ENSURING THE RESILIENCY OF THE ELECTRICAL GRID

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Agenda

Grid Resilience

Flood Risk Assessment and Prioritization

TSS 69 Floodwall Phase 1 Mitigation

Phase II Floodwall Design

Testing the Floodwall

The Keys to Success

Ensuring the Resiliency of the Electrical Grid
Severe Weather is the #1 Cause of Widespread Power Outages

Annual Cost to US Economy for Weather-Related Outages: $18 - $33 billion*

*August 2013, Economic Benefits Of Increasing Electric Grid Resilience To Weather Outages, Executive Office of the President (Report Prepared by President’s Council of Economic Advisers and the U.S. Department of Energy’s Office of Electricity Delivery and Energy Reliability, with assistance from the White House Office of Science and Technology)
Grid Resilience

**June 2011**
A Policy Framework for the 21st Century Grid

**Federal Initiative**
Directed billions of dollars towards:
- Clean energy & renewables
- Increasing reliability and efficiency
- Enabling technological innovation

**October 2011**
Illinois Energy Infrastructure Modernization Act

**State Initiative**
- $2.6 billion investment via a ratepayer increase
- Strengthen and modernize the state’s grid
- Increase reliability
- Smart Grid Upgrades
Substation Flood Risk Assessment & Prioritization

- **810** facilities assessed
- **46** classified as Flood Risk
- **5** selected for Phase 1 Mitigation Studies
Flood Hazard Analysis

- **High** = Floodway
- **Moderate-to-High** = 1% annual chance floodplain
- **Moderate** = 0.2% annual chance floodplain
- **Low** = Unshaded Zone X

Consequences

- Facility Type (CC, TSS, TDC, STA, RP, DC, SS, Terminal)
- Substation Security Tier
- Critical Station Designation
- Customers Served per Facility
- Critical Customers Served
- Key Equipment Impacted

Flood Risk Classification

- **Severe**
- **Very High**
- **High**
- **Moderate-to-High**
- **Moderate**
- **Low**
TSS 69 North Chicago Substation
Selected for Phase 1 Mitigation
Flood Event at TSS 69
TSS 69
Flood Mitigation Design
## HEC-RAS Modeling

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Table 6.3: River Station Model Comparisons

TSS 69 Flood Mitigation Design
FLOODWAY PERMITTING
3708 Rules for NE IL

TSS 69
Flood
Mitigation
Design
To be eligible for a permit, the construction activity must

1. **Be an Appropriate Use of the Floodway**
2. Demonstrate that the appropriate use will not reduce floodway conveyance or storage
3. Will not increase velocities and flood heights

**Challenge:** None of the Appropriate Uses really fit this project other than #1. Could this project be defined as a Public Flood Control Project?

1. **Flood control structures**, dikes, dams and other public works or private improvements relating to the control of drainage, flooding or erosion (Section 18g of the Act) or water quality or habitat for fish and wildlife

"A flood control project which will be operated and maintained by a public agency to reduce flood damages to existing buildings and structures which includes a hydrologic and hydraulic study of the existing and proposed conditions of the watershed. Nothing in this definition or this Part shall preclude the design, engineering, construction or financing, in whole or in part, of a flood control project under this Part by persons or parties who are not public agencies."

A letter from IDNR-OWR dated December, 2015 concurs that this project falls under the definition of a Public Flood Control Project.
TSS 69
Flood Mitigation Design

STRUCTURAL DESIGN

- Access
- Overhead Lines
- Security
- Pump Station
Floodwall Design
Access/Security
Lift Station Design
Agency Collaboration

North Chicago – How will the residents in the floodplain perceive the wall?

East Skokie Drainage District – Re-established the Skokie river channel

IDNR – Floodway permitting

Abbott Labs – Downstream channel with high point on their property

Lake County SMC – Jamei Flood Control Project

ComEd
Phase III Construction
Re-Establishment of the Skokie River Channel (ESDD - 2018)
Flood Gates
Floodwall and new Security Fence, June 2017
On July 12, 2017 approximately **3.25 inches** of rain fell within 24 hours
Discharge, cubic feet per second
Most recent instantaneous value: 37.2 02-27-2019 10:45 CST

USGS Gage Downstream of Substation
Gage height, feet
Most recent instantaneous value: 2.29 02-27-2019  10:45 CST

USGS 05535000 SKOKIE RIVER AT LAKE FOREST, IL

USGS Gage Downstream of Substation
Flood Gates Activated July 12, 2017
Access to the substation during floods
Inundation of the surrounding area
Skokie River looking downstream
Establish a Project Charter

Keep in Mind: Stakeholders have different priorities

Have Meetings early and often

Understand each other’s constraints

Communicate the BENEFIT

Perception is Someone’s Reality

Improve! The Site, the Stream, the Watershed, the Perception

Closeout the Project as Partners in Mitigation

The Keys to Success:
Q & A