Elmhurst Stormwater Drainage Solution Recommendations

Presented by: Jackie Fisher
Stormwater System Public Infrastructure Sub-Committee
Elmhurst City Council
August 20, 2012
Stormwater Problems in Elmhurst

Stormwater System Public Infrastructure Sub-Committee focused on the most pressing problems faced by a significant number of homes in all parts of Elmhurst. We addressed over-foundation flooding for stormwater.

Contributing Factors:
- Ground elevations and drainage patterns,
- Capacity of the stormwater management infrastructure,
- Land development, and
- Others.

Map of 10 Study Areas, April 2012 CBBE Report

Courtesy of Elmhurst.Patch.com/Morrow Family
Map of 10 Study Areas, April 2012 CBBE Report
Stormwater Sub-Committee Goal

**Goal:** To evaluate the CBBE reports and to **identify opportunities to reduce the risk** and impacts of over-foundation flooding in the City, focusing on maximization of the **benefits** to the **largest number of residences** possible while **balancing the ease of implementation** of the solutions.
Stormwater Sub-Committee Process
Stormwater Sub-Committee Process

**Background Review**
- Reviewed background information related to stormwater issues
- Stormwater Websites, CBBE Materials, Previous Elmhurst Studies

**Report Merit**
- Evaluated the scientific merit and thoroughness of the CBBE Report
- Assessed the overall report goals and compared it to CBBE’s overall approach, methodology and resulting recommendations.

**Follow Up**
- Collected additional modeling and other information from CBBE
- Met with City management and staff to have questions addressed
Stormwater Sub-Committee Process

Tabulated Data
• A master table was compiled for each Study Area that compared the modeling results with both drainage & waterproofing solutions

Evaluated Solutions
• Critically evaluated the proposed drainage alternative(s) for each Study Area, considering multiple factors.

Established Tiers
• A tiered approach was developed to help prioritize the selection of potential alternatives; this hierarchy is directly based on severity of the problem, value of alternative, and feasibility of implementation.
Evaluation of the scientific merit and thoroughness of the CBBE Report
Stormwater Sub-Committee: CBBE Report Analysis

**Modeling Approach**
- Sufficiently detailed to adequately represent the system for the intended purposes of this study.

**Cost Estimates**
- Concept–level cost estimates were within the norm
- Caveat: costs did not include third party land acquisition or usage costs

**Drainage Improvement Alternative**
- Appropriate options were presented to mitigate flooding. Caveat: Alternatives could have been more innovative or “out of the box”

**Report Utilization**
- Report should be used as a starting point for making decisions but final decisions and planning of capitol improvement projects will require additional effort by the City
Critical Evaluation of the Drainage Improvement Alternatives
Stormwater Sub-Committee: Analysis of Proposed Drainage Improvement Alternatives

Critically evaluated each drainage alternative in each Study Area, looking at a number of factors:

- Frequency of flooding & number of residences impacted
- Severity of the existing problem
- Benefit of potential improvements relative to their cost
- Value of the proposed alternative
- Unknown issues with the project:
  - undefined off-site storage,
  - land acquisition costs,
  - public acceptance issues, etc?
- Feasibility of the implementation of the alternatives proposed
### Example Evaluation of Drainage Improvement Alternative:

#### Severity of the Problem

<table>
<thead>
<tr>
<th>Problem Area Location</th>
<th>Number of Homes Flooded Per Flood Frequency</th>
<th>Homes Eligible for Flood Proofing</th>
<th>Homes Ineligible for Floodproofing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-Year</td>
<td>5-Year</td>
<td>10-Year</td>
</tr>
<tr>
<td>A. Spring Rd &amp; Harrison St</td>
<td>0</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>B. Saylor Ave &amp; Jackson Ave</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>C. Vallette St &amp; Swain Ave</td>
<td>0</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>D. Washington St</td>
<td>0</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>E. Crescent Ave &amp; Cambridge Ave</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>0</td>
<td>5</td>
<td>37</td>
</tr>
</tbody>
</table>

#### Drainage Solution Evaluation

<table>
<thead>
<tr>
<th>Alternative ID</th>
<th># of Homes Removed</th>
<th>Cost *</th>
<th>Cost per structure</th>
<th>Proposed Level of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwest #1 (Areas B, D, E)</td>
<td>162</td>
<td>$6,910,000</td>
<td>$43,000</td>
<td>10-through 100-Year</td>
</tr>
<tr>
<td>Southwest #2 (Areas B, D, E)</td>
<td>215</td>
<td>$26,100,000</td>
<td>$121,000 (effectively $362,000)</td>
<td>100-Year</td>
</tr>
<tr>
<td>Southwest #3 (Area A)</td>
<td>17</td>
<td>$3,730,000</td>
<td>$219,000</td>
<td>100-Year</td>
</tr>
<tr>
<td>Southwest #4 (Area C)</td>
<td>87</td>
<td>$11,530,000</td>
<td>$133,000</td>
<td>100-Year</td>
</tr>
</tbody>
</table>

* Assumes above ground storage and no allowance for acquisition costs.

#### Value of Alternative

- 20% chance in a given year that they will be flooded

#### Feasibility of Alternative

- Calculations and considerations for each alternative's implementation and impact.
Drainage Improvement Tiers

Drainage Improvement Solution Tiers:

<table>
<thead>
<tr>
<th>Tier #1</th>
<th>Tier #2</th>
<th>Tier #3*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positively impacts the largest number of homes by cost effectively reducing over-foundation flooding.</td>
<td>Positively impacts a number of homes that are routinely flooded during smaller rain events by cost effectively reducing over-foundation flooding.</td>
<td>Positively impact a number of homes. However, the alternatives were perceived to be infeasible because:</td>
</tr>
<tr>
<td>1) Non-preferred variants of Tier 1 or Tier 2 alternatives,</td>
<td>2) Were cost prohibitive or</td>
<td>3) Other less costly options were available such as flood-proofing.</td>
</tr>
</tbody>
</table>

*Note: If a drainage improvement alternative isn’t considered to be feasible for a given study area, then the sub-committee recommends that other alternatives be evaluated and pursued by the City.

Tiers were developed to help prioritize potential alternatives; this hierarchy is directly based on severity of the problem, value of alternative, and feasibility of implementation.
## Stormwater Sub-Committee: Tier 1 Drainage Improvements

<table>
<thead>
<tr>
<th>Drainage Improvement Solution</th>
<th>Alternative ID</th>
<th># of Homes Removed</th>
<th>Cost *</th>
<th>Cost per structure</th>
<th>Proposed Level of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>Southwest #1 (Areas B, D, E)</td>
<td>162</td>
<td>$6,910,000</td>
<td>$43,000</td>
<td>10-through 100-Year</td>
</tr>
<tr>
<td></td>
<td>Pine Street #1**</td>
<td>16</td>
<td>$1,650,000</td>
<td>$103,000</td>
<td>50-Year</td>
</tr>
<tr>
<td></td>
<td>Southwest #4 (Area C)***</td>
<td>87</td>
<td>$11,530,000</td>
<td>$133,000</td>
<td>100-Year</td>
</tr>
<tr>
<td></td>
<td>Southwest #3 (Area A)</td>
<td>17</td>
<td>$3,730,000</td>
<td>$219,000</td>
<td>100-Year</td>
</tr>
<tr>
<td></td>
<td>Total Cost</td>
<td></td>
<td>$23,820,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Assumes above ground storage and no allowance for acquisition costs.
- **The city installed high capacity inlets were and open grates were added to some storm sewer manholes on Pine Street to improve drainage during rain events.
- ***Additional inlets were added at the low point of Spring Road between McKinley and Crescent.
- Church windows were removed from all inlets in problem areas (Parkside, Pine, Washington, etc.).
Stormwater Sub-Committee: Tier 2 Drainage Improvements

<table>
<thead>
<tr>
<th>Drainage Improvement Solution</th>
<th>Alternative ID</th>
<th># of Homes Removed</th>
<th>Cost *</th>
<th>Cost per structure</th>
<th>Proposed Level of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 2</td>
<td>Yorkfield #1</td>
<td>11</td>
<td>$710,000</td>
<td>$65,000**</td>
<td>100-Year</td>
</tr>
<tr>
<td></td>
<td>Seminole #2***</td>
<td>4</td>
<td>$350,000</td>
<td>$88,000</td>
<td>100-Year</td>
</tr>
<tr>
<td></td>
<td>Geneva Ave #1</td>
<td>8</td>
<td>$1,300,000</td>
<td>$163,000</td>
<td>100-Year</td>
</tr>
<tr>
<td></td>
<td><strong>Total Cost:</strong></td>
<td></td>
<td><strong>$2,360,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Assumes above ground storage and no allowance for acquisition costs.

**Requires private property acquisition.

*** High capacity inlets were installed on Cottage Hill south of St. Charles to increase the amount of water entering the storm sewer system instead of sheet flowing to the intersection of Cottage Hill and Seminole. Church windows were cut of inlets at the intersection.
# Stormwater Sub-Committee: Tier 3 Drainage Improvements

<table>
<thead>
<tr>
<th>Drainage Improvement Solution</th>
<th>Alternative ID</th>
<th># of Homes Removed</th>
<th>Cost *</th>
<th>Cost per structure</th>
<th>Proposed Level of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwest #2 (Areas B, D, E)</td>
<td>215</td>
<td>$26,100,000</td>
<td>$121,000</td>
<td>$362,000</td>
<td>100-Year</td>
</tr>
<tr>
<td>Pine Street #2</td>
<td>20</td>
<td>$2,560,000</td>
<td>$128,000</td>
<td>$228,000</td>
<td>100-Year</td>
</tr>
<tr>
<td>Yorkfield #2</td>
<td>11</td>
<td>$1,880,000</td>
<td>$171,000</td>
<td></td>
<td>100-Year</td>
</tr>
<tr>
<td>Seminole #1</td>
<td>4</td>
<td>$810,000</td>
<td>$203,000</td>
<td></td>
<td>100-Year</td>
</tr>
<tr>
<td>Brynhaven #1</td>
<td>22</td>
<td>$3,450,000</td>
<td>$157,000</td>
<td>$445,000</td>
<td>100-Year</td>
</tr>
<tr>
<td>Brynhaven #2</td>
<td>2</td>
<td>$1,670,000</td>
<td>$835,000</td>
<td></td>
<td>100-Year</td>
</tr>
<tr>
<td>Larch#1</td>
<td>3</td>
<td>$1,800,000</td>
<td>$600,000</td>
<td></td>
<td>100-Year</td>
</tr>
<tr>
<td>Pick #1</td>
<td>1</td>
<td>$3,010,000</td>
<td>$3,010,000</td>
<td></td>
<td>100-Year</td>
</tr>
<tr>
<td>Pick #2</td>
<td>0</td>
<td>$1,570,000</td>
<td>-</td>
<td></td>
<td>10-Year</td>
</tr>
<tr>
<td>Pick #3</td>
<td>1</td>
<td>$2,340,000</td>
<td>$2,340,000</td>
<td></td>
<td>100-Year</td>
</tr>
<tr>
<td>York St/I-290#1</td>
<td>0</td>
<td>$670,000</td>
<td>-</td>
<td></td>
<td>100-Year</td>
</tr>
<tr>
<td><strong>Total Cost:</strong></td>
<td><strong>$45,860,000</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Assumes above ground storage and no allowance for acquisition costs.
Next Steps: City should utilize CBBE Report as a starting point in the decision making process

- City should coordinate with key property owners and stakeholders to ascertain the potential costs for the acquisition of properties needed for stormwater storage
- City should determine public acceptance of altering neighborhood parks or open spaces that would be used for stormwater storage

With this information, the City should be able to:

- Choose and prioritize solutions
Stormwater Sub-Committee: City Recommendations

The Stormwater Sub-Committee Supports the recommendations in the CBBE Report that relate to the following areas:

– **Backup Power**
– **Redeveloped Properties and Ordinances**
– **Elevation of New Structures**
Stormwater Sub-Committee: Flood Proofing

In addition to or in some cases in lieu of larger scale drainage alternatives the Sub-committee recommends evaluating flood proofing solutions.

Flood proofing measures can include:
- Installation of glass block windows
- Raising window wells
- Installation of waterproof window well covers
- Re-grading of sidewalks/driveways
- Retaining walls
Stormwater Sub-Committee: City Recommendations

Retrofitting Original and Redeveloped Properties:

We recommend to the City to develop an incentive program encouraging all current owners of redeveloped properties to disconnect their stormwater downspouts from the stormwater sewers to minimize stormwater input during peak flow conditions.

We recommend to the City to develop an incentive program encouraging stormwater management retrofit solutions for all properties that could minimize stormwater entering into stormwater system including, such as adding infiltration trenches, rain gardens, rain barrels.
Stormwater Sub-Committee: City Recommendation

Reverse-Sloped Driveways:

• We recognize that properties with reverse sloped driveways are most at-risk for stormwater damage from over-foundation flooding.

• We encourage the City to evaluate flooding conditions at each of these properties to identify potential flood-proofing solutions.

• The City should not require homeowners to disconnect their reversed-sloped driveways from the sanitary sewer system until a sufficient stormwater drainage solution has been implemented.
Cost-sharing Programs:

• The Stormwater Sub-Committee encourages any and all actions that will mitigate stormwater flooding.

• We encourage the City to consider and/or continue cost-sharing programs that minimize off-site stormwater discharge and that prevent over-foundation flooding.

• List of programs that could be considered for cost-sharing include, but not limited to:
  – Annual rain garden grant program
  – Annual rain barrel grant program
  – Dry-proofing flood prone structures
In Summary...
The Stormwater Sub-Committee encourages the City to follow our tiered recommendations as a starting point for making decisions that will positively impact all residents in our community.

We strongly encourage the City to take action to protect homeowners from over-foundation flooding by utilizing the additional recommendations made by this sub-committee.
Stormwater Sub-Committee: Summary

• The Stormwater Sub-Committee believes it is the City’s responsibility to provide an infrastructure that will reasonably protect homes from stormwater damage during most rain events.

• The problems that the Stormwater Sub-Committee addressed are not new and developed over many decades.

• Correspondingly, solutions will require a sustained, long-term effort, public investment and the will of policy makers to make difficult decisions for the collective good of the community.
Acknowledgments

• Sub-Committee Members
• Elmhurst City Council
• Public Works Department
• Mayor DiCianni
• City Manager, Jim Garbowski
• Elmhurst Community
• CBBE
Questions?
Extra Slides
Stormwater Problems in Elmhurst

Scope of Problem:
Hundreds of private properties in all sections of the city face some form of flooding during moderate intensity (or higher) rainfall events.
Stormwater Problems in Elmhurst

Contributing Factors:

• Ground surface elevations and drainage patterns,
• Capacity of the stormwater management infrastructure,
• Land development with impervious surfaces, and
• Others.

Map of 10 Study Areas, April 2012 CBBE Report
Stormwater Problems in Elmhurst

Stormwater System Public Infrastructure Sub-Committee focused on the most pressing problems faced by HUNDREDS of homes in all parts of Elmhurst. The Sub-Committee focused on over-foundation flooding.

Map of 10 Study Areas, April 2012 CBBE Report