May 27, 2014

TO: Christopher Vonnahme, PE

FROM: Thomas T. Burke, PhD, PE
       David E. Vogel, PE

SUBJECT: Graue Mill Flood Protection Improvements
          (CBBEL Project Number 10-0628)

Christopher B. Burke Engineering, Ltd. (CBBEL) completed a Flood Risk Reduction Assessment of the Graue Mill Subdivision, which is located along Salt Creek between York Road and I-294 in the Village of Hinsdale (Village). The project site is shown on Exhibit 1. The study was prompted by severe flooding resulting from the July 23-24th, 2010 storm event, where approximately 6.5 inches of rain fell over 6 hours. A second severe flooding event occurred on April 17-18th, 2013 during which peak flood elevations exceeded the July 2010 storm event by about 1 foot. The July 2010 and April 2013 storm events produced widespread flooding consisting of home, street, and yard flooding.

The purpose of the study was to analyze the existing drainage system in several locations and evaluate the effectiveness and feasibility of proposed improvements. Improvements include flood walls and flood gates, installing high capacity drains and inlets, grading improvements, installing Tideflex check valves, and increasing pump conveyance.

Table 1 summarizes the recommended projects for each study area.

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Recommended Projects</th>
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| Building 'A'      | • Driveway grading  
                   | • High capacity trench/inlets  
                   | • Replace clogged inlet  
                   | • Increase pump capacity  
                   | • Check valve  
                   | • Re-direct downspouts  
                   | • Raise berm  |
| Building 'B'      | • Retaining wall  
                   | • Check valve  
                   | • Berm at Fox Lane  |
| Condo II/III      | • Flood walls  
                   | • Passive flood gates  
                   | • Site grading  
                   | • 2, 1-2 cfs pump stations  
                   | • Check valve  |
| Hawthorne Lane    | • Berms at southern end of Hawthorne Lane  |
| Dean Farm Property| • Diversion storm sewer line  |
| Compensatory Storage| • Fullersburg Parcel  |
| Utilities         | • Raise utilities and pump station pad to 2 feet above BFE |

Table 1 Recommended Improvements
The three study areas analyzed are listed below and shown in Figure 1. Each study area targeted a known flooding problem identified by the Graue Mill Homeowners Association (HOA) and CBBEL.

1) Building ‘A’ Study Area
2) Building ‘B’ Study Area
3) Condo II / Condo III Study Area
Building ‘A’ Study Area
Building ‘A’ is located on Burr Oak Road at the northwest end of the subdivision, as shown in Figure 2.

Figure 2 Building ‘A’ Study Area

Existing Conditions
Based on DuPage County 2-foot contour aerial topography and CBBEL survey information, there is approximately 2.9 acres of directly connected tributary area. During the July 2010 and April 2013 storm events, stormwater runoff surcharged the storm sewer systems at the top of the driveway and flowed towards the lower garage of Building A. This was in addition to runoff generated by rain falling directly on the driveway and grassed slope. Stormwater pumps in the garage could not keep up with the large inflow and the garage was flooded several feet deep.

The upstream area is drained by a 12-inch diameter storm sewer lines to the existing detention basin located immediately west of Burr Oak Road. The lower garage entrance is approximately 10 feet below adjacent grade and stormwater pumps have been installed to discharge stormwater that collects at the bottom of the driveway.
Proposed Conditions

Improvements include grading, new storm sewers & inlets, a check valve, re-directing downspouts, and increasing pump capacity. A description of the improvements is provided below. The proposed improvements are shown on Exhibit 2.

- **Raise the driveway to the lower garage to create an area of ponding at the trench drain.** By raising the driveway slightly (±6 inches), stormwater runoff will be allowed to pond on top of the trench drain. This will allow additional water to be directed towards the detention basin rather than immediately flowing down the driveway towards the garage entrance. This improvement could be as simple as installing a small speed bump. It will require continual maintenance and must be tied into the landscaping on both sides of the driveway.

- In combination with the previous improvement, install a larger trench drain at the top of the driveway with high capacity inlet grates. The current trench drain restricts flow into the 12-inch diameter storm sewer draining to the detention basin.

- Replace the inlet grate in the Burr Oak Road infield with a higher capacity grate. This will lessen the chance of leaves or other debris blocking the inlet and restricting flow into the 12-inch diameter storm sewer.

- Install a Tideflex check valve on the outlet of the 24-inch diameter storm sewer line discharging from the north detention basin to Salt Creek. This will prevent Salt Creek water from backing up into the basin and reducing the storage volume available for Graue Mill stormwater runoff.

- **Re-direct gutter downspouts from the northern building at Burr Oak Court away from the grassed slope.** The downspouts are proposed to be collected in a new 8-inch diameter
PVC sewer line tying into the existing 18-inch diameter storm sewer along the west side of the building.

- Raise the berm elevation on the north side of the driveway to elevation 646.0 feet. This is 2 feet above the 100-year BFE and will lessen the chance of overflow from the Dean Farm wetland to the north. Approximately 2.8 acre-ft of compensatory storage volume would be required if the berm is raised to elevation 646.0 feet.

- Construct a new pump station adjacent to the garage entrance including two new 10hp – 900 gpm pumps in a new 7 foot diameter, approximately 8 foot deep wet well, new forcemains, and a new pump controller. Additional intake structures (trench drains and curb inlets) along the entrance ramp will be added to collect runoff and convey it to the new pump station. This design results in a maximum pumping rate of approximately 4.0 cfs.

**Building ‘B’ Study Area**

Building ‘B’ is located immediately east of Building ‘A’ on Old Mill Road as shown in Figure 3.

![Figure 3 Building ‘B’ Study Area](image-url)
**Existing Conditions**

Based on DuPage County 2-foot contour aerial topography and CBBEL survey information, there are approximately 4.4 acres tributary to a storage area located immediately east of the Building ‘B’ garage entrance. During the July 2010 and April 2013 storm events, stormwater runoff from the 4.4 acre tributary area and water from Salt Creek filled the storage area. Stormwater flowed over the east driveway curb and towards the Building ‘B’ garage when the storage area water level exceeded the curb elevation. Stormwater pumps at the garage entrance could not keep up with the inflow and the garage was flooded several feet deep.

**Proposed Conditions**

Improvements include retaining walls and installation of a check valve. A description of the improvements is provided below:

- Raise the east and west driveway curb elevations approximately 3.75 feet to elevation 646.0 feet. This is 2-feet above the Salt Creek 100-year BFE of 644.0 feet.
- Construct a berm adjacent to Fox Lane at elevation 646.0 feet.
- Install a Tideflex check valve on the outlet of the 18-inch diameter storm sewer line discharging from the storage area to Salt Creek.

The proposed improvements are shown on Exhibit 3. The retaining walls effectively raise the water surface elevation that the adjacent storage area must reach before overflowing towards the garage. The berm will block overflow from Salt Creek. The check valve will prevent Salt Creek water from backing up into the storage area and reducing the storage volume available for Graue Mill stormwater runoff.
Condo II/III Study Area

The Condo II/III Study Area is located at the intersection of Old Mill Road and Indian Trail Road as shown in Figure 4.
Drainage in the Condo II/III area of Graue Mill is split between Condo II and Buildings 1-3 which drain to the southern detention basins and Buildings 4-5 which drain to the northern detention basin. The southern detention basins are pump evacuated to Salt Creek. Additionally, Building 1 and a portion of Building 2 are located within the floodway boundary of Salt Creek which passes through the southern portion of Graue Mill.

During the July 2010 and April 2013 storm events, Salt Creek overtopped its banks immediately south of Road D and inundated the Condo II/III study area. First floors of units in Condo II and in Buildings 1-3 were damaged by floodwaters. Residents reported water entering the units from the west and flowing east towards Salt Creek.

**Proposed Conditions**

The improvements at the Condo II/III study area focused on blocking Salt Creek overflow from inundating residences. A description of the improvements is provided below:

- Create berms in several areas along the rear of Condo II and Building 3 as well as on Indian Trail Road and east of Old Mill Road. Also install a 2-3 foot high flood wall and/or self-raising flood gates entirely around Building 1, partially around Building 2, and partially around the clubhouse. The berms and flood walls/gates are proposed to be constructed to the peak April 2013 WSEL of 646.0 feet.
- Install a self-raising flood gate across South Indian Trail Road.
- Install 2, approximately 1-2 cfs pump stations adjacent to Condo II and Building 3 behind the proposed berm. The pump stations would serve to drain the area behind the berm that cannot drain by gravity.
- Install a Tideflex check valve on the outlet of the 24-inch diameter storm sewer line discharging to the detention basin. This will prevent Salt Creek water from backing up into the storm sewer system and surcharging behind the blocked off areas.

The proposed improvements are shown on Exhibit 4. Buildings 1 and 2 are located at least partially within the floodway boundary of Salt Creek. Illinois Department of Natural Resources (IDNR) and DuPage County stormwater regulations prohibit fill from being placed within the floodway boundary. However, local floodproofing (flood wall and/or flood gate) within the building envelope to protect the structure itself is acceptable.

The improvements block a portion of 100-year floodplain from being accessed by Salt Creek. The blocked area is considered filled and would require compensatory storage at an incremental 1.5:1 ratio for all fill placed. A total of approximately 4.7 acre-ft of compensatory storage would be required.
Hawthorne Lane

Berms are required in several locations at the southern end of Hawthorne Lane to prevent Salt Creek overflow as shown on Exhibit 5. A floodwall would be needed around the south side of residences at the southeast corner of Fox Lane and Hawthorne Lane.

Dean Farm Property Improvements

CBBEL analyzed improvements on the Dean Farm property to the north of Graue Mill. This property is owned by the Oak Brook Park District. A description of the improvements is provided below:

- Install an overflow structure at approximately elevation 642 ft;
- Install approximately 1,100 feet of 36-inch diameter RCP storm sewer plus a check valve outletting directly to Salt Creek.

The Dean Farm improvements are shown on Exhibit 6. The diversion storm sewer lowers peak flood elevations behind Condo III units.

Compensatory Storage

To meet DuPage County stormwater ordinance requirements, proposed improvements at the Building ‘A’ and Condo II/III Study Areas will require compensatory storage at a 1.5:1 hydraulically incremental ratio for fill placed below the 100-year floodplain elevation. A summary of the compensatory storage requirements is provided in Table 2 below.

<table>
<thead>
<tr>
<th>Location</th>
<th>0-10 Year</th>
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<th>10-100 Year</th>
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<td></td>
<td>Fill</td>
<td>Ratio</td>
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<tr>
<td>Condo II/Condo III</td>
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<tr>
<td>TOTAL</td>
<td>0.50</td>
<td>--</td>
<td>0.75</td>
<td>4.46</td>
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Table 2 Compensatory Storage Summary

CBBEL has identified the Fullersburg Property located to the southwest of Graue Mill adjacent to Salt Creek as the preferred location for compensatory storage grading. Discussions with Forest Preserve District staff have revealed that they are agreeable to using the Fullersburg Property for compensatory storage. The property location is shown in Figure 5.
The majority of the property is located within the Salt Creek floodway and fill cannot be placed within this boundary. However, the southeast portion of the property is above the 10-year flood elevation which will allow compensatory storage to be excavated in the 10-100 year band without the placement of fill. Additionally, the property is only partially wooded which will make site clearing and excavation less costly. The Fullersburg Property has some easements across it which must be accounted for in the detailed design.

Based on site topography and land use, there may be wetlands located on the Fullersburg Property. Before a final design can be generated, a wetland delineation must be performed to determine their exact locations. Coordination with the U.S. Army Corps of Engineers (USACE) may also be necessary.

The Fullersburg Property is the primary option for compensatory storage. Preliminary grading of the Fullersburg Property is shown on Exhibit 7.
Utilities & Pump Station

During the July 2010 and April 2013 storm events, floodwaters inundated utility boxes and knocked out power throughout Graue mill for several days. The pump station at the southwest detention basin also lost power and was not functioning. The locations of the utility boxes and pump station are shown in Figure 6.
Based on CBBEL survey data, the utility and pump station pad elevations are 1-2 feet below the 100-year flood elevation. CBBEL recommends raising the pad elevations 2 feet above the 100-year flood elevation (EL=646.0 feet) to lessen the chance of inundation by floodwaters. Coordination with Commonwealth Edison will be necessary.
Legend

- Berm
- Existing Storm Sewer

RAISE CURB ELEVATIONS TO EL = 646 FT

INSTALL CHECK VALVE
0-10 Year
Storage Volume = 1.20 ac-ft
(includes 0.4 ac-ft existing)

10-100 Year
Storage Volume = 6.70 ac-ft

Legend
- Proposed Grading
- Sanitary Sewer Easement

Graue Mill HOA
Fullersburg Property Preliminary Compensatory Storage Grading

5/23/2014
EXHIBIT 7