Agenda
Village of Glen Ellyn
Special Village Board Workshop
Monday, January 21, 2013
6:00 P.M. – Galligan Board Room
Glen Ellyn Civic Center

1. Call to Order

2. Motion to adjourn to Executive Session for the purposes of discussing collective bargaining negotiations, returning thereafter to open session *(Trustee Ladesic)*

3. Glen Ellyn History Project – Glen Ellyn Park District Representatives

4. Lake Ellyn Hydrologic and Hydraulic Study – Professional Engineer Minix

5. Other Items?

6. Adjournment

Glen Ellyn Park District History

From Prairies & Parks to Places & People.

GLEN ELLYN PARK DISTRICT HISTORY PROJECT

Village Board Presentation

Overview

2

Designed to celebrate the history of the PD for the centennial in 2019.

Three parts:

- Create an archives
- Scan and preserve material in archival storage
- Create a Web site

Archives

3

- Inventory material
  - Audits, election results, bond issues
  - Maps and plans
  - Correspondence, meeting minutes, reports, and resolutions
  - Newspaper clippings and magazine articles
  - Photographs
  - Petitions
- Develop collection policy and procedures
- Select material for archives
- Store and preserve

Glen Ellyn Park District History Project

Scan and Preserve

4

- Scan
  - In-house scanning
  - Glen Ellyn Historical Society
- Preserve
  - Paper: storage in archival-quality boxes, files, photo albums, binders, sleeves
  - Digital media: storage that allows continued access

Glen Ellyn Park District History Project

Web site

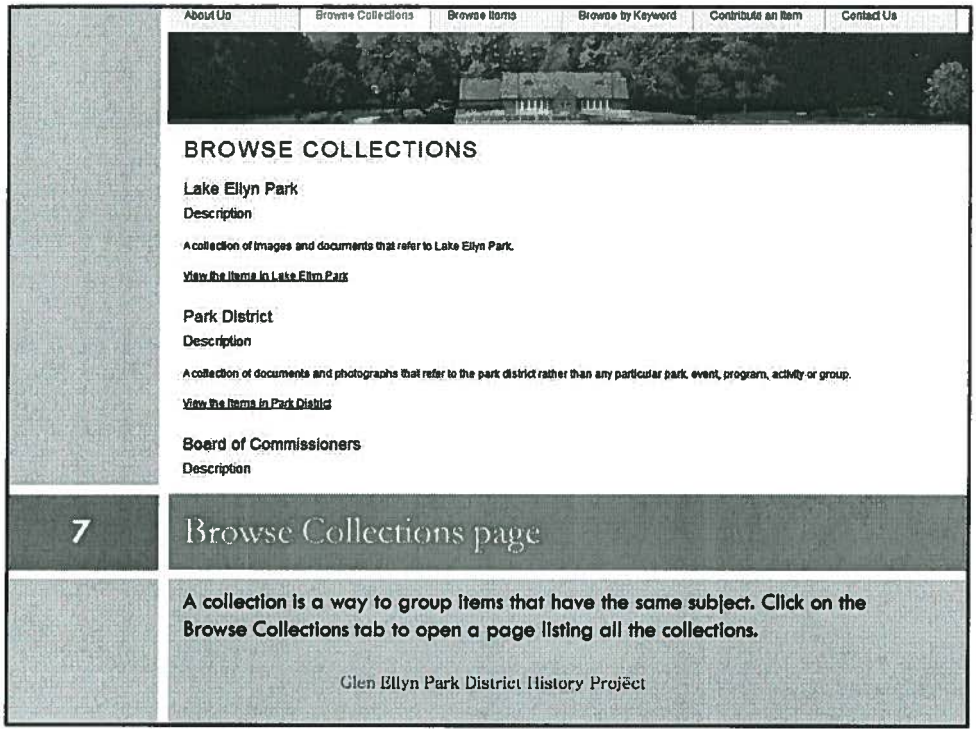
5

- Site
  - Omeka: an open source site designed for archives, museums, and libraries.
  - We are using Omeka.net
  - http://geparkhistory.omeka.net/
- Contents
  - Initial focus is on Lake Ellyn Park and foundation of park district
  - Photographs, newspaper clippings, Board meeting minutes
  - Other parks and events to follow

Glen Ellyn Park District History Project

6

Glen Ellyn Park District History Project



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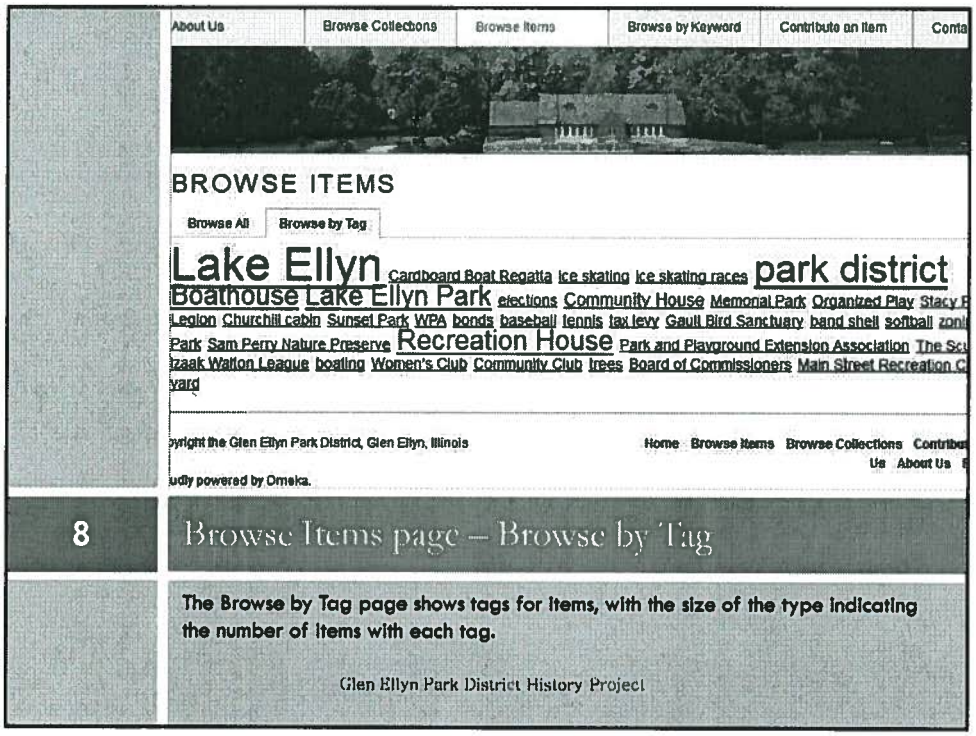
Browse Collections page

A collection is a way to group items that have the same subject. Click on the Browse Collections tab to open a page listing all the collections.

Glen Ellyn Park District History Project



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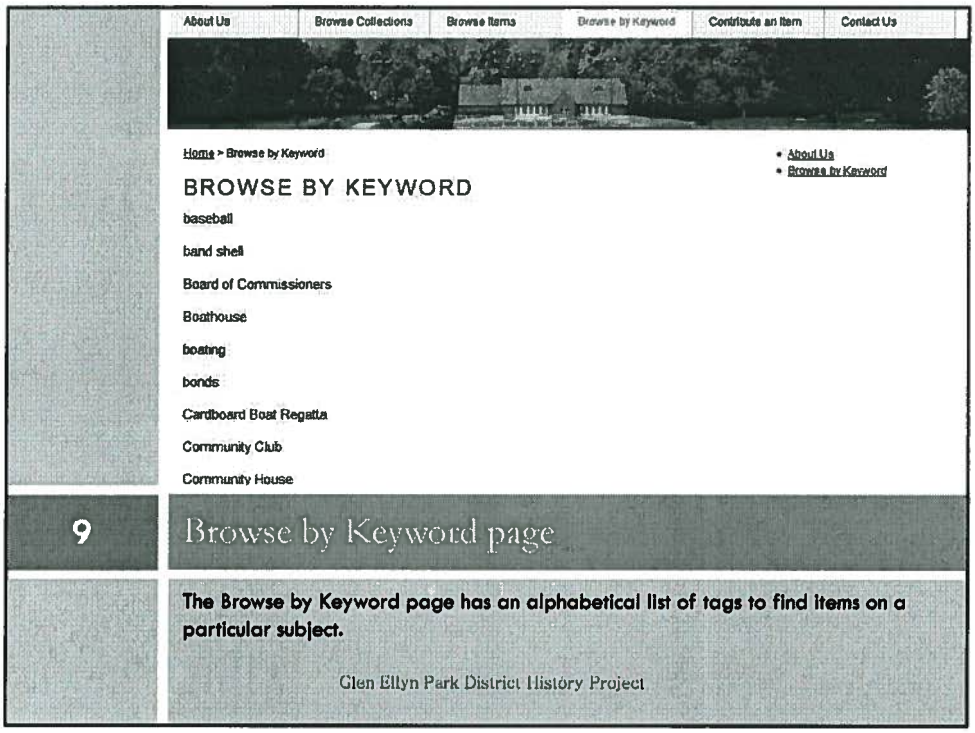
Browse Items page – Browse by Tag

The Browse by Tag page shows tags for items, with the size of the type indicating the number of items with each tag.

Glen Ellyn Park District History Project



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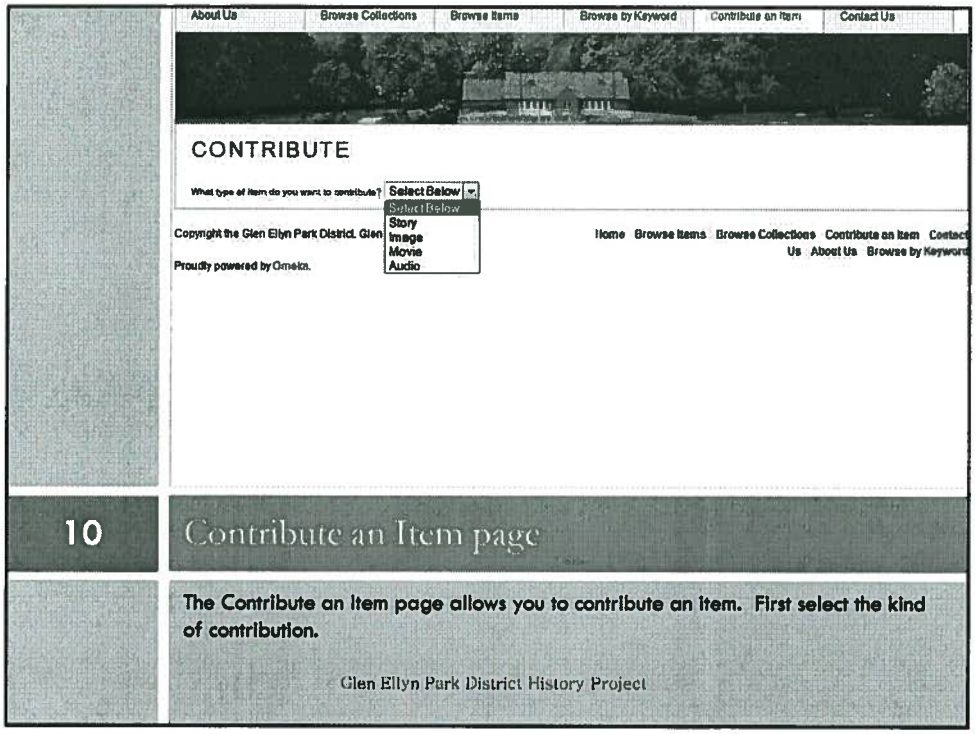
Browse by Keyword page

The Browse by Keyword page has an alphabetical list of tags to find items on a particular subject.

Glen Ellyn Park District History Project



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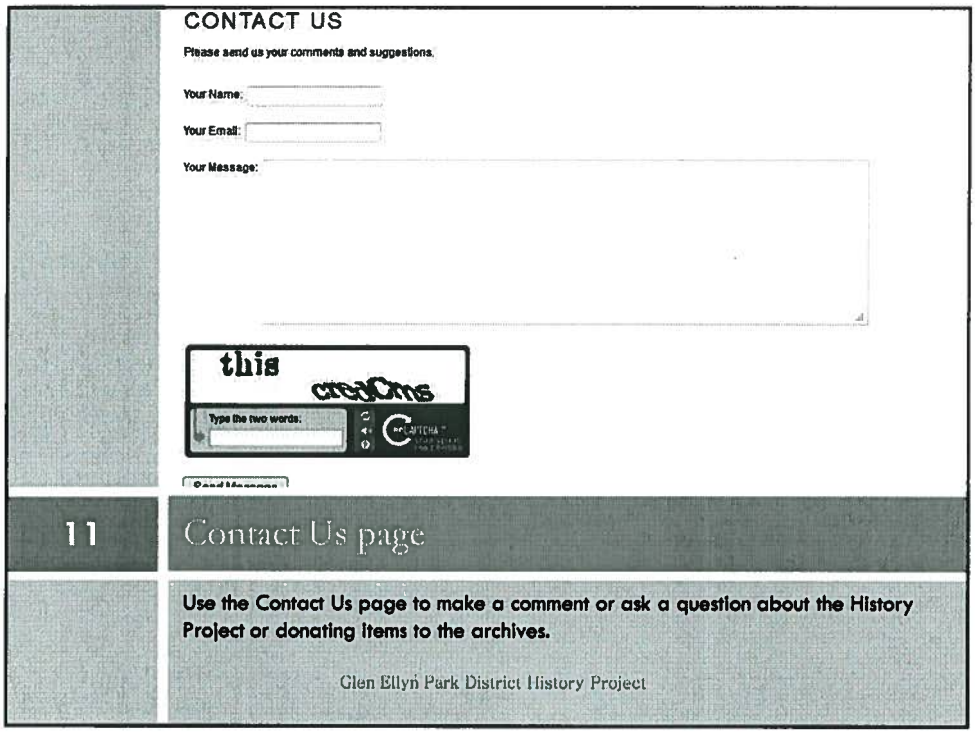
Contribute an Item page

The Contribute an Item page allows you to contribute an item. First select the kind of contribution.

Glen Ellyn Park District History Project



11

Contact Us page

Use the Contact Us page to make a comment or ask a question about the History Project or donating items to the archives.

Glen Ellyn Park District History Project

Moving Forward

12

- Archives
  - Make final selection of material to be placed in the archives
- Scan and preserve
  - Scan material in-house and GEHS as needed
  - Move all materials into archival-grade storage
- Web site
  - Add material
  - Build out collections
- Collaboration
  - Wrote an article for the GEHS newsletter
  - Asking volunteers to help identify people in photographs
  - Explore other ways to collaborate with GEHS

Glen Ellyn Park District History Project

The Larger Picture

13

- Master Plan for Lake Ellyn
  - Lake Ellyn was the first park created and preserving the lake was a galvanizing factor in creating a park district
  - Lake Ellyn is the "crown jewel" of the park district and a major focus of community activity
  - The Web site can emphasize the historical role of Lake Ellyn in creating a community in Glen Ellyn
  - The History Project can support work to create public support for the Master Plan.

Glen Ellyn Park District History

From Prairies & Parks to Places & People.

Glen Ellyn Park District History Project

MEMORANDUM

TO: Mark Franz, Village Manager

FROM: Julius Hansen, Public Works Director
Bob Minix, Professional Engineer

DATE: January 15, 2013

SUBJECT: Hydrologic and Hydraulic Study for Lake Ellyn
Transmittal of Supplemental Project Report and Consultant Presentation to Village Board on January 21, 2013

In May 2012, representatives from RHMG Engineers presented the findings from the drainage study commissioned by the Village and Park District to study Lake Ellyn and address a number of items and issues associated with lake inflows, operations and overflows. Key recommendations from that study included lowering the normal lake level, improving outlet structure hydraulics and removing the restrictor plate on the outlet pipe in order to pass the 100-year design storm without overtopping.

The consultant made a similar presentation to the Glen Ellyn Park District Board and met with interested residents. All these interactions produced feedback and questions that were worthy of additional investigations, particularly relating to preventing / mitigating lake overflows. In July 2012 RHMG received Board authorization to provide supplemental services to the original study including a sensitivity analysis of impervious coverage area in the Lake Ellyn drainage basin; potential of increased lake release rate; outlet structure geometry; handling of lake overflows utilizing a portion of the Perry Preserve; and private property re-grading possibilities.

Lake Ellyn is a key component of the stormwater management system on the north side of the Village. The lake (formed by an earthen dam on the north side of the facility) is designed to receive and store runoff from about a one square mile section of the Village (including all of the Central Business District), normally discharging at a controlled rate into underground pipes that convey the water to Perry's Pond and ultimately to the East Branch of the DuPage River. In September 2008 and July 2010, heavy rainfalls in the Glen Ellyn area resulted in overflows from Lake Ellyn and flooding problems at downstream locations on the east side of Riford between Oak and Chidester. In August 2011, the Village Board authorized RHMG Engineers of Mundelein to conduct a series of hydrologic and hydraulic studies to assess current conditions and make recommendations to minimize the frequency and impacts of Lake Ellyn overflows.

The original project report was conveyed to the Village Board in May 2012. Enclosed herewith is a complete copy of the **supplemental** project report completed in the fall of 2012. On January 21, 2013 project principal (Bill Rickert) and project engineer (Ben Metzler) from RHMG will present a summary of the supplemental report to the Village Board and be available to answer questions pertaining to the adjunct study items.

An invitation to the January 21 Board workshop meeting has been extended to approximately 50 residences downstream of Lake Ellyn along the Lake, Grand, Riford and Chidester corridors that may be impacted or have an immediate interest in Lake Ellyn operations. Excerpts from the supplemental report consisting of the Introduction and Conclusions & Recommendations sections were included with the invitation letter to provide basic report information in advance of the RHMG presentation. Please note the attached letter to the residents.

The consultants will provide a similar presentation at the February 5, 2013 Park District workshop meeting.

We look forward to presenting the supplemental report and discussing the report recommendations with the Village Board, including timing and funding of possible improvements.

Enc. Lake Ellyn H&H Study Supplemental Report (draft)
January 11, 2013 Letter of Invitation

cc: Kristen Schrader, Assistant to the Village Manager, Administration
Dave Harris, Executive Director, Glen Ellyn Park District
Bill Rickert, RHMG Engineers

January 11, 2013

LAKE ELLYN DRAINAGE STUDY
PROJECT STATUS REPORT AND
INVITATION TO JANUARY 21, 2013 VILLAGE BOARD WORKSHOP

Dear Resident:

Lake Ellyn is a key component of the stormwater management system on the north side of the Village. The lake (formed by an earthen dam on the north side of the facility) is designed to receive and store runoff from about a one square mile section of the Village, normally discharging at a controlled rate into underground pipes that convey the water to Perry's Pond and ultimately to the East Branch of the DuPage River. The dam and lake outlet control structure (OCS) are designed to accommodate runoff from the 100-year design storm. Lake Ellyn has filled to capacity and overflowed in recent years, the most recent occurrence in July 2010.

In conjunction with the Glen Ellyn Park District, the Village authorized the consulting firm of RHMG Engineers of Mundelein to perform a study of Lake Ellyn to assess current conditions and make recommendations regarding lake operations and potentially other measures to mitigate the impacts of lake overflows. In April 2012, the consultants completed a report entitled "Hydrologic and Hydraulic Study for Lake Ellyn." Following public presentations to the Village and Park District boards and a public meeting, the engineers were authorized to perform additional studies in order to respond to feedback received from both boards as well as residents.

Attached hereto are excerpts from the supplemental report completed by RHMG in the fall of 2012. Additional investigations included a sensitivity analysis of impervious coverage area in the Lake Ellyn drainage basin; possible lake release rates; outlet structure geometry; handling of lake overflows utilizing a portion of the Perry Preserve; and private property re-grading possibilities.

In addition to preparation of the supplemental report, the consultant again will be making presentations to both the Village and Park District Boards. As a resident in the area immediately downstream of Lake Ellyn and adjacent to the Perry's Pond area, you are invited to attend the Village Board workshop on Monday, January 21, 2013 to hear the consultant's presentation and explanation of the findings from the supplemental studies. The workshop will take place in the third floor Galligan Board Room beginning at 7:00 PM.

If you have any questions in advance of the January 21 workshop, please contact me at 630-547-5514 or bobm@glenellyn.org.

Very truly yours,

Bob Minix

Bob Minix
Professional Engineer
Glen Ellyn Public Works Department

DRAFT

I. INTRODUCTION

The Lake Ellyn Hydrologic and Hydraulic Study was issued in April of 2012. The report was presented at Village and Park District Board Meetings as well as during a special session with residents. There was intelligent discussion regarding the contents of the report and several questions were asked that were not included in the scope of the original study. As a result, the Village and Park District requested that additional investigations be performed relative to the following items:

1. Perform future condition modeling to project the impact of increases in the impervious area within the upstream tributary area to Lake Ellyn and the associated lake levels for the 100-year critical duration event.

2. Further investigate the feasibility of increasing the release rate from Lake Ellyn to the maximum allowable release rate per the DuPage Countywide Stormwater and Flood Plain Ordinance of 61.4 cubic feet per second (CFS), including discussions with the Village's Stormwater and Flood Plain Ordinance Administrator and limited hydraulic modeling of Perry's Pond.

3. Identify the optimum additional weir length/width to be incorporated into the modified outlet control structure.

4. Perform a conceptual design and cost estimate for augmenting the downstream overland flow capacity during overtopping events via a storm sewer and inlet structure from the Sam Perry Nature Preserve under Riford Road to the sideyard channel that drains to Perry's Pond.

5. Perform a topographic survey of the sideyards between 729 and 735 Riford Road and determine whether the side yard swale could be re-graded to be more hydraulically efficient.

6. Prepare an addendum to the April, 2012 "Hydrologic and Hydraulic Study for Lake Ellyn" report summarizing the findings of these additional engineering investigations

II. IMPERVIOUS COVERAGE SENSITIVITY

A. General

A previous report which investigated the sensitivity of impervious area increases was prepared as part of the updated Comprehensive Analysis of Stormwater Drainage in 2000. The condition that 50% of the houses within a given area increased their building footprint by 50% was analyzed in the report. The building footprint only accounts for approximately 37% of the total impervious area on a lot. If the building footprint is increased by 50%, then the impervious percentage for the lot increases by 30% and the total impervious coverage increases 18% (accounting for streets and sidewalks). Therefore, if the building footprint of all of the residences within the tributary area to Lake Ellyn increased by 50%, then the overall impervious coverage percentage would increase from 40% to 47.2%.

The model of Lake Ellyn and its tributary areas was run with several scenarios of differing impervious coverage. The existing coverage of the residential tributary areas is approximately 40%. Scenarios of 50%, 55% and 60% were modeled using the SWMM model created during the initial study. These scenarios represent extreme scenarios in the basin, including every house expanding the footprint by more than 50%. The model was run using the 100-year 48, 12 and 18 hour events, the three events that produce the highest rise in the water surface elevation of Lake Ellyn in the model, respectively (note that the 48 hour event overtops the dam under existing conditions).

B. Existing Lake Conditions

The model was run using the existing conditions discussed in the report, including the orifice with a restrictor plate, 3.25 foot weir and normal water level of 707.5 feet. The results are included in Table 8 below.

TABLE 8 – IMPACT OF FUTURE IMPERVIOUS COVERAGE INCREASES WITH NO CHANGES TO THE LAKE NWL OR OUTLET

Event	Peak Flow into Lake Ellyn (CFS)	Peak Water Surface Elevation	Peak Discharge from Lake Ellyn (CFS)	Time of Peak Discharge
50% Impervious				
100 Year, 48 Hour	159	713.37	107.01 (84 CFS over dam)	44:39 (2nd day of event)
100 Year, 12 Hour	241	713. 20	57.21 (34 CFS over dam)	09:15
100 Year, 18 hour	196	713.17	50.60 (27 CFS over dam)	14:48

If the impervious coverage in the residential areas is increased to 50%, then the 12, 18, and 48 hour events all overtop the dam under existing conditions with a peak flow over the dam of 84 CFS at the 48 hour event. Under current impervious limits, the dam is overtopped under the 48-hour critical duration analysis.

C. Proposed Lake Conditions per April 2012 Report

The model was run using the proposed conditions recommended in the April, 2012 report, including an additional 6-foot weir length, the existing 24-inch diameter orifice with no restrictor plate and a normal water level in Lake Ellyn of 707.0 feet. The results are presented in Table 9 below.

TABLE 9 – IMPACT OF FUTURE IMPERVIOUS COVERAGE INCREASES WITH RECOMMENDED CHANGES TO LAKE NWL AND OUTLET PER APRIL, 2012 REPORT

Event	Peak Flow into Lake Ellyn	Peak Water Surface Elevation	Peak Discharge from Lake Ellyn	Time of Peak Discharge
50% Impervious				
100 Year, 48 Hour	159	713.25	82.24 (44 CFS over dam)	48:06 (3rd day of event)
100 Year, 12 Hour	241	712.82	36.61	11:03
100 Year, 18 hour	196	712.59	36.23	16:39
55% Impervious				
100 Year, 48 Hour	170	713.28	94.67 (56 CFS over dam)	47:57 (2nd day of event)
100 Year, 12 Hour	255	713.05	43.18 (5 CFS over dam)	10:54
100 Year, 18 hour	207	712.88	36.72	18:18

If the impervious coverage in the residential areas is increased to 50%, then the 48 hour event causes overtopping of the dam with a peak flow over the dam of 44 CFS. Under 55 percent impervious conditions, the 48 and 12 hour events overtop the dam, with a peak flow over the dam of 56 CFS.

D. Proposed Lake Conditions with Maximum Release Rate

The model was run using the maximum allowable release rate of 61.4 CFS (0.10 CFS/acre) based on the DuPage County Countywide Stormwater and Floodplain Ordinance, an additional weir length of 8 feet and a normal water level of 707.0 feet in Lake Ellyn. The results are given in Table 10 below.

TABLE 10 – IMPACT OF FUTURE IMPERVIOUS COVERAGE INCREASES WITH MAXIMUM LAKE RELEASE RATE

Event	Peak Flow into Lake Ellyn	Peak Water Surface Elevation	Peak Discharge from Lake Ellyn	Time of Peak Discharge
50% Impervious Coverage				
100 Year, 48 Hour	159	712.34	59.4	48:24 (3rd day of event)
100 Year, 12 Hour	241	712.05	58.53	9:12
100 Year, 18 hour	196	711.52	56.34	14:30
55% Impervious Coverage				
100 Year, 48 Hour	170	712.73	60.55	48:24 (3rd day of event)
100 Year, 12 Hour	255	712.33	59.38	09:18
100 Year, 18 hour	207	711.81	57.82	14:36
60% Impervious Coverage				
100 Year, 48 Hour	179	713.08	71.46 (	48:21 (3rd day of event)
100 Year, 12 Hour	269	712.61	60.19	09:21
100 Year, 18 hour	218	712.10	58.69	14:42

There is no overtopping observed under the 50% and 55% impervious coverage conditions for any event. Overtopping is observed during the 48-hour event with an impervious coverage of 60%, with the maximum flow over the dam of 45 CFS.

E. Zoning Considerations

The majority of the residences in the area tributary to Lake Ellyn are in the R-2 zoning district (lots that are greater than 8,700 square feet). There are limits on impervious coverage on individual lots, however, there is not a discrete limit. Instead, the impervious coverage is a function of the area of the front and rear yards and the size of the house on the lot. Consequently, establishing a standard maximum impervious coverage for the basin is not feasible. Based on the model results, the impervious coverage should not be permitted to exceed 55%. The Village could further investigate upper limits of impervious coverage based on the current zoning classifications to determine if impervious coverages on individual lots can reach or exceed 55% coverage. As previously noted, if all of the lots tributary to the Lake Ellyn increase their footprint by 50%, then the impervious coverage would increase to 47.2%, significantly less than the recommended 55% coverage and the 60% coverage condition that causes overtopping of Lake Ellyn under the maximum lake discharge. Realistically, it is not expected that the entire residential tributary area to Lake Ellyn would reach an aggregate 55% impervious coverage.

III. INCREASING THE PEAK DISCHARGE RATE FROM LAKE ELLYN

Representatives from RHMG and the Village of Glen Ellyn's Public Works Department met with the Village's Stormwater and Flood Plain Ordinance Administrator to discuss the potential to increase the peak discharge from Lake Ellyn. The Stormwater and Flood Plain Ordinance Administrator was amenable to increasing the discharge, but wanted to confirm that the discharges to Perry's Pond would not exceed historyical peak discharges.

Events that cause the highest water surface elevation in Perry's Pond under existing conditions are low frequency, high-intensity events that cause over topping of Lake Ellyn and result in a discharge several magnitudes greater than the expected 28 CFS capacity of the existing outlet control structure. Increasing the discharge by a factor of 2.19 to 61.4 CFS results in discharges from the lake that are smaller in magnitude than the flows that occur during an overtopping event.

Several events were modeled to quantify the water surface increase. A node representing Perry's Pond was added to the model. A simplified Perry's Pond storage curve was assumed (footprint of the lake measured from aerial photographs, vertical side slopes) and the outlet was modeled as a broad crested weir at an elevation of 690.20 feet. The modeling did not account for the sag in the weir at an elevation of

689.90 feet. The assumptions for both the storage and discharge curves for Perry's Pond are conservative in that they result in a higher normal water level and a lower discharge rate.

The 100 year, 48-hour; July 23, 2010; 5-year, 24-hour; and 2-Year 24-hour events were routed through the model under existing conditions (28 CFS) and the proposed 61.4-CFS outlet with modified weir condition. The results are shown below in Table 11 below.

TABLE 11 – DISCHARGES INTO PERRY'S POND

Condition	Peak WSEL*	Peak Inflow (CFS)	Peak Outflow (CFS)
100 year, 48 hour Event			
Existing Conditions	692.55	87	86
Proposed Conditions	692.32	79	66
July 23, 2010 Event			
Existing Conditions	693.57	208	202
Proposed Conditions	692.60	96	92
5 year, 24 hour Event			
Existing Conditions	691.80	27	26
Proposed Conditions	692.13	50	50
2-Year, 24 hour Event			
Existing Conditions	691.84	30	28
Proposed Conditions	692.18	54	54

* Water Surface Elevation

There is an increase in the peak water surface elevation of Perry's Pond due to the increased capacity of the Lake Ellyn outlet control structure. However, the peak WSEL observed under existing conditions (693.57 feet) is not reached during any of the modeled events under the proposed conditions. For most events, the peak water surface elevation in Perry's pond will be higher, but the water surface will be reduced to the normal water level quicker due to Lake Ellyn draining faster.

Prior to 1991, the discharge configuration of Lake Ellyn was not restricted. The peak discharge from the lake was controlled by the capacity of the two storm sewer pipes that discharge into Perry's Pond via the channel between 717 and 725 Riford Road. Under the proposed configuration with a peak discharge of 61.4 CFS, the outlet of the lake will still be restricted, and the capacity of the storm sewer discharging into the pond will not be increased.

IV. ADDITIONAL OUTLET CONTROL STRUCTURE WEIR LENGTH

Increasing the weir length (width) in the outlet control structure will cause the discharge from Lake Ellyn to be outlet controlled at a lower elevation, thereby increasing the effective storage of the lake. Several weir lengths and outlet configurations were modeled and analyzed. There are several factors that need to be considered in the design of the new outlet, including rate of discharge, location relative to the existing features of the lake and protection from floating debris.

An additional weir length of 8 feet in conjunction with the existing 3.25 foot weir would lower the elevation at which the Lake Ellyn outlet control structure is orifice controlled. If the orifice is modified to produce a peak discharge of 61.4 CFS, then the lake outflow will be orifice controlled at an elevation of 708.5 feet, 1.5 feet above the normal water level of 707.0 feet. The existing weir and unmodified outlet control structure transitions to orifice control at 709.5 feet, 2.0 feet above the normal water level of 707.5 feet. If the additional weir length is not constructed, then the outlet would transition to orifice control at an elevation of 711.8 feet.

There are several potential configurations for the new outlet. Construction of a box structure that would convey flow via weirs on all sides would reduce the total footprint of the structure. Additionally, a submerged weir system similar to the inlet structures for the lake would prevent debris from flowing downstream and fouling trash grates.

The additional weir length and increased orifice size were modeled to determine the effect on the downstream storm sewer. The 5-year 1 hour and 5-year 24 hour events were modeled to determine the effect of the OCS modifications on the peak discharges downstream. The results, along with the peak discharges associated with existing conditions, are compared in Exhibits N and O. For both conditions, the peak discharges are increased primarily as a result of the increased capacity of the outlet. For the 5-year, 24-hour event, the peak discharge into Perry's Preserve increased from 27 CFS, to 50 CFS. For the 5-year, 1 hour event the peak discharge increases from 80 CFS to 82 CFS. The minimal increase is due to the timing of the peak discharge in the downstream storm sewer system with respect to the timing of the peak discharge from Lake Ellyn.

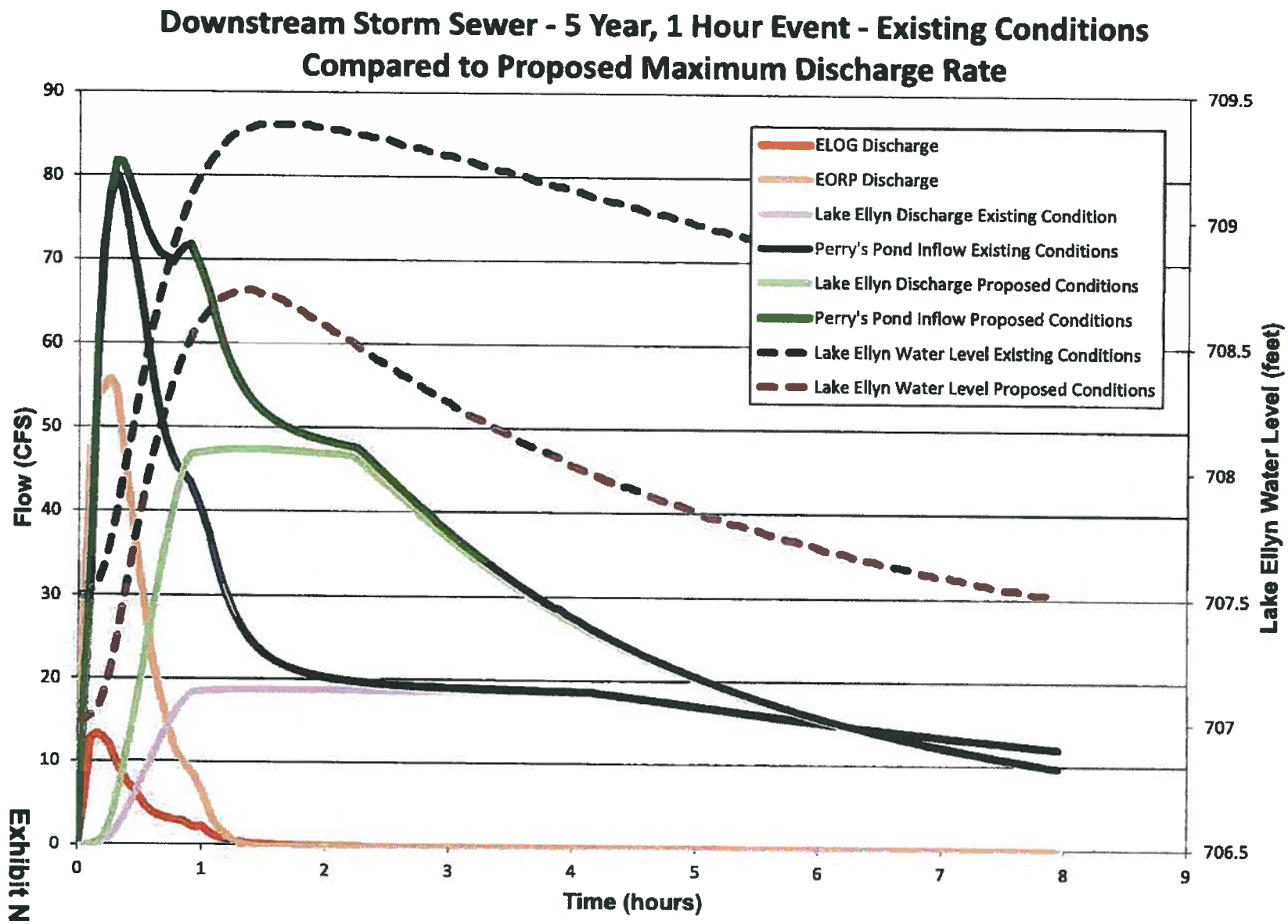

Downstream Storm Sewer - 5 Year, 1 Hour Event - Existing Conditions
Compared to Proposed Maximum Discharge Rate
Flow (CFS)
Lake Ellyn Water Level (feet)
Time (hours)
ELOG Discharge
EORP Discharge
Lake Ellyn Discharge Existing Condition
Perry's Pond Inflow Existing Conditions
Lake Ellyn Discharge Proposed Conditions
Perry's Pond Inflow Proposed Conditions
Lake Ellyn Water Level Existing Conditions
Lake Ellyn Water Level Proposed Conditions
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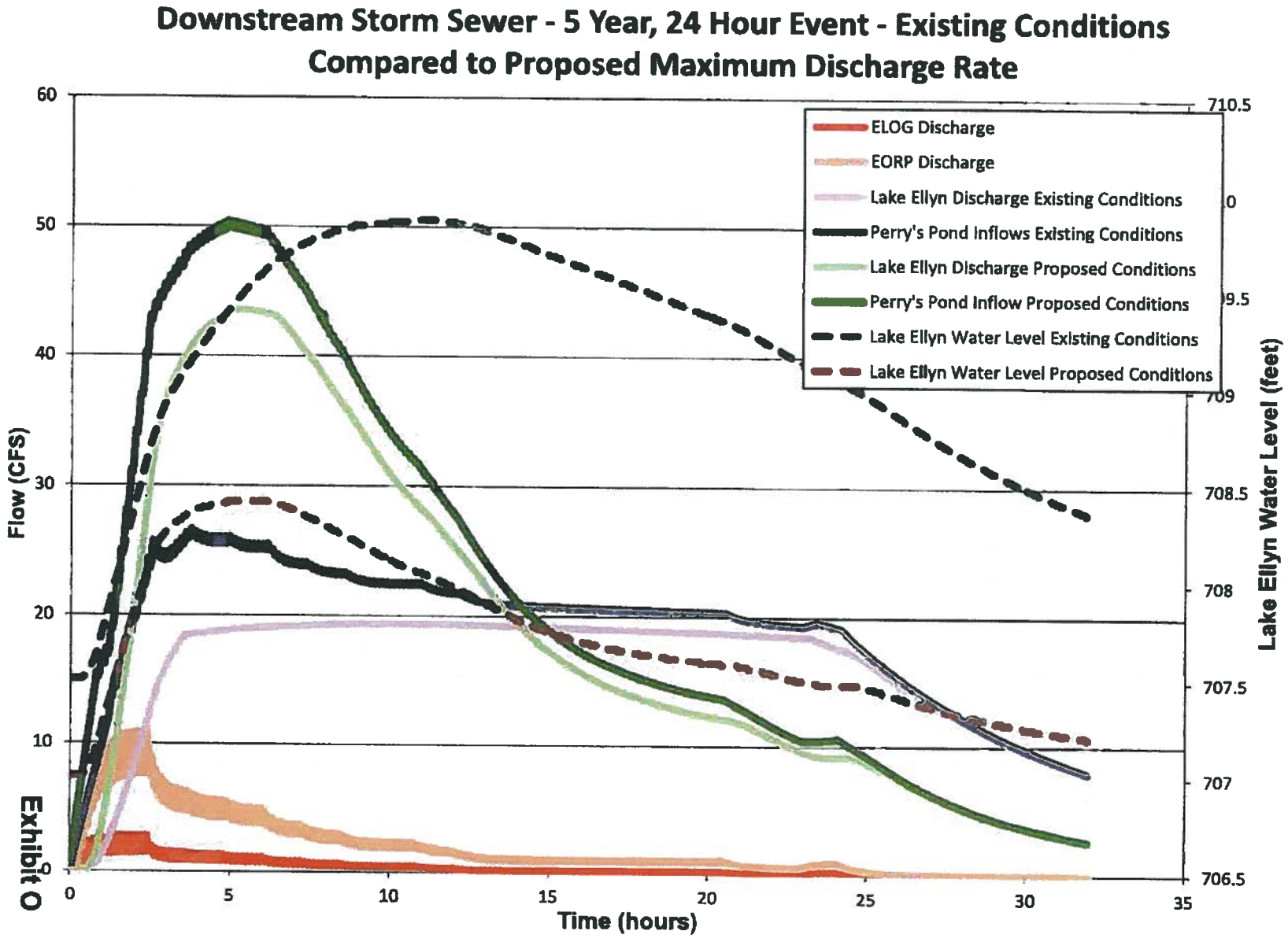
Exhibit N


Downstream Storm Sewer - 5 Year, 24 Hour Event - Existing Conditions
Compared to Proposed Maximum Discharge Rate
ELOG Discharge
EORP Discharge
Lake Ellyn Discharge Existing Conditions
Perry's Pond Inflows Existing Conditions
Lake Ellyn Discharge Proposed Conditions
Perry's Pond Inflow Proposed Conditions
Lake Ellyn Water Level Existing Conditions
Lake Ellyn Water Level Proposed Conditions
Flow (CFS)
Lake Ellyn Water Level (feet)
Time (hours)
60
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40
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Exhibit O

V. PROPOSED STORM SEWER

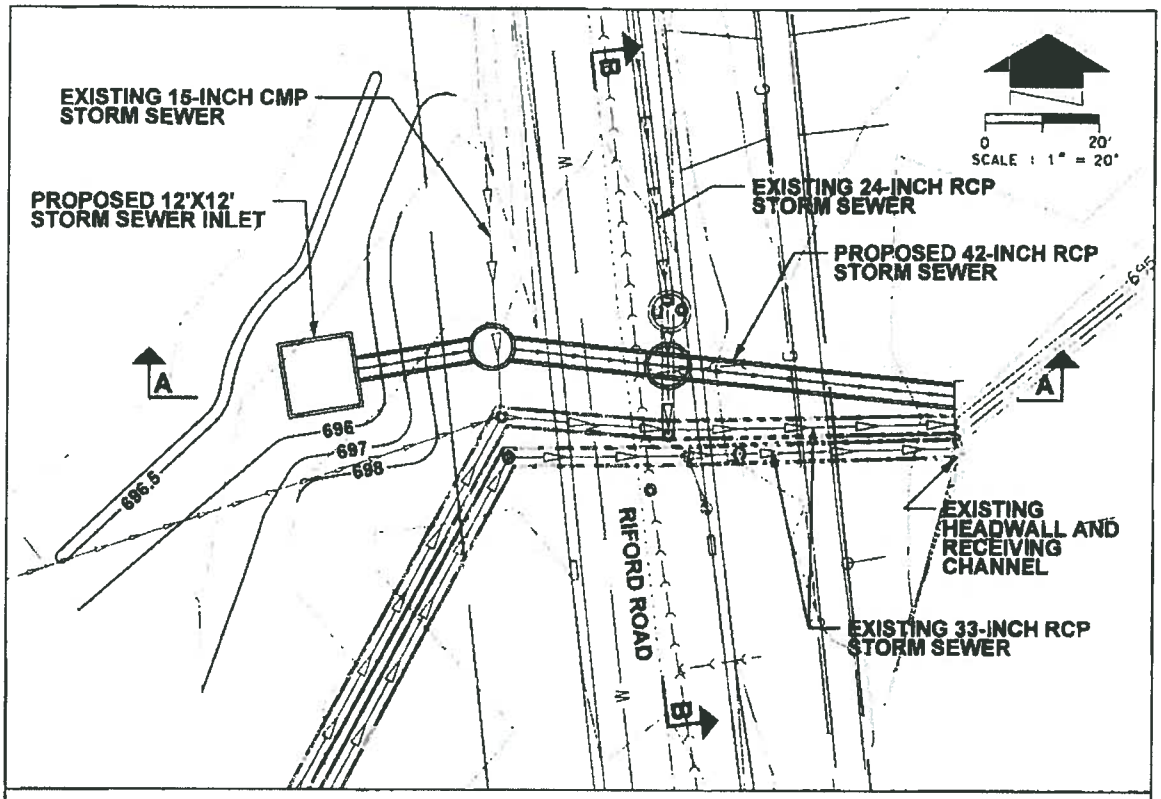
The potential to install a storm sewer connecting the Joseph "Sam" Perry Preserve area bounded by Oak Street, Grand Avenue and Riford Road to the sideyard channel that drains to Perry's Pond was also evaluated. The preserve is along the natural overland flow path that stormwater follows during overtopping events of the Lake Ellyn dam. Installation of the pipe connecting Perry's Preserve and Perry's Pond would reduce the amount of flow conveyed overland via the sideyard swale between 729 and 735 Riford. A brief discussion on the proposed location, size and design of the pipe is given below.

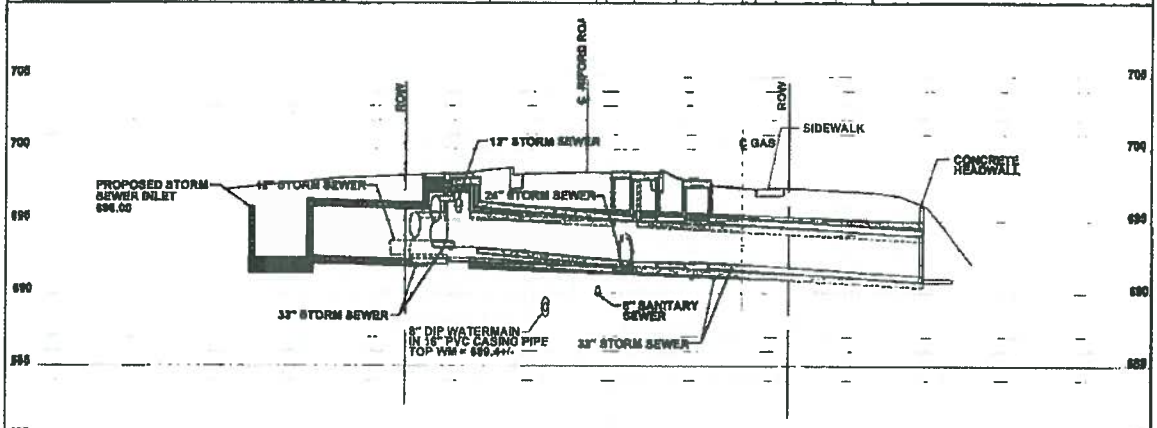
A concrete pipe interconnecting Perry's Preserve and Perry's Pond can be installed across Riford Road north of the existing 33-inch dual storm sewer crossing. The storm sewer would receive high flows from Perry's Preserve as well as from two storm sewers that convey flow from the north along Riford Road. The two storm sewers are a 24-inch reinforced concrete pipe (RCP) storm sewer that flows from north to south along the centerline of Riford Road and a 15-inch corrugated metal pipe (CMP) along the west ditch of Riford Road that conveys flow from the ditch within Perry's Preserve. In order to avoid increasing peak flows to Perry's Pond, a control structure would be installed at the upstream end of the storm sewer to prevent stormwater from low intensity, low duration (frequent) rain events from being conveyed to Perry's Pond. The inlet structure would be a 12-foot by 12-foot box structure with a rim elevation of 696.00.

A berm with a crest length of 100 feet and an elevation of 696.5 feet will be constructed upstream of the box structure to provide additional storage in the preserve and minimize the instances of the storm sewer conveying flow. The berm will allow for ponding water within the preserve, maintaining and preserving the existing wetland characteristics. See Exhibit P for a plan, profile and cross section view of the crossing. Additionally, a cost estimate is included as Exhibit Q.

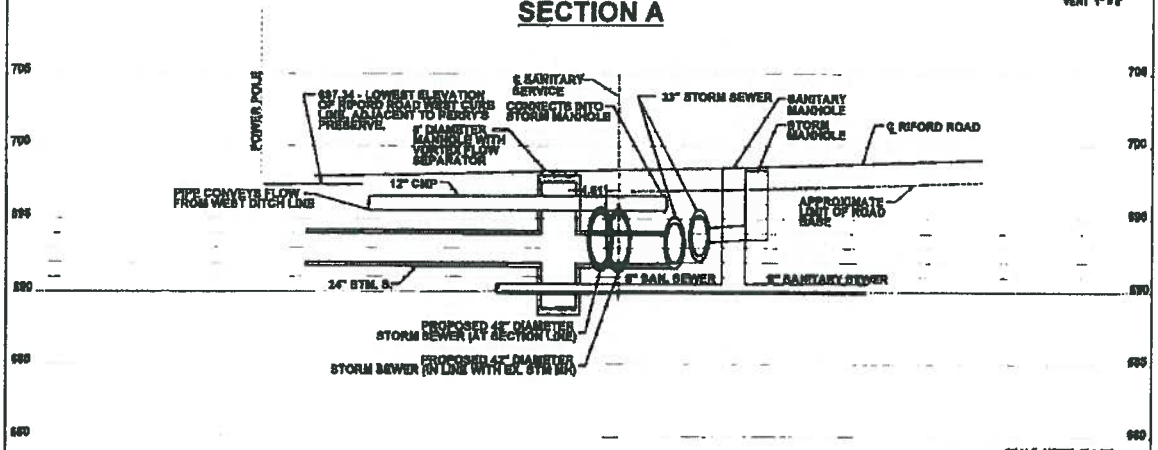
There are several potential utility conflicts that would need to be evaluated during the design phase. There is potential for a conflict with the existing watermain along the west side of Riford Road. The watermain was installed below the existing storm sewers and within a casing pipe in 2010. Installation of the new 42-inch storm sewer could require additional lowering of the watermain in order to maintain the required vertical separation distance. Additionally, a sanitary sewer service and the gas main along the east side of Riford may need to be relocated. Finally, the headwall will need to need to be expanded to accommodate the additional 42-inch pipe.

The capacity of the proposed storm sewer and inlet structure is 86 CFS at a headwater elevation of 697.4 feet. The sag point of Riford Road is approximately 697.4 feet and is located approximately 165 feet north of the existing storm sewer crossing. During events that cause overtopping of the Lake Ellyn dam, stormwater is conveyed over the low point and through the sideyards of 735 and 729 Riford. The additional storm sewer will convey up to 86 CFS prior to the overtopping of the road. In modeling





SECTION A



SECTION B

RHMG	REZEK, HENRY, MEISENHEIMER, AND GENDE, INC. 875 CAMPUS DRIVE, MUNDELEIN, ILLINOIS 60060, 847-362-5858 635 TOLLWAY RD. SUITE F, ELGIN, ILLINOIS 60123, 847-742-5858	**EXHIBIT P - RELIEF STORM SEWER RIFORD ROAD CROSSING** DATE: 9/17/2012 PROJ#: 21222001

EXHIBIT Q
ENGINEER'S PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST
VILLAGE OF GLEN ELLYN - LAKE ELLYN H&H STUDY
RIFORD ROAD RELIEF SEWER

September 20, 2012

Item No.	Description	Quantity	Unit	Unit Price	Total
1	42-Inch Diameter Storm Sewer	106	LF	$ 150.00	$ 15,900
2	7-Foot Diameter Manhole	2	EA	$ 7,500.00	$ 15,000
3	12-Foot x 12-Foot Box	1	EA	$ 18,000.00	$ 18,000
4	Sanitary Service Relocation	1	EA	$ 2,500.00	$ 2,500
5	Headwall Expansion	1	LS	$ 12,000.00	$ 12,000
6	Sidewalk Remove and Replace	60	SF	$ 7.00	$ 420
7	Curb and Gutter Remove and Replace	24	LF	$ 40.00	$ 960
8	Pavement Patching – 6-Inch Section	40	SY	$ 65.00	$ 2,600
9	Trench Backfill	30	LF	$ 40.00	$ 1,200
10	Watermain Encasement/Adjustment	1	LS	$ 5,000.00	$ 5,000
11	Limited Clearing and Site Grading within Perry's Preserve	1	LS	$ 8,000.00	$ 8,000
12	Soil Erosion and Sediment Control	1	LS	$ 2,500.00	$ 2,500
13	Site Restoration	1	LS	$ 3,000.00	$ 3,000
14	Traffic Control	1	LS	$ 14,000.00	$ 14,000
	Subtotal				**$ 101,080**
	15% Contingency				**$ 15,162**
	15% Engineering				**$ 15,162**
	Total				**$ 131,404**

of Lake Ellyn, the peak flow observed entering Perry's Preserve during the 2010 event is 151 CFS and the peak flow exiting the preserve and overtopping Riford Road is 145 CFS. The flows include overland flow from the Oak Street Basin and surrounding areas. There is not sufficient capacity in the proposed 42-inch storm sewer to convey all overtopped flow; however, the amount of stormwater required to be conveyed overland is reduced by more than 50% when examining the July 2010 event. The remainder of the flow not conveyed by the proposed storm sewer is conveyed through the sideyard swale and peak water surface elevation in the model is 697.70 feet, below the window well at 729 Riford but above the garage floors are 729 and 735 Riford.

VI. MODIFICATIONS TO THE SIDEYARD SWALE BETWEEN 729 AND 735 RIFORD

It can be observed from visual inspection of the sideyard swale that there is not a uniform grade from the back of curb along Riford Road to the rear yards. Videos of the July 23, 2010 overtopping event published on Youtube.com that show the sideyard swale were also examined as part of this analysis. In watching the videos, it appears there is highpoint and constriction between the existing garages at 729 and 735 Riford that reduces the conveyance of the sideyard swale. There may be potential for increasing the conveyance by regrading the swale. There are several critical elevations along the sideyard – the window well (698.02 feet) and finished garage floor (697.42 feet) at 729 Riford and the finished garage floor (697.49 feet) at 735 Riford. The objective is to lower the water surface to an elevation below these critical elevations. The July 23, 2010 event was used as the reference point for the investigation.

RHMG performed a survey from the sideyard between 729 and 735 Riford to Perry's Pond in the rear of 725 and 729 Riford. A base map was prepared using the survey data, contours were generated and the sideyard swale was modeled using the United States Army Corps of Engineers' HEC-RAS hydraulic model. There is no available flow data for the July 23, 2010 event, but the flow overtopped the window well at 729 Riford per anecdotal evidence. The window well was surveyed and the rim is at an elevation of 698.02 feet, and therefore the stormwater reached at least that elevation. The peak flow observed overtopping the dam in the SWMM model for the

July 23, 2010 event is approximately 145 CFS. The peak model-generated flow through the sideyard swale is 145 CFS, including overland flows from the Oak Street Basin and the surrounding areas directly tributary to the sideyard and Perry's Preserve. The HEC-RAS model was run with this flow input and the observed water surface elevation at the upstream end of the swale is 698.48, higher than the lip of the window well. Due to lack of calibration data, it is difficult to accurately quantify the flow through the sideyard swale. However, the relative reduction in water surface elevation as a result of the proposed swale modifications can be determined.

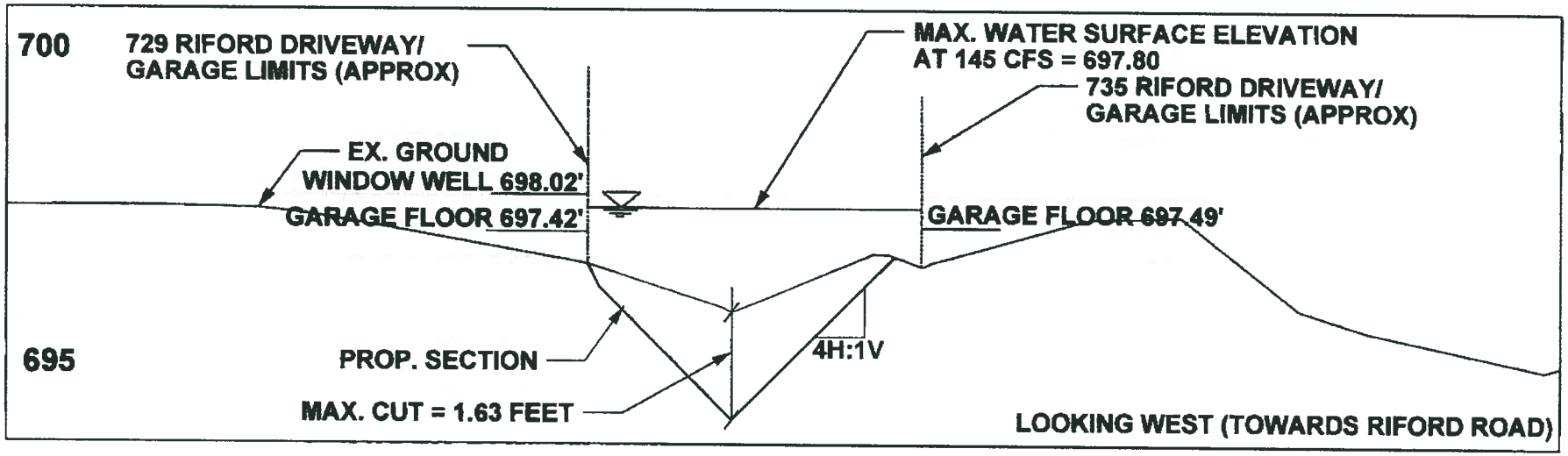
There were several proposed scenarios modeled in HEC-RAS, two of which are discussed in detail below. The proposed typical cross sections and profiles for the sideyard swale are included in Exhibits R and Exhibit S. Additionally, a cost estimate is provided in Exhibit T.

1. **V-Ditch from the front yard inlet to the rear yard** – A proposed ditch straight-graded from the front yard to the rear yard was modeled. The grading starts approximately 8 feet east of the beehive inlet in the front yard and removes all high points from the front to rear side yard. The ditch is at a slope of 0.87%, less than the preferred minimum slope of 2% for vegetated ditches. The maximum cut from existing grade to the proposed invert is 1.63 feet. It is not possible to match existing grade at a 4:1 side slope at the north garage face of 729 Riford (2:1 slope for approximately 2.5 feet). Regrading the swale at this slope would

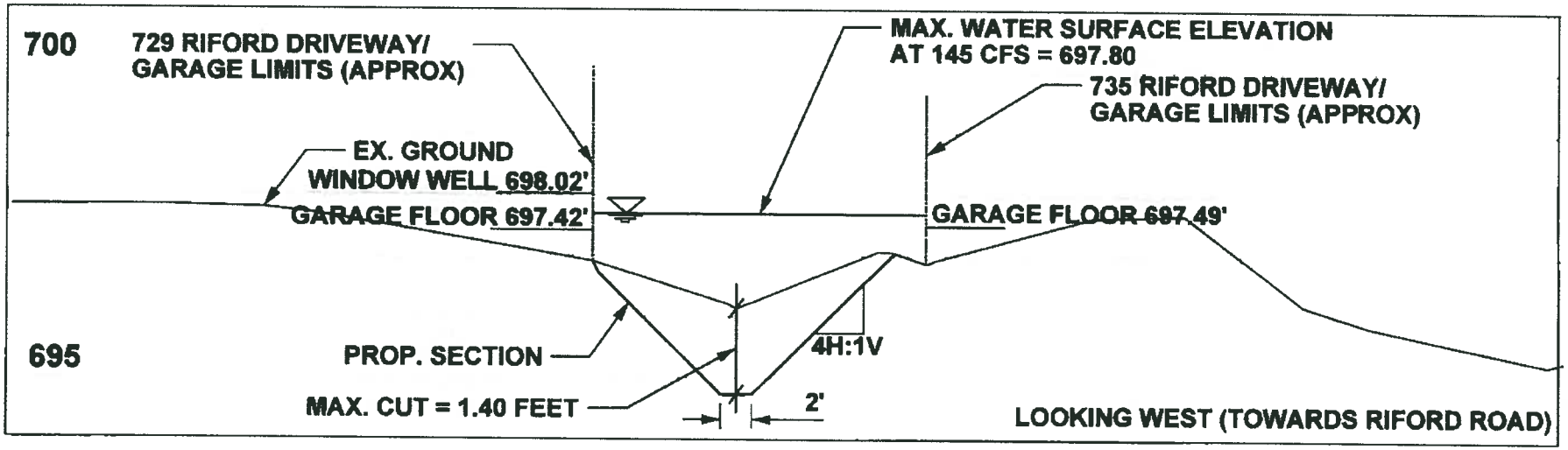
decrease the water surface elevation for a flow of 145 CFS to 697.80 feet, a reduction of 0.68 feet from the existing conditions.

2. **Trapezoidal Ditch from the front yard inlet to the rear yard** – A proposed 2-foot wide flat bottomed, 4:1 side sloped trapezoidal ditch was modeled. The grading starts 18 feet east of the beehive inlet in the front yard. The local low point at the beehive is preserved with this grading option, as is a local highpoint east of the inlet. The length of grading is shorter and the slope of the swale is steeper due to a higher upstream elevation (at the local highpoint). The ditch is at a slope of 1.33%, which is still less than the preferred minimum slope of 2% for vegetated ditches. The maximum cut from existing grade to the proposed invert is 1.40 feet. It is not possible to match existing grade at a 4:1 side slope at the west garage face of 729 Riford and a small retaining wall will be required. Regrading the swale to this slope and cross section would increase conveyance and decrease the water surface elevation for a flow of 145 CFS to 697.69 feet at the upstream end, 0.79 feet lower than the existing conditions.

Option 2 provides a larger reduction in water surface elevation. If Option 2 were in place during the July, 2010 event, the water surface elevation would still be above the garage floor but below the top of the window well. Installation of Option 2 will not prevent all instances of overtopping a window well or flow into a garage, but will reduce the potential for damage as well as reducing the duration and severity of the events.



OPTION 1 - V-DITCH

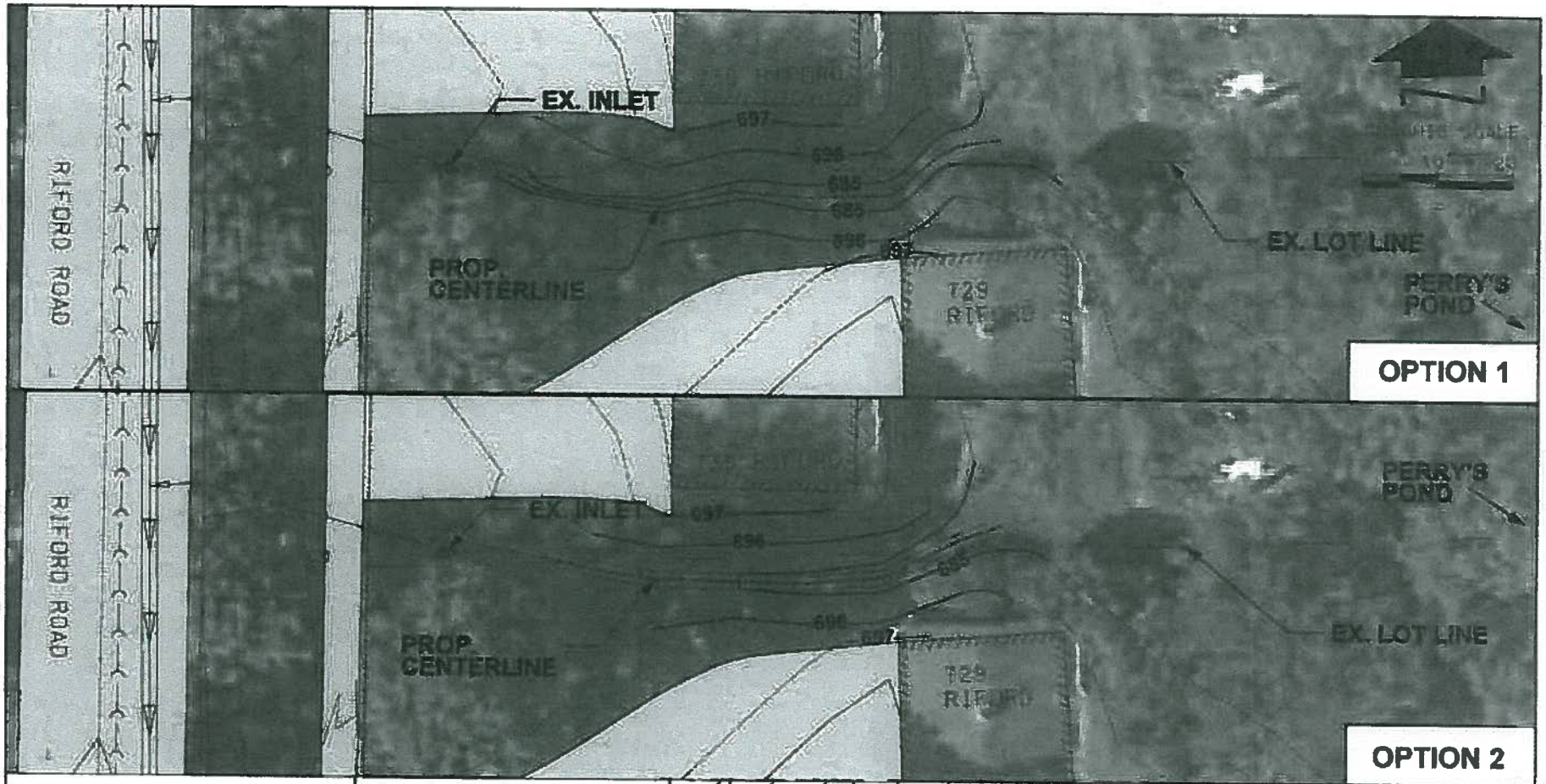


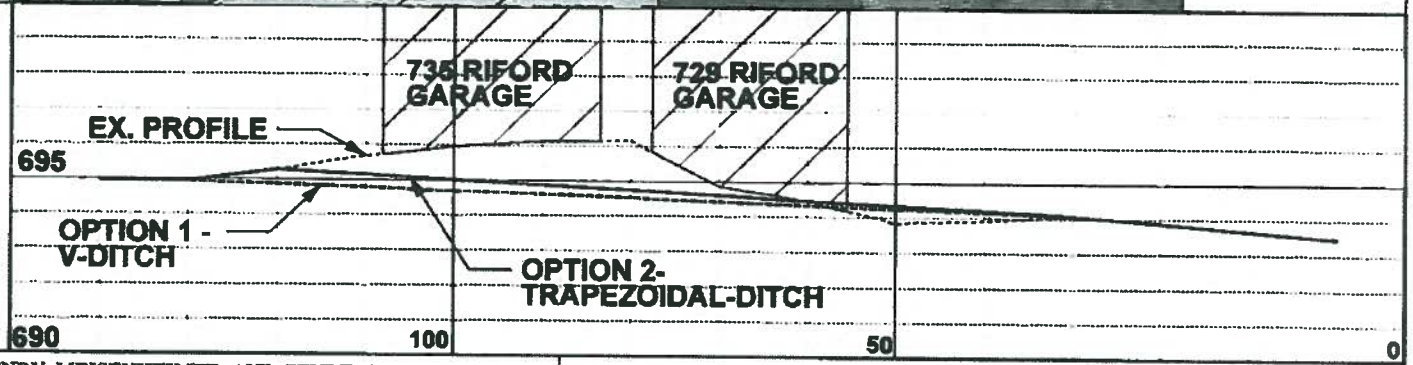
OPTION 2 - TRAPEZOIDAL DITCH

RHMG
REZEK, HENRY, MEISENHEIMER, AND GENDE, INC.
975 CAMPUS DRIVE
MUNDELEIN, ILLINOIS 60060
847-362-5959
535 TOLLWAY RD. SUITE F
ELGIN, ILLINOIS 60123
847-742-5959

EXHIBIT R - TYPICAL CROSS SECTIONS FOR SIDEYARD SWALE REGRADING

DATE: 09/17/2012 PROJ#: 21220001





RHMG
REZEK, HENRY, MEISENHEIMER, AND GENDE, INC.
975 CAMPUS DRIVE
MUNDELEIN, ILLINOIS 60060
847-362-5959
535 TOLLWAY RD. SUITE F
ELGIN, ILLINOIS 60123
847-742-5959

EXHIBIT S - EXISTING AND PROPOSED SIDEYARD PROFILES

DATE: 9/28/2012

PROJ#: 21220001

EXHIBIT T
ENGINEER'S PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST
VILLAGE OF GLEN ELLYN - LAKE ELLYN H&H STUDY
729 AND 735 RIFORD ROAD SIDEYARD GRADING

September 20, 2012

Item No.	Description	Quantity	Unit	Unit Price	Total
1	Grading Sideyard Ditch	1	LS	$ 10,000.00	$ 10,000
2	Soil Erosion and Sediment Control	1	LS	$ 1,000.00	$ 1,000
3	Restoration	1	LS	$ 5,000.00	$ 5,000
	Subtotal				**$ 16,000**
	15% Contingency				**$ 2,400**
	15% Engineering				**$ 2,400**
	Total				**$ 20,800**

Another consideration of the proposed regrading is the effect on velocity. It is desirable to reduce the velocity of the flow in order to reduce the potential for scour along the channel and general safety. Velocity of flow increases as the area of flow decreases. The constriction in the sideyard swale between the two garages increases velocity through the sideyard swale, as observed in video of a previous overtopping event. The proposed solutions reduce the peak velocity at the downstream end of the swale from 12 feet per second to 10.8 and 10.5 feet per second for Options 1 and 2, respectively. Additionally, the average velocity downstream of the two garages decreases from 11.1 for the existing condition to 10.1 and 8.2 feet per second for Options 1 and 2, respectively.

VII. SIDEYARD REGRADING AND PROPOSED STORM SEWER

The two proposed solutions were also examined in aggregate to determine the effect on the downstream properties during the 2010 event. The proposed storm sewer under Riford Road was included in the SWMM model to determine the flow split between overland flow over Riford Road and the proposed storm sewer. The peak flow conveyed via the storm sewer is 84.8 CFS and the peak flow overtopping Riford Road is 55.3 CFS at 6:09 a.m., according to the model results. The peak water surface elevation in Perry's preserve is 698.0 feet.

The sideyard swale regraded to the recommended Option 2 would convey the 55.3 CFS without overtopping existing window wells or seeping into a garage with a water surface elevation of 696.82 feet.

VII. CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations of this additional study are as follows:

1. Increasing the building footprint of all of the houses in the tributary area to Lake Ellyn will result in an aggregate impervious area increase of 7.2% to approximately 47.2%.

2. Under existing lake conditions, Lake Ellyn would overtop the dam if the impervious area increased to 50%. Under the recommended conditions in the April, 2012 report, the lake would overtop if the impervious area increased to 50%. If the outlet is modified to produce the maximum permitted discharge per the DuPage Countywide Stormwater and Flood Plain Ordinance, then the lake would overtop if the impervious area increased to 60%.

3. It is recommended that the total impervious coverage ratio not be permitted exceed 55% for the residential portions of the area tributary to Lake Ellyn. Realistically, it is not expected that the upstream area will be developed to that coverage in the future.

4. As a result of discussions with the Village's Stormwater and Flood Plain Administrator and examination of previous conditions, it is recommended that the peak discharge rate from Lake Ellyn be increased to the maximum allowable rate

of 61.4 CFS. If this recommendation is implemented, it is also recommended that the outlet control structure for Lake Ellyn be modified to incorporate an additional 8 feet of weir length.

5. Installation of a 42-inch storm sewer under Riford Road adjacent to the existing 33-inch storm sewer crossing under Riford appears to be feasible. The new storm sewer could not contain all flow from Lake Ellyn overtopping events, but would reduce the amount of flow discharged over Riford Road and through the sideyards of 729 and 735 Riford. The estimated cost for this work, including 15% contingency and engineering, is approximately $132,000.

6. The sideyard between 729 and 735 Riford can be regraded to a trapezoidal cross section at a slope of 1.33% to be more hydraulically efficient. The estimated cost for this work, including 15% contingency and engineering, is approximately $21,000.

7. Installation of both the 42-inch storm sewer and regrading of the swale will reduce the potential for property damage during future overflow events. These improvements would have prevented property damage during the July 23, 2010 event.