ComEd Flood Mitigation - Technology for Response

IAFSM Conference
March 2017
ComEd Flood Mitigation Program

Presented by Eric Jensen
FLOOD MITIGATION PROGRAM

✓ Substation Flood Improvement Projects

- TDC 555 Glen Ellyn (constructed)
- TDC 557 Butterfield (constructed)
- TSS 69 North Chicago (constructed)
- TSS 192 Ridgeland (constructed)
- TSS 46 Des Plaines (engineering)
- TSS 153 Taylor Street (pending)

✓ V3FR System:

- TSS 46 Des Plaines (constructed)
FLOOD MITIGATION PROGRAM

Typical Lift Station showing valving, pumps and discharge piping.
FLOOD MITIGATION PROGRAM

✓ Innovative Design
✓ Personnel access and completed liner
FLOOD MITIGATION PROGRAM

✓ Stanley Cup Storm
   June 2015
FLOOD MITIGATION PROGRAM

30 Priority Stations (out of 810 total)
FLOOD MITIGATION PROGRAM

✓ Severe Risk Stations

- TDC 414 Roberts Road (done)
- TSS 46 Des Plaines (ongoing)
- TSS 64 Bellwood
- TSS 73 Chicago Heights
- TDC 206 Rolling Meadows
- TDC 253 Schaumburg
- TDC 566 Oak Brook
FLOOD MITIGATION PROGRAM
# FLOOD MITIGATION PROGRAM

## ESTIMATED STATION FLOOD PROOFING COSTS

### SEVERE FLOOD RISK STATIONS

<table>
<thead>
<tr>
<th>Site</th>
<th>Approximate Wall Height</th>
<th>Approximate Wall Length (ft)</th>
<th>Approximate Station Area (Ac)</th>
<th>Total Estimated Flood Proofing Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS 64 – Bellwood</td>
<td>8-9 feet</td>
<td>2700</td>
<td>8.5</td>
<td>$4M - $6M</td>
</tr>
<tr>
<td>TSS 73 – Chicago Heights</td>
<td>3-4 feet</td>
<td>1600</td>
<td>3.9</td>
<td>$1M - $2M</td>
</tr>
<tr>
<td>TDC 206 – Rolling Meadows</td>
<td>6-7 feet</td>
<td>1400</td>
<td>1.1</td>
<td>$2M - $3M</td>
</tr>
<tr>
<td>TDC 253 – Schaumburg</td>
<td>5-6 feet</td>
<td>1000</td>
<td>1.7</td>
<td>$2M - $3M</td>
</tr>
<tr>
<td>TDC 566 – Oak Brook</td>
<td>6-7 feet</td>
<td>1000</td>
<td>1.1</td>
<td>$2M - $3M</td>
</tr>
</tbody>
</table>
ComEd is implementing a Flood Risk Mitigation Program to recommend next steps toward achieving flood resiliency for all 30 of the stations identified as Severe, Very High and High Risk to flooding. Tasks such as feasibility, station recommendations, prioritization, and design and construction will be performed as part of this Flood Mitigation Program.

- Mitigate Flood Damages
- Cost Effective Solutions
- Technology for Forecasting
- Efficient Emergency Response
- Planned Expenditures
V3 Flood Forecasting For Resiliency (V3FR)

Presented by:
Greg Wolterstorff, P.E.
What is Flood Resiliency?

The ability to respond proactively and with prioritization to protect vulnerable properties and assets during a flood event, and the capacity to recover quickly from disruptive flood waters.
V3FR INTRODUCTION

**V3FR System:**
- *Continuously calculates* the likely peak flood elevation
- *Determines Risk Levels* at each location
- *Forecasts timing* of peak flood
- Assists with *prioritization of resource deployment*
- *Communicates advance warning* of future flood risk event
STORM EVENT

STORM EVENT

DATA COLLECTION

FORECAST

ALERTS

ACTION

Incident Forecasting

Areal Average QPF (inches)

- < 0.10
- 0.11 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- 0.76 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 3.00
- 3.01 - 4.00
- 4.01 - 6.00
- 6.01 - 9.00
- > 9.00

North Central River Forecast Center

Department of Commerce, NOAA, National Weather Service, Chanhassen, MN

Created: 1141z, 09/19/2013
DATA COLLECTION
DATA COLLECTION

❖ NOAA Weather Data
  - Publicly available data
  - Rainfall data is provided up to 48 hours in advance of storm, and updated every 15 minutes.

❖ Real Time Weather Data
DATA COLLECTION

**USGS Stream Gauge Data**

- Data is provided at specific monitoring stations.
- V3 utilizes this watershed gauge data for calibration, correlation and calculation of potential flood due to actual storm events.

**V3FR Real Time Data**

- V3FR Monitor senses *rainfall amounts and water level changes* at the site.
FORECAST

STORM EVENT

START

DATA COLLECTION

FORECAST

ALERTS

ACTIVATE PROTOCOL

ACTION
FORECAST

- Predictive information and real-time data is fed through V3’s proprietary model.
- Watershed characteristics, historic information and hydraulic system all determine forecasted outcome.
- A range of potential flood elevations is developed.
TSS46 DES PLAINES

**CURRENT STATUS**
- Telemetry: current
- Stage: Below Alert Stages
- Forecast Peak: Storm Sewer Fill
- Current Water Elevation: 624.58'
- Stage Below Bank: 8.30'
- 24-Hour Precipitation: 0.84''

**SITE INFORMATION**
- ID: TSS46
- Latitude: 42.0507
- Longitude: -87.898
- Sensor Elevation: 623.70'
- Bank Elevation: 632.00'

**TELEMETRY**
- Water elevation (ft)
- Precip (in)
- Forecast peak
- Historical data
ALERTS

STORM EVENT

START

DATA COLLECTION

FORECAST

ACTION

ALERTS

ACTIVATE PROTOCOL
Flood Alerts

- Predictive and real-time alerts are created.
- Criteria is customized for each V3FR location.
- Alerts are evaluated regularly.
FLOOD ALERTS

- Alerts are sent by SMS, email and phone.
- Key operational staff are notified up to 48 hours in advance of the storm event.
- Updates provide *storm tracking and shifts in intensity* and duration.
- Dashboard access allows *full digest of V3FR locations*
ACTION

- **Activate Client Specific Protocol**
  - Timing and approximate water elevation of flood is forecasted.
  - **Prioritize response** based on severity at each location.
  - For flood protected sites: **Install flood gates, inflate bladders, etc.**
  - For non-flood protected sites: Deliver sand and bags, **construct temporary mitigation measures.**
  - 48 hour **advance notice!**

www.floodstopbarrier.com/blog.html
WHO BENEFITS FROM V3FR?

- **Vulnerable Assets or First Responders**
  - Vulnerable assets at risk to flood loss, such as stations, buildings, quarries, etc.
  - Municipality, agency, utility or business that has flood response deployment responsibility.
  - Mitigate or prevent damages.
  - Minimize emergency costs.
  - Improve resiliency.
Climate & Watershed Change

- V3FR is continuously learning.
- V3FR forecasting evolves with the change in climate and adjusts to the intensity of recent storm events and the outcome of those discharges from the watershed.
- Climate model costs not necessary.
- Watershed changes incorporated.
ADDITIONAL USES OF V3FR:
Integrated Stormwater Management

- **Proactively** integrate existing stormwater assets
- **Active control** of pumps or valves during storm event
- Decreased damages to problem areas at a *fraction of the cost*
ADDITIONAL USES OF V3FR:
Enhanced Water Quality

- Reduce sediment and nutrients during first flush
- Achieve up to 100% of retention volumes
- Pollutants drop out
- Healthy receiving waters
- Pollutant reduction can be tracked with monitoring

Nutrient Loading – Gulf of Mexico Hypoxia
Questions