City of Lockport
Stormwater Master
Conveyance Plan

Garfield Park and Kelvin Grove

By: Kristina M. Falat, EIT, CFM
Stormwater Master Conveyance Plan

- **Project Location**
  - City of Lockport, Illinois
    - Garfield Park
    - Kelvin Grove

- **Project Purpose**

- **Project Overview**
  - Analysis
  - Existing Storm Sewers
  - Proposed Alternatives
    - Storm Sewer Improvements
    - Regional Detention
    - Cost of each alternative
    - Benefit of each alternative
ANALYSIS

Storms Analyzed using StormCAD program:
- 50% chance of annual occurrence (2-year)
- 20% chance of annual occurrence (5-year)
- **10% chance of annual occurrence (10-year)** *
- 4% chance of annual occurrence (25-year)
- 2% chance of annual occurrence (50-year)
- 1% chance of annual occurrence (100-year)

* The 10-year storm is the design event.
Rainfall values from Bulletin 70 Figure 21 (Isohyetal).
ANALYSIS

Conditions Analyzed:

- Tail-water conditions outfall
  - Free outfall
  - 10-year FEMA water surface elevation in Milne Creek

- Times of concentrations
  - TR-55 methodology by flow path (15 minutes max.)
  - Assumed 5 minutes
EXISTING CONDITIONS

Existing Storm Sewer Systems – Garfield Park
Scenario: Existing 10 year storm
EXISTING CONDITIONS

Existing Storm Sewer Systems – Kelvin Grove
Scenario: Existing 10 year storm
EXISTING CONDITIONS

Existing Storm Sewers Results:

- Back-pitched pipes
- Under-sized pipes
- Surcharging inlets
  - Flow exceeds inlet capacity
  - Back-pitched and under-sized pipes force water out of the system
EXISTING CONDITIONS

Back-Pitched Pipes – Kelvin Grove
Scenario: Existing 10 year storm
EXISTING CONDITIONS

Pipes Lacking Capacity & Surcharging Inlets – Garfield Park

Scenario: Existing 10 year storm
EXISTING CONDITIONS

Pipes Lacking Capacity & Surcharging Inlets – Kelvin Grove

Scenario: Existing 10 year storm
PROPOSED CONDITIONS

Proposed Storm Sewers Alternatives:

- 1. Correct back-pitched pipes
- 2. Parallel pipes to increase capacity
- 3. Re-size system to increase capacity
- 4. Complete new storm sewer systems
PROPOSED CONDITIONS

Assumptions:

- Costs are estimated for planning purposes
- Costs are estimated based on 2008 unit prices and should be increased by 5% per year for budgeting
- Costs do not include design or construction inspection services
ALTERNATIVE ONE
Correction of Back-Pitched Pipes

COSTS

Garfield Park:
443 feet of storm sewer pipes
ranging from 12” to 38”x60” diameter pipe
$ 61,367.00

Kelvin Grove:
1123 feet of storm sewer
ranging from 12” to 48” diameter pipe
$ 129,394.00
ALTERNATIVE ONE

Correction of Back-Pitched Pipes – Garfield Park

Scenario: Proposed 10 year storm
ALTERNATIVE ONE

Correction of Back-Pitched Pipes – Kelvin Grove

Scenario: Proposed 10 year storm

[Diagram of pipeline system]
ALTERNATIVE ONE
Correction of Back-Pitched Pipes

BENEFITS

Garfield Park: Sufficient capacity to convey the design event (10-year, 24-hour storm).

Kelvin Grove: Little; most pipes continue to lack capacity to convey the design event.
ALTERNATIVE TWO
Parallel Pipes

COSTS

Garfield Park:
5,487 feet of storm sewer
ranging from 12” to 18” diameter pipe $ 281,078.00

Kelvin Grove:
6,267 feet of storm sewer
ranging from 12” to 30” diameter pipe $ 353,527.00
ALTERNATIVE TWO

Parallel Pipes – Garfield Park
Scenario: Proposed 10 year storm
ALTERNATIVE TWO
Parallel Pipes

BENEFITS

Garfield Park: Sufficient capacity to convey the 25-year, 24-hour storm event.

Kelvin Grove: Sufficient capacity to convey the design event (10-year, 24-hour storm).
ALTERNATIVE THREE
Re-sized Pipes

COSTS

Garfield Park:
8,023 feet of storm sewer
ranging from 12” to 42” diameter pipe $ 1,581,553.00

Kelvin Grove:
6,887 feet of storm sewer
ranging from 12” to 54” diameter pipe $ 1,394,030.00
ALTERNATIVE THREE

Re-Sized Pipes – Garfield Park
Scenario: Proposed 10 year storm
ALTERNATIVE THREE

Re-Sized Pipes – Kelvin Grove
Scenario: Proposed 10 year storm
ALTERNATIVE THREE
Re-sized Pipes

BENEFITS

Garfield Park: Sufficient capacity to convey the design event.

Kelvin Grove: Sufficient capacity to convey the design event.
ALTERNATIVE FOUR
Complete New System

COSTS

Garfield Park:
23,602 feet of storm sewer
ranging from 12” to 48” diameter pipe $ 4,183,306.00

Kelvin Grove:
15,715 feet of storm sewer
ranging from 12” to 48” diameter pipe $ 2,626,189.00
ALTERNATIVE FOUR

Complete New System – Garfield Park
ALTERNATIVE FOUR

Complete New System – Kelvin Grove

Scenario: Proposed 10 year storm
ALTERNATIVE FOUR
Complete New System

BENEFITS

Garfield Park: Sufficient capacity to convey the design event.

Kelvin Grove: Sufficient capacity to convey the design event.
REGIONAL DETENTION
REGIONAL DETENTION

Expand Existing Detention Basin at Kelvin Grove School

- Assumptions (available area, depth, impacts)
- Alternatives
  - Minimum size – 1.71 acre-feet
  - Medium size – 2.97 acre-feet
  - Maximum size – 3.98 acre-feet
- Divert water using the storm sewer system
- Costs
- Benefits
REGIONAL DETENTION

Alternatives for Diverting Water From Storm Sewer System

- **“A”** – 50% of flow from Holly and Maple Courts and north portion of Read Street with a 24-inch pipe.

- **“B”** – 50% of flow from Milne Drive and 50% of flow from Holly and Maple Courts and north portion of Read Street with a 30-inch pipe.

- **“C”** – 75% of flow from Holly and Maple Courts and north portion of Read St. and 50% of flow from Milne Drive with a 36-inch pipe.
REGIONAL DETENTION

Diversion “A”
Scenario: Proposed 10 year storm

KELVIN GROVE - DIVERSION ALTERNATIVE “A”

Divert OUT KG-18-H to Kelvin Grove detention basin
Divert 50% of flow from KG-18-H to Kelvin Grove detention basin
REGIONAL DETENTION

Diversion “B”
Scenario: Proposed 10 year storm

KELVIN GROVE - DIVERSION ALTERNATIVE “B”

Divert 50% of flow from KG-18-H to Kelvin Grove detention basin
Additionally, divert 30% of flow from KG-18-G to Kelvin Grove detention basin (with a 30” pipe)
Diversion “C”
Scenario: Proposed 10 year storm

KELVIN GROVE - DIVERSION ALTERNATIVE “C”

KG-18-H Divert 75% of flow from KG-18-H to Kelvin Grove detention basin

Additionally, divert 50% of flow from KG-19-G to Kelvin Grove detention basin (with a 30” pipe)
**REGIONAL DETENTION**

**Benefits**

<table>
<thead>
<tr>
<th>Diversion</th>
<th>Expanded Basin Size</th>
<th>Equivalent Ponding Depth*</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A”</td>
<td>Minimum</td>
<td>1.90 ft.</td>
</tr>
<tr>
<td>“B”</td>
<td>Medium</td>
<td>2.25 ft.</td>
</tr>
<tr>
<td>“C”</td>
<td>Maximum</td>
<td>&gt;2.50 ft.</td>
</tr>
</tbody>
</table>

* At intersection of Valley Lane and Milne Drive
REGIONAL DETENTION

Costs

- Minimum (1.71 ac.-ft.) - $ 244,170.00
- Medium (2.97 ac.-ft.) - $ 441,649.00
- Maximum (3.98 ac.-ft.) - $ 569,514.00

(Does not include the cost of land acquisition or easements.)
PROPOSED STORM SEWER ALTERNATIVES

1. Correct back-pitched pipes (1,566 ft.) - $190,761.00
2. Parallel pipes (11,754 ft.) - $634,605.00
3. Re-sized pipes (14,910 ft.) - $2,975,583.00
4. Complete new system (39,317 ft.) - $6,809,495.00

REGIONAL DETENTION

- Minimum (1.71 ac.-ft.) - $244,170.00
- Medium (2.97 ac.-ft.) - $441,649.00
- Maximum (3.98 ac.-ft.) - $569,514.00
Stormwater Master Conveyance Plan

- QUESTIONS?

- THANK YOU!