

**APWA**

# REPORTER



## Flood-proofing the Glen Ellyn Public Library

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# Flood-proofing the Glen Ellyn Public Library

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**G**len Ellyn, Ill., is located in the center of DuPage County, 25 miles west of the city of Chicago, and northwest of the Interstate 88 and Interstate 355 Interchange.

The Glen Ellyn Public Library was built in 1994 and opened to the public in January 1995. The library is constructed on an old industrial rail strip of property immediately south of the Union Pacific Railroad. The GEPL is located on the west side of the Glen Ellyn Central Business District.

The Glen Ellyn Public Library is a very busy facility. To demonstrate, in FY 2013-2014 there were:

- 383,401 visitors
- 657,100 items checked out
- 79,212 users of the Internet
- 72,125 reference questions asked

## The Event

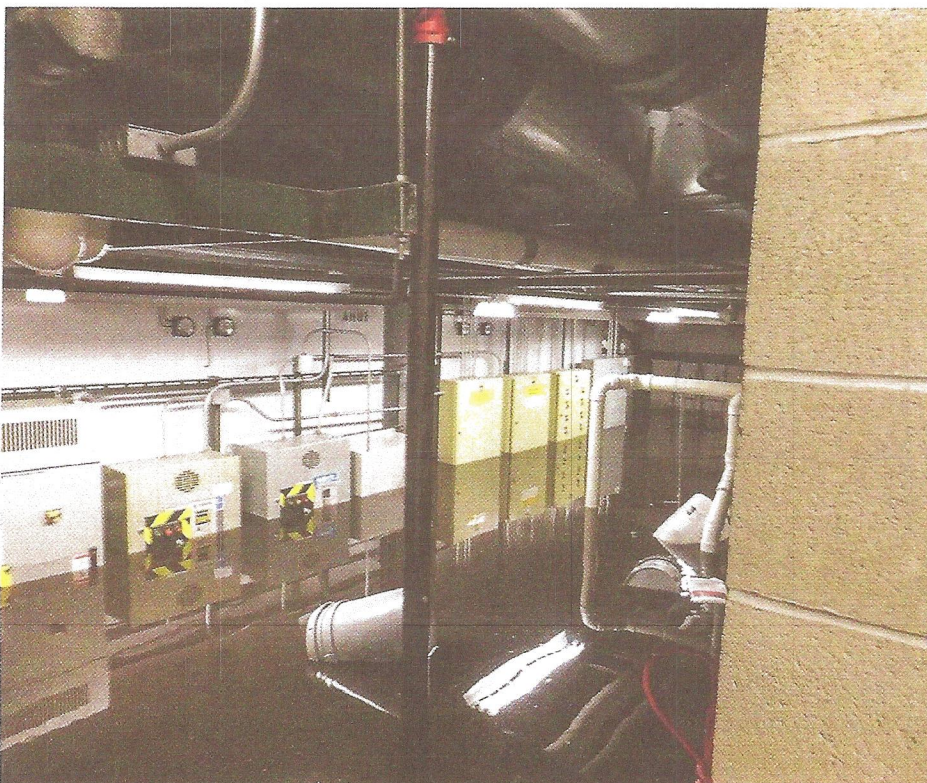
On April 18, 2013, the Glen Ellyn Public Library suffered a catastrophe. The Village of Glen Ellyn realized 6.64" of rain in a 24-hour period. This storm equates to a 50-year storm.

The library building was completely unable to handle the rains that day. The stormwaters flooded into the outdoor utility wells. The large volume of stormwater in the utility wells ultimately burned out all the storm and sanitary pumping infrastructure within a couple hours. The building then succumbed and took over 5' of stormwater in the basement. The water flooded all the building's vital support systems. All HVAC Systems went underwater and were put out of commission and damaged beyond repair. Additionally, all of the pumping systems being out of commission caused the bathrooms on first floor to back up, thus causing more extensive damage.

## The Immediate Response

- The library was closed to the public.
- Pro-Serve was called and were onsite the next day to initiate the disaster recovery services. Tasks completed by Pro-Serve included the following:

The library basement on April 18, 2013





- o Water removal.
- o Removal of all water damaged building materials.
- o Providing temporary fresh air and air handling capability for the building.
- o The removal of all moisture from the building to ensure that there would be no future mold issues.
- Outside contractors were called onsite to initiate additional recovery services. Tasks completed by the outside contractors included the following:
  - o Replace the burned-out motors in all air conditioning and air handling equipment.
  - o Replace the burned-out motors in all the storm and sanitary pumping equipment.
  - o Restore all damaged flooring.
  - o Restore all damaged walls.
  - o Ensure the safety and integrity of

all electrical, communications, and safety infrastructure.

- The library was reopened to the public on April 27, 2013.

### The FEMA Submittal

Within five days after the April 18 event transpired the library and the Village both proactively prepared and submitted all required documentation to FEMA. This exercise is required to be eligible for any government aid for disaster relief.

Total costs due to damages, disaster recovery, cleanup, one month of library closure, engineering and construction of capital improvements was estimated to be in the vicinity of \$700,000.

### The Stormwater Engineering Study

The Stormwater Engineering Study commenced in May 2013. The purpose of the Engineering Study was to perform a stormwater analysis, determine the cause of the flooding, develop a preliminary plan for solution, determine the estimated cost for the solution, and obtain all required approvals and permits.

The Study commenced and the proposed scope of work included the following:

- Perform a complete topographic survey and develop Site Plan to facilitate the Study.
- Review all available existing and as-built plans.
- Develop a complete hydraulic model for the GEPL site and beyond.
- Conceptualize engineering and infrastructure solutions to ensure



Re-landscaping of the north yard: installation of underdrain



that GEPL will properly handle a similar storm in the future.

- Develop reasonable and probable costs for the construction of the proposed engineering and infrastructure improvements.
- Begin the coordination and approval processes with all involved agencies.
- Develop procurement options for the GEPL to most cost-effectively construct the infrastructure improvements.
- Develop a complete Engineering Report and present to the GEPL Board for review and approval.

The Involved Agency Discovery Process determined the following:

- Construction Permit would be required by DuPage County, because the north yard of the library was County property.
- The Village of Glen Ellyn is a "Full-Waiver Community," meaning that all Building and Drainage Permits would be required by the Village.
- The leadership team of the library was most interested in constructing the necessary improvements as soon as possible. The GEPL leadership team wanted to eliminate its exposure to future storms as soon as possible. Therefore, the Engineer began to work with the Village Engineers and County Engineers immediately to minimize the review period for the required permits. The Engineer also encouraged input from both the Village Engineers and County Engineers to ensure that they felt to be part of the plan and position the library's permit applications to be approved on first submittal.

The Stormwater Engineering Study discovered the following deficiencies in the Library Flood Prevention Program:

- Utility wells on the north wall were very susceptible to taking on stormwater. The natural topography flowed toward the north wall of the library. The library was taking on additional stormwater unnecessarily.
- The storm sewer system in the north yard of the library was rather obsolete and not functioning as originally intended.
- Several acres of railroad right-of-way owned by the UNPRR were draining through the library yard and directly to the north wall of the library.
- The landscaping design in the north yard of the library and in the east yard of the library were not acting as an asset to the total positive drainage plan.
- The storm pumps in the library basement were undersized and inefficient and required to be replaced.

The Engineering Study was approved and accepted by the GEPL in June 2013.

Project approvals and permits from the Village and the County were received in July 2013.

### The Design and Construction Process

Upon completion of the Study the GEPL Board agreed on the following priorities moving forward:

- To make sure that all engineering is performed professionally and that



Re-landscaping of the east yard: the overflow weir at the northeast corner

all construction improvements are implemented correctly.

- All required stormwater improvement construction activities are to be completed within one year of the actual event.
- All procurement options are to be explored to have the construction activities delivered in the best and most cost-effective fashion possible.

### Project #1: Construct the parapet walls on both the Air Intake Well and the Exhaust Well

- The first line of defense was to construct 18" tall concrete parapet walls around the utility wells in the north yard of the library.
- The Engineer developed plan and quantities.
- Specific local contractors were invited to submit cost proposals.
- MYS Inc, was the selected Contractor.
- The Project was successfully completed in August 2013.



## Project #2: Construction of the Sewer Improvements

- The second priority was to re-create a working storm sewer system in the north yard. This sewer system needed to transport the water from the north yard to the sewer system in the GEPL main parking lot. The sewer system drains to the 42" storm interceptor sewer on Duane Street immediately south of the library.
- The Engineer developed plan and quantities.

- Specific local contractors were invited to submit cost proposals.
- Russ's Plumbing and Sewer was the selected Contractor.
- The Project was successfully completed in October 2013.

## Project #3: Re-Landscaping of the North Yard

The scope of the project was to ensure that the drainage system would never be overlooked or go unnoticed in the future. The North Yard is required to effectively drain to the new sewer

system. The re-landscaping would entail the following:

- Ditch Excavation
- Underdrain Installation
- Installation of Fabric Lining
- Complete the Ditch with Cobbles

The Engineer worked hand in hand with the library's On-Call Contract Landscaper, McAdam Landscaping.

This Project was successfully completed on October 21, 2013.



Project completion



#### Project #4: Re-Landscaping of the North Yard

The scope of the project was to create an overland flow escape route. If in the future a large rainstorm occurs during high water table conditions and with the storm sewers full, then it is intended that the north yard will overflow around the east side of the building directly to the interceptor sewer on Duane Street.

The Re-Landscaping would entail the following:

- Construct an Overflow Weir at the Northeast Corner of the Building.
- Construct an Overflow Channel along the East Side of the Building.

The Engineer worked hand in hand with the library's On-Call Contract Landscaper, McAdam Landscaping.

This Project was successfully completed on October 25, 2013.

#### Project #5: The Stormwater Improvements on the Railroad Property

During the Storm of April 18, 2013, several acres of the Union Pacific Railroad Property drained into the North Yard of the library. This condition exacerbated the flood issues on that day.

- The Scope of Work for the Project was to redirect this drainage area away from the North Yard and to construct this drainage area to flow directly into the Library Parking Lot Storm Sewer System.

This project was coordinated and managed by Dawn Bussey, Library Director, and by Julius Hansen, Public Works Director for the Village.

The work was completed by Union Pacific Railroad Forces and Village of Glen Ellyn Forces. This work was accomplished at no cost to the GEPL.

This project was completed in November 2013.

#### Project #6: The Replacement of the Storm Pumps

The Storm Pumps in the Lower Level required change.

Currently the stormwater is pumped directly into the storm sewer. During the April 18 storm, the storm sewers were full and stagnant. The Storm Pumps worked continuously without moving any water until they burned out, approximately an hour later.

The proposed condition will change the outlet piping to pipe out above ground and drop into the outside storm sewer. A two-inch air-gap will be provided, in case the storm sewer is full. If the storm sewers are full, then the pumped stormwater will release into the North Yard. The existing 3 HP Storm Pumps will be removed and replaced with 5 HP Storm Pumps which will pump the stormwater over the additional required head. The GEPL decided to maintain its current provider and new Metropolitan Pumps were designed for the lower level. The New Pumps were also designed on a new variable speed drive system, to improve the operational efficiency. To maintain the integrity of the system, the piping air gap system was installed in a new "Hot Box" to be located along the north wall.

The Engineer completed Plan and Contract Documents. The Project was put out to bid. Six contractors bid on the Project. The Project was successfully built by DeFranco

Plumbing and completed in April 2014.

#### The Costs of Engineering and Stormwater Infrastructure Improvements:

The Total Cost to the Glen Ellyn Public Library due to the April 18, 2013 rainstorm event and the subsequent engineering and construction costs are detailed as follows:

- Engineering = \$68,800
- Study and Permitting = \$31,570
  - Design & Construction = \$36,230
- Construction = \$87,159.58
- Parapet Walls = \$10,675
  - New Sewers = \$3,875
  - Re-Landscape the North Yard = \$19,251.25
  - Re-Landscape the East Yard = \$7,709.33
  - UNPRR Improvements = \$0.  
[Performed by RR forces]
  - New Storm Pumps = \$45,649

#### Conclusion

The rain event transpired on April 18, 2013. The final inspection and approval of the last construction improvement was on May 6, 2014.

All newly installed drainage systems are behaving as designed and intended.

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