Creating 180 acre-feet in a Fully Built Urban Environment to Address Urban Flooding:

MWRD's Melvina Ditch Reservoir Expansion

IAFSM ANNUAL CONFERENCE, MARCH 2020

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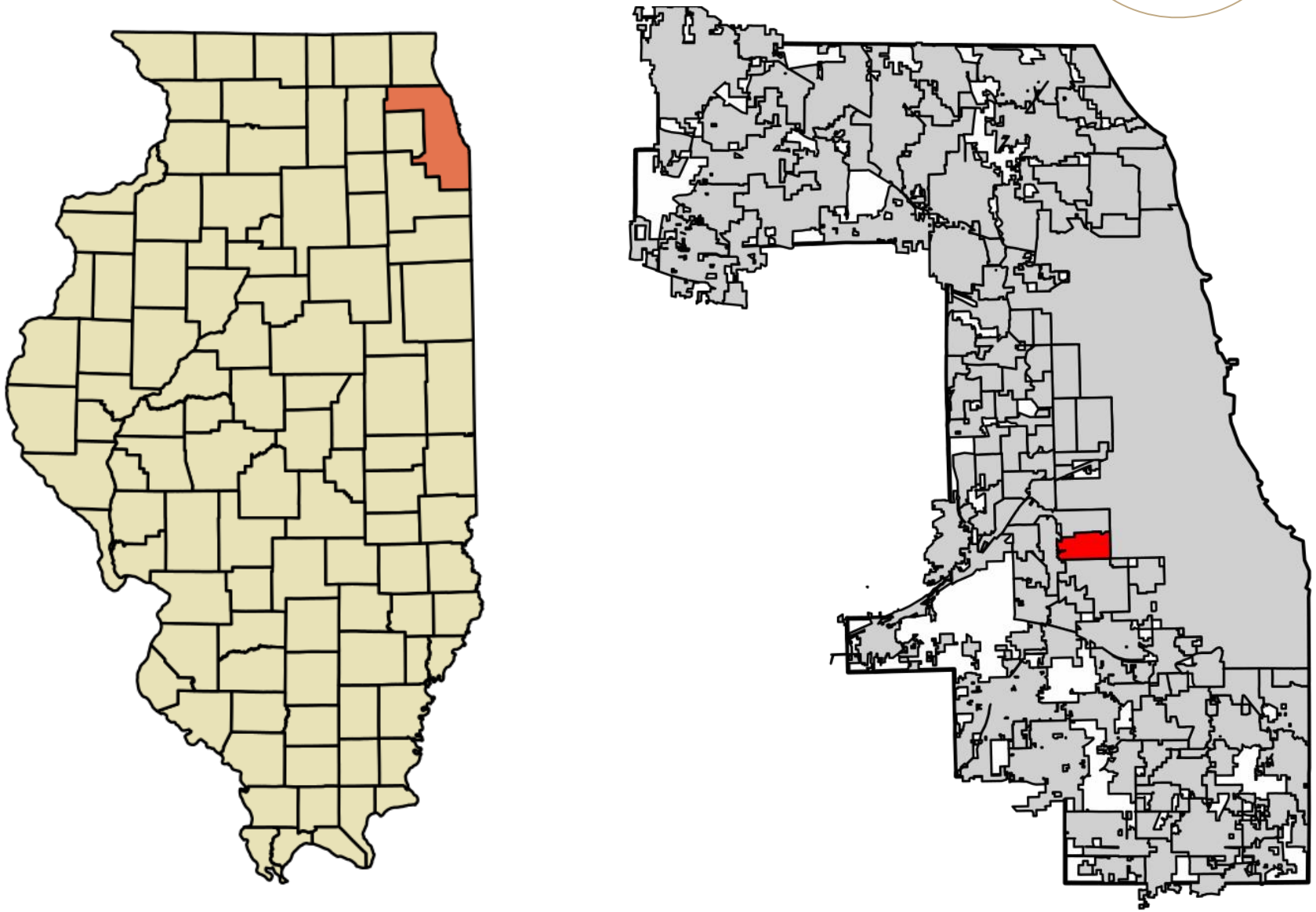
AGENDA

- Background
- Project Need
- Engineering Evaluation
  - Alternatives
  - Expected Results
- Engineering Design
  - Design Considerations
  - Cost and Construction Considerations
- Construction
- Application to Other Urban Flooding Problems

BACKGROUND: BURBANK



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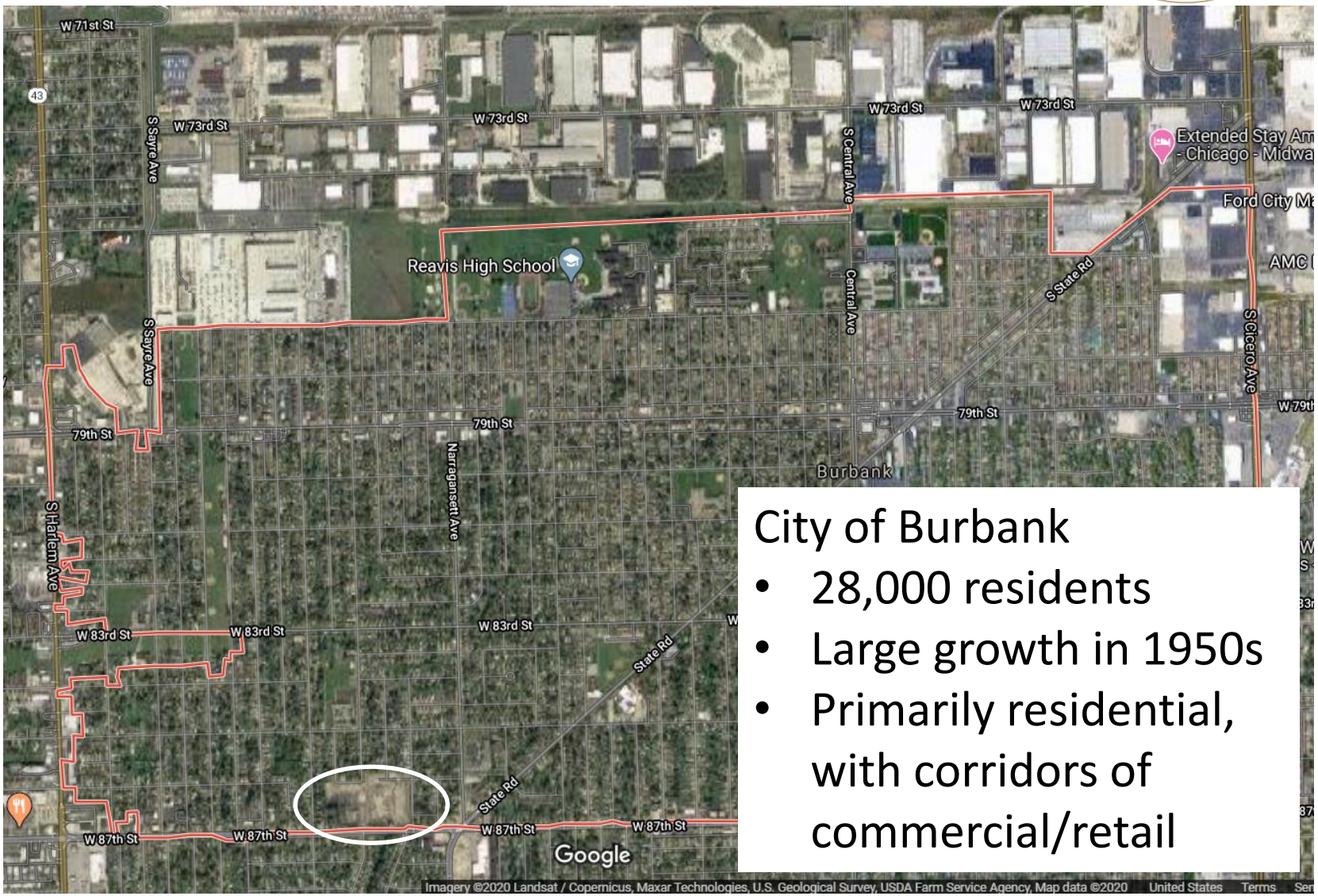
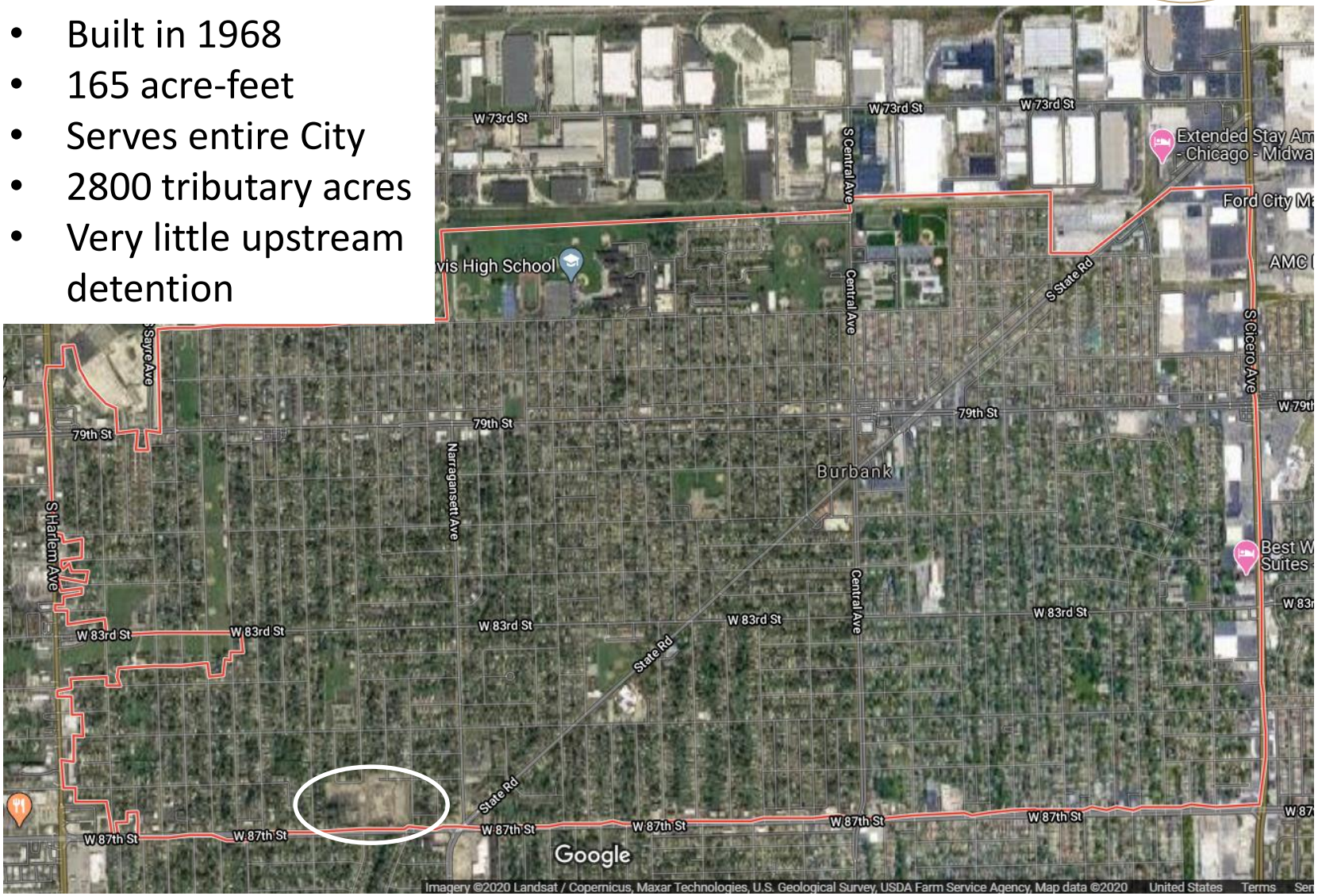


City of Burbank

- 28,000 residents
- Large growth in 1950s
- Primarily residential, with corridors of commercial/retail

BACKGROUND: RESERVOIR

- Built in 1968
- 165 acre-feet
- Serves entire City
- 2800 tributary acres
- Very little upstream detention



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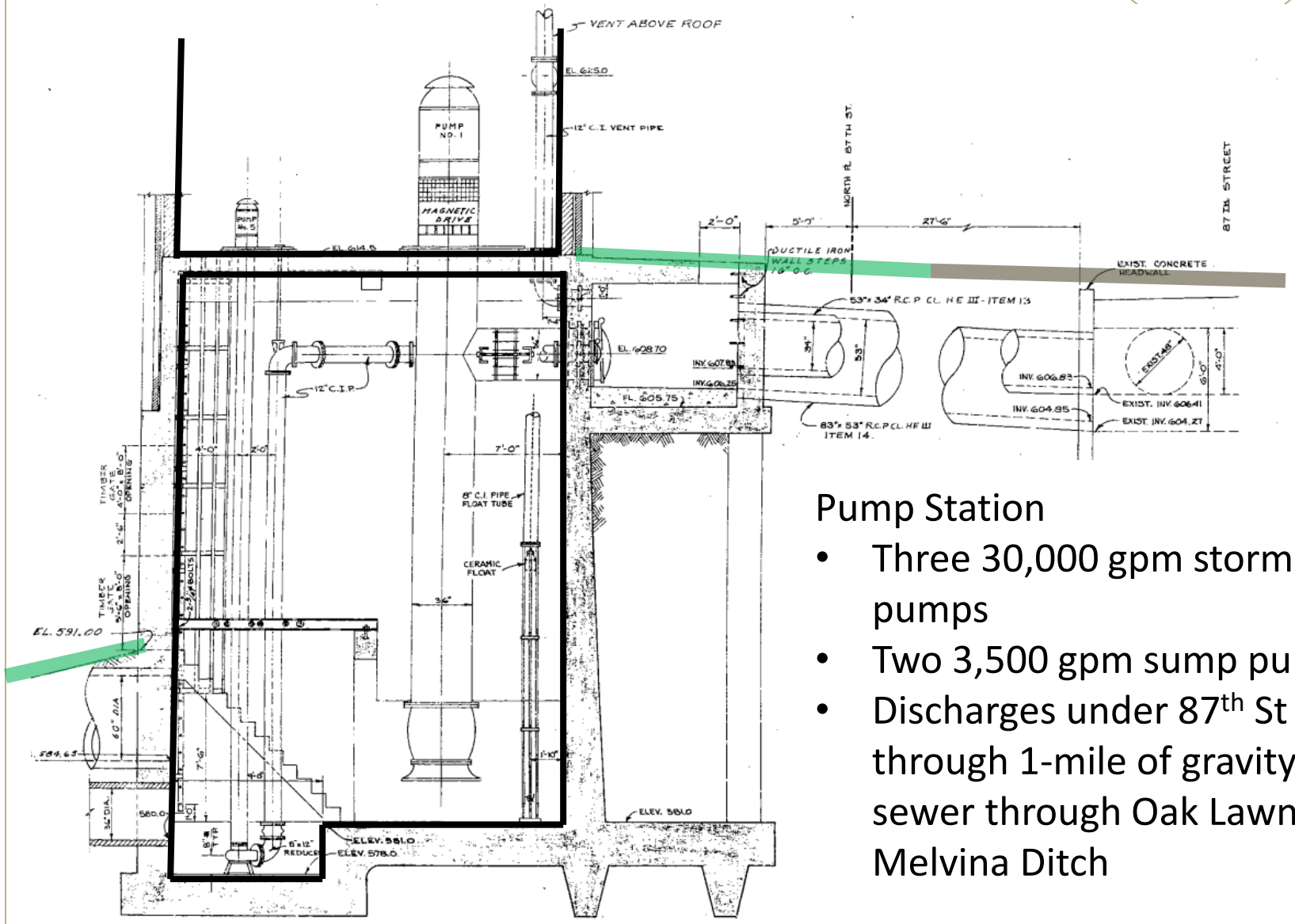
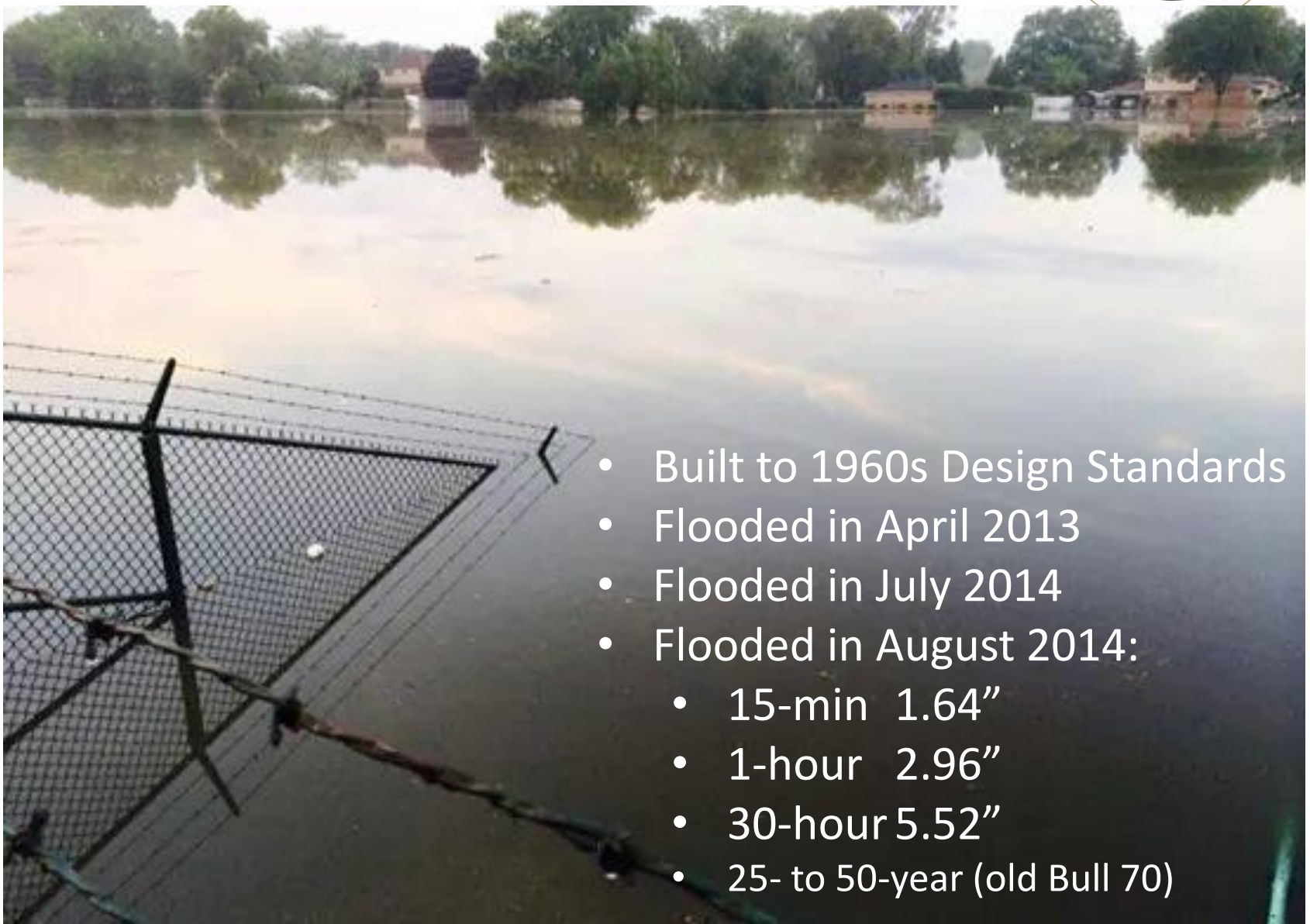


Pump Station

- Three 30,000 gpm storm pumps
- Two 3,500 gpm sump pumps
- Discharges under 87th St and through 1-mile of gravity sewer through Oak Lawn to Melvina Ditch

PROJECT NEED

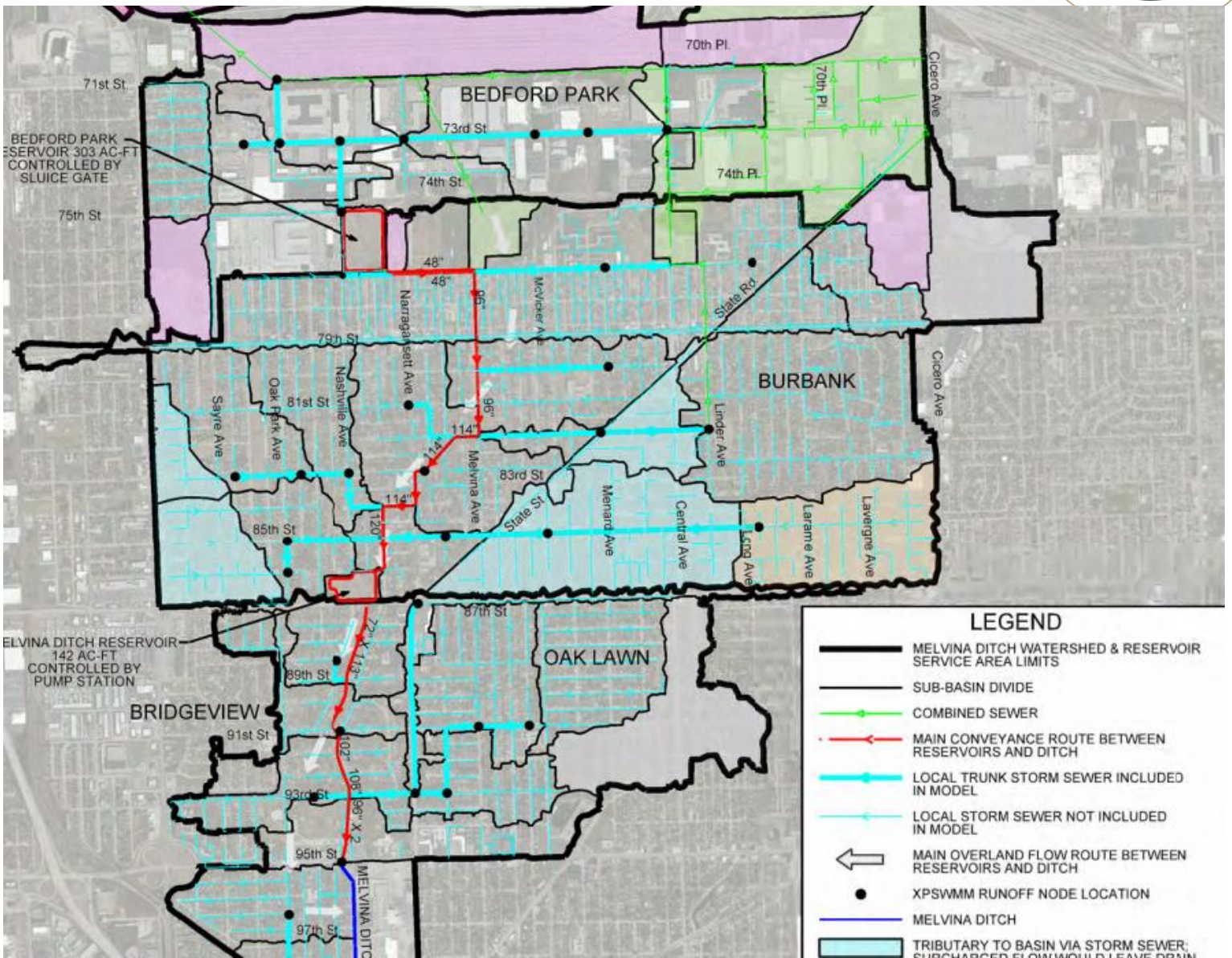


- Built to 1960s Design Standards
- Flooded in April 2013
- Flooded in July 2014
- Flooded in August 2014:
  - 15-min 1.64”
  - 1-hour 2.96”
  - 30-hour 5.52”
  - 25- to 50-year (old Bull 70)

PROJECT NEED

- Burbank reported over 3,000 properties impacted in August 2014 (includes street/yard flooding, includes flooding from local sewers)
- Explore alternatives to provide additional storage; prepare construction documents

ENGINEERING EVALUATION



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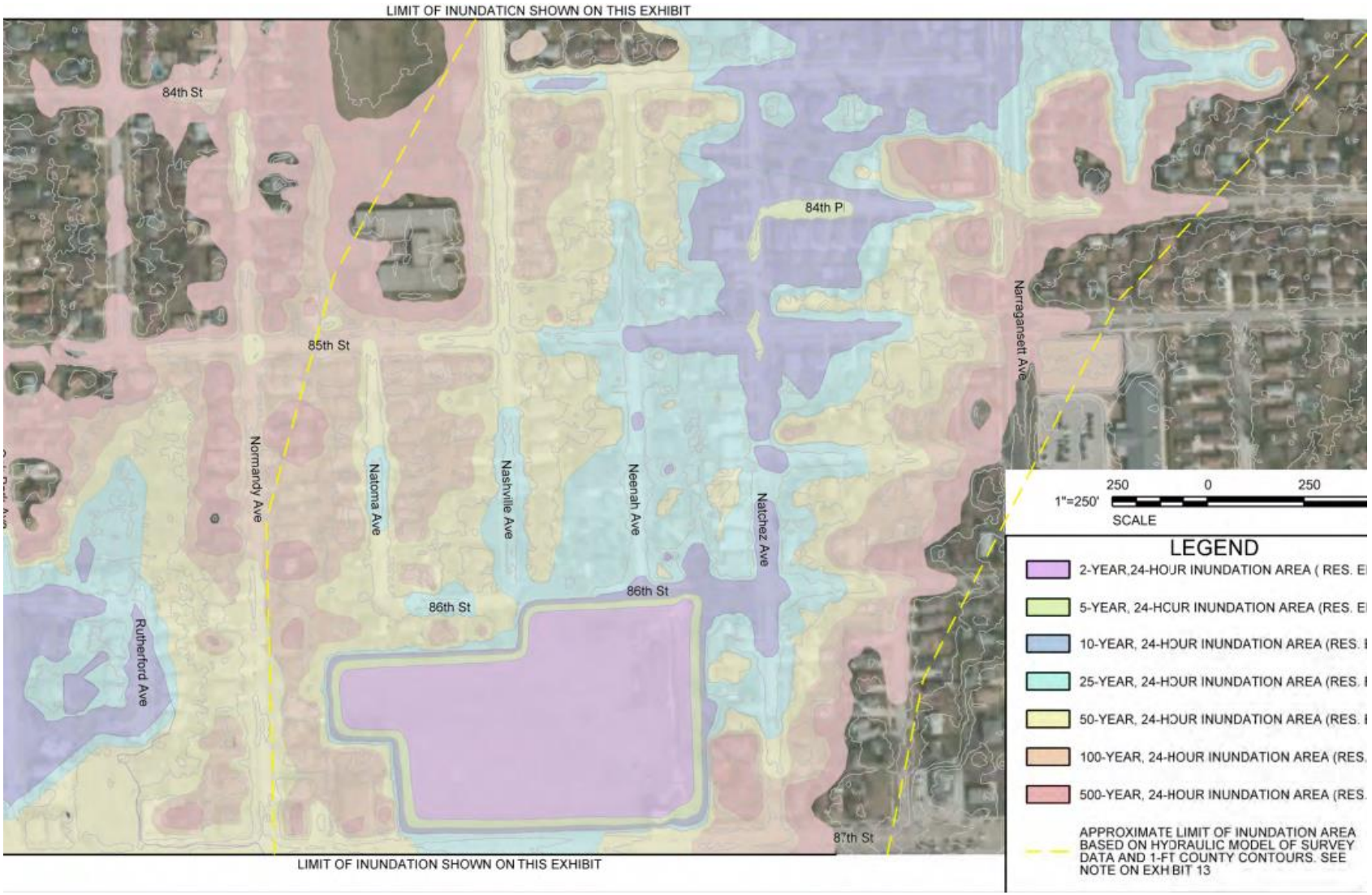
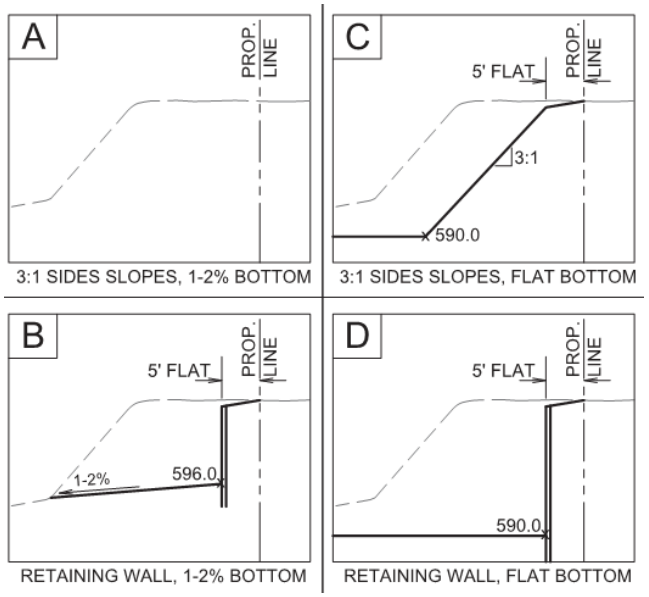
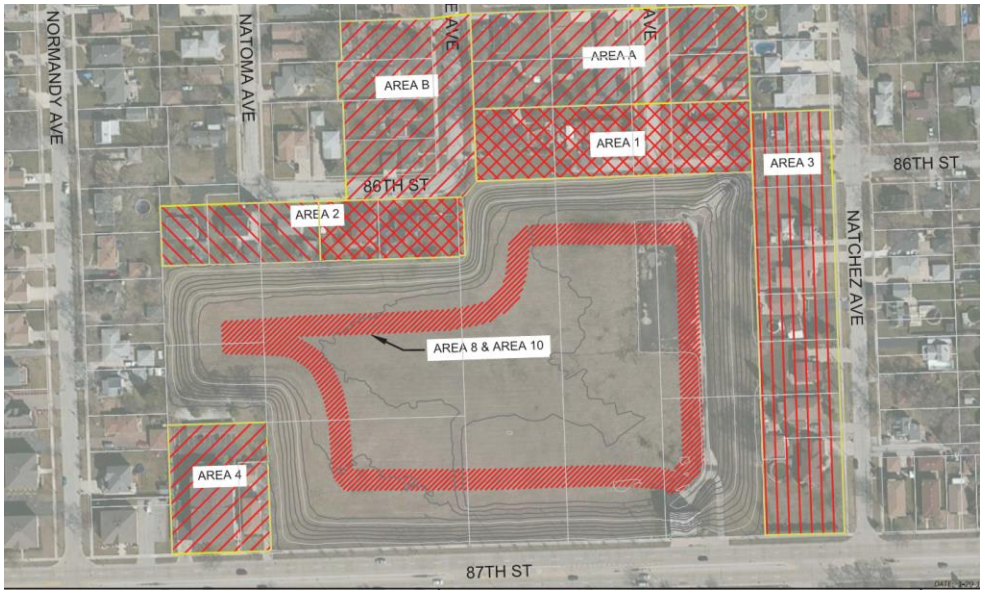


ENGINEERING EVALUATION

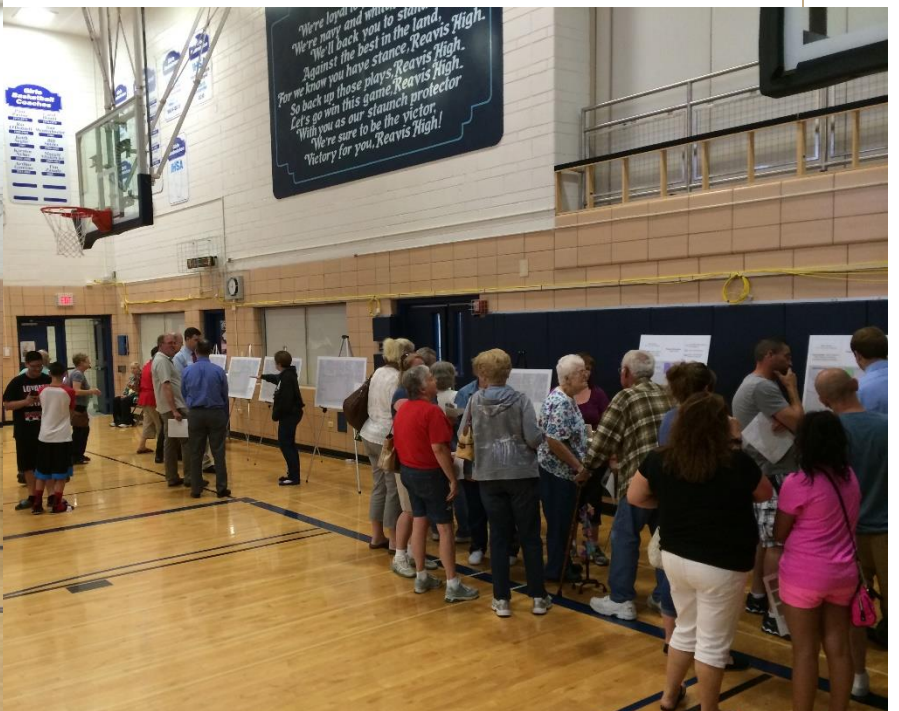
- Analysis of expansion alternatives at Melvina Ditch Reservoir
- Study considered various alternatives
  - Flatten bottom
  - Use deep retaining walls instead of sloped sides
  - Dig the reservoir deeper
  - Expand the reservoir footprint





ENGINEERING EVALUATION

- Presented alternatives at Public Open House
- Sought feedback from area residents



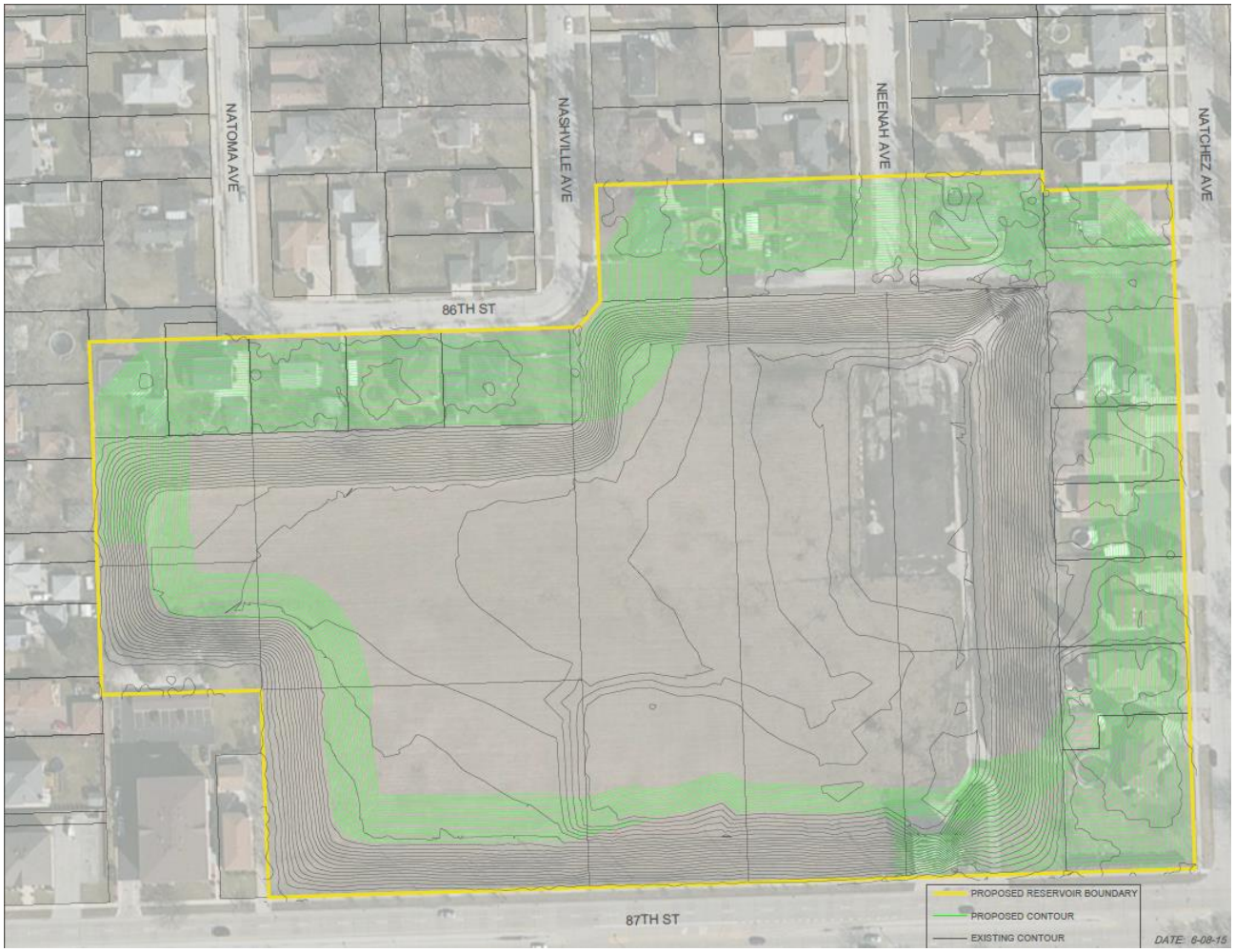
ENGINEERING EVALUATION

Selected Alternative "E"

Horizontal expansion:
Purchase 15 properties,
3:1 side slopes

Vertical expansion to bottom of pump station

New storage:
186 ac-ft
113% increase



ENGINEERING EVALUATION

Anticipated Benefits of Additional Storage:

August 2014 storm

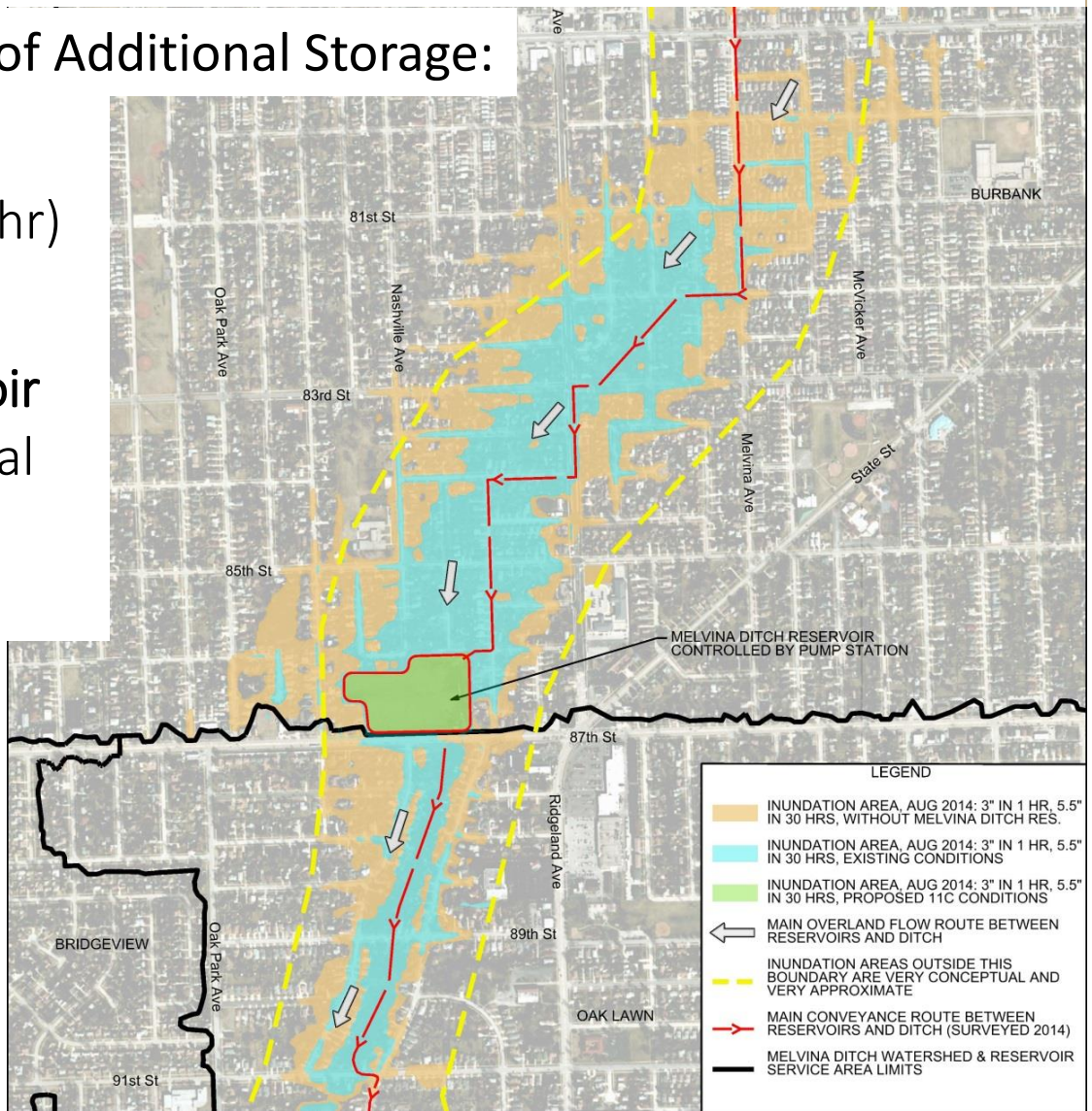
(3” in 1 hr, 5.5” in 30 hr)

Flooding from reservoir overtopping only (local sewer flooding not shown)

Without any reservoir

Existing reservoir

With Alt E



ENGINEERING EVALUATION

Anticipated Benefits of Additional Storage:

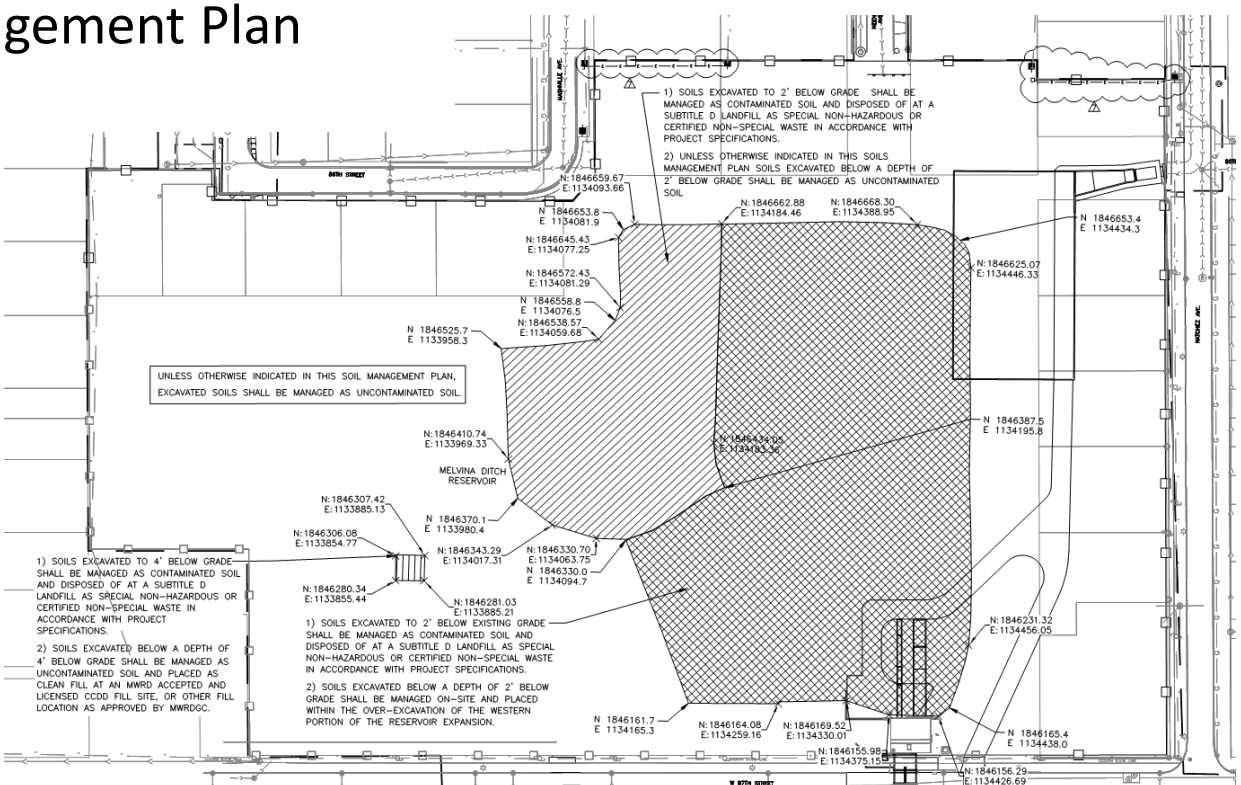
- Reduced Flooding
  - August 2014 storm: 512 properties benefit
  - Homes protected from structural damage:
    - Repeat of August 2014: 100% protected (26 homes)
    - 25-year storm: 100% protected (18 homes)
    - 50-year storm event: 85% protected (80 homes)
    - 100-year storm event: 52% protected (144 homes)

- Reduced or eliminate overflows across 87th Street to Oak Lawn

ENGINEERING DESIGN

Earthwork Considerations

- Haul-off of more than 315,000 cy
- Pre-certification from CCDD facilities to accept uncontaminated soil
- Soil Management Plan



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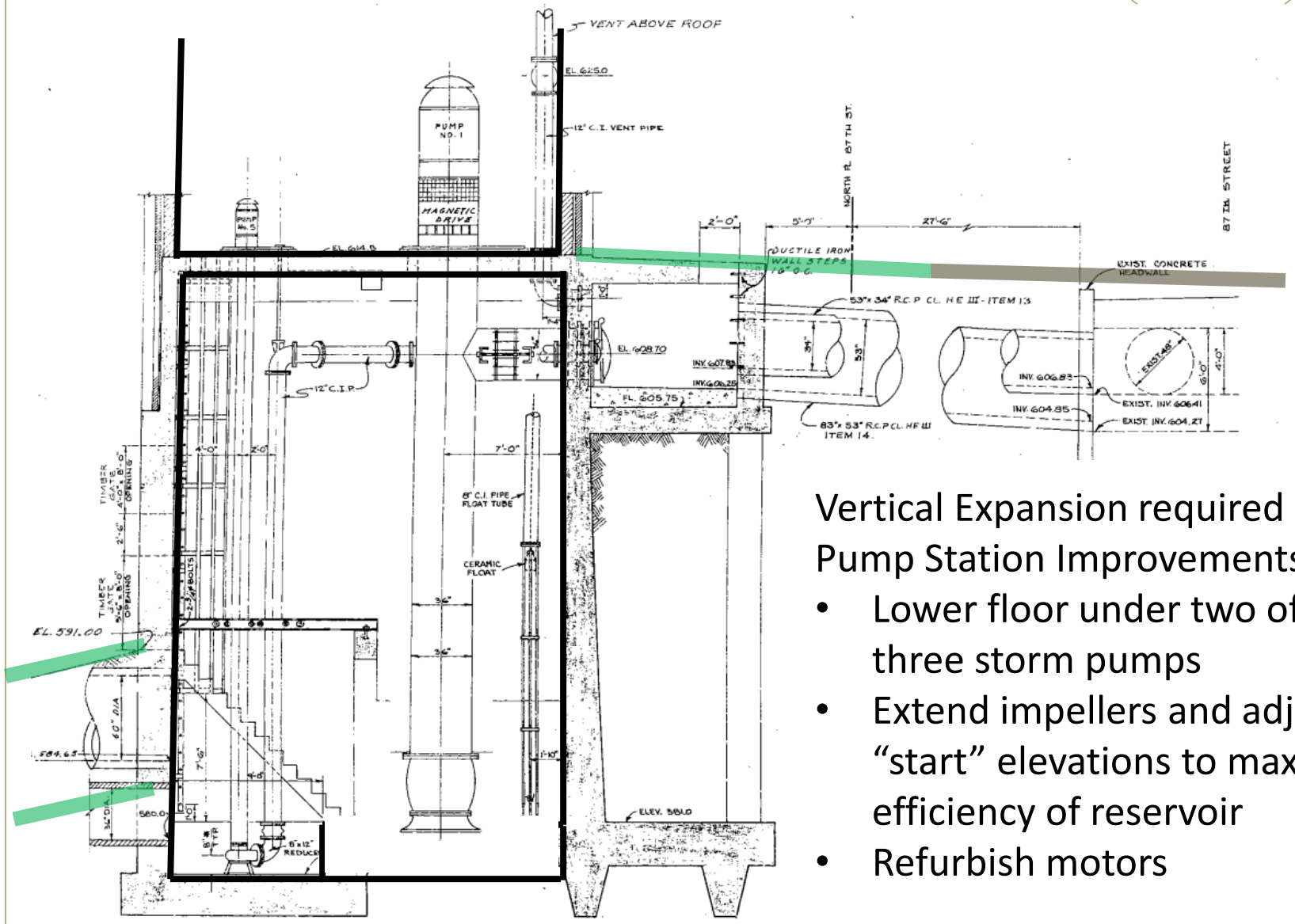


Vertical Expansion required

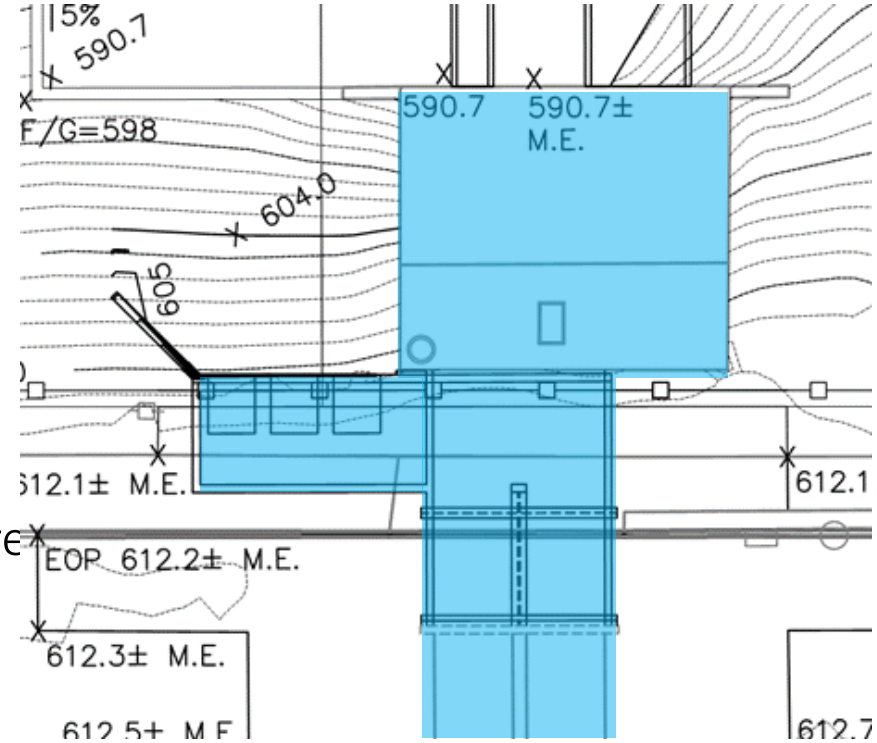
Pump Station Improvements

- Lower floor under two of three storm pumps
- Extend impellers and adjust “start” elevations to maximize efficiency of reservoir
- Refurbish motors

ENGINEERING DESIGN

Emergency bypass / overflow system

- Pumping remains primary means of reservoir discharge
- Emergency bypass system operates when pumps are inoperable
- Three openings connect reservoir to a junction chamber
- Flap gates prevent backflow
- If pumps fail:
  - Top few feet of reservoir drain via gravity
  - Eliminates overflow and flooding
  - Remainder of reservoir drains when power restore



ENGINEERING DESIGN

Emergency bypass / overflow system

ENGINEERING DESIGN

Other design elements

- New spillway in northeast corner
- New intakes from reservoir into pump station
- 87th Street improvements requested by CCDOTH
- Utility relocations, disconnections, extensions
- Native vegetation design for bottom and sides of reservoir

DESIGN LIMITATIONS

Reservoir improvements **WILL NOT solve all flooding**

- Municipalities were fully built out over time, with inadequate stormwater conveyance and storage systems
  - Local Storm Sewer Network is Limiting
  - Lack of Detention Storage is Limiting
- MWRD alone cannot solve all flooding problems
- Communities must participate in solutions

DESIGN LIMITATIONS

Reservoir improvements **WILL NOT solve all flooding**

- MWRD Intergovernmental Agreements with City of Burbank and Village of Oak Lawn
  - Require future investment in stormwater infrastructure to reduce upstream flooding. Could include:
    - Larger pipes, additional street inlets
    - Detention storage
    - Green infrastructure

UNDER CONSTRUCTION

SUMMARY

Application of Melvina Design to other Urban Flooding Problems

- Control overflow
  - Whether from natural depressional areas or large constructed facilities, lack of a defined overflow can be damaging
- Look for vertical expansion opportunities
  - Utilize existing pump stations to create more efficient storage
  - Convert dry bottom to wet or naturalized bottom
  - Active or passive control: Drain down wet bottom ponds to “create” new storage for incoming storm (may require pump station or gates) (not part of Melvina Ditch Reservoir project)

SUMMARY

Application of Melvina Design to other Urban Flooding Problems

- Soil management plans and CCDD pre-screening
  - Control costs on large excavation projects
- Local system improvements may be needed
  - Storage, conveyance, inlets

QUESTIONS?