTING TRUNK SEWER

Pump Station #1			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.75	630
P#2 SWP-2	8.5	634	631
Prop 1	80	-	630
Prop 2	80	-	631

PROPOSED ADDITIONAL 42"
SEWER OUTLET TO THE DPR

LEGEND

- PROPOSED STORM SEWER
- PUMP STATION
- LEVEE 37
- STORM MANHOLE
- STORM SEWER

25YR 2HR STORM
FLOOD DEPTH (FT)

- 0 - 1
- 1 - 2
- 2 - 3
- 3- 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- >8

DSGN.	MJB	CHKD.	ELG

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

CLIENT: VILLAGE OF MOUNT PROSPECT
PROJECT NO.: 15-0225
TITLE: ALTERNATIVE 8 - 25-YEAR STORM SEWER IMPROVEMENT WITH 10-YEAR FIS TAILWATER & UPGRADED PUMP STATIONS
DATE: 9/16/15
EX 13

INSTALL 6-INCH RESTRICTOR TO ALLOW LOW FLOWS TO BYPASS AND HIGH FLOWS TO DRAIN INTO PROPOSED STORAGE AREA

0 150 300 600
Feet
1 inch = 300 feet

(PUMP #2) N PARK DRIVE LOW C. B.
RIM EL. = 633.88
EX FLOOD WSEL = 636.46
PR FLOOD WSEL = 635.01

Pump Station #2			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.25	629
P#2 SWP-2	8.5	632.25	630
P#2 SWP-3	8.5	633.25	631
Prop 1	40	-	629
Prop 2	40	-	630
Prop 3	40	-	631

PROPOSED STORAGE AT
ROBERT FROST ELEMENTARY
NWL = 632.5
HWL = 639.2
VOLUME = 18.0 AC-FT

5' X 5' RCBC

5' X 5' RCBC

(PUMP #2) S PARK DRIVE LOW C. B.
RIM EL. = 634.78
EX FLOOD WSEL = 636.82
PR FLOOD WSEL = 636.36

INSTALL 12-INCH RESTRICTOR TO ALLOW LOW FLOWS TO BYPASS AND HIGH FLOWS TO BACK UP INTO PROPOSED STORAGE AREA

LEGEND

- AT-RISK HOMES (2)
- PROPOSED STORM SEWER
- PUMP STATION
- LEVEE 37
- STORM MANHOLE
- STORM SEWER

25YR 2HR STORM

FLOOD DEPTH (FT)

- 0 - 1
- 1 - 2
- 2 - 3
- 3- 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- >8

ADDITIONAL SEWER REQUIRED TO REDUCE FLOODING

INSTALL 12" RESTRICTOR ON EXISTING 54" STORM SEWER TO REDUCE FLOWS TO PUMP STATION #1

PROPOSED 54" STORM SEWER ALLOWS FLOW TO BACKUP INTO STORAGE AREA AND THEN DRAIN FOLLOWING THE STORM EVENT

PROPOSED STORAGE AT
INDIAN GROVE ELEMENTARY
NWL = 630.5
HWL = 638.2
VOLUME = 12.0 AC-FT

Pump Station #1			
Pump ID	Max Pumping Rate (cfs)	Existing Start Elevation (ft)	Proposed Start Elevation (ft)
P#2 SWP-1	8.5	631.75	630
P#2 SWP-2	8.5	634	631
Prop 1	30	-	630
Prop 2	30	-	631

(PUMP #1) PARK DRIVE LOW C. B.
RIM EL. = 635.67
EX FLOOD WSEL = 637.95
PR FLOOD WSEL = 636.78

AZTEC LANE
ONEIDA LANE
WOODVIEW DRIVE
SEMINOLE LANE
MAYA LANE
PARK DRIVE
DES PLAINES RIVER
PAWNEE LANE
BURNING BUSH
YUMA LANE
NORTH RIVER WEST COURT
NORTH RIVER ROAD
EAST WOOD LANE
SIPKA LANE
TANO LANE
BURR OAK DRIVE
CELTIC GLEN DRIVE
SAUK LANE

DSGN.	MJB
CHKD.	ELG

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

CLIENT: VILLAGE OF MOUNT PROSPECT

PROJECT NO.: 15-0225

TITLE: ALTERNATIVE 9 - 25-YEAR STORM SEWER AND FLOOD STORAGE IMPROVEMENT WITH 10-YEAR FIS TAILWATER & UPGRADED PUMP STATIONS

DATE: 9/16/15

EX 14

Appendix 1
Cost Estimates

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018

MOUNT PROSPECT
(CBBEL PROJECT NO. 150225)

ENGINEER'S OPINION OF PROBABLE COST
DATE: August 24, 2015
LAST REVISED:

ALTERNATIVE 1: PUMP STATION 2 UPGRADE

ITEM #	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST
20800150	TRENCH BACKFILL	CY	$ 40.00	**200**	$ 8,000.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**350**	$ 1,750.00
25000110	SEEDING	ACRE	$ 10,000.00	**0.07**	$ 700.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**350**	$ 1,750.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**200**	$ 3,000.00
50100300	REMOVAL OF EXISTING STRUCTURES NO. 1 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
50100400	REMOVAL OF EXISTING STRUCTURES NO. 2 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
54010505	PRECAST CONCRETE BOX CULVERTS 5' X 5'	FOOT	$ 500.00	**185**	$ 92,500.00
550A0050	STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	$ 80.00	**10**	$ 800.00
55100500	STORM SEWER REMOVAL 12"	FOOT	$ 15.00	**10**	$ 150.00
55101400	STORM SEWER REMOVAL 30"	FOOT	$ 40.00	**185**	$ 7,400.00
60234200	INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	$ 2,000.00	**1**	$ 2,000.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**1**	$ 800.00
60500060	REMOVING INLETS	EACH	$ 500.00	**1**	$ 500.00
60605100	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24 (ABUTTING EXISTING PAVEMENT)	FOOT	$ 35.00	**200**	$ 7,000.00
63301215	REMOVE AND REERECT STEEL PLATE BEAM GUARDRAIL, TYPE B	FOOT	$ 25.00	**200**	$ 5,000.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 10,000.00	**1**	$ 10,000.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 3,000.00	**1**	$ 3,000.00
NA	BOX CULVERT CONNECTION TO EXISTING BACKFLOW STRUCTURE	EACH	$ 10,000.00	**2**	$ 20,000.00
				SUB-TOTAL	$ 172,350.00
		20%		CONTINGENCY	$ 34,470.00
				CONSTRUCTION TOTAL	$ 206,820.00

ALTERNATIVE 2: PUMP STATION 2 UPGRADE & PROPOSED PROSPECT HEIGHTS PUMP STATION					
ITEM #	ITEM	UNIT	UNIT COST	**QUANTITY**	**TOTAL COST**
20100110	TREE REMOVAL (6 TO 15 UNITS DIAMETER)	UNIT	$ 50.00	**45**	$ 2,250.00
20100500	TREE REMOVAL, ACRES	ACRE	$ 10,000.00	**0.07**	$ 700.00
20101200	TREE ROOT PRUNING	EACH	$ 250.00	**10**	$ 2,500.00
20800150	TRENCH BACKFILL	CY	$ 40.00	**350**	$ 14,000.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**950**	$ 4,750.00
25000110	SEEDING	ACRE	$ 10,000.00	**0.2**	$ 2,000.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**950**	$ 4,750.00
28100109	STONE RIPRAP, CLASS A5	SQ YD	$ 60.00	**120**	$ 7,200.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**260**	$ 3,900.00
44201000	CLASS B PATCHES, TYPE IV, 12 INCH	SQ YD	$ 100.00	**75**	$ 7,500.00
44201745	CLASS D PATCHES, TYPE III, 8 INCH	SQ YD	$ 80.00	**25**	$ 2,000.00
50100300	REMOVAL OF EXISTING STRUCTURES NO. 1 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
50100400	REMOVAL OF EXISTING STRUCTURES NO. 2 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
54010505	PRECAST CONCRETE BOX CULVERTS 5' X 5'	FOOT	$ 500.00	**185**	$ 92,500.00
54213693	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 48"	EACH	$ 4,500.00	**4**	$ 18,000.00
550A0050	STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	$ 80.00	**10**	$ 800.00
550A0480	STORM SEWERS, CLASS A, TYPE 2 48"	FOOT	$ 150.00	**700**	$ 105,000.00
55100500	STORM SEWER REMOVAL 12"	FOOT	$ 15.00	**10**	$ 150.00
55101400	STORM SEWER REMOVAL 30"	FOOT	$ 40.00	**185**	$ 7,400.00
60223800	MANHOLES, TYPE A, 6'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 6,000.00	**1**	$ 6,000.00
60224446	MANHOLES, TYPE A, 7'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 9,000.00	**1**	$ 9,000.00
60234200	INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	$ 2,000.00	**1**	$ 2,000.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**1**	$ 800.00
60500060	REMOVING INLETS	EACH	$ 500.00	**1**	$ 500.00
60603800	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	$ 30.00	**40**	$ 1,200.00
60605100	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24 (ABUTTING EXISTING PAVEMENT)	FOOT	$ 35.00	**220**	$ 7,700.00
63301215	REMOVE AND REERECT STEEL PLATE BEAM GUARDRAIL, TYPE B	FOOT	$ 25.00	**200**	$ 5,000.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 15,000.00	**1**	$ 15,000.00
85000300	MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION	L SUM	$ 10,000.00	**1**	$ 10,000.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 6,000.00	**1**	$ 6,000.00
Z0033024	MAINTAIN EXISTING LIGHTING SYSTEM	L SUM	$ 8,000.00	**1**	$ 8,000.00
NA	BOX CULVERT CONNECTION TO EXISTING BACKFLOW STRUCTURE	EACH	$ 10,000.00	**2**	$ 20,000.00
NA	LANDSCAPE RESTORATION (FENCE/ENTRANCE MONUMENTS/PLANTING BEDS)	L. SUM	$ 20,000.00	**1**	$ 20,000.00
				SUB-TOTAL	$ 394,600.00
		20%		CONTINGENCY	$ 78,920.00
				CONSTRUCTION TOTAL	$ 473,520.00

ALTERNATIVE 3B: PUMP STATION 2 UPGRADE & PROPOSED UPSTREAM STORAGE					
ITEM #	ITEM	UNIT	UNIT COST	**QUANTITY**	**TOTAL COST**
20100110	TREE REMOVAL (6 TO 15 UNITS DIAMETER)	UNIT	$ 50.00	**100**	$ 5,000.00
20101200	TREE ROOT PRUNING	EACH	$ 250.00	**4**	$ 1,000.00
20200100	EARTH EXCAVATION	CU YD	$ 40.00	**27100**	$ 1,084,000.00
20800150	TRENCH BACKFILL	CY	$ 40.00	**440**	$ 17,600.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**13900**	$ 69,500.00
25000110	SEEDING	ACRE	$ 10,000.00	**2.9**	$ 29,000.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**13900**	$ 69,500.00
28100109	STONE RIPRAP, CLASS A5	SQ YD	$ 60.00	**60**	$ 3,600.00
42300200	PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 6 INCH	SQ YD	$ 80.00	**110**	$ 8,800.00
42400200	PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH	SQ FT	$ 7.00	**950**	$ 6,650.00
44000200	DRIVEWAY PAVEMENT REMOVAL	SQ YD	$ 15.00	**110**	$ 1,650.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**220**	$ 3,300.00
44000600	SIDEWALK REMOVAL	SQ FT	$ 2.00	**950**	$ 1,900.00
44201692	CLASS D PATCHES, TYPE II, 4 INCH	SQ YD	$ 60.00	**15**	$ 900.00
50100300	REMOVAL OF EXISTING STRUCTURES NO. 1 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
50100400	REMOVAL OF EXISTING STRUCTURES NO. 2 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
54010505	PRECAST CONCRETE BOX CULVERTS 5' X 5'	FOOT	$ 500.00	**185**	$ 92,500.00
54213693	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 48"	EACH	$ 4,500.00	**1**	$ 4,500.00
54213705	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 60"	EACH	$ 8,000.00	**1**	$ 8,000.00
550A0050	STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	$ 80.00	**10**	$ 800.00
550A0190	STORM SEWERS, CLASS A, TYPE 1 48"	FOOT	$ 150.00	**870**	$ 130,500.00
550A0210	STORM SEWERS, CLASS A, TYPE 1 60"	FOOT	$ 220.00	**215**	$ 47,300.00
55100500	STORM SEWER REMOVAL 12"	FOOT	$ 15.00	**10**	$ 150.00
55101400	STORM SEWER REMOVAL 30"	FOOT	$ 40.00	**185**	$ 7,400.00
55101900	STORM SEWER REMOVAL 48"	FOOT	$ 60.00	**130**	$ 7,800.00
60224446	MANHOLES, TYPE A, 7'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 8,000.00	**2**	$ 16,000.00
60224459	MANHOLES, TYPE A, 8'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 10,000.00	**1**	$ 10,000.00
60234200	INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	$ 2,000.00	**1**	$ 2,000.00
60500040	REMOVING MANHOLES	EACH	$ 2,000.00	**2**	$ 4,000.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**1**	$ 800.00
60500060	REMOVING INLETS	EACH	$ 500.00	**1**	$ 500.00
60603800	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	$ 30.00	**20**	$ 600.00
60605100	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24 (ABUTTING EXISTING PAVEMENT)	FOOT	$ 35.00	**200**	$ 7,000.00
63301215	REMOVE AND REERECT STEEL PLATE BEAM GUARDRAIL, TYPE B	FOOT	$ 25.00	**200**	$ 5,000.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 15,000.00	**1**	$ 15,000.00
X6020293	MANHOLES, TYPE A, 8'-DIAMETER, WITH 2 TYPE 1 FRAMES, CLOSED LID, RESTRICTOR PLATE	EACH	$ 15,000.00	**1**	$ 15,000.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 9,000.00	**1**	$ 9,000.00
NA	BOX CULVERT CONNECTION TO EXISTING BACKFLOW STRUCTURE	EACH	$ 10,000.00	**2**	$ 20,000.00
NA	STORM JUNCTION CHAMBER	EACH	$ 12,000.00	**1**	$ 12,000.00
NA	REMOVE BASEBALL FIELD EQUIPMENT	L. SUM	$ 4,000.00	**1**	$ 4,000.00
				SUB-TOTAL	$ 1,730,250.00
		20%		CONTINGENCY	$ 346,050.00
				CONSTRUCTION TOTAL	$ 2,076,300.00

ALTERNATIVE 4: PUMP STATION 2 UPGRADE & PROPOSED STORM SEWER IMPROVEMENTS					
ITEM #	ITEM	UNIT	UNIT COST	**QUANTITY**	**TOTAL COST**
20800150	TRENCH BACKFILL	CY	$ 40.00	**550**	$ 22,000.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**350**	$ 1,750.00
25000110	SEEDING	ACRE	$ 10,000.00	**0.07**	$ 700.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**350**	$ 1,750.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**200**	$ 3,000.00
44201747	CLASS D PATCHES, TYPE IV, 8 INCH	SQ YD	$ 80.00	**350**	$ 28,000.00
50100300	REMOVAL OF EXISTING STRUCTURES NO. 1 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
50100400	REMOVAL OF EXISTING STRUCTURES NO. 2 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
54010505	PRECAST CONCRETE BOX CULVERTS 5' X 5'	FOOT	$ 500.00	**185**	$ 92,500.00
550A0050	STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	$ 80.00	**10**	$ 800.00
550A0430	STORM SEWERS, CLASS A, TYPE 2 30"	FOOT	$ 150.00	**315**	$ 47,250.00
55100500	STORM SEWER REMOVAL 12"	FOOT	$ 15.00	**10**	$ 150.00
55101200	STORM SEWER REMOVAL 24"	FOOT	$ 20.00	**150**	$ 3,000.00
55101400	STORM SEWER REMOVAL 30"	FOOT	$ 40.00	**185**	$ 7,400.00
60234200	INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	$ 2,000.00	**1**	$ 2,000.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**1**	$ 800.00
60500060	REMOVING INLETS	EACH	$ 500.00	**1**	$ 500.00
60605100	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24 (ABUTTING EXISTING PAVEMENT)	FOOT	$ 35.00	**200**	$ 7,000.00
63301215	REMOVE AND REERECT STEEL PLATE BEAM GUARDRAIL, TYPE B	FOOT	$ 25.00	**200**	$ 5,000.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 18,000.00	**1**	$ 18,000.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 4,000.00	**1**	$ 4,000.00
NA	STORM JUNCTION CHAMBER	EACH	$ 20,000.00	**2**	$ 40,000.00
NA	REMOVE EXISTING JUCTION CHAMBER	EACH	$ 5,000.00	**2**	$ 10,000.00
NA	BOX CULVERT CONNECTION TO EXISTING BACKFLOW STRUCTURE	EACH	$ 10,000.00	**2**	$ 20,000.00
				SUB-TOTAL	$ 323,600.00
		20%		CONTINGENCY	$ 64,720.00
				CONSTRUCTION TOTAL	$ 388,320.00

ALTERNATIVE 6: PUMP STATION 1 UPGRADE & PROPOSED UPSTREAM STORAGE					
ITEM #	ITEM	UNIT	UNIT COST	**QUANTITY**	**TOTAL COST**
20100110	TREE REMOVAL (6 TO 15 UNITS DIAMETER)	UNIT	$ 50.00	**30**	$ 1,500.00
20101200	TREE ROOT PRUNING	EACH	$ 250.00	**4**	$ 1,000.00
20200100	EARTH EXCAVATION	CU YD	$ 40.00	**14500**	$ 580,000.00
20800150	TRENCH BACKFILL	CY	$ 40.00	**350**	$ 14,000.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**6700**	$ 33,500.00
25000110	SEEDING	ACRE	$ 10,000.00	**1.4**	$ 14,000.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**6700**	$ 33,500.00
42300200	PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 6 INCH	SQ YD	$ 80.00	**50**	$ 4,000.00
42400200	PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH	SQ FT	$ 7.00	**200**	$ 1,400.00
44000200	DRIVEWAY PAVEMENT REMOVAL	SQ YD	$ 15.00	**50**	$ 750.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**240**	$ 3,600.00
44000600	SIDEWALK REMOVAL	SQ FT	$ 2.00	**200**	$ 400.00
44201747	CLASS D PATCHES, TYPE IV, 8 INCH	SQ YD	$ 80.00	**250**	$ 20,000.00
550A0050	STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	$ 60.00	**20**	$ 1,200.00
550A0490	STORM SEWERS, CLASS A, TYPE 2 54"	FOOT	$ 190.00	**810**	$ 153,900.00
55100700	STORM SEWER REMOVAL 15"	FOOT	$ 15.00	**200**	$ 3,000.00
55101300	STORM SEWER REMOVAL 27"	FOOT	$ 25.00	**135**	$ 3,375.00
55101500	STORM SEWER REMOVAL 33"	FOOT	$ 45.00	**260**	$ 11,700.00
60224446	MANHOLES, TYPE A, 7'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 9,000.00	**5**	$ 45,000.00
60224469	MANHOLES, TYPE A, 9'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 12,000.00	**1**	$ 12,000.00
60234200	INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	$ 2,000.00	**1**	$ 2,000.00
60500040	REMOVING MANHOLES	EACH	$ 1,000.00	**3**	$ 3,000.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**2**	$ 1,600.00
60603800	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	$ 30.00	**240**	$ 7,200.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 7,000.00	**1**	$ 7,000.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 3,500.00	**1**	$ 3,500.00
NA	STORM JUNCTION CHAMBER WITH RESTRICTOR	EACH	$ 20,000.00	**1**	$ 20,000.00
NA	REMOVE EXISTING RESTRICTOR STRUCTURE	EACH	$ 2,500.00	**1**	$ 2,500.00
NA	LANDSCAPE RESTORATION (PLAYGROUND AREA)	L. SUM	$ 5,000.00	**1**	$ 5,000.00
				SUB-TOTAL	$ 989,625.00
		20%		CONTINGENCY	$ 197,925.00
				CONSTRUCTION TOTAL	$ 1,187,550.00

ALTERNATIVE 7: PUMP STATION 1 UPGRADE & PROPOSED STORM SEWER IMPROVEMENTS					
ITEM #	ITEM	UNIT	UNIT COST	**QUANTITY**	**TOTAL COST**
20100110	TREE REMOVAL (6 TO 15 UNITS DIAMETER)	UNIT	$ 50.00	**100**	$ 5,000.00
20101200	TREE ROOT PRUNING	EACH	$ 250.00	**6**	$ 1,500.00
20800150	TRENCH BACKFILL	CY	$ 40.00	**400**	$ 16,000.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**450**	$ 2,250.00
25000110	SEEDING	ACRE	$ 10,000.00	**0.1**	$ 1,000.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**450**	$ 2,250.00
42300200	PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 6 INCH	SQ YD	$ 80.00	**100**	$ 8,000.00
42400200	PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH	SQ FT	$ 7.00	**500**	$ 3,500.00
44000200	DRIVEWAY PAVEMENT REMOVAL	SQ YD	$ 15.00	**175**	$ 2,625.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**300**	$ 4,500.00
44000600	SIDEWALK REMOVAL	SQ FT	$ 2.00	**500**	$ 1,000.00
44201747	CLASS D PATCHES, TYPE IV, 8 INCH	SQ YD	$ 80.00	**270**	$ 21,600.00
550A0090	STORM SEWERS, CLASS A, TYPE 1 18"	FOOT	$ 80.00	**450**	$ 36,000.00
550A0120	STORM SEWERS, CLASS A, TYPE 1 24"	FOOT	$ 90.00	**470**	$ 42,300.00
55100500	STORM SEWER REMOVAL 12"	FOOT	$ 15.00	**680**	$ 10,200.00
55100700	STORM SEWER REMOVAL 15"	FOOT	$ 15.00	**240**	$ 3,600.00
60200205	CATCH BASINS, TYPE A, 4'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 4,000.00	**2**	$ 8,000.00
60203805	CATCH BASINS, TYPE A, 5'-DIAMETER, TYPE 1 FRAME, OPEN LID	EACH	$ 5,000.00	**3**	$ 15,000.00
60500040	REMOVING MANHOLES	EACH	$ 800.00	**2**	$ 1,600.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**3**	$ 2,400.00
60603800	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	$ 30.00	**100**	$ 3,000.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 6,000.00	**1**	$ 6,000.00
Z0004522	HOT-MIX ASPHALT DRIVEWAY PAVEMENT, 6"	SQ YD	$ 70.00	**75**	$ 5,250.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 3,000.00	**1**	$ 3,000.00
				SUB-TOTAL	$ 205,575.00
		20%		CONTINGENCY	$ 41,115.00
				CONSTRUCTION TOTAL	$ 246,690.00

THIS ESTIMATE DOES NOT INCLUDE THE FOLLOWING ITEMS:

A. LAND ACQUISITION
B. UTILITY RELOCATIONS
C. ACQUISITION OF EASEMENTS OR RIGHT-OF-WAY
D. ACQUISITION OF IDOT PERMITS OR COUNTY PERMITS
E. FENCE REMOVAL AND REPLACEMENT
F. IMPACT TO THE EXISTING FLOODWALL

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018

MOUNT PROSPECT
(CBBEL PROJECT NO. 150225)

ENGINEER'S OPINION OF PROBABLE COST
DATE: September 15, 2015
LAST REVISED:

ALTERNATIVE 8: 25-YEAR STORM SEWER IMPROVEMENT ALTERNATIVE WITHOUT TAILWATER & PUMPS[1]

ITEM #	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST[2]
20100110	TREE REMOVAL (6 TO 15 UNITS DIAMETER)	UNIT	$ 50.00	**100**	$ 5,000.00
20101200	TREE ROOT PRUNING	EACH	$ 250.00	**20**	$ 5,000.00
20800150	TRENCH BACKFILL	CY	$ 40.00	**7000**	$ 280,000.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**1300**	$ 6,500.00
25000110	SEEDING	ACRE	$ 10,000.00	**0.27**	$ 2,700.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**1300**	$ 6,500.00
42300200	PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 6 INCH	SQ YD	$ 80.00	**200**	$ 16,000.00
42400200	PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH	SQ FT	$ 7.00	**1000**	$ 7,000.00
44000200	DRIVEWAY PAVEMENT REMOVAL	SQ YD	$ 15.00	**400**	$ 6,000.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**1520**	$ 22,800.00
44000600	SIDEWALK REMOVAL	SQ FT	$ 2.00	**1000**	$ 2,000.00
44201747	CLASS D PATCHES, TYPE IV, 8 INCH	SQ YD	$ 80.00	**5100**	$ 408,000.00
50100300	REMOVAL OF EXISTING STRUCTURES NO. 1 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
50100400	REMOVAL OF EXISTING STRUCTURES NO. 2 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
54010505	PRECAST CONCRETE BOX CULVERTS 5' X 5'	FOOT	$ 500.00	**85**	$ 42,500.00
54010606	PRECAST CONCRETE BOX CULVERTS 6' X 5.5'	FOOT	$ 600.00	**100**	$ 60,000.00
550A0050	STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	$ 75.00	**100**	$ 7,500.00
550A0120	STORM SEWERS, CLASS A, TYPE 1 24"	FOOT	$ 100.00	**605**	$ 60,500.00
550A0140	STORM SEWERS, CLASS A, TYPE 1 30"	FOOT	$ 130.00	**800**	$ 104,000.00
550A0160	STORM SEWERS, CLASS A, TYPE 1 36"	FOOT	$ 140.00	**4186**	$ 586,040.00
550A0180	STORM SEWERS, CLASS A, TYPE 1 42"	FOOT	$ 160.00	**2120**	$ 339,200.00
55100500	STORM SEWER REMOVAL 12"	FOOT	$ 15.00	**690**	$ 10,350.00
55100700	STORM SEWER REMOVAL 15"	FOOT	$ 15.00	**240**	$ 3,600.00
55100900	STORM SEWER REMOVAL 18"	FOOT	$ 15.00	**330**	$ 4,950.00
55101200	STORM SEWER REMOVAL 24"	FOOT	$ 20.00	**150**	$ 3,000.00
55101400	STORM SEWER REMOVAL 30"	FOOT	$ 40.00	**185**	$ 7,400.00
60203805	CATCH BASINS, TYPE A, 5'-DIAMETER, TYPE 1 FRAME, OPEN LID	EACH	$ 5,000.00	**5**	$ 25,000.00
60221100	MANHOLES, TYPE A, 5'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 4,500.00	**8**	$ 36,000.00
60223800	MANHOLES, TYPE A, 6'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 6,500.00	**6**	$ 39,000.00
60224446	MANHOLES, TYPE A, 7'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 9,000.00	**15**	$ 135,000.00
60224459	MANHOLES, TYPE A, 8'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 10,000.00	**1**	$ 10,000.00
60224469	MANHOLES, TYPE A, 9'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 12,000.00	**1**	$ 12,000.00
60234200	INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	$ 2,000.00	**6**	$ 12,000.00
60500040	REMOVING MANHOLES	EACH	$ 800.00	**6**	$ 4,800.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**5**	$ 4,000.00
60500060	REMOVING INLETS	EACH	$ 500.00	**6**	$ 3,000.00
60603800	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	$ 30.00	**300**	$ 9,000.00
60605100	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24 (ABUTTING EXISTING PAVEMENT)	FOOT	$ 35.00	**1220**	$ 42,700.00
63301215	REMOVE AND REERECT STEEL PLATE BEAM GUARDRAIL, TYPE B	FOOT	$ 25.00	**200**	$ 5,000.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 50,000.00	**1**	$ 50,000.00
Z0004522	HOT-MIX ASPHALT DRIVEWAY PAVEMENT, 6"	SQ YD	$ 70.00	**200**	$ 14,000.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 20,000.00	**1**	$ 20,000.00
NA	STORM JUNCTION CHAMBER	EACH	$ 20,000.00	**5**	$ 100,000.00
NA	REMOVE EXISTING JUCTION CHAMBER	EACH	$ 5,000.00	**5**	$ 25,000.00
NA	BOX CULVERT CONNECTION TO EXISTING BACKFLOW STRUCTURE	EACH	$ 10,000.00	**2**	$ 20,000.00
NA	UTILITY RELOCATION[3]	L. SUM	$ 1,000,000.00	**1**	$ 1,000,000.00
				SUB-TOTAL	$ 3,571,040.00
		20%		CONTINGENCY	$ 714,208.00
				CONSTRUCTION TOTAL	$ 4,285,248.00

[1]Does not include pump station cost
[2]Based on 2015 dollar estimates
[3]An allowance has been included for utility relocations, but the amount is not an upper limit

THIS ESTIMATE DOES NOT INCLUDE THE FOLLOWING ITEMS:

A. LAND ACQUISITION
B. ACQUISITION OF EASEMENTS OR RIGHT-OF-WAY
C. ACQUISITION OF IDOT PERMITS OR COUNTY PERMITS
D. FENCE REMOVAL AND REPLACEMENT
E. IMPACT TO THE EXISTING FLOODWALL

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018

MOUNT PROSPECT
(CBBEL PROJECT NO. 150225)

ENGINEER'S OPINION OF PROBABLE COST
DATE: September 18, 2015
LAST REVISED:

ALTERNATIVE 9: 25-YEAR STORM SEWER AND FLOOD STORAGE IMPROVEMENT WITH 10-YEAR FIS TAILWATER & UPGRADED PUMP STATION

ITEM #	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST[2]
20100110	TREE REMOVAL (6 TO 15 UNITS DIAMETER)	UNIT	$ 50.00	**130**	$ 6,500.00
20101200	TREE ROOT PRUNING	EACH	$ 250.00	**10**	$ 2,500.00
20200100	EARTH EXCAVATION	CU YD	$ 40.00	**62500**	$ 2,500,000.00
20800150	TRENCH BACKFILL	CY	$ 40.00	**1390**	$ 55,600.00
21101615	TOPSOIL FURNISH AND PLACE, 4"	SY	$ 5.00	**30150**	$ 150,750.00
25000110	SEEDING	ACRE	$ 10,000.00	**4.2**	$ 42,000.00
25100630	EROSION CONTROL BLANKET	SY	$ 5.00	**30150**	$ 150,750.00
28100109	STONE RIPRAP, CLASS A5	SQ YD	$ 60.00	**100**	$ 6,000.00
42300200	PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 6 INCH	SQ YD	$ 80.00	**160**	$ 12,800.00
42400200	PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH	SQ FT	$ 7.00	**1150**	$ 8,050.00
44000200	DRIVEWAY PAVEMENT REMOVAL	SQ YD	$ 15.00	**160**	$ 2,400.00
44000500	COMBINATION CURB AND GUTTER REMOVAL	FOOT	$ 15.00	**500**	$ 7,500.00
44000600	SIDEWALK REMOVAL	SQ FT	$ 2.00	**1150**	$ 2,300.00
44201747	CLASS D PATCHES, TYPE IV, 8 INCH	SQ YD	$ 80.00	**1215**	$ 97,200.00
50100300	REMOVAL OF EXISTING STRUCTURES NO. 1 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
50100400	REMOVAL OF EXISTING STRUCTURES NO. 2 (BOX CULVERT INTO JUNCTION)	EACH	$ 4,000.00	**1**	$ 4,000.00
54010505	PRECAST CONCRETE BOX CULVERTS 5' X 5'	FOOT	$ 500.00	**185**	$ 92,500.00
54213693	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 48"	EACH	$ 4,500.00	**1**	$ 4,500.00
54213705	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 60"	EACH	$ 8,000.00	**1**	$ 8,000.00
550A0050	STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	$ 80.00	**30**	$ 2,400.00
550A0120	STORM SEWERS, CLASS A, TYPE 1 24"	FOOT	$ 100.00	**520**	$ 52,000.00
550A0140	STORM SEWERS, CLASS A, TYPE 1 30"	FOOT	$ 130.00	**680**	$ 88,400.00
550A0190	STORM SEWERS, CLASS A, TYPE 1 48"	FOOT	$ 150.00	**750**	$ 112,500.00
550A0210	STORM SEWERS, CLASS A, TYPE 1 60"	FOOT	$ 220.00	**215**	$ 47,300.00
550A0490	STORM SEWERS, CLASS A, TYPE 2 54"	FOOT	$ 190.00	**810**	$ 153,900.00
55100500	STORM SEWER REMOVAL 12"	FOOT	$ 15.00	**10**	$ 150.00
55100700	STORM SEWER REMOVAL 15"	FOOT	$ 15.00	**200**	$ 3,000.00
55101300	STORM SEWER REMOVAL 27"	FOOT	$ 25.00	**135**	$ 3,375.00
55101400	STORM SEWER REMOVAL 30"	FOOT	$ 40.00	**185**	$ 7,400.00
55101500	STORM SEWER REMOVAL 33"	FOOT	$ 45.00	**260**	$ 11,700.00
55101900	STORM SEWER REMOVAL 48"	FOOT	$ 60.00	**130**	$ 7,800.00
60221100	MANHOLES, TYPE A, 5'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 4,500.00	**2**	$ 9,000.00
60223800	MANHOLES, TYPE A, 6'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 6,500.00	**3**	$ 19,500.00
60224446	MANHOLES, TYPE A, 7'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 8,000.00	**7**	$ 56,000.00
60224459	MANHOLES, TYPE A, 8'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 10,000.00	**1**	$ 10,000.00
60224469	MANHOLES, TYPE A, 9'-DIAMETER, TYPE 1 FRAME, CLOSED LID	EACH	$ 12,000.00	**1**	$ 12,000.00
60234200	INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	$ 2,000.00	**2**	$ 4,000.00
60500040	REMOVING MANHOLES	EACH	$ 2,000.00	**5**	$ 10,000.00
60500050	REMOVING CATCH BASINS	EACH	$ 800.00	**3**	$ 2,400.00
60500060	REMOVING INLETS	EACH	$ 500.00	**1**	$ 500.00
60603800	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	$ 30.00	**300**	$ 9,000.00
60605100	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24 (ABUTTING EXISTING PAVEMENT)	FOOT	$ 35.00	**200**	$ 7,000.00
63301215	REMOVE AND REERECT STEEL PLATE BEAM GUARDRAIL, TYPE B	FOOT	$ 25.00	**200**	$ 5,000.00
70101700	TRAFFIC CONTROL AND PROTECTION	L. SUM	$ 22,000.00	**1**	$ 22,000.00
X6020293	MANHOLES, TYPE A, 8'-DIAMETER, WITH 2 TYPE 1 FRAMES, CLOSED LID, RESTRICTOR PLATE	EACH	$ 15,000.00	**1**	$ 15,000.00
Z0013798	CONSTRUCTION LAYOUT	L. SUM	$ 12,500.00	**1**	$ 12,500.00
NA	STORM JUNCTION CHAMBER WITH RESTRICTOR	EACH	$ 20,000.00	**1**	$ 20,000.00
NA	REMOVE EXISTING RESTRICTOR STRUCTURE	EACH	$ 2,500.00	**1**	$ 2,500.00
NA	LANDSCAPE RESTORATION (PLAYGROUND AREA)	L. SUM	$ 5,000.00	**1**	$ 5,000.00
NA	BOX CULVERT CONNECTION TO EXISTING BACKFLOW STRUCTURE	EACH	$ 10,000.00	**2**	$ 20,000.00
NA	STORM JUNCTION CHAMBER	EACH	$ 12,000.00	**1**	$ 12,000.00
NA	REMOVE BASEBALL FIELD EQUIPMENT	L. SUM	$ 4,000.00	**1**	$ 4,000.00
				SUB-TOTAL	$ 3,904,675.00
		20%		CONTINGENCY	$ 780,935.00
				CONSTRUCTION TOTAL	$ 4,685,610.00

[1]Does not include pump station cost (See Report Table 7)
[2]Based on 2015 dollar estimates

THIS ESTIMATE DOES NOT INCLUDE THE FOLLOWING ITEMS:

A. LAND ACQUISITION
B. UTILITY RELOCATIONS
C. ACQUISITION OF EASEMENTS OR RIGHT-OF-WAY
D. ACQUISITION OF IDOT PERMITS OR COUNTY PERMITS
E. FENCE REMOVAL AND REPLACEMENT
F. IMPACT TO THE EXISTING FLOODWALL