Cedar Rapids Wastewater Treatment Plant Renovations and Upgrades After the Flood of 2008

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NAFSMA Flood Risk Resiliency Workshop
San Antonio, Texas
City of Cedar Rapids Water Pollution Control Facility and Sanitary Sewer History

1885
City hires Charles P. Allen, a civil engineer from Chicago, to draw up plans for a sewerage and drainage system as well as grading for the city streets. These plans are accepted a year later.

1887
Pleasant Street sewer is installed in Cedar Rapids.

1888-1895
A number of sanitary sewer lines and sewer lines and new storm sewers are constructed during this period. Early sewers are made of wood or pipes.

1907-1912
A new additional sewer system is built in Cedar Rapids, costing $7,565. The total system now consists of 75.1 miles and is valued at $300,000. Most construction is prompted by residential and commercial development.

1929
A study of the sanitary sewer system recommends that a main interceptor and five sub-main sanitary sewer lines be constructed immediately. It also recommends that a pumping station and sewage treatment plant be built to treat sewage before it is dumped into the river.

1933
City Council approves the issuance of bonds to construct the first sewage treatment plant in an area known as Shumway. The City also applies for Public Works Administration (PWA) funds to aid in the construction of the treatment plant.

1934
First sewage treatment plant completed. Cedar Rapids is the first Iowa city to undertake sewage treatment on an all-mechanized basis and prevent pollution with machinery. The City also becomes the first of its size to recognize and accept both domestic and industrial waste problems at the outset of a state-wide stream pollution abatement program.

1952
City Council reveals plan for a $2.7 million expansion to the sewage disposal plant to double the plant's capacity to 16 million gallons and to better treat sewage that is put into the river.

1969
Construction is completed on concrete dams to cover the digester and contain odors at sewage disposal plant.

1980
Construction is completed on new Water Pollution Central Facility on eastern end. Grants through the U.S. Environmental Protection Agency as authorized by the 1972 Clean Water Act pay 60% of the plant construction costs.

1985
During demolition of old sewage treatment plant, one of the sludge ponds catches fire. More than 15,000 fish are evacuated from their homes. The day is labeled Fish Tragedy.

1998
Construction is completed on concrete dams to cover the digester and contain odors at sewage disposal plant.

2000
Aerobic pretreatment facility that also provides began for use in the incinerator and before is constructed.

2008
Cedar Rapids Water Pollution Central Facility floods, causing approximately $80 million in damages and forcing the facility to be offline for 12 days.

2014
The last of flood mitigation and recovery projects are completed at the Water Pollution Control facility. Approximately $25 million was invested to protect the facility from future flooding.

2015
The City currently owns and maintains more than 600 miles of sanitary sewers and another 500 miles of storm sewer. The Water Treatment Facility on Southeast Road treats 40-50 million gallons of wastewater per day during normal city weather conditions.
Cedar Rapids Water Pollution Control Facility

The Cedar Rapids Water Pollution Control Facility (CRWPCF) is one of the few advanced wastewater treatment facilities in the State of Iowa. Most treatment facilities provide two levels of treatment, but treatment operations at CRWPCF typically provide three treatment levels, plus final disinfection and dechlorination.

Average Dry Weather Treatment
40-50 MILLION GALLONS PER DAY

Maximum Treatment Capacity
125 MILLION GALLONS PER DAY

Cedar Rapids POPULATION 128,000

BY THE NUMBERS

BOD LOADING - Equal to those of city with a population of 1.5-1.8 MILLION

9 Major INDUSTRIAL Customers

Número de EMPLOYEES 86

ORIGINAL 1980 Cost of the Facility $80 MILLION

Estimated REPLACEMENT COST $250 MILLION
Flood Impact

People Impacted

- 18,623 people in impacted area
- 10,000 displaced
- 7,749 parcels flooded
- 5,900 residential
Facilities Impacted

• 310 City facilities flooded

• Major City buildings damaged and displaced
  • City Hall
  • Central Fire Station
  • Animal Control
  • Public Works

• City Bus Terminal
• Main Public Library
• Police Station
Flood Impact

10 Square Miles of Downtown Cedar Rapids Flooded
Industrial Impact
Industrial Impact
Prior flood of record(s) – 20 feet
1851 and 1929

2008 flood – 31.12 feet
WPC Impact Timeline

June 12 – Plant flooded
June 24 – Main Lift Started
July 17 – Primary treatment (solids hauled to landfill)
July 18 – Secondary treatment (roughing filter)
August 25
Advanced Treatment (CAS)
Alkaline Stabilization (Bio-solids land applied)
September 15 – Disinfection
December 6 – Advanced Treatment (NAS)
March 31 – Incinerator
2010 to 2014 – Permanent Repairs
## WPC
### FEMA Funded Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency recovery</td>
<td>$2.2 million</td>
</tr>
<tr>
<td>Package 1</td>
<td>$3.2 million</td>
</tr>
<tr>
<td>Package 2</td>
<td>$2.4 million</td>
</tr>
<tr>
<td>Package 3</td>
<td>$7.8 million</td>
</tr>
<tr>
<td>Incinerator/LPO process</td>
<td>$8.5 million</td>
</tr>
<tr>
<td>Return sewer pump station</td>
<td>$1.8 million</td>
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<tr>
<td>Flood water pump station</td>
<td>$10 million</td>
</tr>
<tr>
<td>Flood protection wall/berm</td>
<td>$5.8 million</td>
</tr>
</tbody>
</table>

**Approximate total**: $41.7 million
Flood Recovery Projects

Flood Recovery Costs $47,210,000

- Flood Wall Phase 1: $10,121,000
- Flood Wall Phase 2: $5,820,000
- Incinerator: $8,554,000
- Package 1, 2 & 3: $13,109,000
- Return Sewer Pump Station: $1,806,000

Emergency Repairs: $2,545,000
Sludge Hauling: $2,710,000
Engineering: $2,595,000

www.Cedar-Rapids.org
**WPC Impact**

**Section 404**

**HMPG Flood Wall Project**

(Stafford Act)

- Cost @ $20 million
- Grant Funding
  - 75% FEMA
  - 10% Iowa HSEMD
  - 15% City of Cedar Rapids CIP Budget
- Protection Provided
  - Estimated plant damage $75 million
  - Estimated $1 billion to replace facility
  - 3 feet higher than 2008 flood level
Total Estimated Budget - $20,918,152
2008 Flood Estimated Plant Damage - $75,000,000
2008 Flood Elevation of 720Ft (10Ft above 100-year level)

Project Description:
1,200 LF Flood Wall (723Ft Elevation)
3,800 LF Earthen Berm (723Ft Elevation)
Install Plant Effluent Pump Station
Re-Route Diversion Sewer
Internal Storm Sewer Modifications
Section 406 HMP Process

- Two HMP projects Originally included in Project Worksheet Version in 2010
- Received 101 pages of Programmatic Issues/Required Documentation from FEMA 4/2011
- Both HMP projects de-obligated from PW
- Successfully appealed a partial approval for the Plant Return Pump Station portion in 8/2012
- Started construction 6/2013
- Completed in 2015 and tested in 2016
Plant Return Project HMP

- Broken into 3 contracts
- Total cost of $1.086 Million
- Plant Relevance
  - High Water Events in 2013 and 2014
  - Maintenance staff at plant 24/7 for weeks during each event to maintain inflatable bladder and pumps
  - Tested under normal plant flow but not high flows
Dealing with FEMA

- Originally obligated @ $92 M for repairs and incinerator, not including flood wall project
- Ultimately de-obligated majority of funds for incinerator and other projects
- 101 pages of programmatic questions and clarification requirements
- De-obligation came after contracts already in progress for short term repairs
Dealing with FEMA (con’t)

• Multiple appeals with no timeline on FEMA
• Hind sight is always 20/20
• Told to throw everything in to PW’s
• Document, Document, Document
• Just when you think you have it figured out, new players get involved
• Constant revolving door of players
• Rules seemed to change, case law of Stafford Act
Dealing with FEMA (con’t)

• Rules seemed to change, case law of Stafford Act
• Consultant or No Consultant???
• We had a plant to run and customers to take care of – blurred the lines of who pays for what
• A lot of raw emotions by the end of the process
• Lack of trust from our customers
Department of Homeland Security
Office of Inspector General

FEMA Should Recover $13.8 Million in FEMA Public Assistance Funds Awarded to Cedar Rapids, Iowa, for Ineligible Hydroelectric Plant
Success After Disaster

- WEFTEC Papers on Flood Wall and Incinerator Repairs, which have been published in various trade journals
- EPA Flood Resilience Training for Water and Wastewater Utilities – 2016
- EPA Extreme Events and Climate Adaptation Planning Workshop – 2015
- Several ACEC Awards
- Flood wall and pump station tested in 9/2016