Lessons [being] learnt
2016 Flood in Cedar Rapids

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• Agenda
  – 2008 Flood Event
  – 2016 Flood Event
  – [Long Term] Flood Control System
Cedar Rapids

- Population 120,000
- Second largest city in Iowa
- Industrial roots: Quaker Oats, General Mills, Cargill
- Vibrant urban town
The Historic 2008 Flood
Floodwaters spread across more than 10 square miles of the city, 14% of the land.
5,390 homes belonging to more than 18,000 citizens were affected, and 10,000 residents were displaced by the disaster.
The flood caused over $5.4 billion in damages to the community.
Over 1,000 blocks in the heart of the community were flooded. More than 300 public buildings and 900 businesses were damaged.
The Central Fire Station, Police Station, City Hall, County Courthouse, County Administrative offices, and County Jail all required immediate relocation.
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Flood Risk Reduction Since 2008

- Interim flood control plan and concept for permanent protection (2008)
- Voluntary Property Acquisition Program (1300+) 2009-2014
- Adoption of New Flood Insurance Rate Maps (2010)
- Updated Floodplain Management Ordinance (2010)
- Retrofitted buildings flooded in 2008 and Raised Building Equipment
- Raised two bridges over Prairie Creek (2009 and 2011)
- McGrath Amphitheatre / Levee protection (2012)
- Waste Pollution Control Plant Upgrades / Levee System (2013)
- Water System Improvements / Wells Raised (2012)
- Interim Levee Repairs
- Sanitary Sewer Improvements and Watershed Management (ongoing)
- Secure GRI state funding (2014)
- NewBo/Czech Village projects 2016 - 2018
- FCS 5 – 20 years
- Remaining Risk
In the meantime... how we do fight floods?

**Plugs**  
Storm sewers are plugged at elevated river levels to prevent water from back flowing into the lines and causing flooding at low lying areas.

**Pumps**  
Used with plugs. Pumps move trapped rainwater “over the wall” to keep a protected area from being flooded by accumulated rain.
September 2016 | Rising River Crest

- 19.5’ predicted 9/22
- 25.3’ predicted 9/24
- **4 DAYS TO PREPARE**

Action Stage = 10’
Minor Flooding = 12’
Major Flooding = 16’
2008 Flood = 31.12’
Impacts of 25’ Flood
Immediate Actions

• Enact Flood Response Plan and Interim Flood Response Plan
• Director and Council member briefing
• Open Incident Command Center and EOC
• Establish Core Operations
  – Above ground barrier (Hescos, Clay Berms etc.)
  – Underground gates and plugs
  – Public Safety / Traffic Control / Evacuations
  – Communications Team

• Public Outreach
Recruiting Community Professionals
Evacuation

- Safety / Room to work
- Evacuation area set at the 26-ft flood inundation area
- Curfew observed
- Evacuation area revised to 24-ft flood inundation area
- National Guard assisted with checkpoints and security of area
Above Ground Barriers:
HESCO Walls & Berms
Height, location based on projected river levels.
Nine miles worth of HESCOS
Redundancies built into temporary system.
1.2 miles of earthen berms reinforced with clay
Contractor crews partnered on construction and maintenance of system.
Above Ground Barrier: A Difficult Decision
Wall required solid foundation and elevation
Underground & Pumping
Approximately 300 manhole cones fortified
• Plugged 4 storm sewer pipes with concrete
• Plugged 6 storm sewer manholes with sandbags
• Plugged 1 storm sewer manhole with clay
• Plugged about 60 pipes with air inflated mechanical plugs
Private Citizenry Response
Communications: Daily Press Conferences
Today's complete flood update: bit.ly/2dtBmHY

City of Cedar Rapids Iowa Government
@CityofCRIowa

Flood Information
Volunteer | Request Assistance

Jump to: Evacuation | Sandbag Disposal | Flood Debris Disposal | Re-Entry of Home or Business | Road Closures | Information for Businesses | Daily Updates

Evacuation Plan

Mayoral Proclamation Dissolving Evacuation and Curfew

The evacuation area was lifted at Noon on Friday, September 30 for businesses and residents to access their property for flood-recovery efforts. On Saturday, October 1 the entire area was opened to the public. Please travel safely and continue to be aware of work taking place near the river as crews work to remove flood debris and protection measures.

Evacuation Plan Map (Revised 9-28-16)
System monitored 24/7
Successful Fight – Minimal Impact
Decommissioning the system
Decommissioning the system
Community Pride
PW Director Jen Winter with Cedar Rapids RoughRiders

Thank You CR!

Event pays tribute to Cedar Rapids flood protectors

Jason Kline @CRKennedyHigh 4h
@kj pilcher @CityofCRiowa vs. The Flood
2008 vs. 2016
Lessons Learned

• Set up alerts for pending high water (e.g. USGS text alerts)
• Regular communication with media/public
  – Daily Press Conferences
  – Webpage depository
• Be Ready – drills, preparation, communication
  – Set up systems ahead of time
  – Think about your underground
• Ask for help – contractors and consultants
  – Emergency procurement
• Encourage staff to get rest/sleep
  – Marathon, not a sprint.
• It’s not over ‘til its over
  – 24/7 monitoring during the peak
• Business impact sans-flood: business interruption, lack of flood insurance, etc.
Looking Ahead
Flood Control System

The Flood Control System Master Plan was adopted by City Council on June 23, 2015, providing direction for the implementation and construction of the permanent Flood Control System.
Entire System

LEGEND
Levee  
Removable wall  
Permanent wall
Fast Facts

- Designed to convey the same water volume as the flood of 2008
- Approximately 7 miles long
- Protects both sides of the river
- Combination of permanent floodwalls, removable walls, levees and gates (approximately 20 percent removable walls)
- Incorporates aesthetic elements that reflect culture and history
- Includes pump stations and detention basins to protect against rainwater flooding as pipes close to protect against river.
<table>
<thead>
<tr>
<th>Sequence Plan</th>
<th>Anticipated Timeline</th>
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<tbody>
<tr>
<td>NewBo/Sinclair from 8th Avenue Bridge to new Alliant Substation</td>
<td>0 – 5 years out</td>
</tr>
<tr>
<td>Czech Village from 12th Avenue Bridge to former landfill site</td>
<td>0 – 5 years out</td>
</tr>
<tr>
<td>8th Avenue Bridge Replacement / Elevation</td>
<td>0 – 5 years out</td>
</tr>
<tr>
<td>North Industrial from north tie-in point to Interstate 380 (I-380)</td>
<td>5 – 10 years out</td>
</tr>
<tr>
<td>Kingston Village – from I-380 to 8th Avenue Bridge</td>
<td>5 – 10 years out</td>
</tr>
<tr>
<td>Downtown – from I-380 to 8th Avenue Bridge</td>
<td>10 + years out</td>
</tr>
<tr>
<td>Time Check – from Ellis Lane (north tie-in point) to I-380</td>
<td>10 + years out</td>
</tr>
<tr>
<td>Cargill South – from Alliant Substation to south tie-in point</td>
<td>15 + years out</td>
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<tr>
<td>Ingredion – from 8th Avenue Bridge to 12th Avenue Bridge</td>
<td>15 + years out</td>
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Funding

With inflation, estimate is approximately $700 Million (over 20 years)

- 2/3 construction
- 1/3 design, permitting, and other pre-construction services

Combination of Federal, State, and City dollars

- $11.5M Federal CDBG Disaster Recovery Grant
- $73M Federal Army Corps funding (approved, but not yet appropriated)
- $110M City Match
- $267M State Sales Tax Fund
2017 - 2018 Construction
Dirt Moving

- Two flood pump stations (NewBo and Sinclair)
- 2,500 linear feet of levee (NewBo and Sinclair)
- Sanitary sewer, storm sewer and water main relocations in advance of levee work
- Storm sewer gates at CRST and Tree of Five Seasons
- Time Check / NW Memorial Plaza and Gates
Additional Priorities

- Conceptual pump station design in Kingston and Czech Village
- Flood control alignment alternative study upstream of Quaker Oats, including Cedar Lake
- Completion of Quaker Oats flood and Union Pacific RR wall and gate design
- Design commencement of 8th Avenue bridge replacement
Future Projects:
8th Avenue Bridge
Benefits of Replacing/Elevating Bridge

- Preserve connection to both sides of the river during flood emergency
- Preserve access to hospitals, police department, and interstate
- Life expectancy of bridge coincides with FCS timeline
- Save money by eliminating flood gate at 8th Avenue
- Dual use: flood protection + new bridge
- Development opportunities
Aesthetics – Community Input

Most preferred to least preferred: 1,221 total votes

1. Short tower with cables
   - 437 1st place votes
   - 3,208 points

2. Arch above travelway
   - 285 1st place votes
   - 2,721 points

3. Arch below travelway
   - 242 1st place votes
   - 1,796 points

4. Steel arch
   - 139 1st place votes
   - 1,629 points

5. Concrete
   - 106 1st place votes
   - 1,238 points

Point Methodology:
Five points given for a 1st place vote, three points for 2nd place, one point for 3rd place
Continuous Improvements

Technology Enhancements | Gate Considerations | Revised Alignment
Value Engineering | Aesthetic Improvements

https://www.youtube.com/watch?v=6J_VO6gKBXc
Questions?

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