# City of Lockport Stormwater Master Conveyance Plan

## Garfield Park and Kelvin Grove

By: Kristina M. Falat, EIT, CFM

BAXTER & WOODMAN Consulting Engineers

# 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

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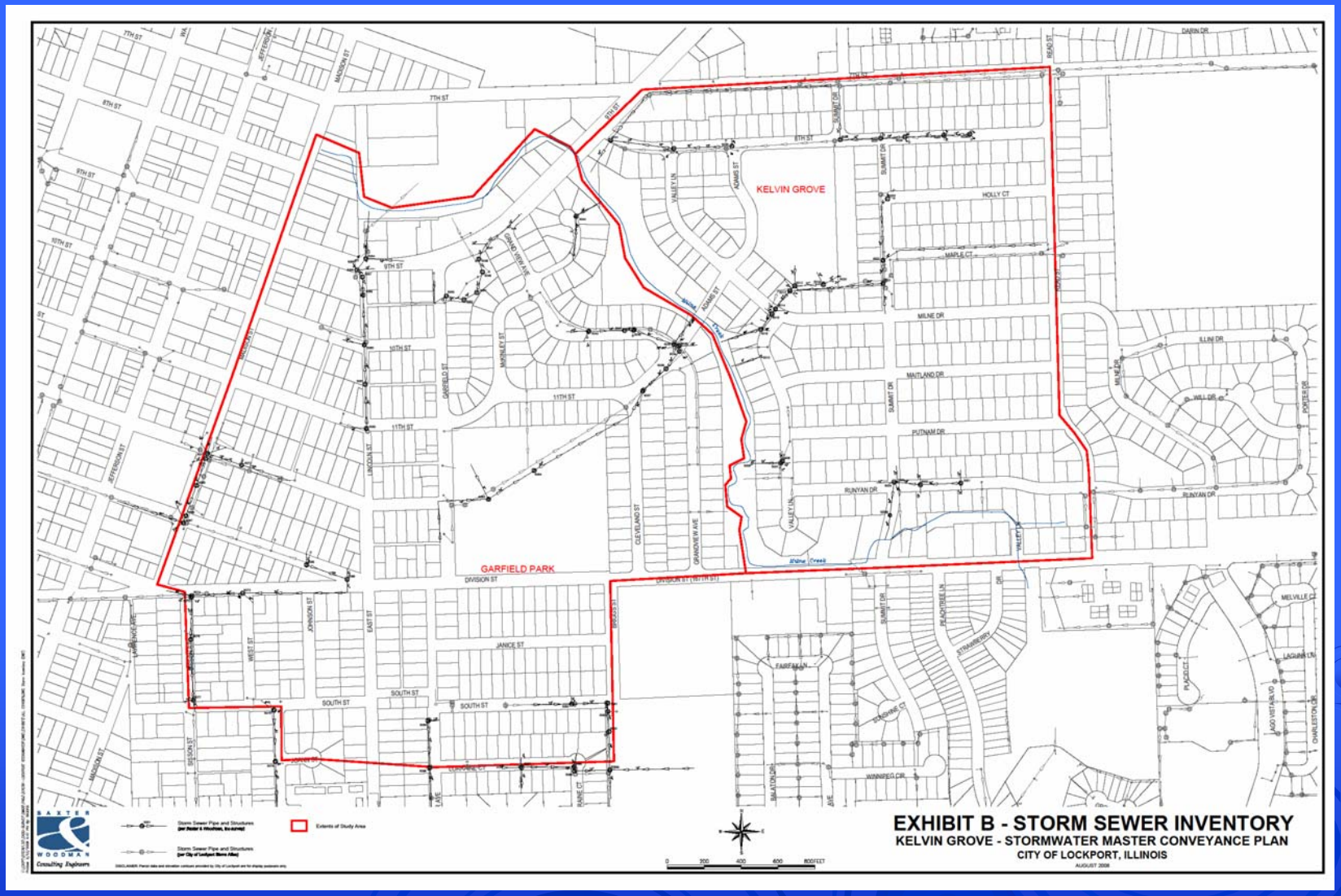
# Stormwater Master Conveyance Plan



# Stormwater Master Conveyance Plan

# 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).

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# 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

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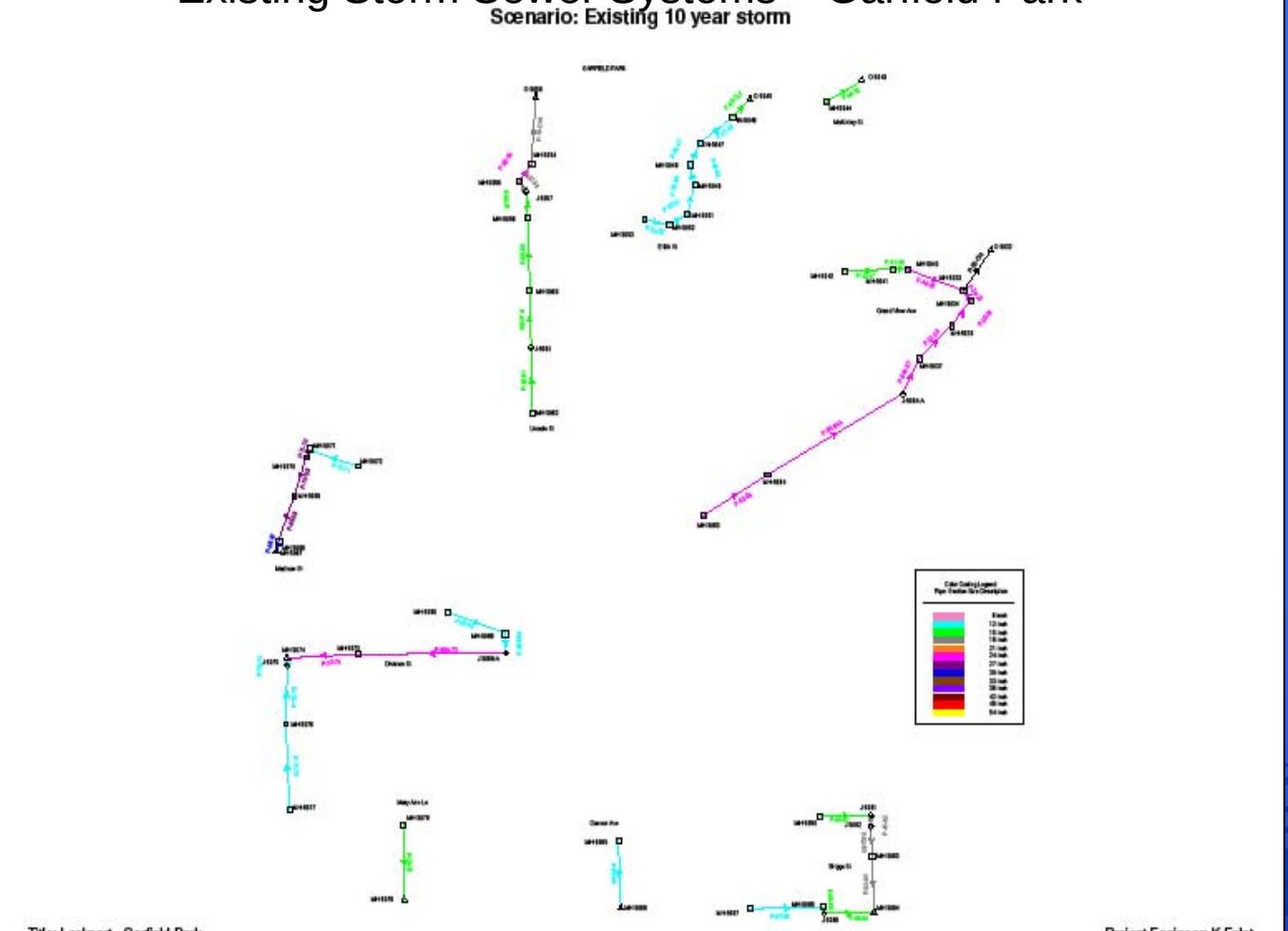
# EXISTING CONDITIONS

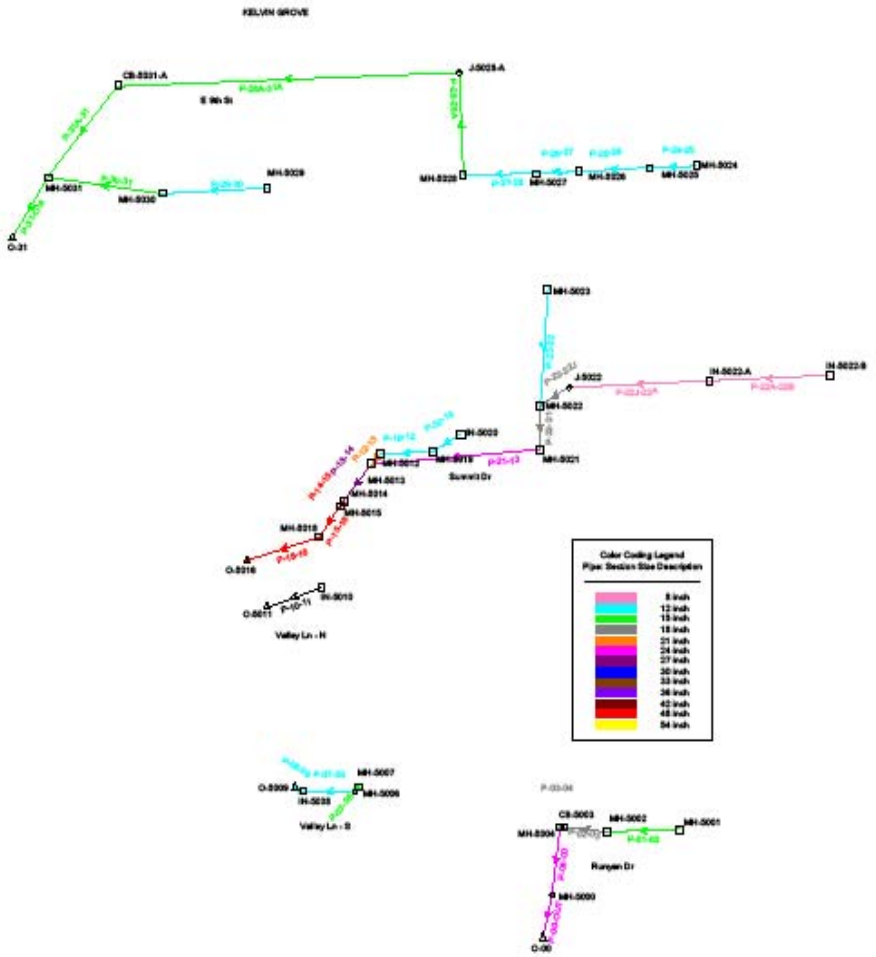
Existing Storm Sewer Systems – Garfield Park



# EXISTING CONDITIONS

Existing Storm Sewer Systems – Kelvin Grove

Scenario: Existing 10 year storm

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Page 1 of 1

# 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

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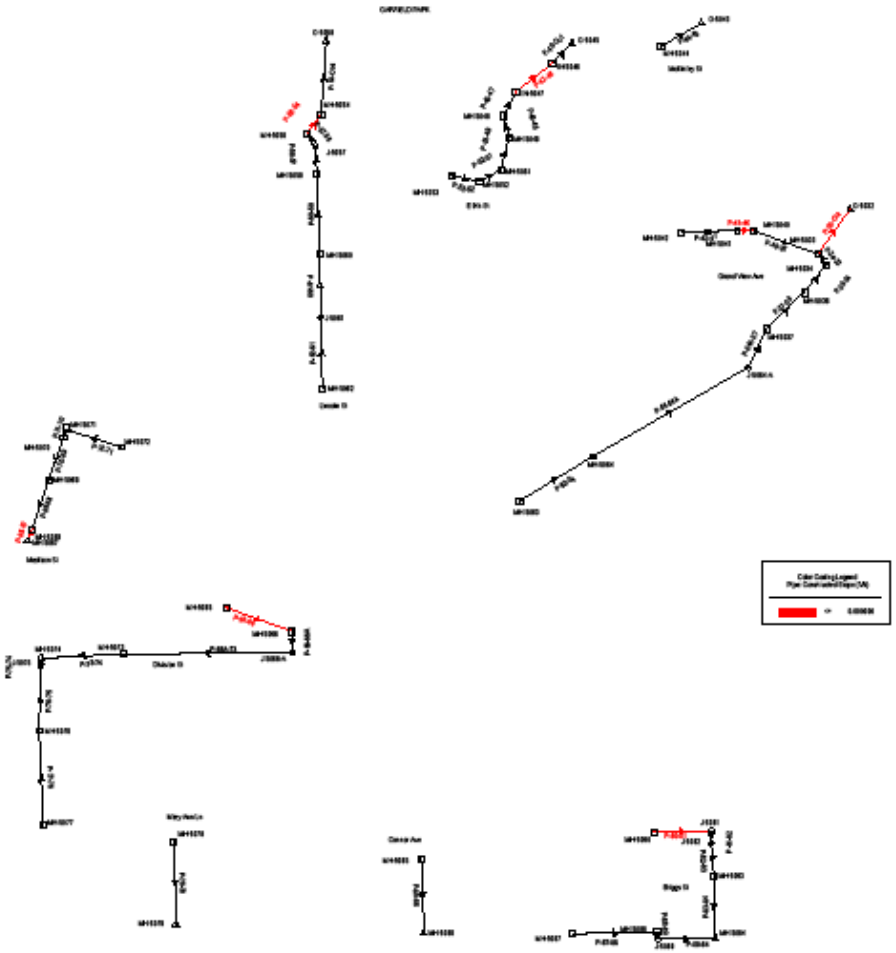
# EXISTING CONDITIONS

## Back-Pitched Pipes – Garfield Park

**Scenario: Existing 10 year storm**



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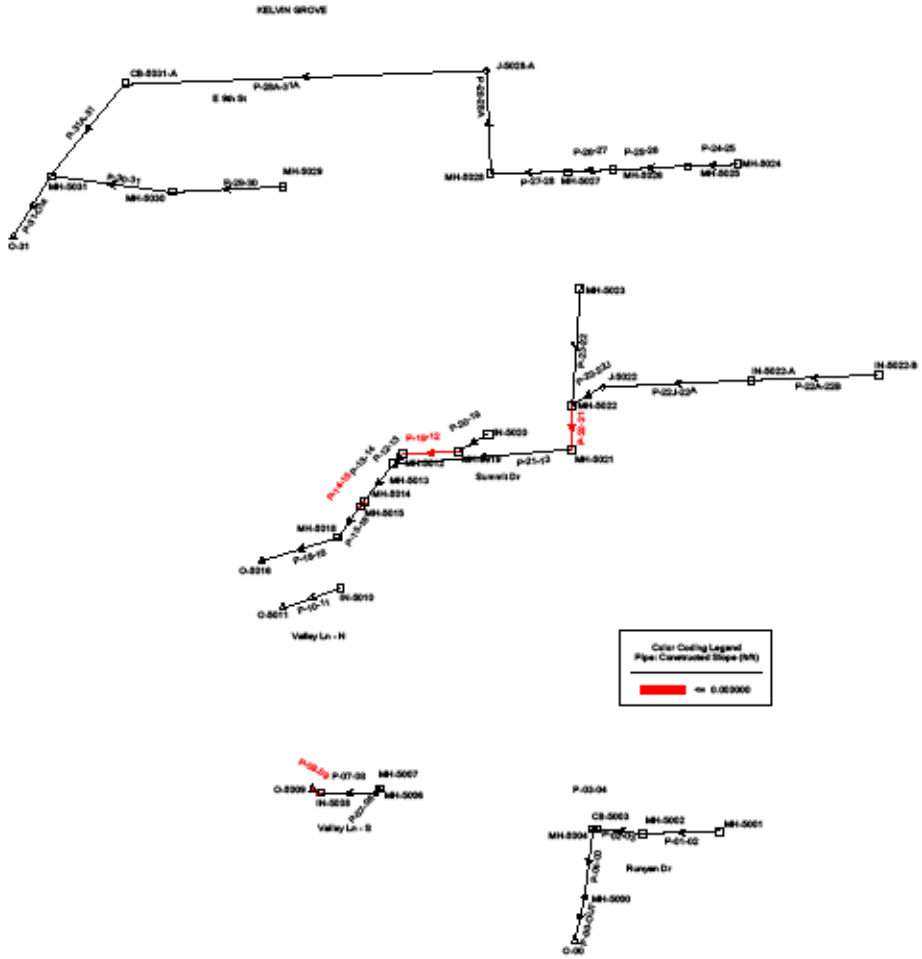
Page 1 of 1

# EXISTING CONDITIONS

## Back-Pitched Pipes – Kelvin Grove

**Scenario: Existing 10 year storm**

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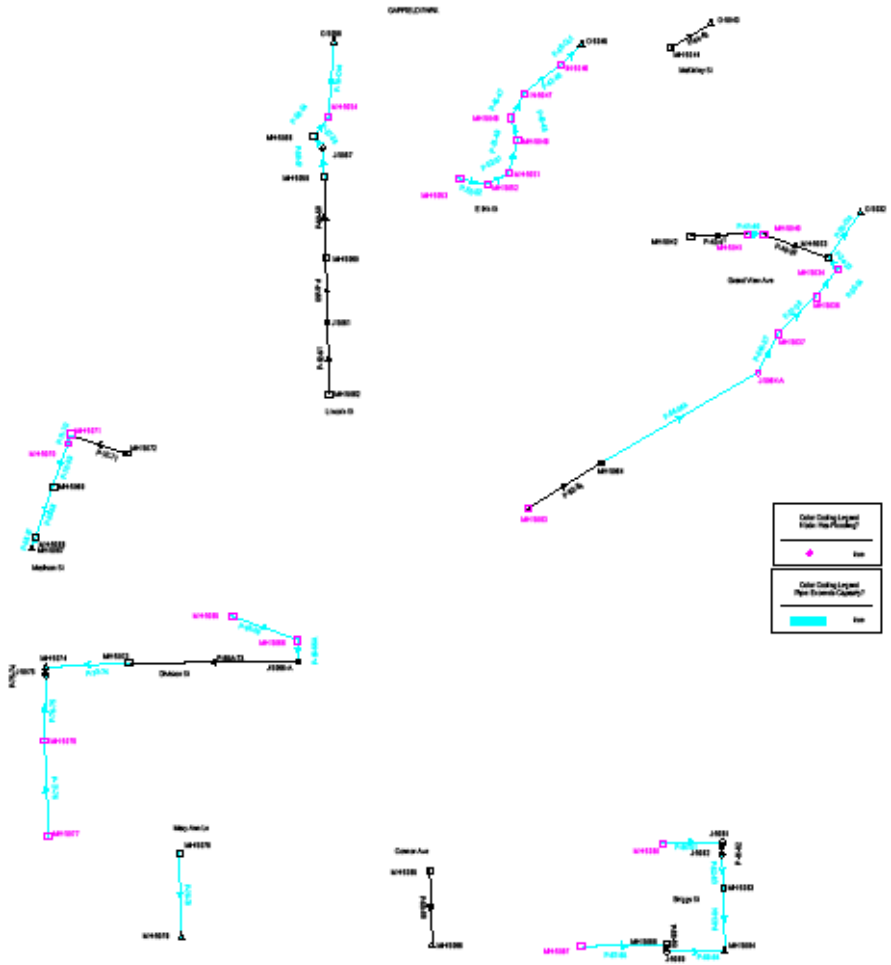
Page 1 of 1

# EXISTING CONDITIONS

Pipes Lacking Capacity & Surcharging Inlets – Garfield Park

Scenario: Existing 10 year storm



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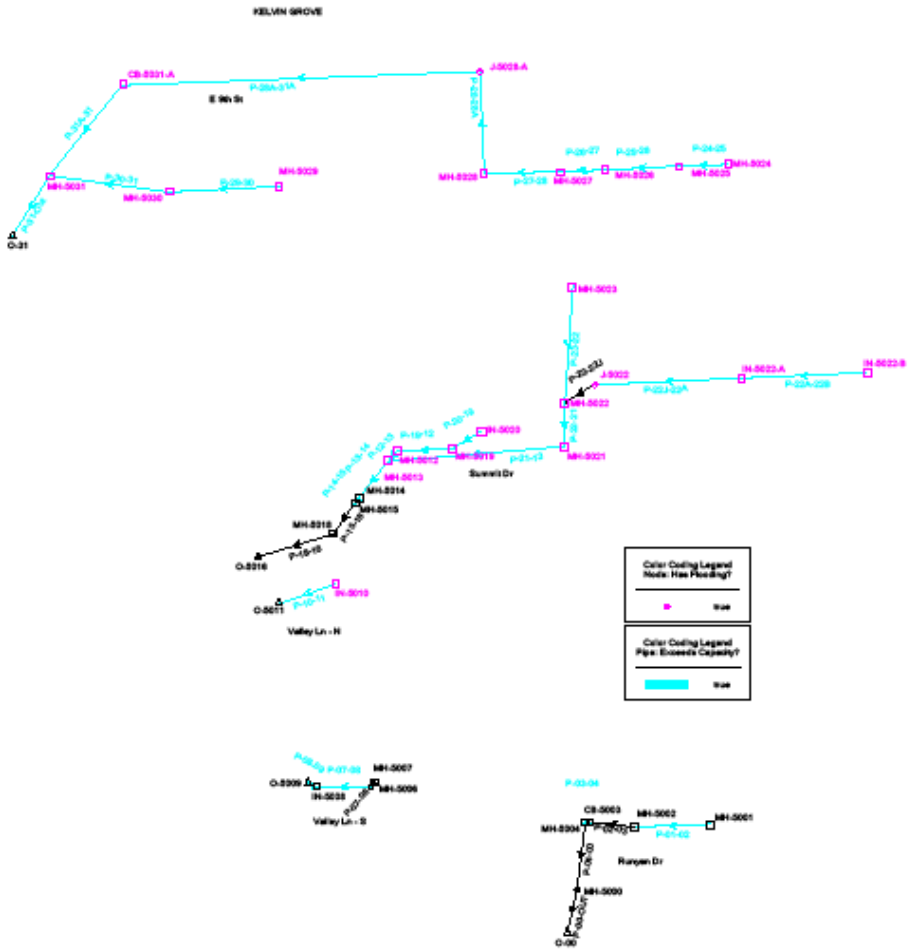
Page 1 of 1

# EXISTING CONDITIONS

## Pipes Lacking Capacity & Surcharging Inlets – Kelvin Grove

**Scenario: Existing 10 year storm**

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Page 1 of 1

# 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

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# 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

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# 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

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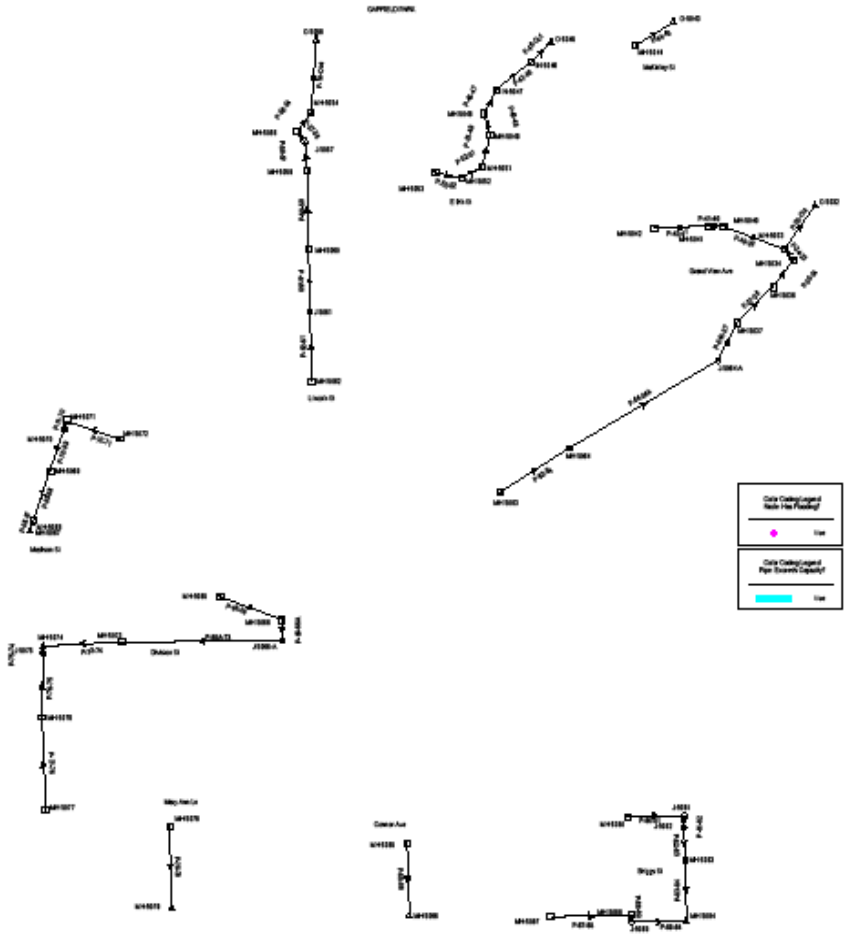
# ALTERNATIVE ONE

## Correction of Back-Pitched Pipes – Garfield Park

**Scenario: Proposed 10 year storm**



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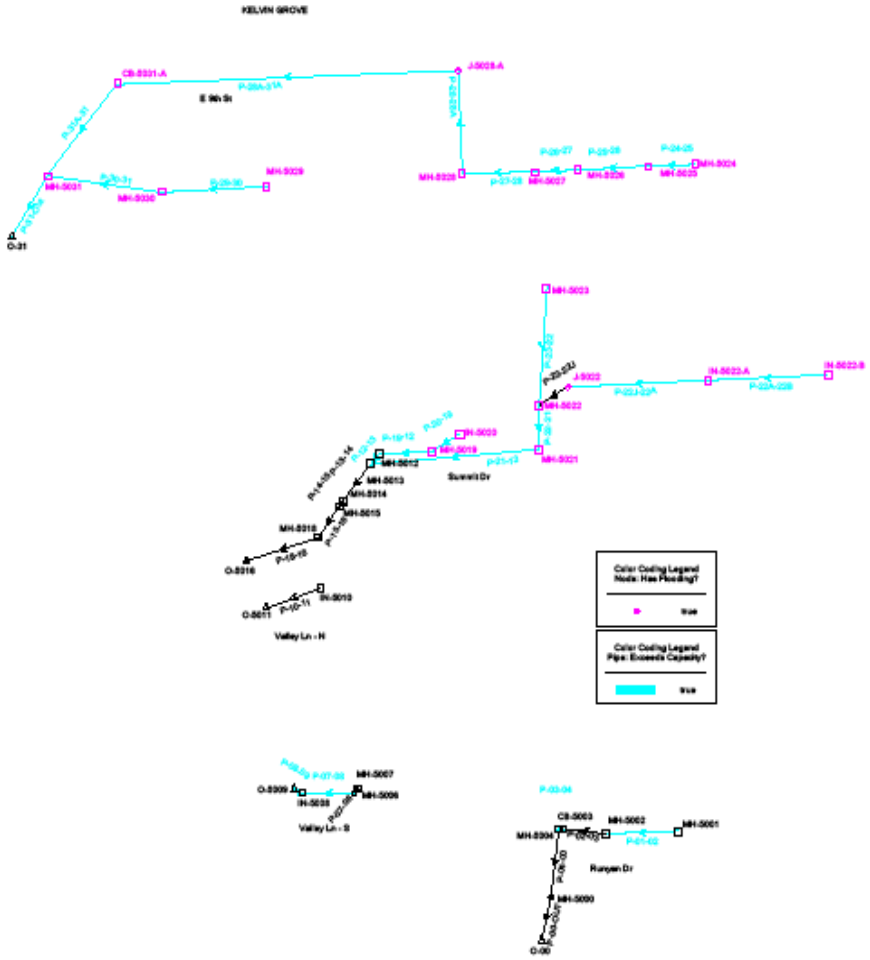
Page 1 of 1

# ALTERNATIVE ONE

## Correction of Back-Pitched Pipes – Kelvin Grove

**Scenario: Proposed 10 year storm**

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Page 1 of 1

# 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.

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# 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

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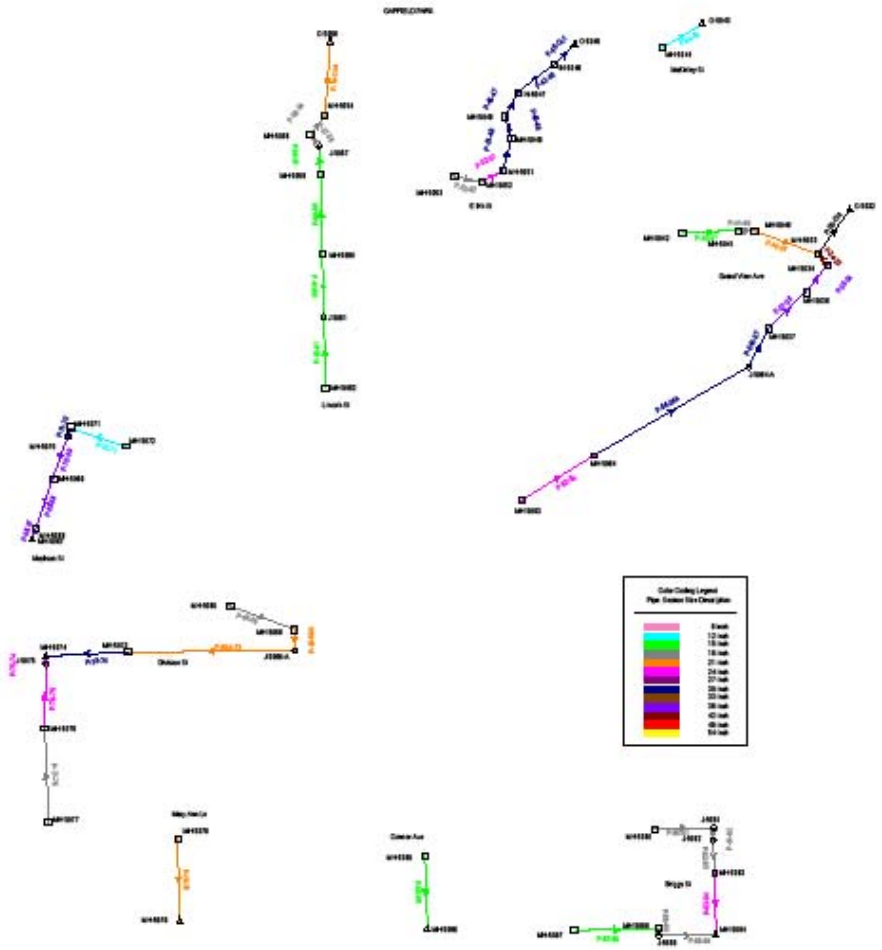
# ALTERNATIVE TWO

## Parallel Pipes – Garfield Park

**Scenario: Proposed 10 year storm**



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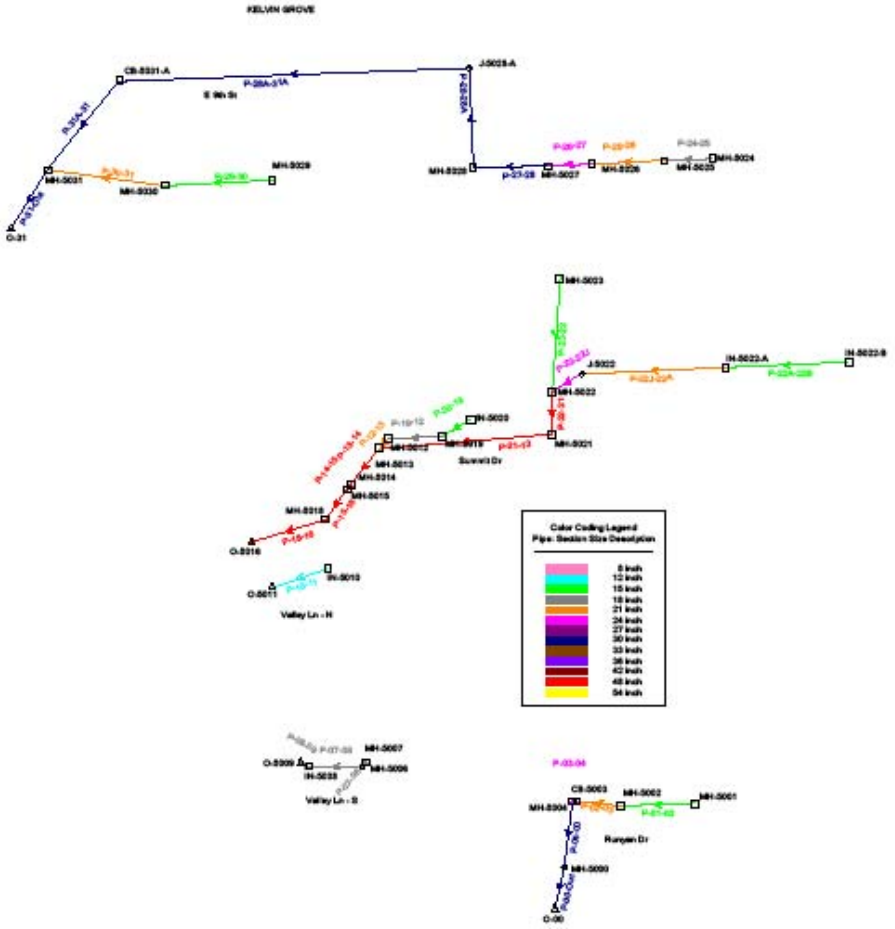
Page 1 of 1

# ALTERNATIVE TWO

## Parallel Pipes – Kelvin Grove

**Scenario: Proposed 10 year storm**

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Page 1 of 1

# 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).

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# 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

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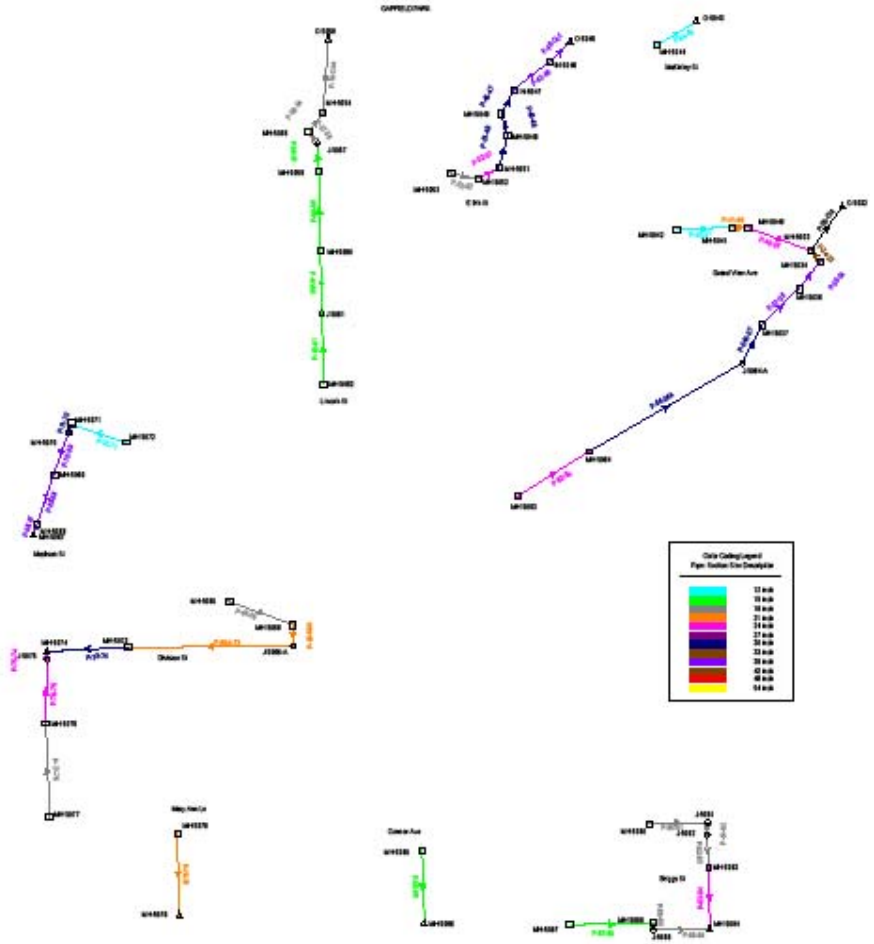
# ALTERNATIVE THREE

## Re-Sized Pipes – Garfield Park

**Scenario: Proposed 10 year storm**



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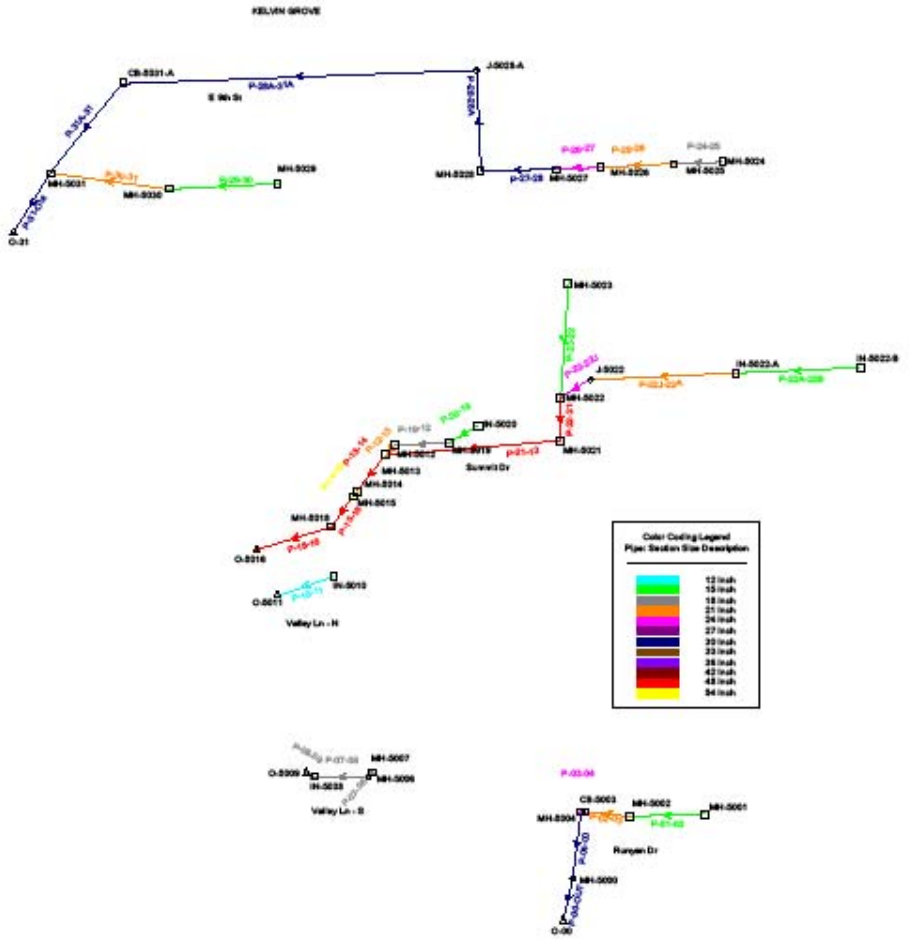
Page 1 of 1

# ALTERNATIVE THREE

## Re-Sized Pipes – Kelvin Grove

**Scenario: Proposed 10 year storm**

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Page 1 of 1

# ALTERNATIVE THREE
## Re-sized Pipes

BENEFITS

Garfield Park: Sufficient capacity to convey the design event.

Kelvin Grove: Sufficient capacity to convey the design event.

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# 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

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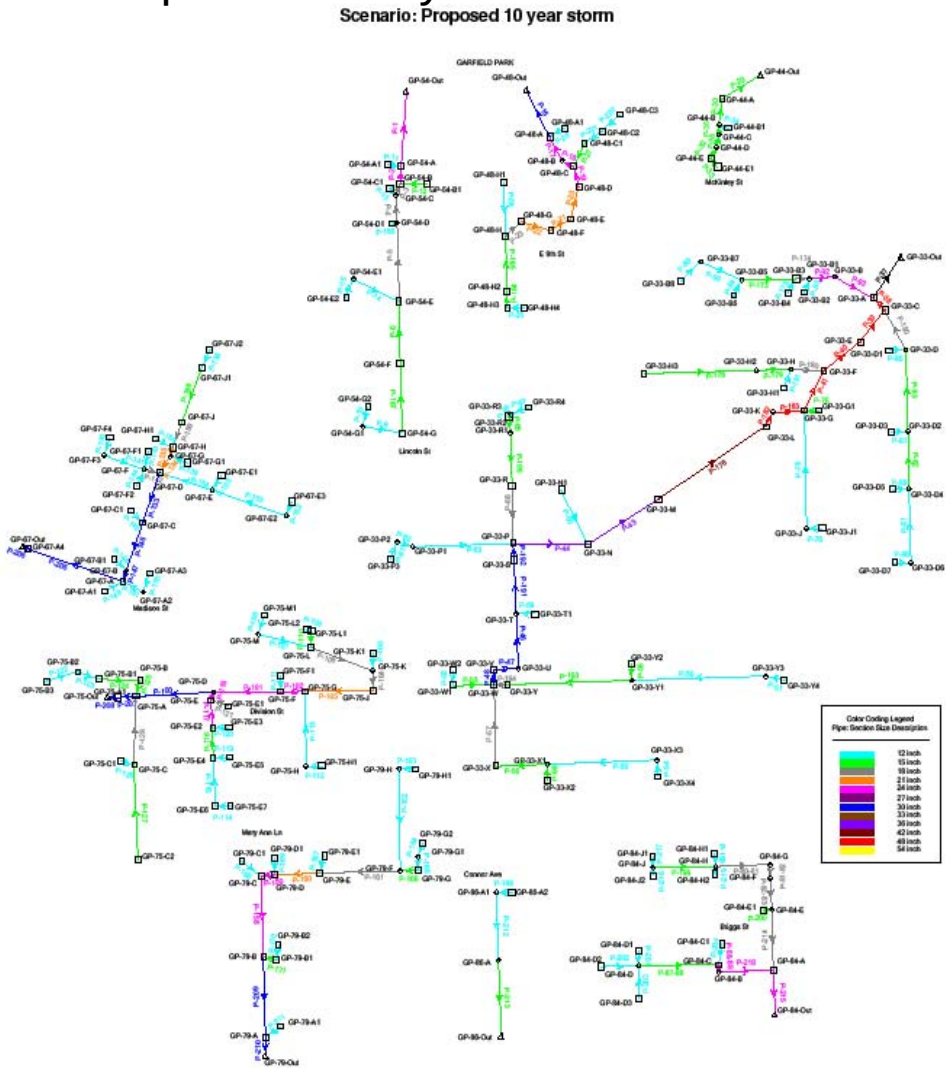
# ALTERNATIVE FOUR

## Complete New System – Garfield Park

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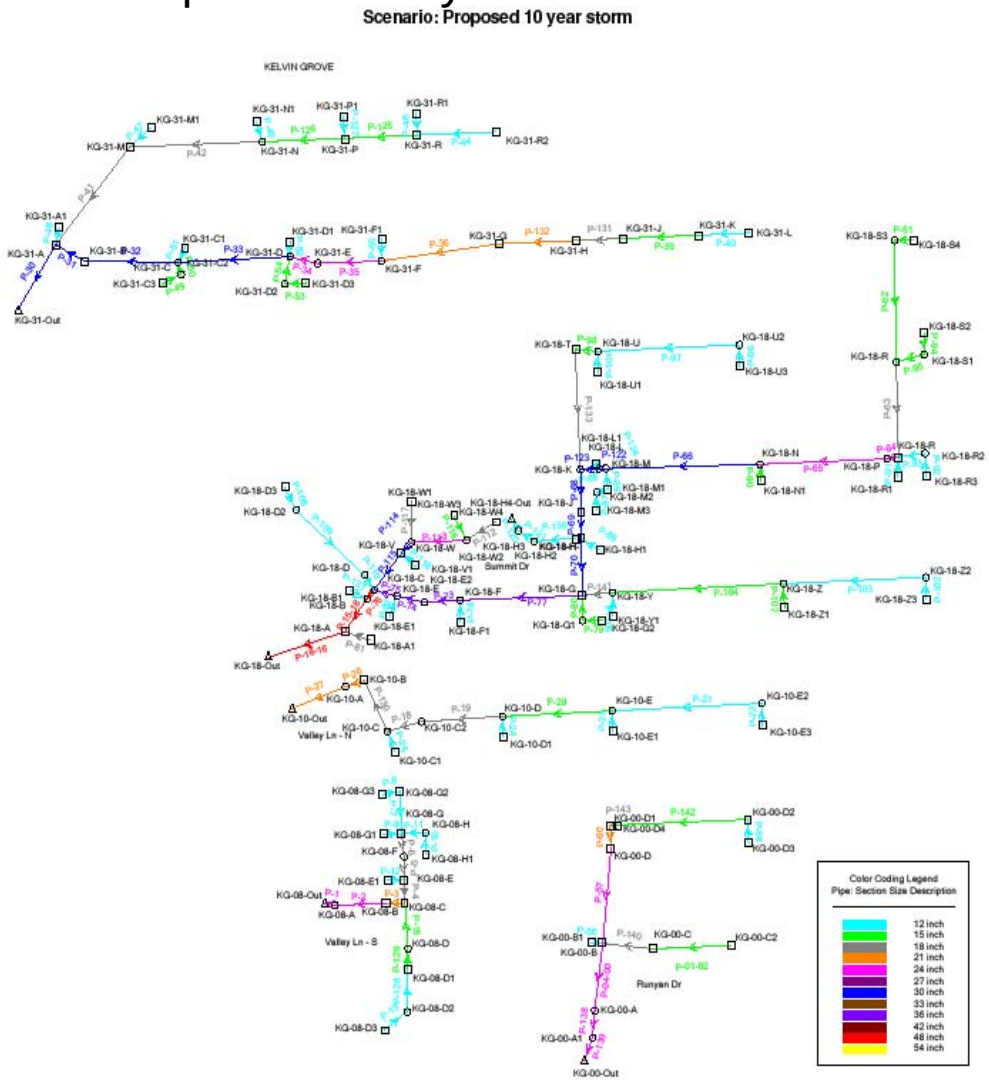
Page 1 of 1

# ALTERNATIVE FOUR

## Complete New System – Kelvin Grove

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Page 1 of 1

# ALTERNATIVE FOUR
## Complete New System

BENEFITS

Garfield Park: Sufficient capacity to convey the design event.

Kelvin Grove: Sufficient capacity to convey the design event.

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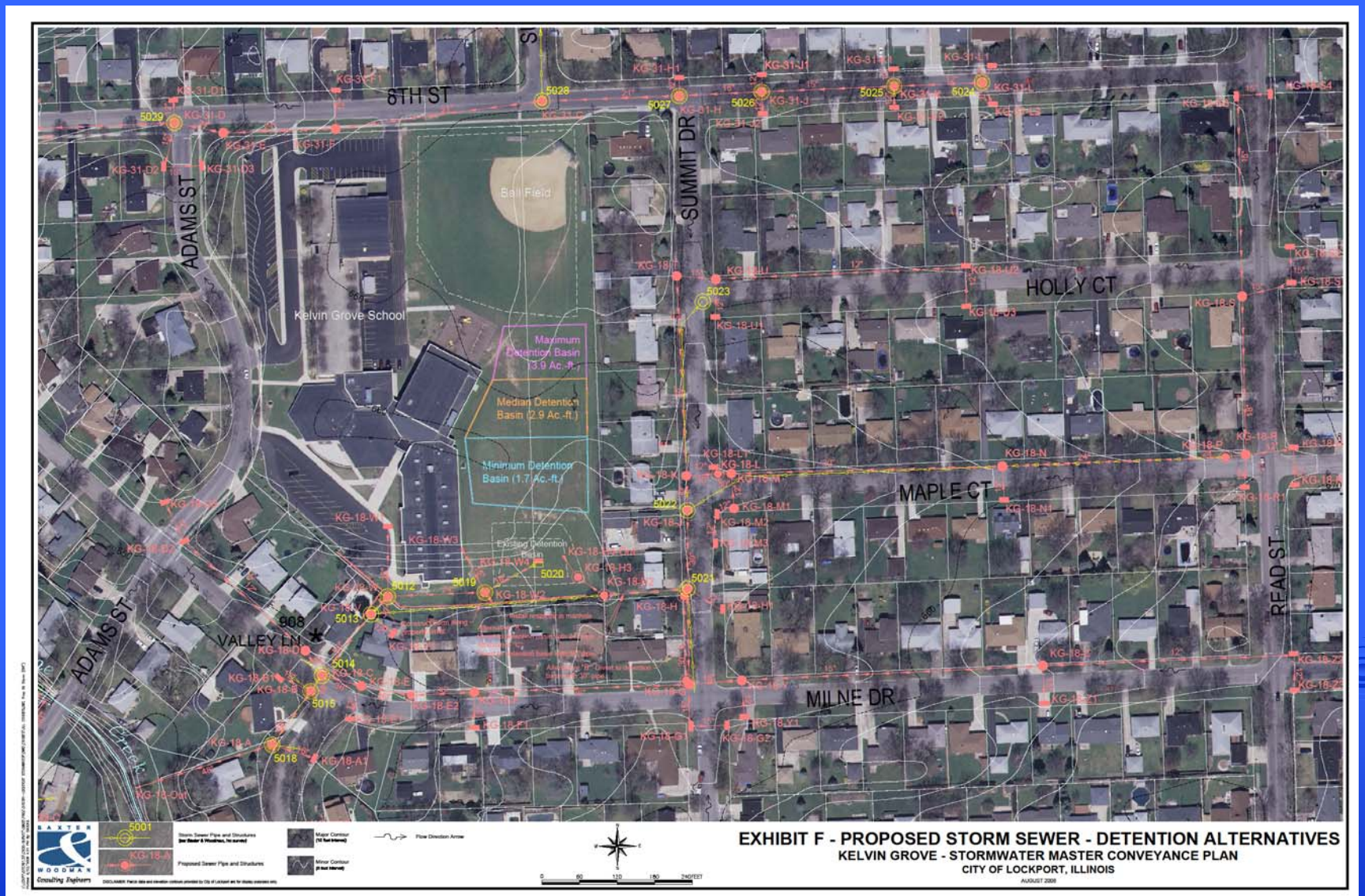
# REGIONAL DETENTION



# 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

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# 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.

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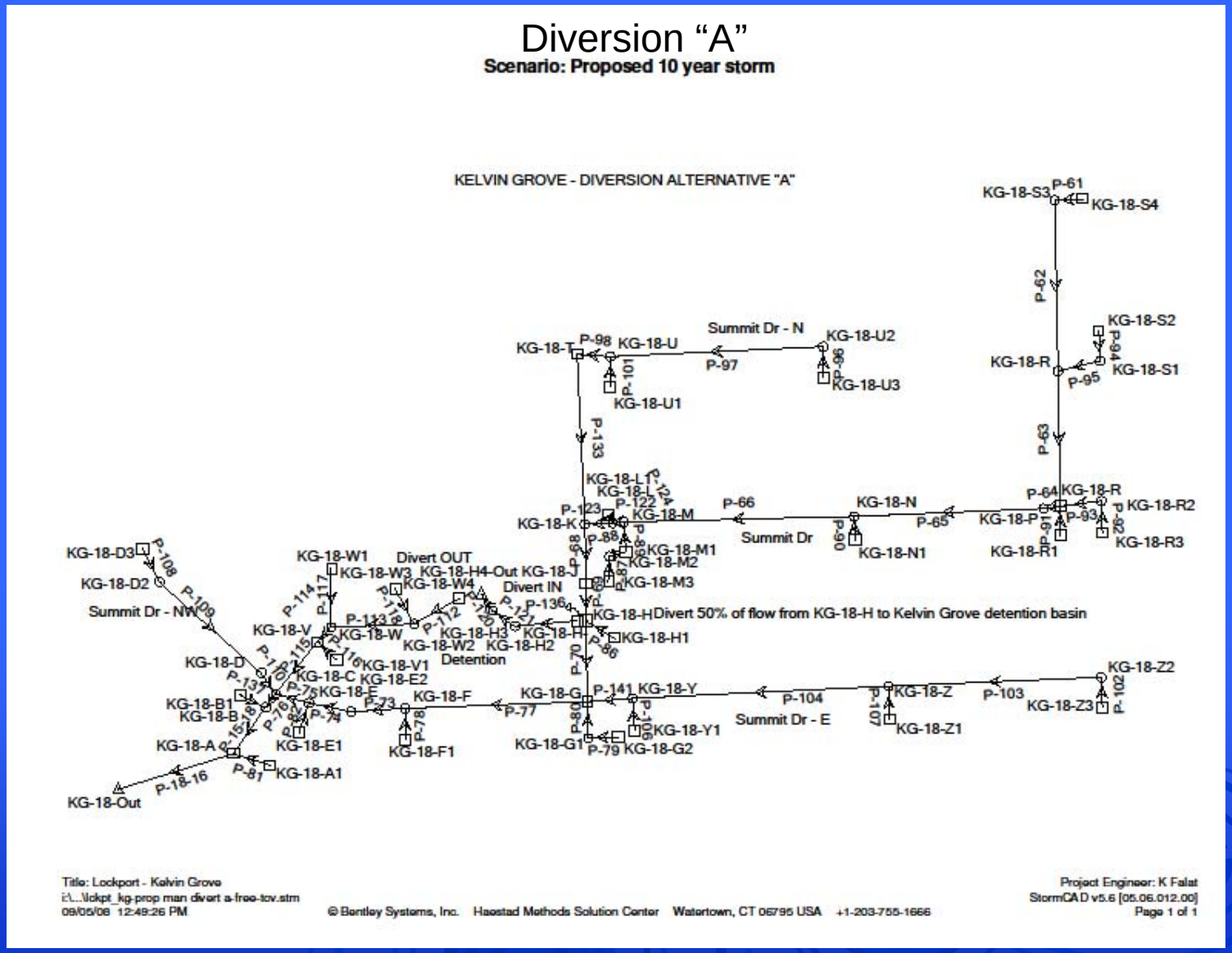
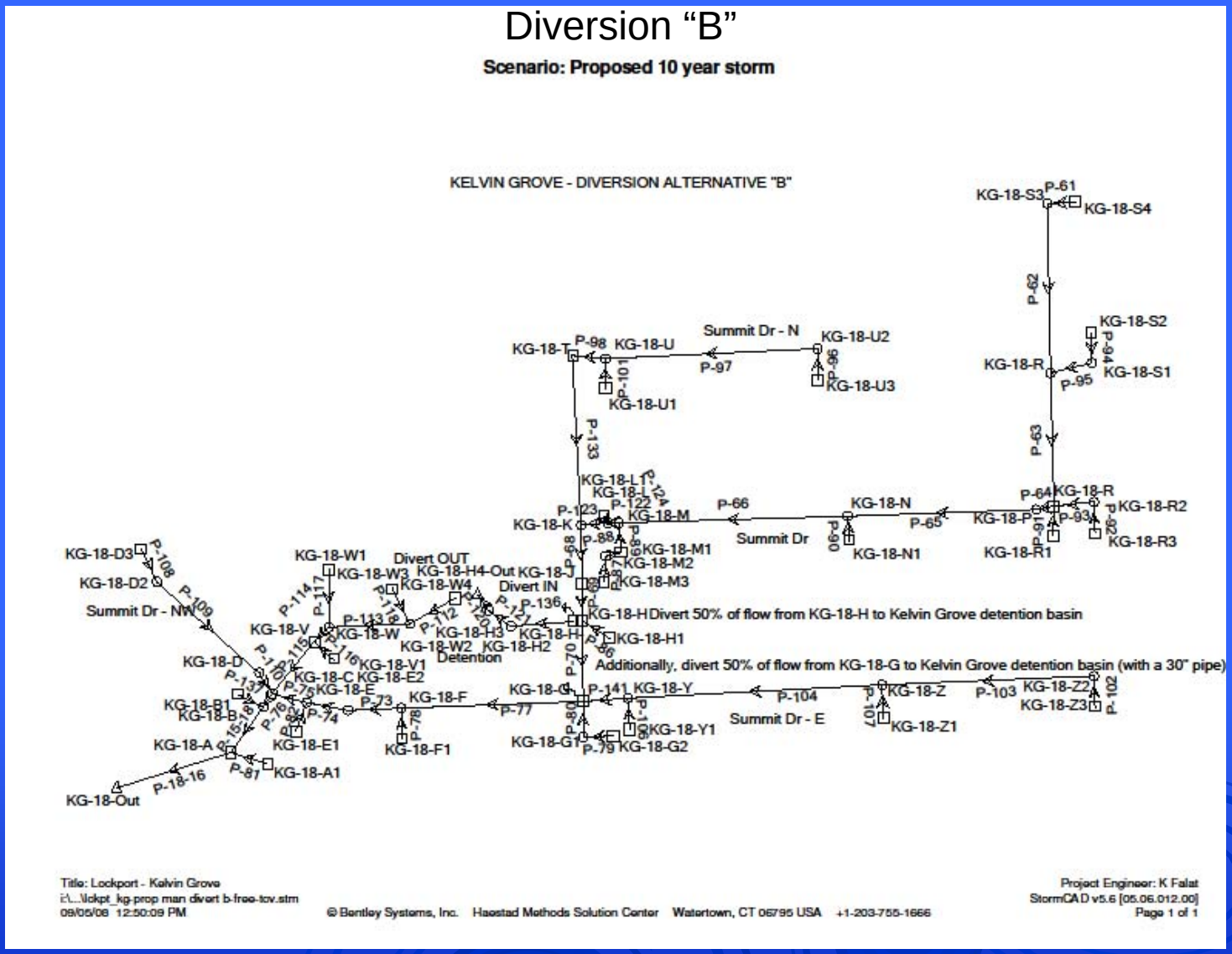
# REGIONAL DETENTION



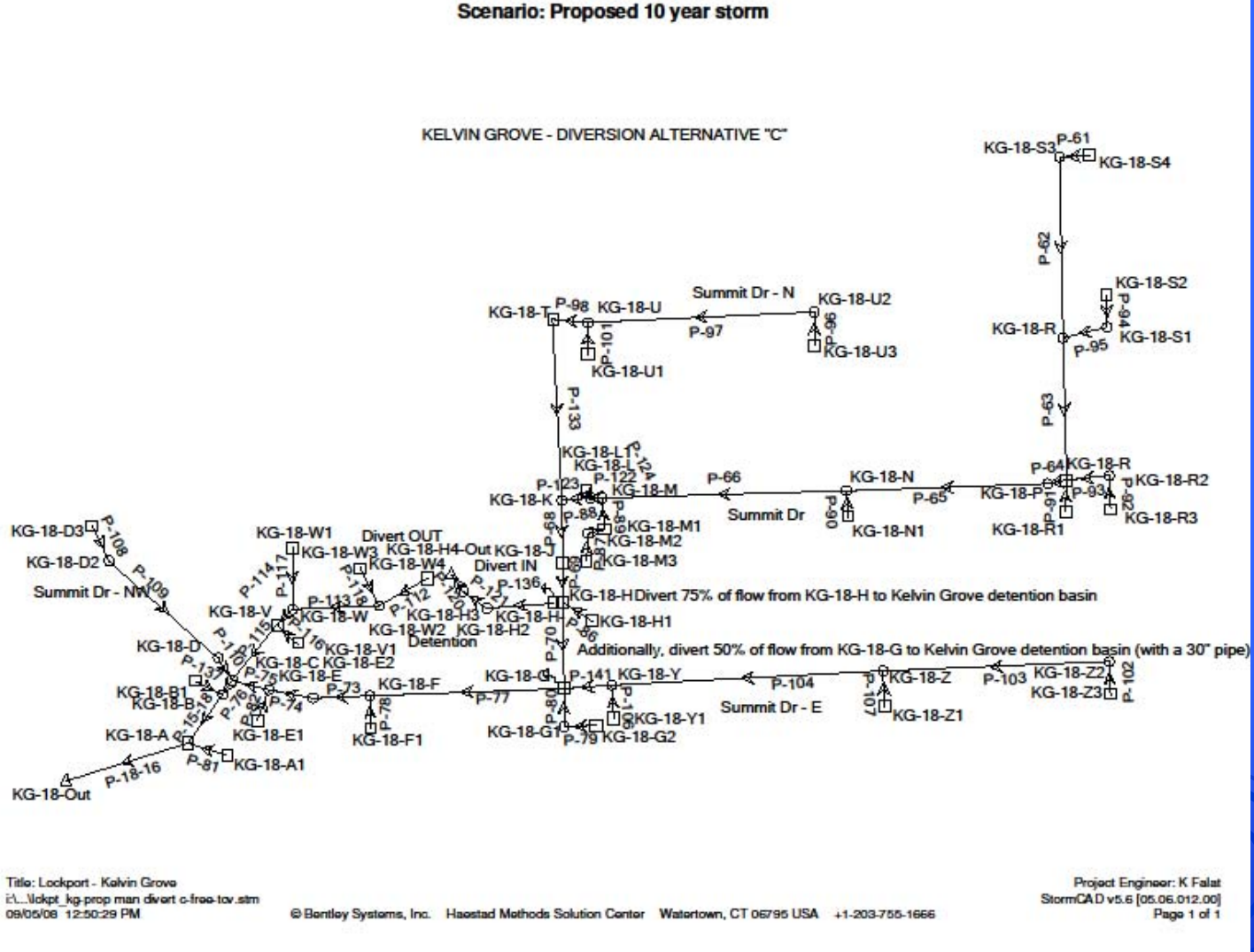
# REGIONAL DETENTION

Diversion “B”



# REGIONAL DETENTION

Diversion “C”



# REGIONAL DETENTION
## Benefits

| Diversion | Expanded Basin Size | Equivalent Ponding Depth* |
|---|---|---|
| “A” | Minimum | 1.90 ft. |
| “B” | Medium | 2.25 ft. |
| “C” | Maximum | >2.50 ft. |

* At intersection of Valley Lane and Milne Drive

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# 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.)*

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# Stormwater Master Conveyance Plan

## SUMMARY

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

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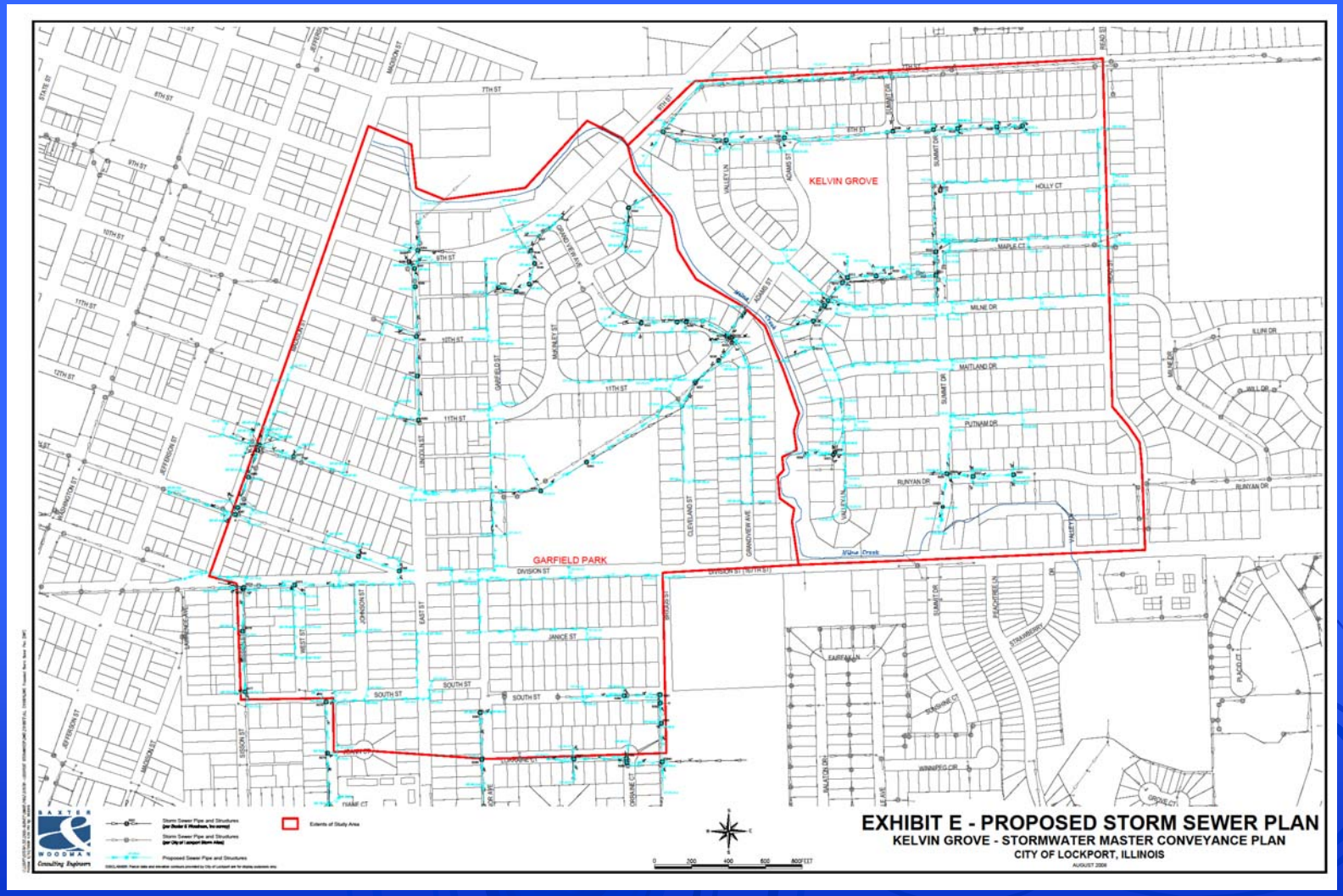
# Stormwater Master Conveyance Plan

## RECOMMENDATIONS



# Stormwater Master Conveyance Plan

- **QUESTIONS?**
  - **THANK YOU!**

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