Appendix C Results Maps
FIGURE
JUNE 2016 EVENT MODEL RESULTS
BASELINE CONDITIONS

Sub Catchment
Modeled Storage Area
Storm Pipe
Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)
0.1 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1+

DATA SOURCE: City of Cedar Rapids

CZECH VILLAGE WATERSHED DRAINAGE STUDY
FIGURE 5-YEAR MODEL RESULTS
BASELINE CONDITIONS

<table>
<thead>
<tr>
<th>Sub Catchment</th>
<th>Modeled Storage Area</th>
<th>Storm Pipe</th>
<th>Surcharge</th>
<th>Ponding Depth (ft)</th>
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<td>Less than half full</td>
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DATA SOURCE: City of Cedar Rapids

PATH: L:\CITY_OF_CEDAR_RAPIDS_FY18_DRAINAGE_STUDY\TM FIGURES\MXD\CZECH VILLAGE\CZECH_5_YEAR_MODEL_RESULTS.MXD  -  USER: JREMUS  -  DATE: 3/13/2018

CITY OF CEDAR RAPIDS
CZECH VILLAGE WATERSHED DRAINAGE STUDY
14th St SW Detention Basin
Total Storage: 5.0 acre-ft
5-year results:
Storage used: 5.0 acre-ft
Downstream open channel peak flow reduction: 20%

King's Material Detention Basin + Channel and Pipe Conveyance Improvements
Total Storage at Detention Basin: 78.6 acre-ft
Pipe Capacity Increase at 12th Ave: 25%
5-year results:
Channel flow at 6th St. SW: 250 cfs (40% increase)
Detention basin storage used: 19.5 acre-ft
12th Ave SW WSEL: N/A
12th Ave SW Pipe flow: 260 cfs
Total downstream peak flow reduction: 60%
FIGURE 5-YEAR MODEL RESULTS
TIER 1 PROJECTS - CONVEYANCE ALT.

Open Channel Improvements and Extension + Pipe Conveyance Improvements
Pipe Capacity Increase at M St: 70%
5-year results:
Channel flow U/S of 6th St. SW: 230 cfs (37% increase)
12th Ave SW WSEL: 726.2 ft
12th Ave SW Pipe flow: 195 cfs
Total downstream peak flow reduction: 60%

14th St SW Detention Basin
Total Storage: 5.0 acre-ft
5-year results:
Storage used: 5.0 acre-ft
Downstream open channel peak flow reduction: 20%
Figures 5-Year Model Results Tier 2 Projects - Detention Alt.

- **Sub Catchment**
- **Modeled Storage Area**
- **Storm Pipe**
- **Surcharge**
  - Less than half full
  - More than half full
  - Full - Bottleneck Downstream
  - Full - Bottleneck Pipe

**Ponding Depth (ft)**
- 0.1 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1+

**Tier 2 Project Details**

**Sub-Catchment:**
- Alandale Park Open Channel Improvements
  - 5-year results:
    - Downstream peak overland flow reduction: 40%

**Equipment:**
- Manhole Modification south of Evergreen Packing
  - 5-year results:
    - Storage used: 0.9 acre-ft
    - Upstream WSEL: 796.4 ft
    - Upstream overland volume reduction: 35%
10th Avenue SW Detention Basin
Total Storage at Detention Basin: 6.5 acre-ft
Pipe Capacity Increase at 12th Ave: 70%
5-year results:
- Detention basin storage used: 0.9 acre-ft
- 12th Ave SW WSEL: 726.2 ft
- 12th Ave SW Pipe flow: 215 cfs
- Total downstream peak flow reduction: 19%

Alandale Park Open Channel Improvements
5-year results:
- Downstream peak overland flow reduction: 40%

Manhole Modification south of Evergreen Packing Equipment
5-year results:
- Storage used: 0.9 acre-ft
- Upstream WSEL: 796.4 ft
- Upstream overland volume reduction: 35%
Detention Basin at Abandoned Cryo Facility
Total Storage: 4.4 acre-ft
5-year results:
Storage Used: 2.2 acre-ft
Open channel no longer contributing to Wilson Ave flooding
FIGURE 100-YEAR MODEL RESULTS BASELINE CONDITIONS

<table>
<thead>
<tr>
<th>Sub Catchment</th>
<th>Modeled Storage Area</th>
<th>Storm Pipe</th>
<th>Surcharge</th>
<th>Ponding Depth (ft)</th>
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<td>Full - Bottleneck Downstream</td>
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<td>Full - Bottleneck Pipe</td>
<td>3.1 - 4.0</td>
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DATA SOURCE: City of Cedar Rapids

PATH: L:\CITY_OF_CEDAR_RAPIDS_FY18_DRAINAGE_STUDY\TM FIGURES\MXD\CZECH_VILLAGE\CZECH_100_YEAR_MODEL_RESULTS.MXD  -  USER: JREMUS  -  DATE: 3/13/2018
FIGURE 100-YEAR MODEL RESULTS
TIER 1 PROJECTS - DETENTION ALT.

Sub Catchment
Modeled Storage Area
Storm Pipe
Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)
0.1 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1+

Czech village watershed drainage study

King's Material Detention Basin + Channel and Pipe
Conveyance Improvements
Total Storage at Detention Basin: 78.6 acre-ft
Pipe Capacity Increase at 12th Ave: 25%
100-year results:
- Channel flow at 6th St. SW: 235 cfs (20% increase)
- Detention basin storage used: 72.8 acre-ft
- WSEL: 727 ft
- 12th Ave SW Pipe flow: 295 cfs
- Total downstream peak flow reduction: 70%

14th St SW Detention Basin
Total Storage: 5.0 acre-ft
100-year results:
- Storage used: 5.0 acre-ft
- Downstream open channel peak flow increase: 20%

DATA SOURCE: City of Cedar Rapids

CITY OF CEDAR RAPIDS
CZECH VILLAGE WATERSHED DRAINAGE STUDY
FIGURE
100-YEAR MODEL RESULTS
TIER 1 PROJECTS - CONVEYANCE ALT.

Sub Catchment
Modeled Storage Area
Storm Pipe

Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)

0.1 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1+

Open Channel Improvements and Extension + Pipe Conveyance Improvements
Pipe Capacity Increase at M St: 70%
100-year results:
Channel flow U/S of 6th St. SW: 315 cfs (62% increase)
12th Ave SW WSEP: 729.4 ft
12th Ave SW Pipe flow: 160 cfs

14th St SW Detention Basin
Total Storage: 5.0 acre-ft
5-year results:
Storage used: 5.0 acre-ft
Downstream open channel peak flow reduction: 20%

DATA SOURCE: City of Cedar Rapids

CITY OF CEDAR RAPIDS
CZECH VILLAGE WATERSHED DRAINAGE STUDY
FIGURE 100-YEAR MODEL RESULTS
TIER 2 PROJECTS - DETENTION ALT.

Data Source: City of Cedar Rapids

Legend:
- Sub Catchment
- Modeled Storage Area
- Storm Pipe

Surcharge:
- Less than half full
- More than half full
- Full - Bottleneck Downstream
- Full - Bottleneck Pipe

Ponding Depth (ft):
- 0.1 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1+

Manhole Modification south of Evergreen Packing Equipment
100-year results:
- Storage used: 3.6 acre-ft
- Upstream WSEL: 798.4 ft
- Upstream overland volume reduction: 25%

Alandale Park Open Channel Improvements
100-year results:
- Downstream peak overland flow reduction: 35%
FIGURE
100-YEAR MODEL RESULTS
TIER 2 PROJECTS - CONVEYANCE ALT.

Sub Catchment
Modeled Storage Area
Storm Pipe
Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)
0.1 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1+

0 2,000 Feet
DATA SOURCE: City of Cedar Rapids

CITY OF CEDAR RAPIDS
CZECH VILLAGE WATERSHED DRAINAGE STUDY

10th Avenue SW Detention Basin
Total Storage at Detention Basin: 6.5 acre-ft
Pipe Capacity Increase at 12th Ave: 70%
100-year results:
Detention basin storage used: 6.5 acre-ft
12th Ave SW WSEL: 728.7 ft
12th Ave SW Pipe flow: 170 cfs
Total downstream peak flow reduction: -3%

Alandale Park Open Channel Improvements
100-year results:
Downstream peak overland flow reduction: 35%

Manhole Modification south of Evergreen Packing Equipment
100-year results:
Storage used: 3.6 acre-ft
Upstream WSEL: 798.4 ft
Upstream overland volume reduction: 25%
Detention Basin at Abandoned Cryo Facility
Total Storage: 4.4 acre-ft
100-year results:
Storage Used: 4.4 acre-ft
Flooded volume at Alandale Park reduction: 50%
FIGURE
MODEL RESULTS
JUNE 2014 FLOOD

Sub Catchment
Modeled Storage Area
Storm Pipe
Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)

0.1 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1+

DATA SOURCE: City of Cedar Rapids

CITY OF CEDAR RAPIDS
ROCKFORD ROAD SW WATERSHED DRAINAGE STUDY
FIGURE 5-YEAR MODEL RESULTS BASELINE CONDITIONS

DATA SOURCE: City of Cedar Rapids

Sub Catchment
Modeled Storage Area
Storm Pipe
Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)
- 0.1 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1+

16th St SW to 15th St SW
5-year results:
WSEL: 758.6 ft
Pipe flow: 159 cfs

Drainage Ditch North of 16th Ave SW
5-year results:
WSEL: 757.4 ft (Rockford Road)
Pipe flow: 45 cfs

Vacant Lot South of 16th Ave SW
5-year results:
WSEL: 762.4 ft
Pipe flow: 230 cfs

Newport's Flowers
5-year results:
WSEL: 793.8 ft
Pipe flow: 85 cfs

3rd St SW & Diagonal Dr
5-year results:
WSEL: 725.9 ft (3rd St. SW)
Pipe flow: 45 cfs

Alley East of Cargill
5-year results:
Overland flow: 324 cfs

Perfect Game Building
5-year results:
WSEL: 748.8 ft

Veterans Memorial Park
5-year results:
WSEL: 750.3 ft
Pipe flow: 230 cfs

Open Channel North of Rockford Glen
5-year results:
WSEL: 763.9 ft (Rockford Road)
Channel flow: 243 cfs

Open Channel at 18th St SW
5-year results:
WSEL: 777.4 ft
Channel flow: 121 cfs
FIGURE
5-YEAR MODEL RESULTS
TIER 1 PROJECTS

Sub Catchment
Modeled Storage Area
Storm Pipe

Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)
0.1 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1+

Berm and Inlet, Veterans Memorial, and SW Rockford Road Detention Basins
Total Storage at Veterans Memorial Detention Basin: 4.0 acre-feet
Total Storage at SW Rockford Road Detention Basin: 7.7 acre-feet
5-year results:
Pipe flow downstream: 360 cfs (6% increase)
Detention basin storage used: 8.0 acre-ft
Downstream flood volume reduction in Taylor Neighborhood: 74%
### FIGURE

#### 5-YEAR MODEL RESULTS

**TIER 2 PROJECTS**

<table>
<thead>
<tr>
<th>Sub Catchment</th>
<th>Modeled Storage Area</th>
<th>Storm Pipe</th>
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<table>
<thead>
<tr>
<th>Surcharge</th>
<th>Less than half full</th>
<th>More than half full</th>
<th>Full - Bottleneck downstream</th>
<th>Full - Bottleneck Pipe</th>
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</thead>
</table>

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<th>Ponding Depth (ft)</th>
<th>0.1 - 1.0</th>
<th>1.1 - 2.0</th>
<th>2.1 - 3.0</th>
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<th>4.1 - 5.0</th>
<th>5.1+</th>
</tr>
</thead>
</table>

Swale Between 16th St SW & 15th St SW

5-year results:
- Downstream peak flow: 295 cfs (13% increase)
- Local flood volume reduction: 81%
**FIGURE 5-YEAR MODEL RESULTS TIER 3 PROJECTS**

**DATA SOURCE:** City of Cedar Rapids

**Surcharge**
- Less than half full
- More than half full
- Full - Bottleneck Downstream
- Full - Bottleneck Pipe

**Ponding Depth (ft)**
- 0.1 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1+

---

**Kingston and Veterans Memorial Pervious Paving**
- 5-year results:
  - Downstream peak flow: 5 cfs (80% decrease)

**Newport's Detention Basin**
- Total Storage at Newport's Detention Basin: 4.4 acre-feet
- 5-year results:
  - Detention basin storage used: 1.0 acre-ft
  - Downstream flood volume reduction in Taylor Neighborhood: 1%

**Perfect Game Detention Basin**
- Total Storage at Perfect Game Detention Basin: 1.0 acre-feet
- 5-year results:
  - Detention basin storage used: 1.0 acre-ft
  - Downstream flood volume reduction in Taylor Neighborhood: 1%
<table>
<thead>
<tr>
<th>Sub Catchment</th>
<th>Modeled Storage Area</th>
<th>Storm Pipe</th>
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<td>Surcharge</td>
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<td>Full - Bottleneck Downstream</td>
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<td>Full - Bottleneck Pipe</td>
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**FIGURE 100-YEAR MODEL RESULTS BASELINE CONDITIONS**

<table>
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<th>Sub Catchment</th>
<th>Modeled Storage Area</th>
<th>Storm Pipe</th>
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<tbody>
<tr>
<td><strong>Vacant Lot South of 16th Ave SW</strong></td>
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<tr>
<td>100-year results:</td>
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<tr>
<td>WSEL: 763.4 ft</td>
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<tr>
<td>Pipe flow: 244 cfs</td>
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<tr>
<td><strong>Veterans Memorial Park</strong></td>
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<tr>
<td>100-year results:</td>
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<tr>
<td>WSEL: 749.7 ft</td>
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<tr>
<td><strong>Open Channel North of Rockford Glen</strong></td>
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<tr>
<td>100-year results:</td>
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<tr>
<td>WSEL: 764.9 ft (Rockford Road)</td>
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<tr>
<td>Channel flow: 535 cfs</td>
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<tr>
<td><strong>Open Channel at 18th St SW</strong></td>
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<tr>
<td>100-year results:</td>
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<tr>
<td>WSEL: 778.5 ft</td>
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<tr>
<td>Channel flow: 157 cfs</td>
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<tr>
<td><strong>Drainage Ditch North of 16th Ave SW</strong></td>
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<td>100-year results:</td>
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<tr>
<td>WSEL: 758.2 ft (Rockford Road)</td>
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<td>Pipe flow: 45 cfs</td>
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<tr>
<td><strong>3rd St SW &amp; Diagonal Dr</strong></td>
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<tr>
<td>100-year results:</td>
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<tr>
<td>WSEL: 726.6 ft (3rd St. SW)</td>
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<tr>
<td>Pipe flow: 53 cfs</td>
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<tr>
<td><strong>Newport's Flowers</strong></td>
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<tr>
<td>100-year results:</td>
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<tr>
<td>WSEL: 795.0 ft</td>
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<td>Pipe flow: 88 cfs</td>
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</tbody>
</table>

**DATA SOURCE:** City of Cedar Rapids

**FIGURE 100-YEAR MODEL RESULTS BASELINE CONDITIONS**

**Sub Catchment**

1. **Vacant Lot South of 16th Ave SW**
   - 100-year results:
   - WSEL: 763.4 ft
   - Pipe flow: 244 cfs

2. **Veterans Memorial Park**
   - 100-year results:
   - WSEL: 749.7 ft

3. **Open Channel North of Rockford Glen**
   - 100-year results:
   - WSEL: 764.9 ft (Rockford Road)
   - Channel flow: 535 cfs

4. **Open Channel at 18th St SW**
   - 100-year results:
   - WSEL: 778.5 ft
   - Channel flow: 157 cfs

**Modeled Storage Area**

- **Vacant Lot South of 16th Ave SW**
- **Veterans Memorial Park**
- **Open Channel North of Rockford Glen**
- **Open Channel at 18th St SW**

**Storm Pipe**

- **Vacant Lot South of 16th Ave SW**
- **Veterans Memorial Park**
- **Open Channel North of Rockford Glen**
- **Open Channel at 18th St SW**

**Ponding Depth (ft)**

- **0.1 - 1.0**
- **1.1 - 2.0**
- **2.1 - 3.0**
- **3.1 - 4.0**
- **4.1 - 5.0**
- **5.1+**
**FIGURE 100-YEAR MODEL RESULTS TIER 1 PROJECTS**

**Surcharge**
- Less than half full
- More than half full
- Full - Bottleneck Downstream
- Full - Bottleneck Pipe

**Ponding Depth (ft)**
- 0.1 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1+

Berm and Inlet, Veterans Memorial, and SW Rockford Road Detention Basins
Total Storage at Veterans Memorial Detention Basin: 4.0 acre-feet
Total Storage at SW Rockford Road Detention Basin: 7.7 acre-feet
100-year results:
Pipe flow downstream: 360 cfs (8% increase)
Detention basin storage used: 11.7 acre-ft
Downstream flood volume reduction in Taylor Neighborhood: 78%
Swale Between 16th St SW & 15th St SW
100-year results:
Downstream peak flow: 655 cfs (12% decrease)
Local flood volume reduction: 38%
FIGURE
100-YEAR MODEL RESULTS
TIER 3 PROJECTS

Sub Catchment
Modeled Storage Area
Storm Pipe

Surcharge
Less than half full
More than half full
Full - Bottleneck Downstream
Full - Bottleneck Pipe

Ponding Depth (ft)
0.1 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1+

PATH: L:\CITY_OF_CEDAR_RAPIDS_FY18_DRAINAGE_STUDY\CV AND RR TM FIGURES\MXD\ROCKFORD ROAD\ROCKFORD_RD_100_YEAR_TEIR_3_FLOOD_RESULTS.MXD  -  USER: AVECCHI  -  DATE: 6/28/2018

CITY OF CEDAR RAPIDS
ROCKFORD ROAD SW WATERSHED DRAINAGE STUDY

Kingston and Veterans Memorial Pervious
Paving
100-year results:
Downstream peak flow: 24 cfs (43% decrease)

Perfect Game Detention Basin
Total Storage at Perfect Game Detention Basin: 1.0 acre-feet
100-year results:
Detention basin storage used: 1.0 acre-ft
Downstream flood volume reduction in Taylor Neighborhood: 1%

Newport's Detention Basin
Total Storage at Newport's Detention Basin: 4.4 acre-feet
100-year results:
Downstream peak flow: 12 cfs (86% decrease)
Detention basin storage used: 4.4 acre-ft
Local flood volume reduction: 100%