Northeast Ohio
Regional Sewer District

Lower Shaker Lake Dam Reconstruction

TODAY'S MEETING WILL BEGIN SHORTLY

Northeast Ohio
Regional Sewer District

NEORSD Podcast

A bi-weekly chat with the real people who bring our clean water work to life.

neorsd.buzzsprout.com

Northeast Ohio
Regional Sewer District

Lower Shaker Lake Dam Reconstruction

Today's meeting will start shortly.

Photo credit: Denis Zaharija


Can you save on your sewer bill?
Utility Assistance
Resource Fair
August 10, 2024
(216)881.8247
neorsd.org/save
NEORSD

Lower Shaker Lake Dam Reconstruction

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Working for Clean Water

Northeast Ohio
Regional Sewer District

NEORSD.ORG/CAREERS

SAVE THE DATE
SHARE THE FUN

The award-winning festival of all things water full of free fun, treats, tours, and more for all ages!

9.21.2024

IN CUYAHOGA HEIGHTS OFF I-77

CLEAN WATER FEST

PRESENTED BY NEORSD

Lower Shaker Lake Dam Reconstruction

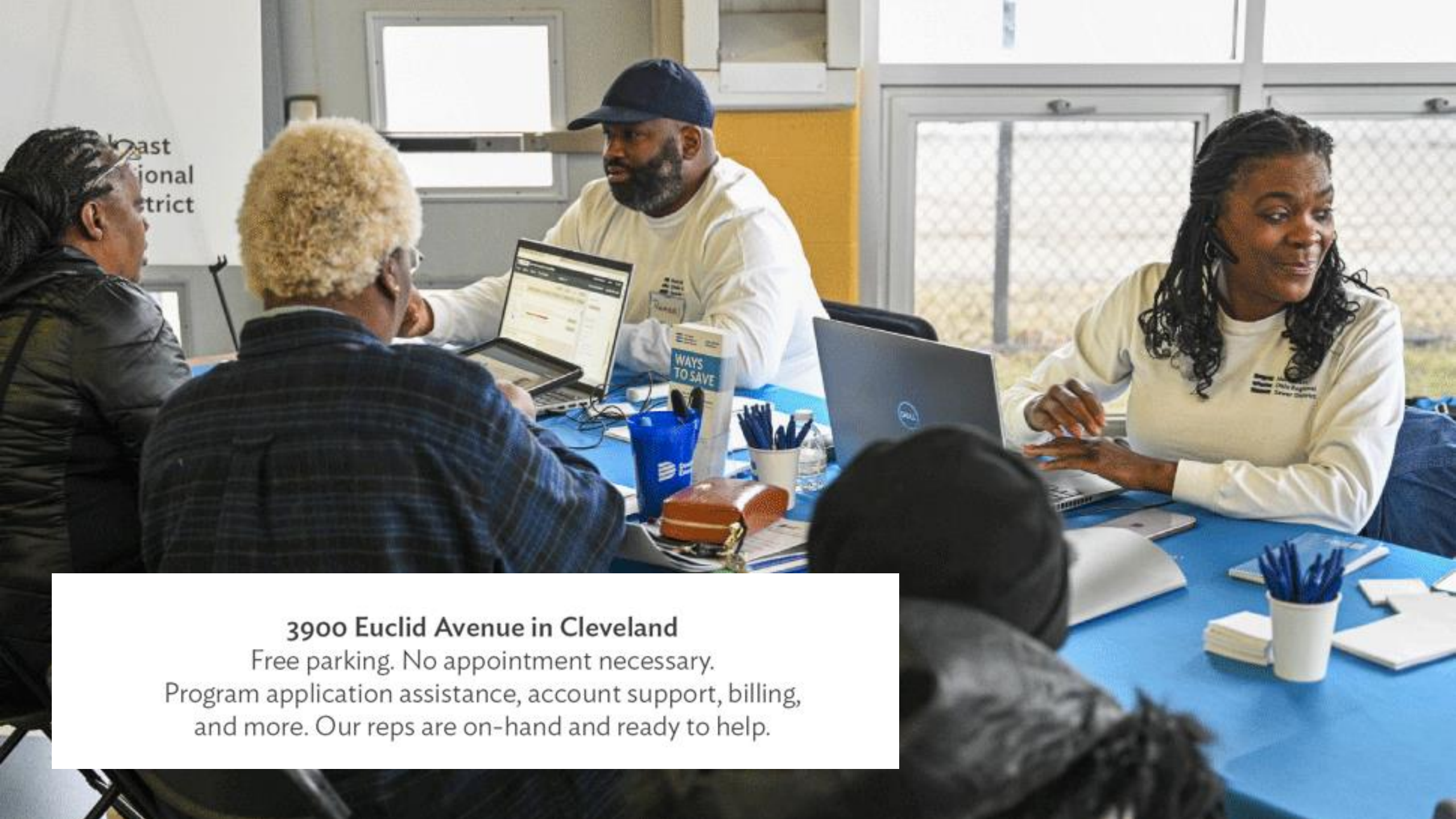
Today's meeting will start shortly.

Photo credit: Denis Zaharija

Real people. Here to help.

FIRST SATURDAY
OF EVERY MONTH

8:00 TO 11:00 A.M.



3900 Euclid Avenue in Cleveland

Free parking. No appointment necessary.
Program application assistance, account support, billing, and more. Our reps are on-hand and ready to help.

Lower Shaker Lake Dam Reconstruction

Today's meeting will start shortly.

Photo credit: Denis Zaharija

Lower Shaker Lake Dam Reconstruction

NORTHEAST OHIO REGIONAL SEWER DISTRICT

MAY 20, 2024

Northeast Ohio
Regional Sewer District

Glad you’re here.

JENN ELTING, SENIOR MANAGER OF COMMUNITY & MEDIA RELATIONS

NORTHEAST OHIO REGIONAL SEWER DISTRICT

ELTINGJ@NEORSD.ORG

Housekeeping

- Tonight's meeting
  - Meet the team
  - Update on the project
  - Recording available at neorsd.org/LowerLake

Housekeeping

- May 21 at Nature Center at Shaker Lakes
  - 2600 South Park Boulevard
  - 11A – 1P and
    5P – 7P
- neorsd.org/accessibility
  eltingj@neorsd.org

Public Engagement

- October 2023
  - October 5 Webinar
  - October 7 Open House
- Partner events
  - Take to the Lake, AppleFest, AutumnFest
- Online survey

Zoom Q&A

askus@neorsd.org

Matt Scharver

DIRECTOR OF WATERSHED PROGRAMS
NORTHEAST OHIO REGIONAL SEWER DISTRICT
SCHARVERM@NEORSD.ORG

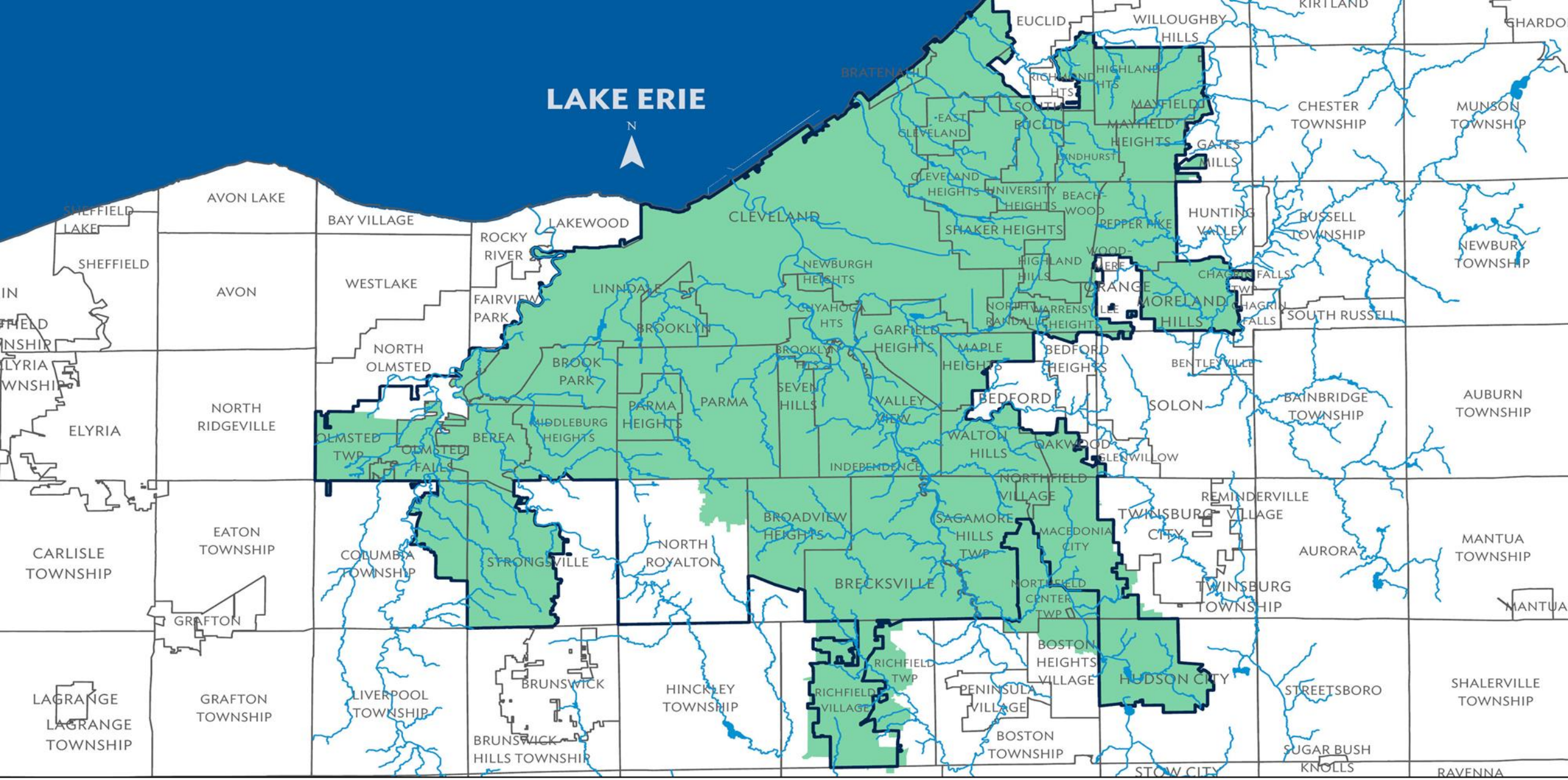
Tonight's Agenda

- About NEORSD & Project
- Background and Existing Conditions Summary
- Online Survey Results Briefing
- Resources & Park Space
- Pre-Design Update

About NEORSD

NEORSD: At a glance

- **Services:** Sanitary and stormwater management to 63 municipalities, including the City of Cleveland, across 4 counties
- **Governance:** Independent political subdivision of the State of Ohio governed by a 7-member Board of Trustees



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363 SQUARE MILE SERVICE AREA
489 MILE REGIONAL STORMWATER SYSTEM

1,000,000 Residents

Regional Stormwater Management Program

- Addresses problems related to stormwater runoff from hard surfaces.

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- Runoff contributes to regional stream flooding, streambank erosion, and water quality issues.

Regional Stormwater Management Program

- Addresses problems related to stormwater runoff from hard surfaces.
- Runoff contributes to regional stream flooding, erosion, and water-quality issues.
- Improves our ability to further address stormwater problems that cross community boundaries.

Roles and Responsibilities

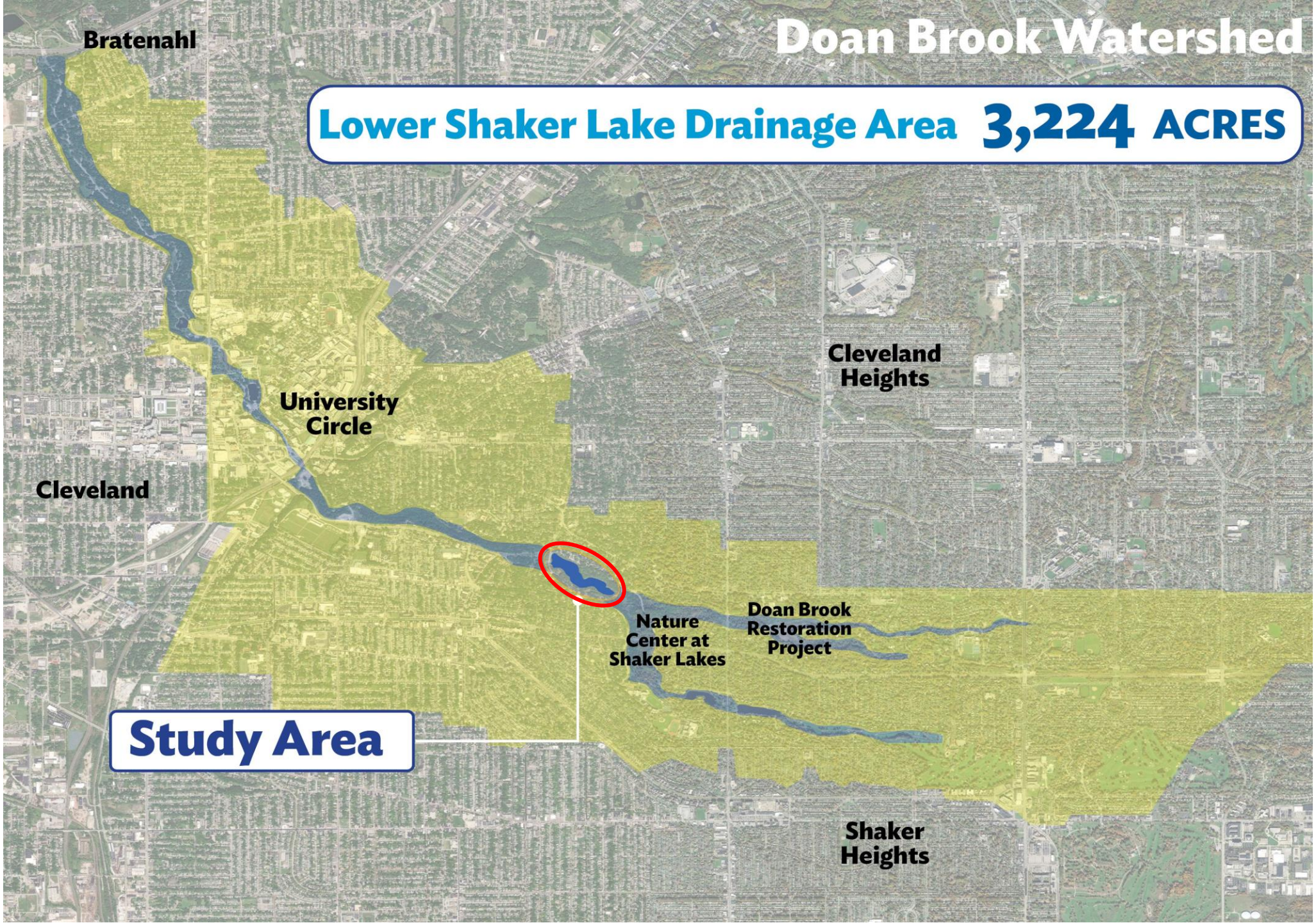
- **Ohio Department of Natural Resources (ODNR):** Assess, enforce dam compliance
- **Shaker Heights and Cleveland Heights:** Dam owners; responsible to comply with ODNR standards
- **City of Cleveland:** Property owner; long-term lease to Cities of Shaker Heights and Cleveland Heights
- **NEORSD:** Regional Stormwater Management Program

Reasons to Reconstruct Dam

- **Non-compliance with State regulations:**
  - Dam not built to modern engineering standards
  - Class I dam failure would result in probable loss of life and property damage
  - Dam cannot pass Probable Maximum Flood

Reasons to Reconstruct Dam

- Non-compliance with State regulations
- **NEORSD Chagrin River & Lake Erie Direct Tributaries Stormwater Master Plan findings:**
  - Lower Shaker Lake Dam provides downstream flood control benefit


Doan Brook Watershed
Lower Shaker Lake Drainage Area 3,224 ACRES
Bratenahl
University Circle
Cleveland
Cleveland Heights
Nature Center at Shaker Lakes
Doan Brook Restoration Project
Study Area
Shaker Heights

Project Goals

Project Goals

- **Address dam safety deficiencies** and bring dam into compliance with State of Ohio regulations.

Project Goals

- **Reduce flood risk** downstream of the dam and along Coventry Road and North Park Boulevard.

Project Goals

- **Restore and stabilize Doan Brook** immediately downstream of the dam and Coventry Road.

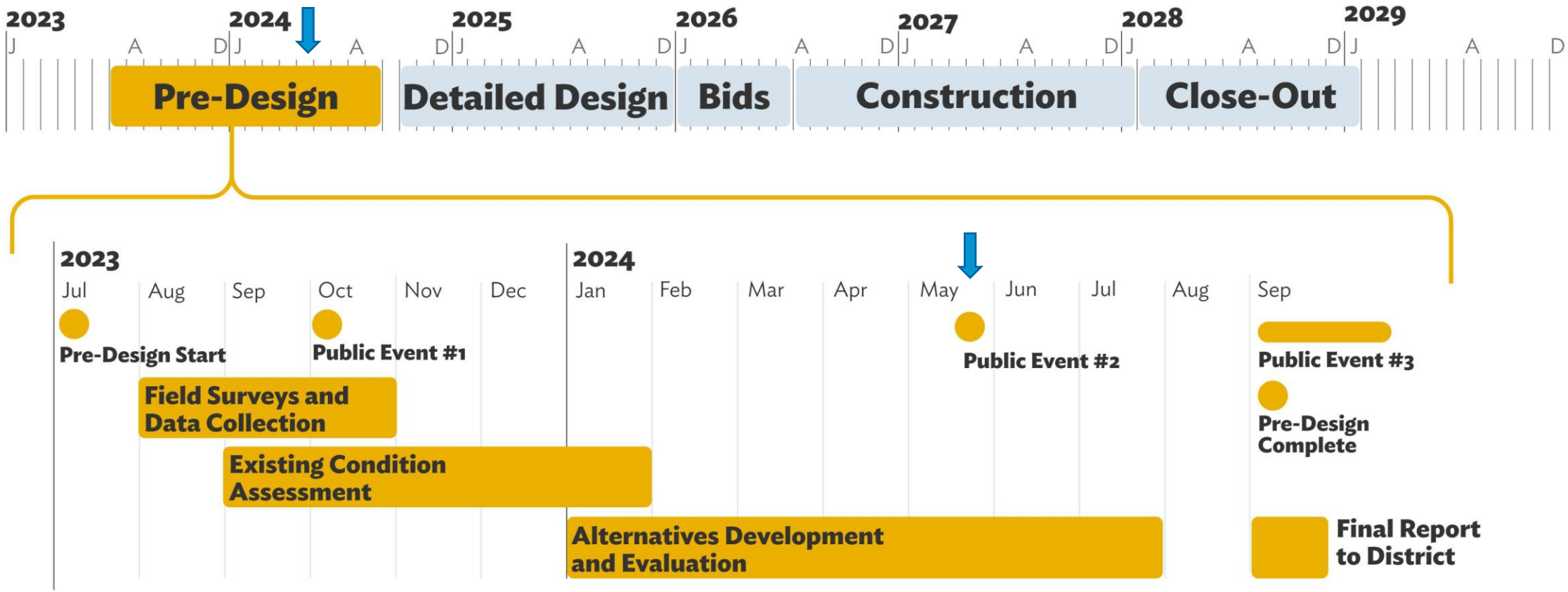
Project Goals

- **Integrate dam safety improvements** with consideration to historical and cultural features and park space.

Schedule

Pre-Design Phase

Timeline



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Dam Safety Improvements – Necessary Features

- Overtopping Protection/Armoring
  - Erosion protection of embankment
- Floodwall
  - Containment and directing of flood waters
- Reconstructed Principal Spillway
- Expanded Spillway Capacity
  - Must be able to safely pass the design storm (PMF)

Background & Existing Conditions Summary

STUDY OF THE EXISTING DAM AND RELATED FEATURES

Lower Shaker Lake History

- North Union Shaker Community (1822-1889)
- Doan Brook dammed for sawmill, gristmill (1836)
- 187-year-old earthen dam not built to modern standards, noncompliant with state regulations

Dam Regulation and Classification

- In Ohio, dams are regulated by ODNR's Division of Water Resources – Ohio Dam Safety Program

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- All regulated (non-exempt) dams must meet all ODNR standards
- Classification of regulated dams in Ohio is governed by Ohio Administrative Code (OAC) 1501:21

Dam Classification

Lower Shaker Lake Dam is classified as a Class I (High Hazard Potential) dam

Ohio's Dam Classification Criteria

Hazard Potential		Height (FT)	Storage (AC FT)	Downstream Hazard Potential
I	High	>60	>5,000	Probable Loss of Human Life
II	Significant	>40	>500	Loss or Damage of High-value Infrastructure of Assets
III	Low	>25	>50	Damage of Local Roads or Not Otherwise High Valued Assets
IV	Exempt	<25	<50	Dam or Agriculture/Rural Land

Lower Shaker Lake Dam Class

Height (FT)	Storage (AC FT)	D/S Hazard
		X
	178	
17.3		

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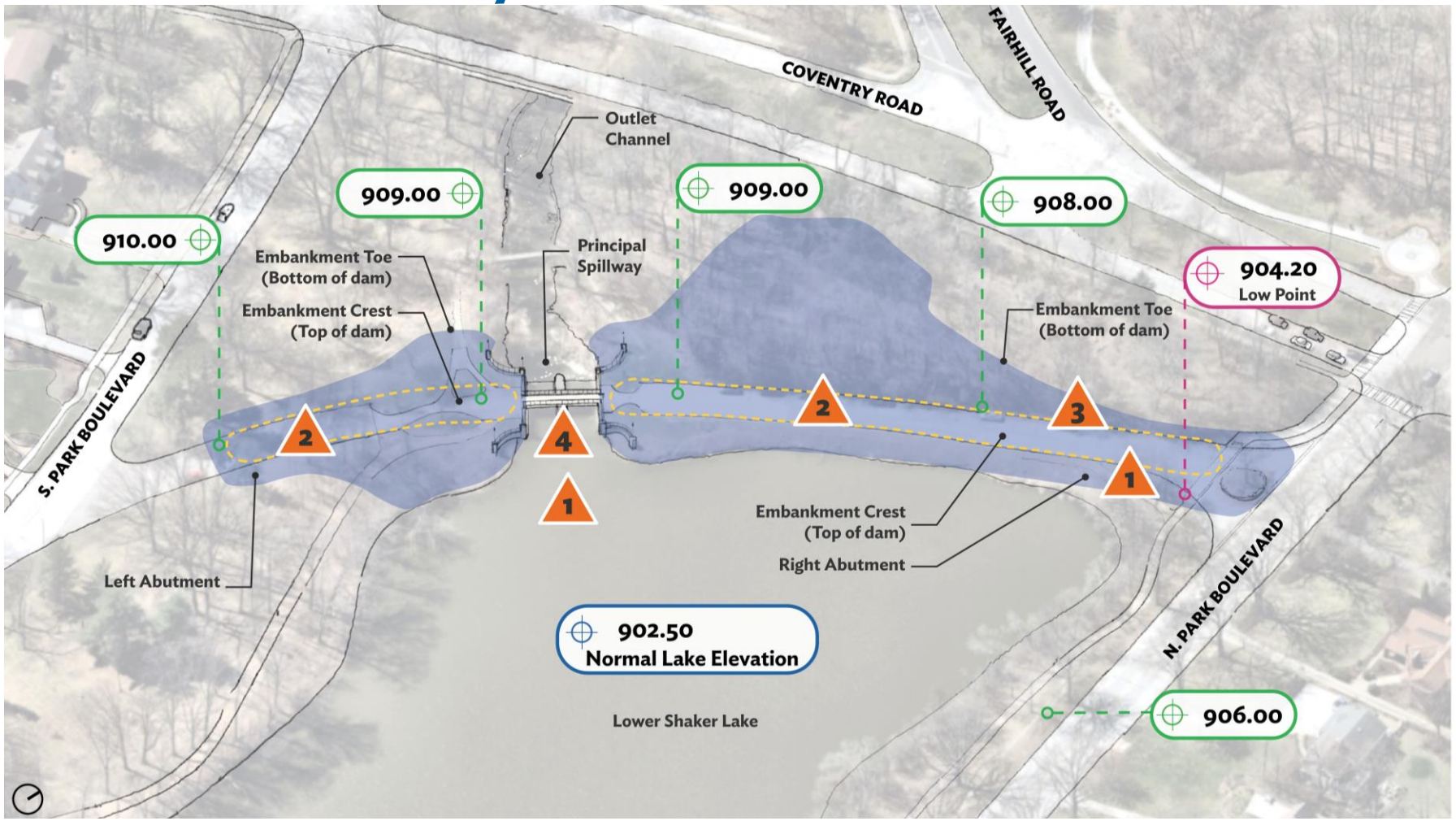
Existing Conditions Summary

DAM SAFETY CHALLENGES - OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RESOURCES – OHIO DAM SAFETY PROGRAM

Dam Safety Deficiencies



Dam Safety Deficiencies

1. Inadequate Spillway Capacity
2. Inadequate Embankment Protection & Uneven Crest Elevation
3. Inadequate Embankment Stability/Seepage
4. Inadequate Masonry Spillway Stability

Embankment Limits

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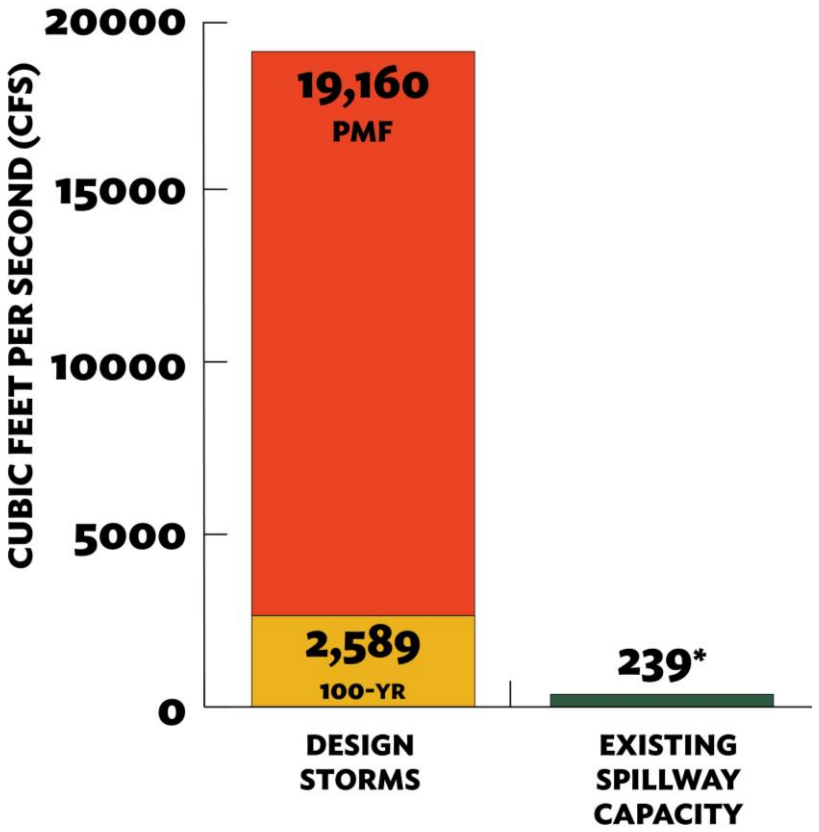
Dam Safety Deficiencies

1 Inadequate Spillway Capacity

- Limited Capacity of Existing Spillway

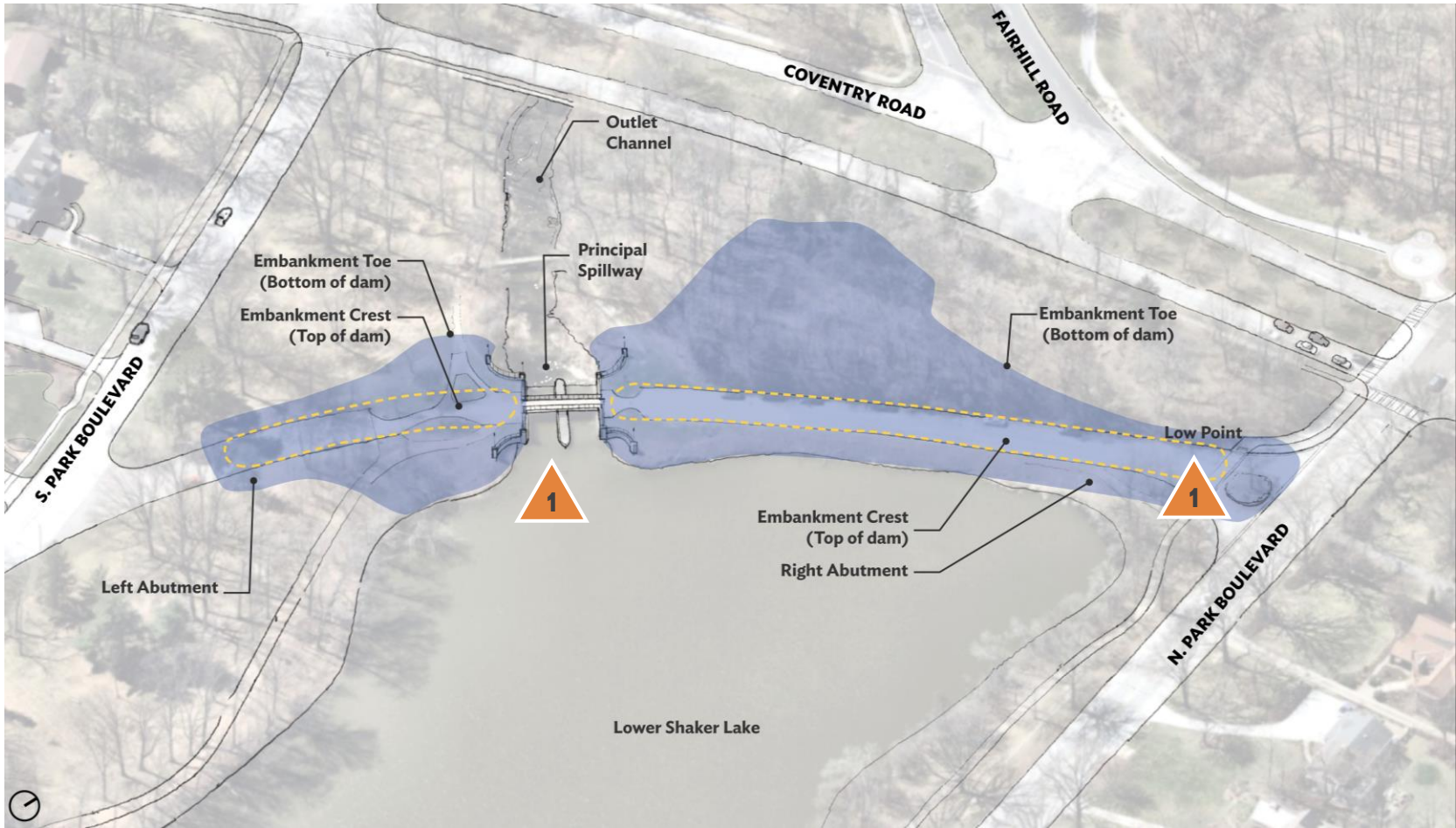
Maximum Inflow Compared to Spillway Capacity (prior to overtopping)



Dam Safety Deficiencies

1 Inadequate Spillway Capacity

- Limited Capacity of Existing Spillway
- “Low Spot” near Right Abutment



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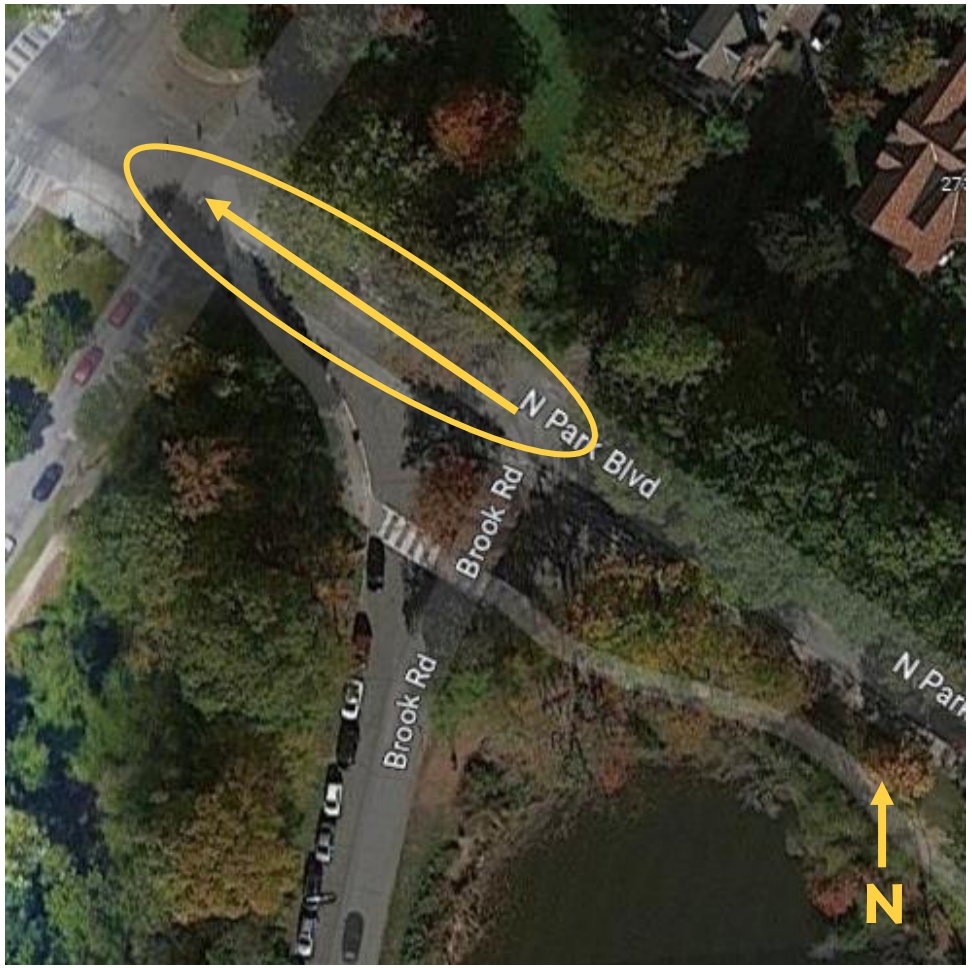
North Park Overtops July 17, 2021



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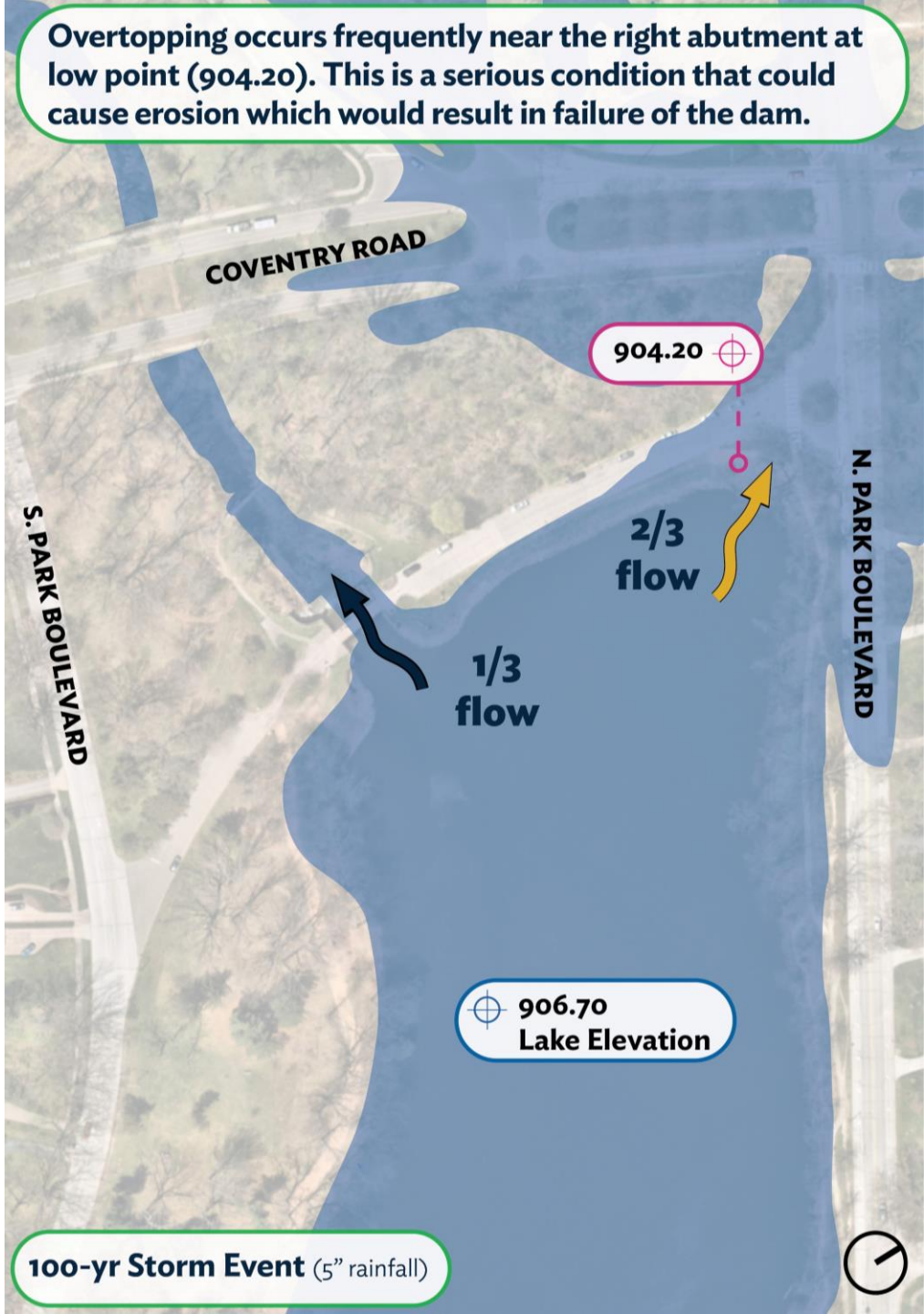
Challenge of Overtopping

For the 100-yr Storm Event:

- 2/3rd of flow passes over the right abutment (low spot)
- 1/3rd passes through existing principal spillway



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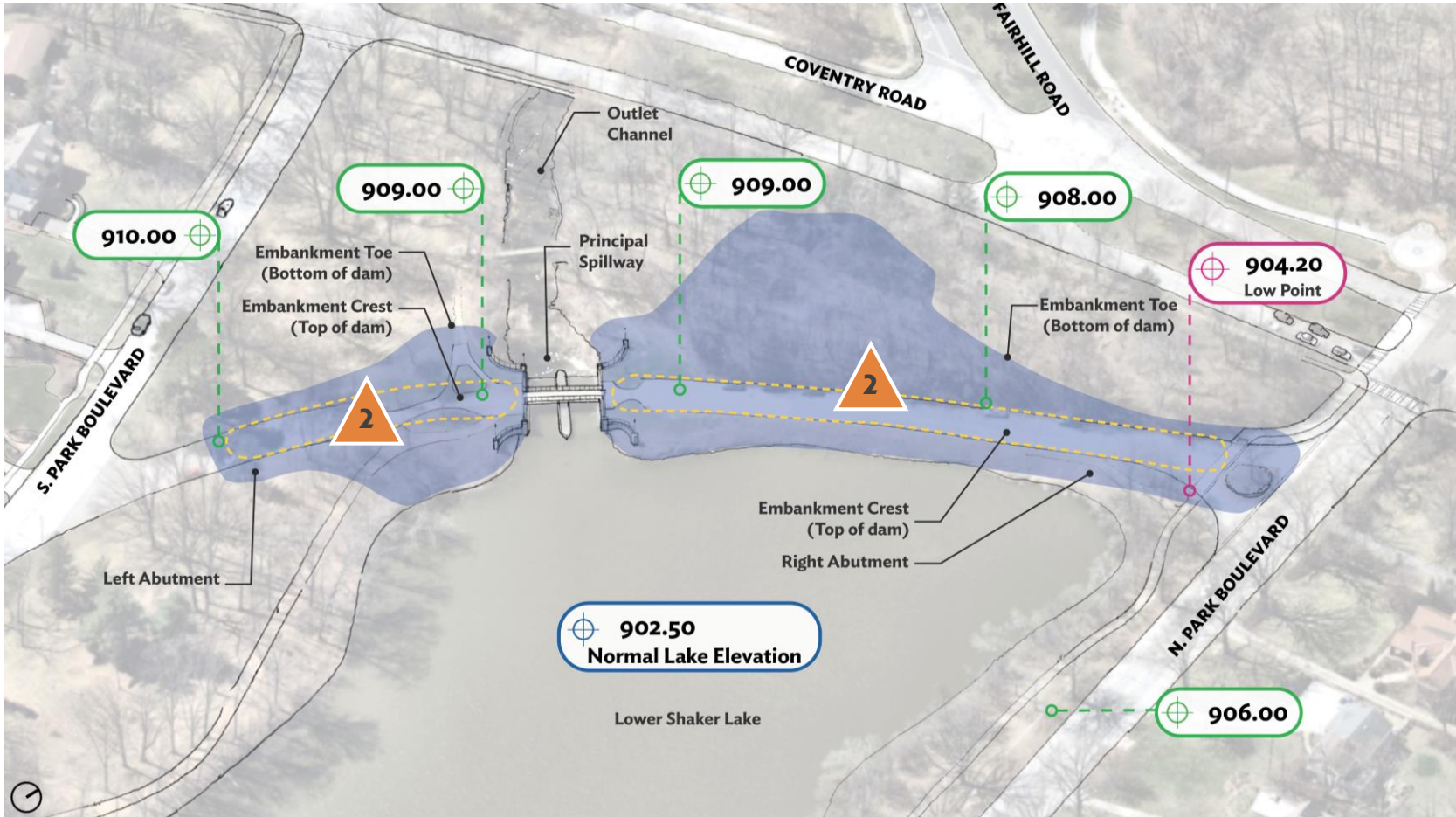
Challenge of Overtopping

2 Inadequate/No Embankment Overtopping Protection

- Not Armored to Resist Erosion
- Irregular Crest Elevation



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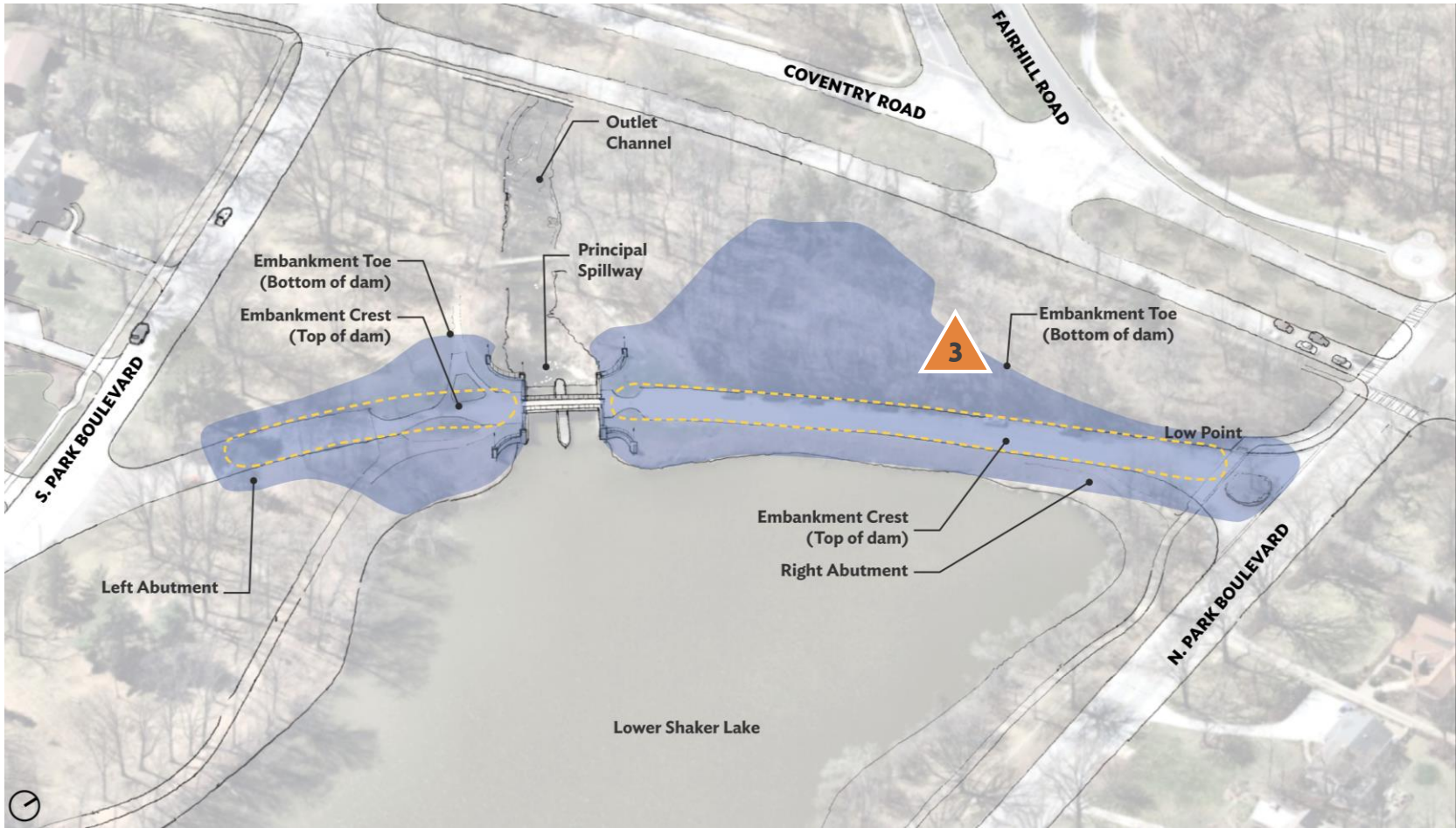
Dam Safety Deficiencies

3 Inadequate Embankment Stability

- Slope Stability
- Seepage
- Variable Embankment Fill



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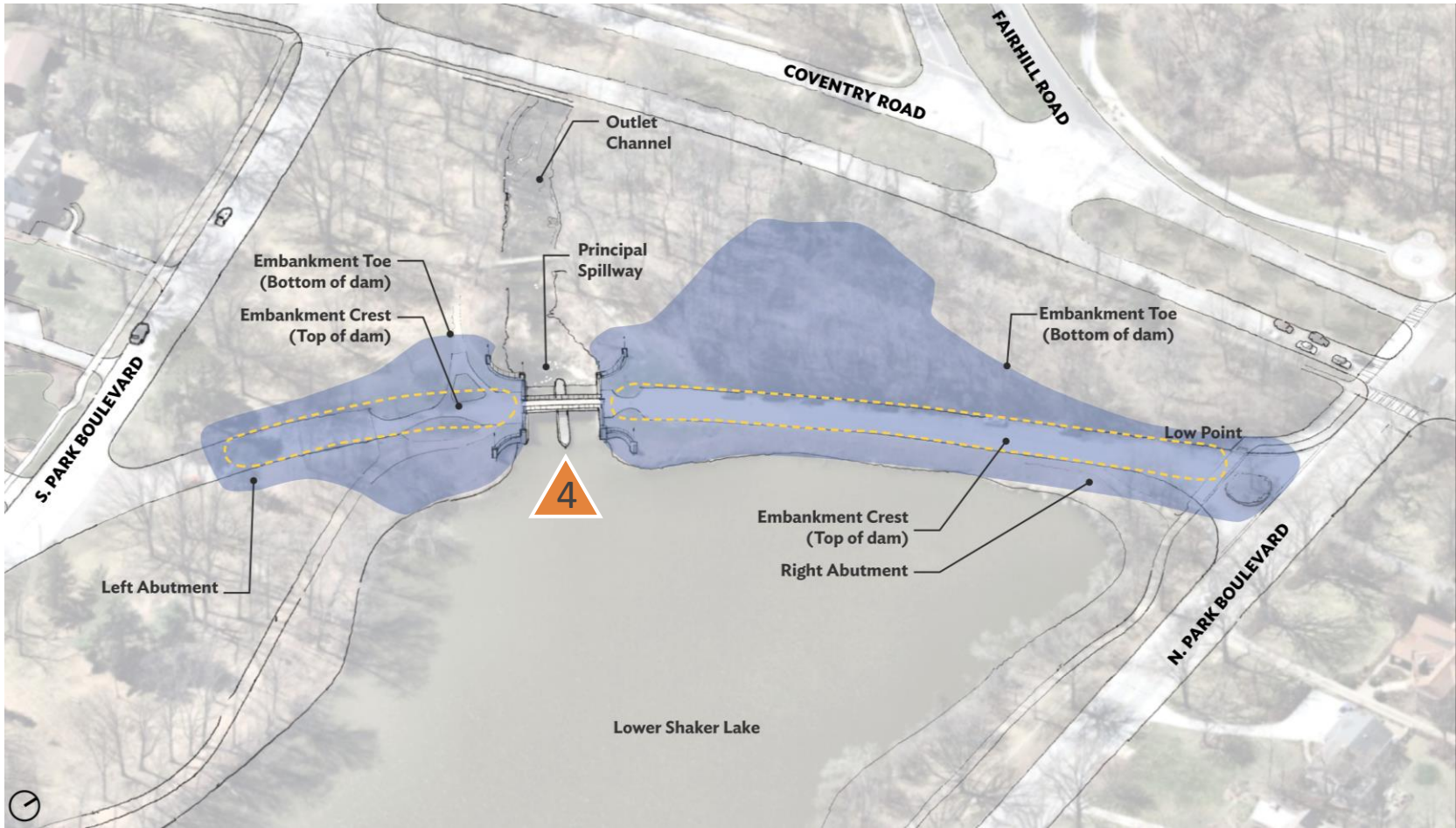
Dam Safety Deficiencies

4 Inadequate Existing Spillway Stability

- Sliding and Overturning
- Undermining at Outlet Channel
- No Internal Seepage Controls



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Dam Safety Deficiencies

4 Inadequate Existing Spillway Stability

- Sliding and Overturning
- Undermining at Outlet Channel
- No Internal Seepage Controls

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Survey Results Summary

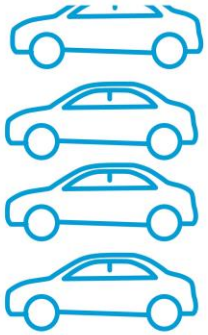
OCTOBER ON-SITE EVENT

FEBRUARY-MARCH ON-LINE SURVEY

How Visitors Get to Lower Shaker Lake

Walk/Run/Jog

54%



Car

36%

Bike

8%

Other (Write-in)

1%

* "Public Transit" and "Wheels (skates, blades, boards, scooters)" received 1 and 2 responses, respectively. Write-in responses indicated travel depended on season, or was a combination of 1 or more modes.

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Visitors' Favorite Thing to Do

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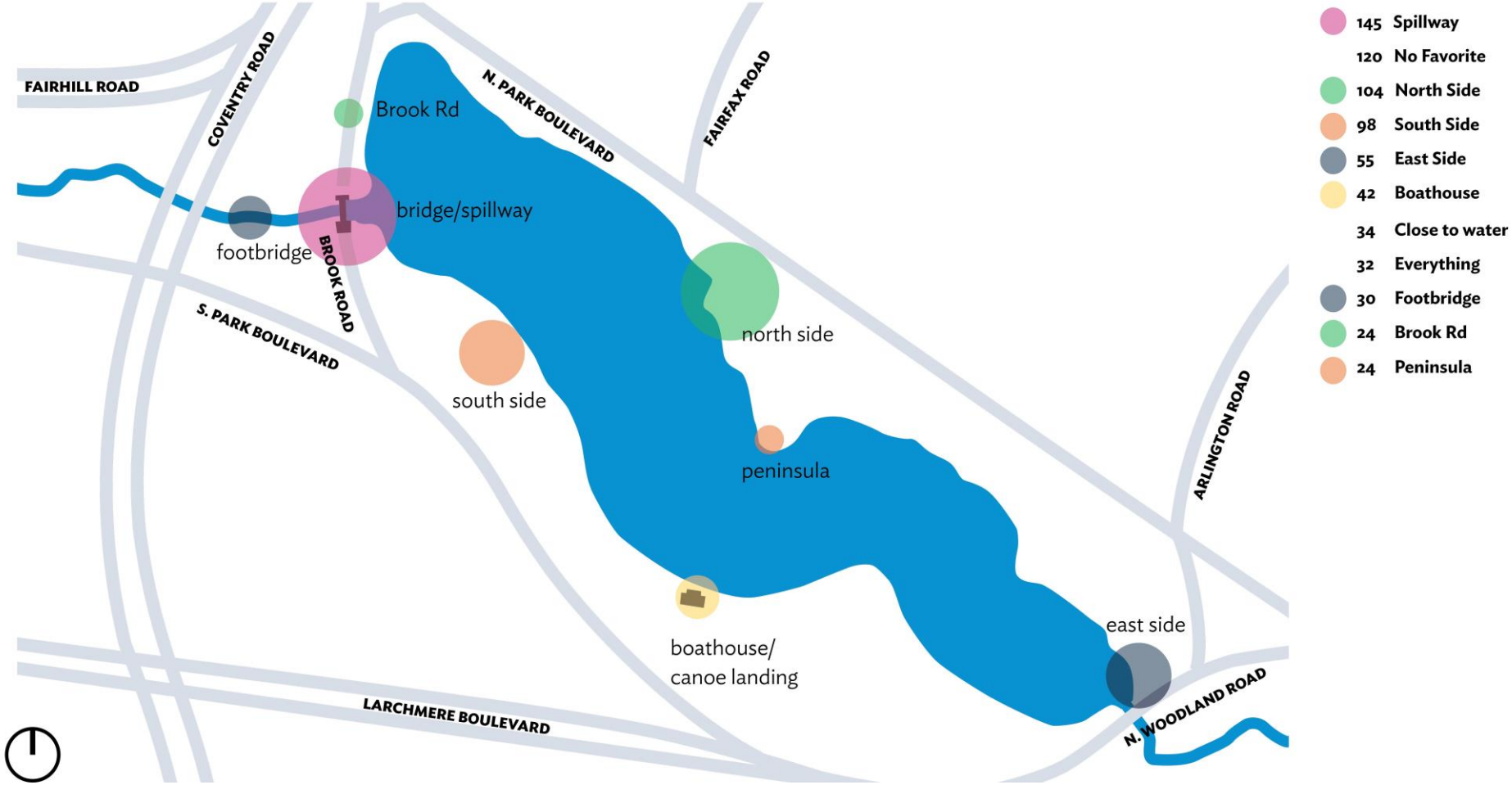
Visitor's Favorite Spot



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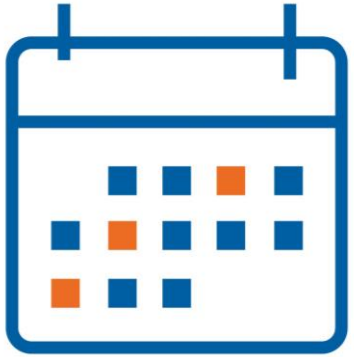
Visitor Data



A majority of surveyed respondents visit weekly

91% of visitors listed walking as an activity engaged in at Lower Shaker Lake

78%

Of surveyed respondents live in immediately adjacent neighborhoods

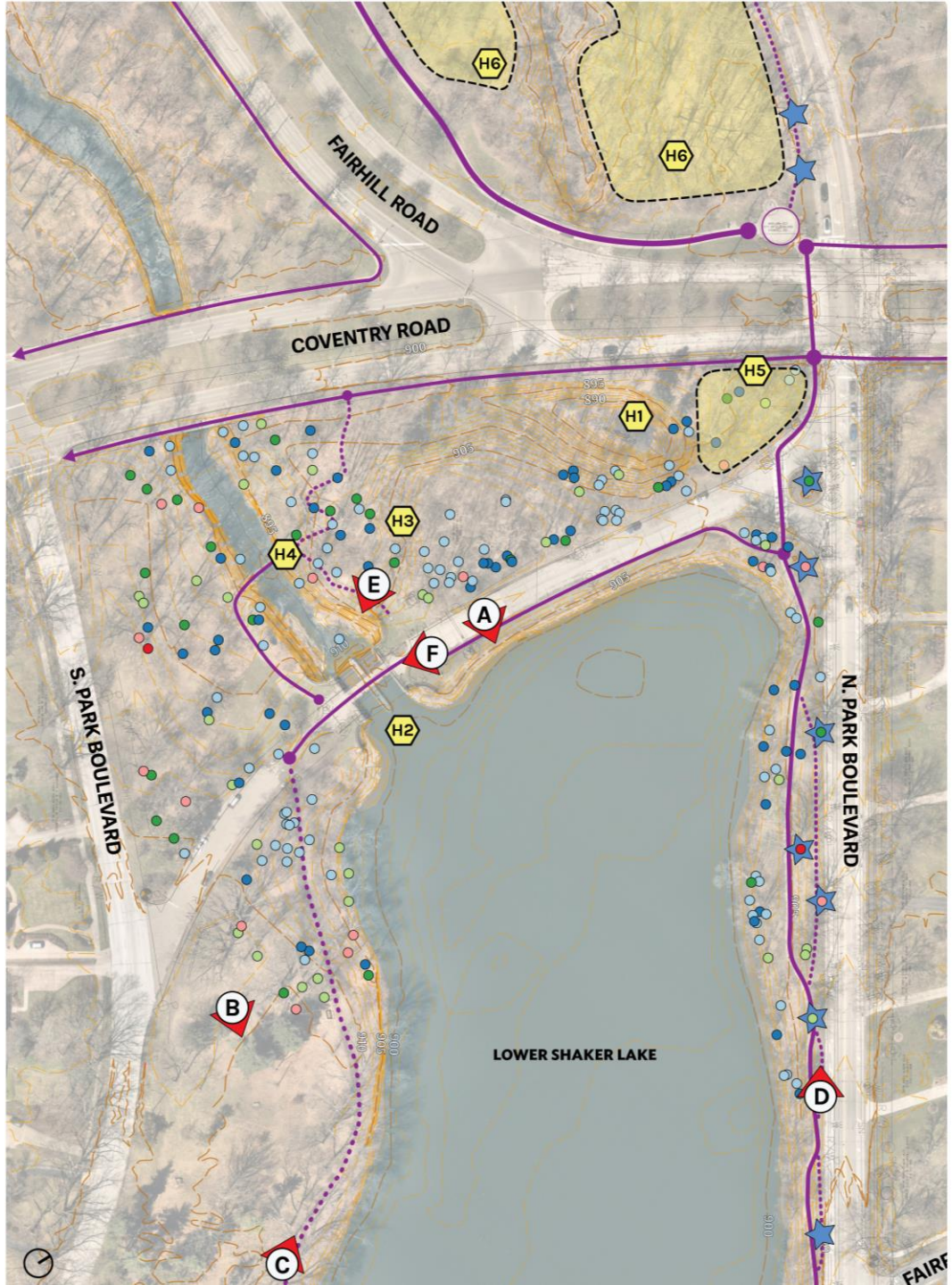
Landscape Features

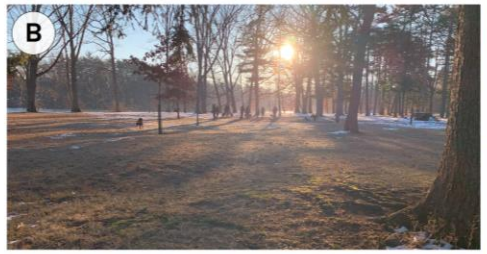
Landscape Features

KEY

- PEDESTRIAN ACCESS - PAVED
- PEDESTRIAN ACCESS - UNPAVED
- CONTOUR - INDEX
- CONTOUR - INTEGER
- NORMAL LAKE LEVEL
- LIBERTY OAK
- SURVEYED TREES (BY DBH CLASS)
  - 8 - 12 IN
  - 12.5 - 18 IN
  - 18.5 - 24 IN
  - 24.5 - 30 IN
  - 30.5 - 36 IN
  - 36.5 - 42 IN

- H1 SAWMILL / GARDEN CLUB SITE
- H2 SPILLWAY
- H3 ICEHOUSE
- H4 FOOTBRIDGE
- H5 SHAKER MEMORIAL GARDEN
- H6 MILL FAMILY SETTLEMENT





Steven Riedy, PE
Project Manager
Dam Safety & Geotechnical
HDR

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Regional Sewer District

Meet the Team

Design Team

HDR

Steven Riedy, PE
Project Manager
Dam Safety & Geotechnical

Jared Deible, PE
Dam Safety &
Geotechnical/Civil

SmithGroup

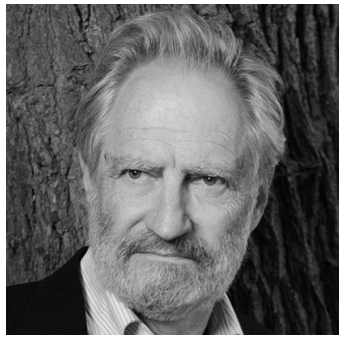
Chad Brintnall,
PLA, ALSA
Landscape Architecture

Michelle Johnson
Stakeholder & Public
Communications

Lawhon &

Andy Sewell
Cultural/Historical

Bluestone



Roy Larick, Ph.D.
Cultural/Historical

Anna Enderle,
PLA, ALSA
Landscape Architecture

Design Team – Roles

Northeast Ohio Regional Sewer District

Prime Consultant

DLZ

Structural Lead, Geotech Peer Review

SMITHGROUP

Landscape Architecture, Stakeholder & Community Engagement

Blue Stone

Cultural & Historical Stakeholder Engagement

RESOURCE INTERNATIONAL Rii

Geotechnical Exploration & Laboratory Testing

AECOM

Dredging & Sediment Management

LA

Permitting Guidance, Geomorphology & Streambank Stabilization, Tree Survey

KS ASSOCIATES

Topographic Survey, Sediment Sampling

anutec

Project Controls

Pre-Design Update

CONSIDERED ALTERNATIVES ARE UNDER DEVELOPMENT

PRESENTED CONCEPTS ARE DRAFT

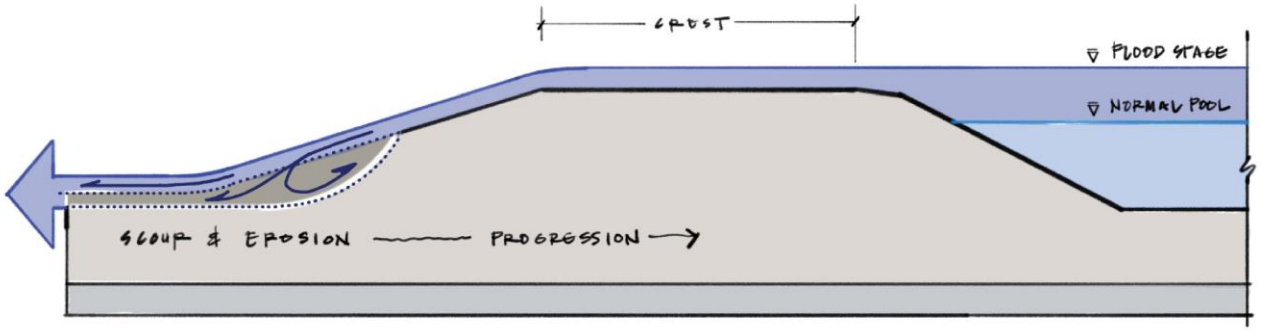
Dam Safety Improvements – Necessary Features

- Overtopping Protection/Armoring
  - Erosion protection of embankment
- Floodwall
  - Containment and directing of flood waters
- Reconstructed Principal Spillway
- Expanded Spillway Capacity
  - Must be able to safely pass the design storm (PMF)

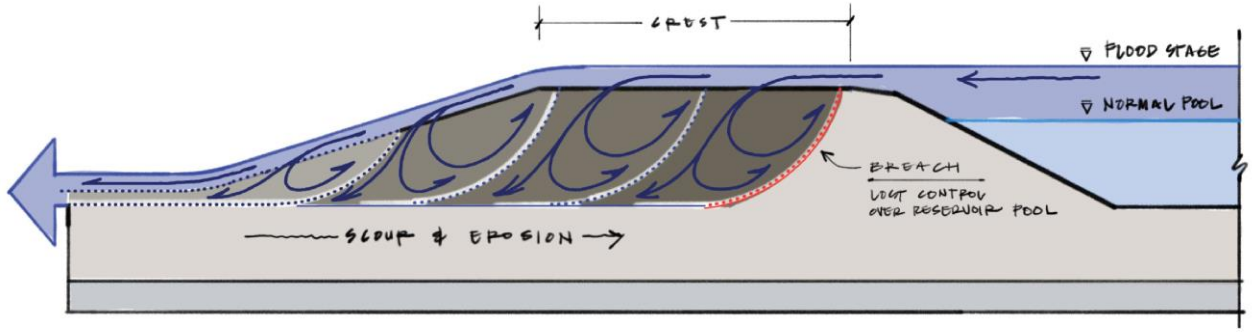
Overtopping Protection/Armoring

Problem

Unarmored Earthen Embankment - Initial Stage



Unarmored Earthen Embankment - Breach Stage



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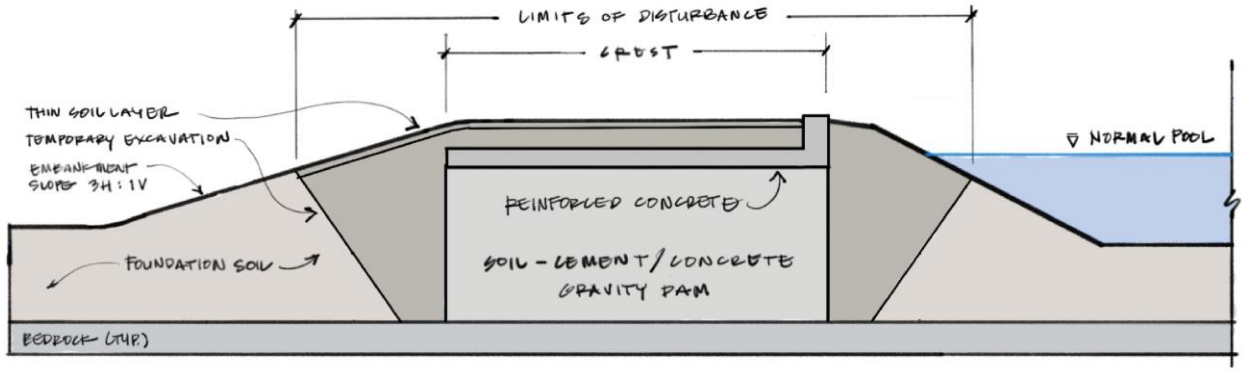
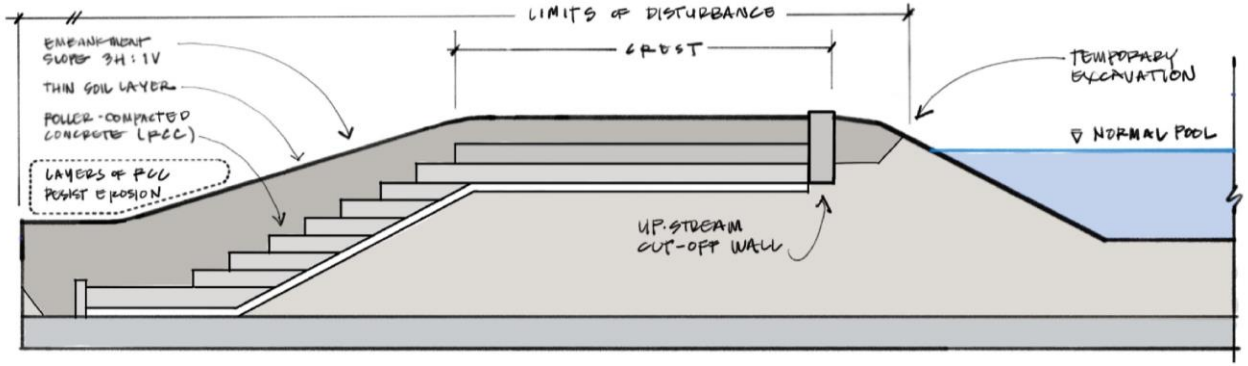
Overtopping Protection/Armoring

Typical Solutions

Gravity Dam



Roller-Compacted Concrete



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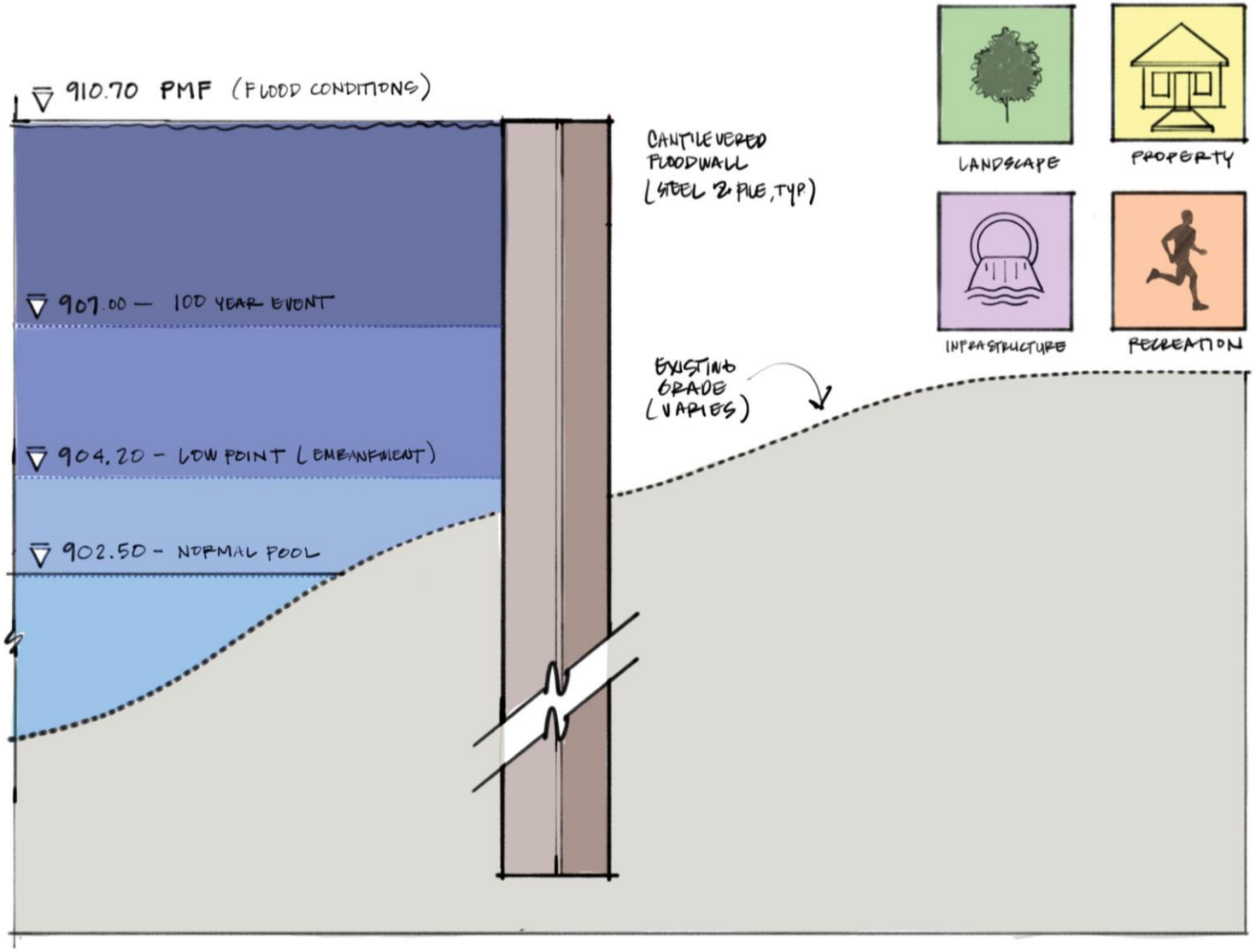
Floodwall

- Containment of flood waters



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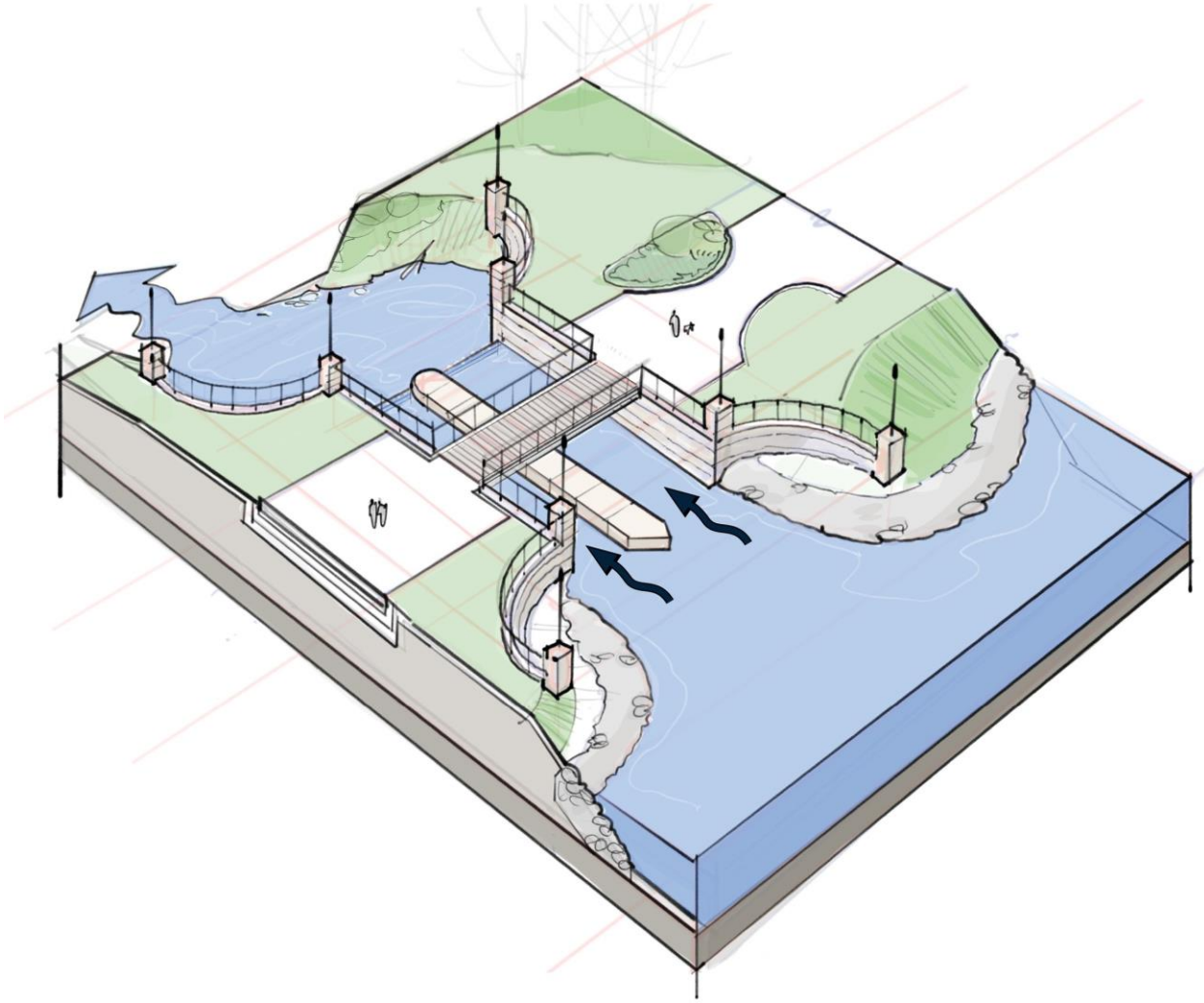
Reconstructed Principal Spillway

- Conveys most of the low-level flows
- Reconstructed to provide required stability



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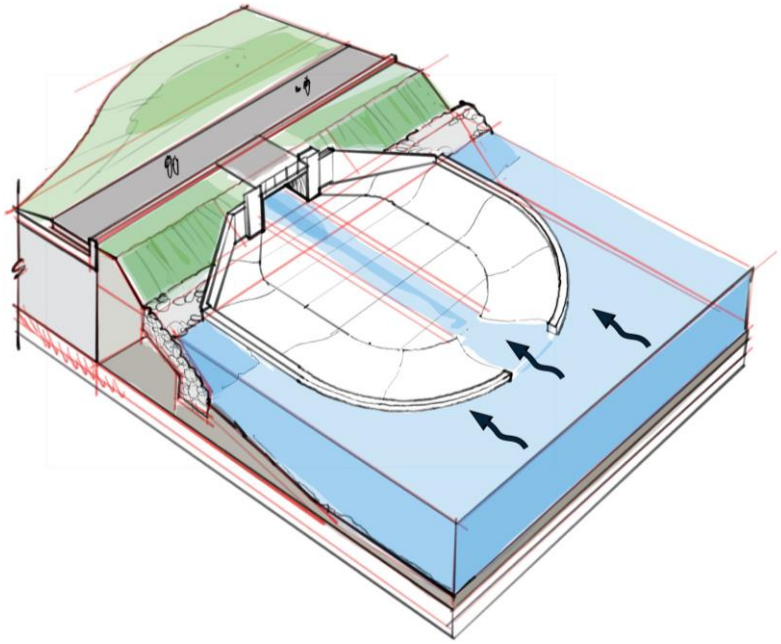
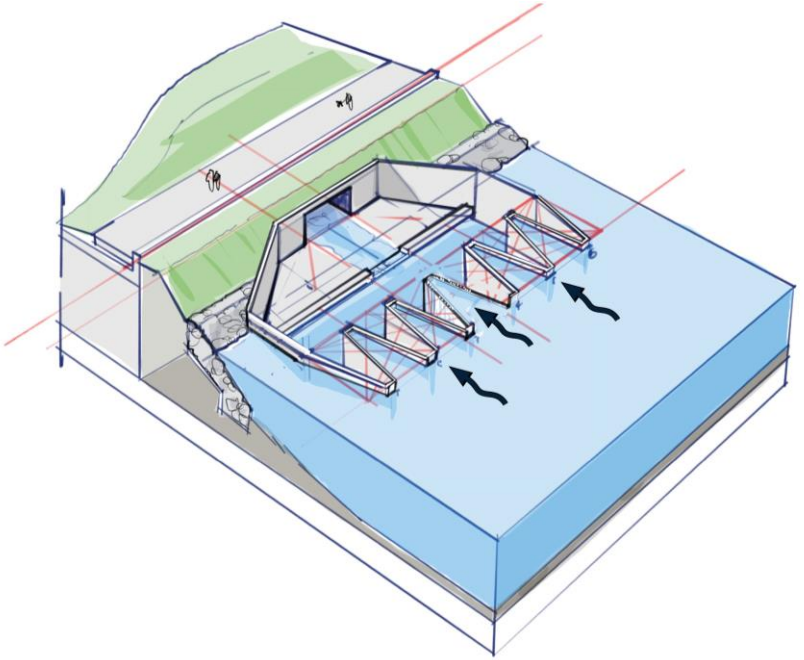
Auxiliary Spillway

- Used to increase hydraulic capacity
  - Typically used with Principal Spillway

Spillway Type 1

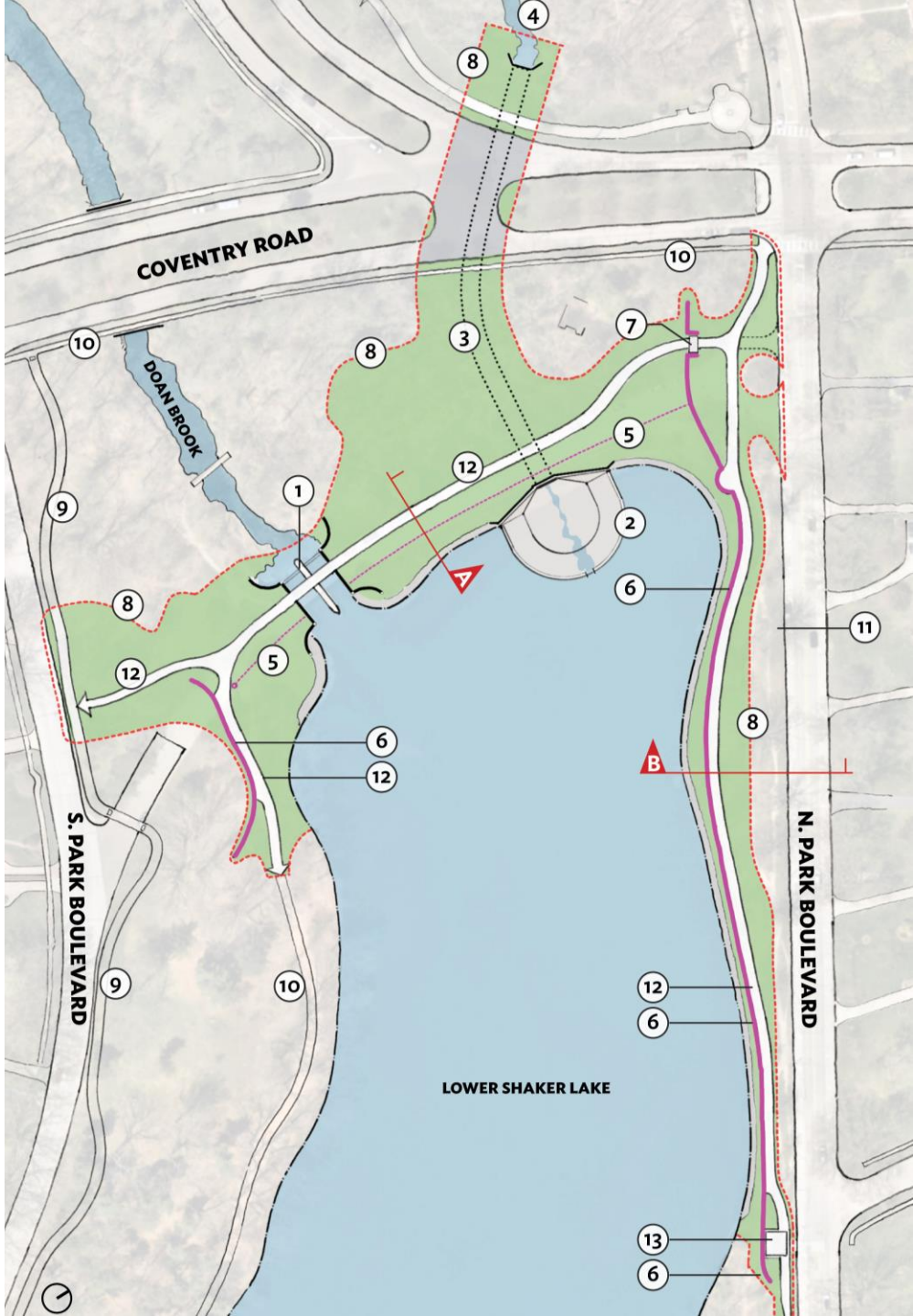


Spillway Type 2



Concept – Site Framework

1. RECONSTRUCTED EXISTING PRINCIPAL SPILLWAY
2. AUXILIARY SPILLWAY
3. AUXILIARY SPILLWAY CHUTE
4. OUTFALL
5. GRAVITY DAM (OVERTOPPING PROTECTION)
6. FLOODWALL
7. MAINTENANCE & PEDESTRIAN ACCESS
8. APPROXIMATE PROJECT LIMITS
9. SHAKER HEIGHTS MULTIPURPOSE TRAIL
10. EXISTING WALK / PATHWAY
11. EXISTING LIBERTY OAK
12. PATHWAY CONNECTION
13. TRAIL NODE



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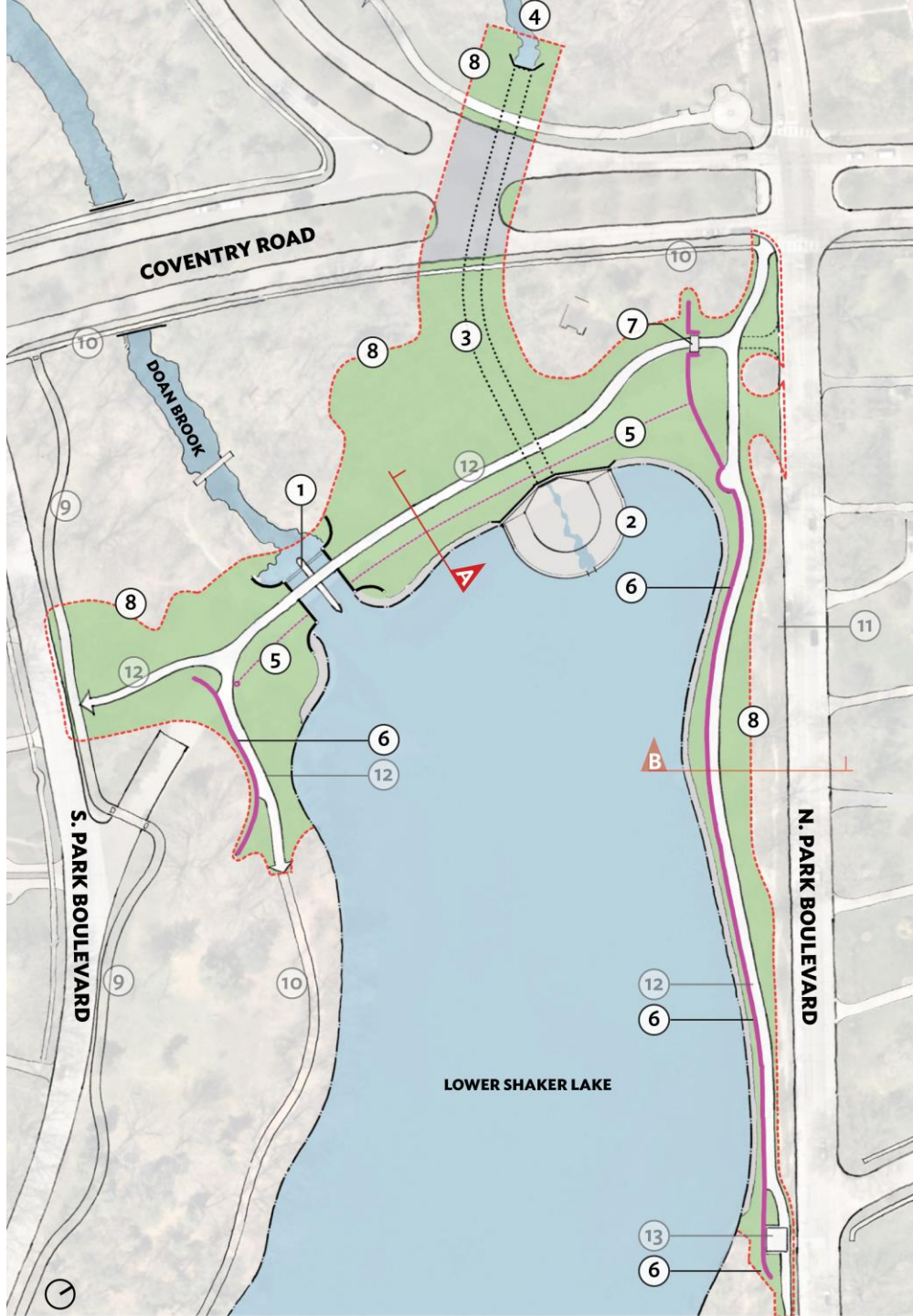

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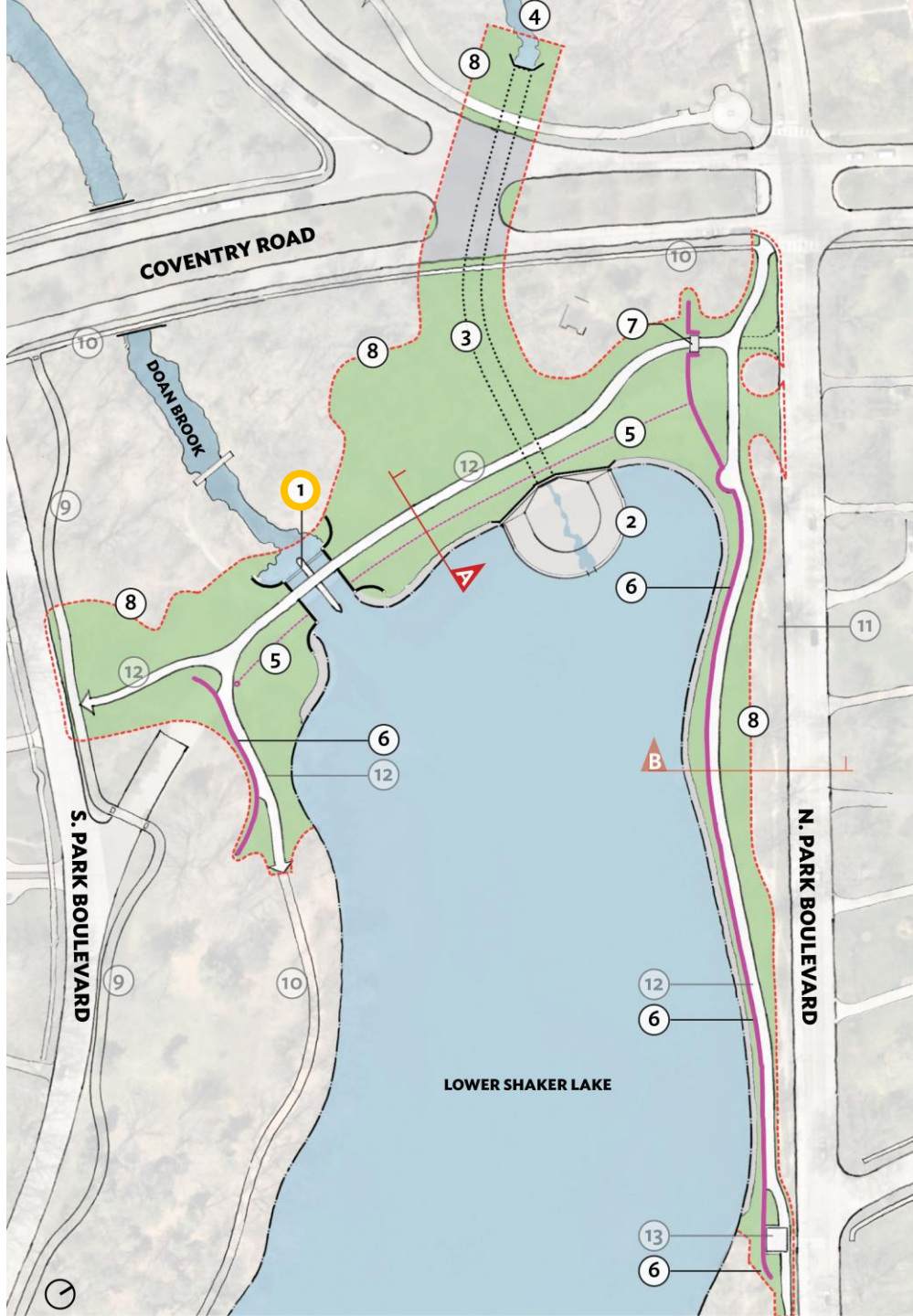

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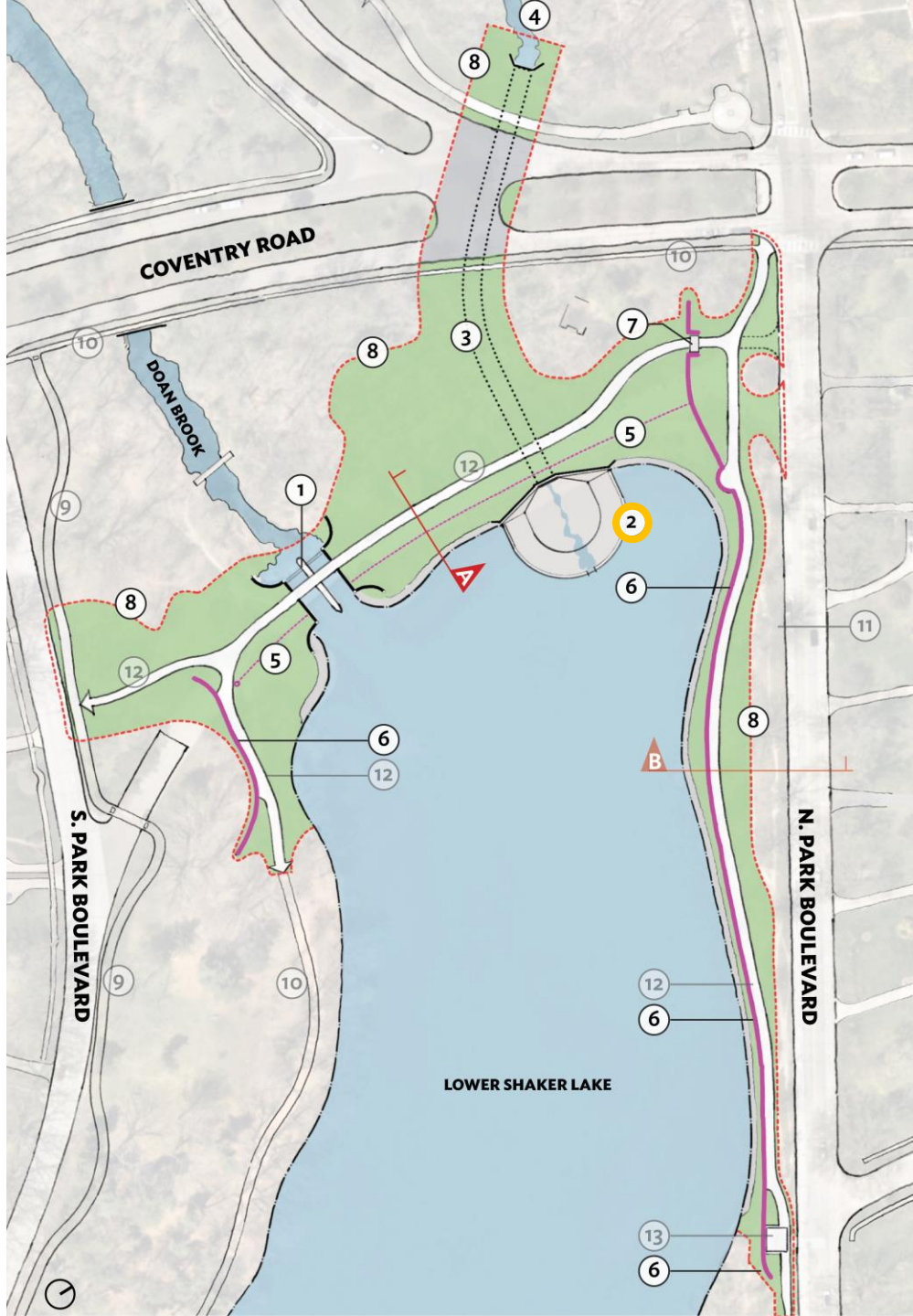

Northeast Ohio Regional Sewer District

Concept – Site Framework

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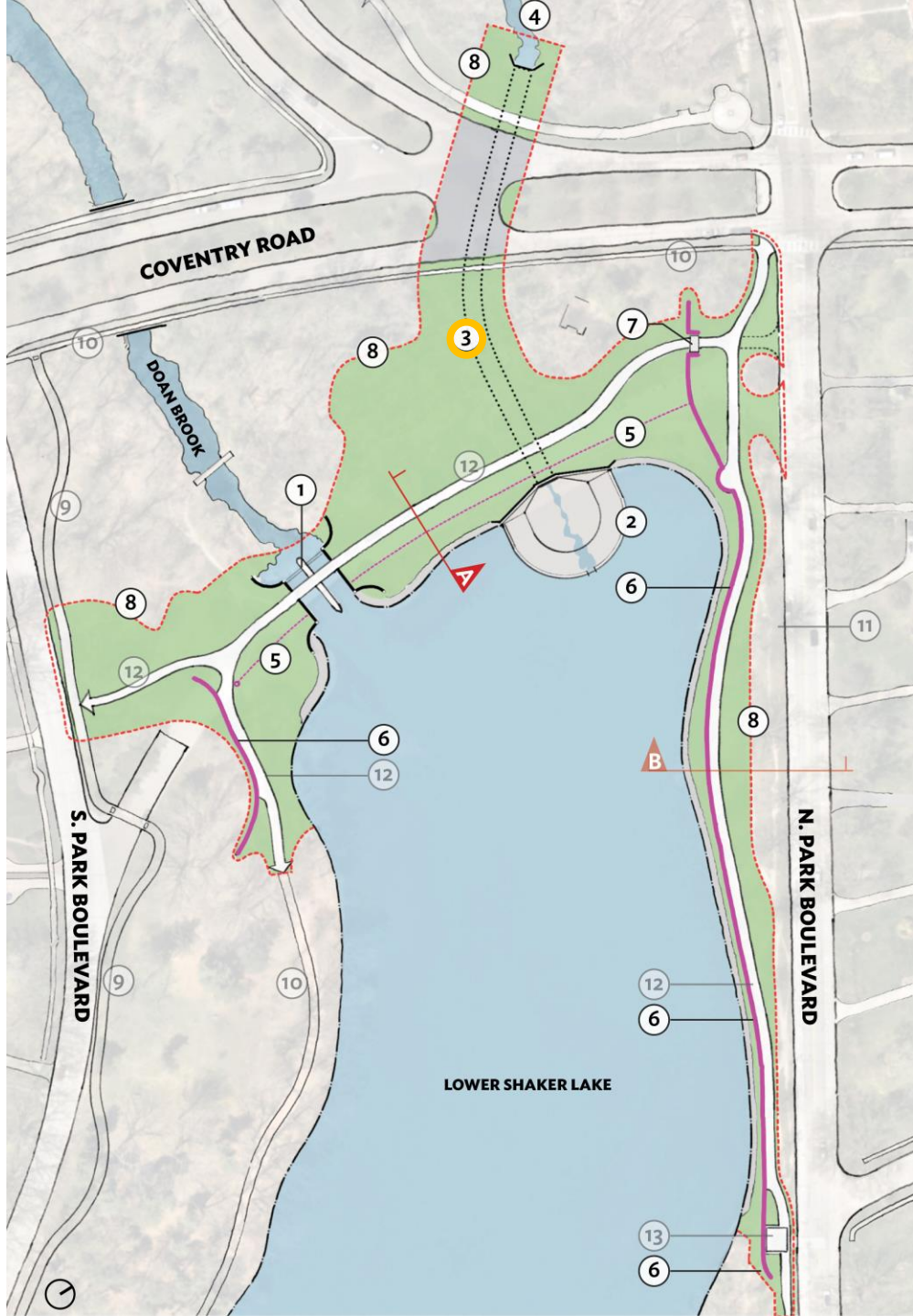

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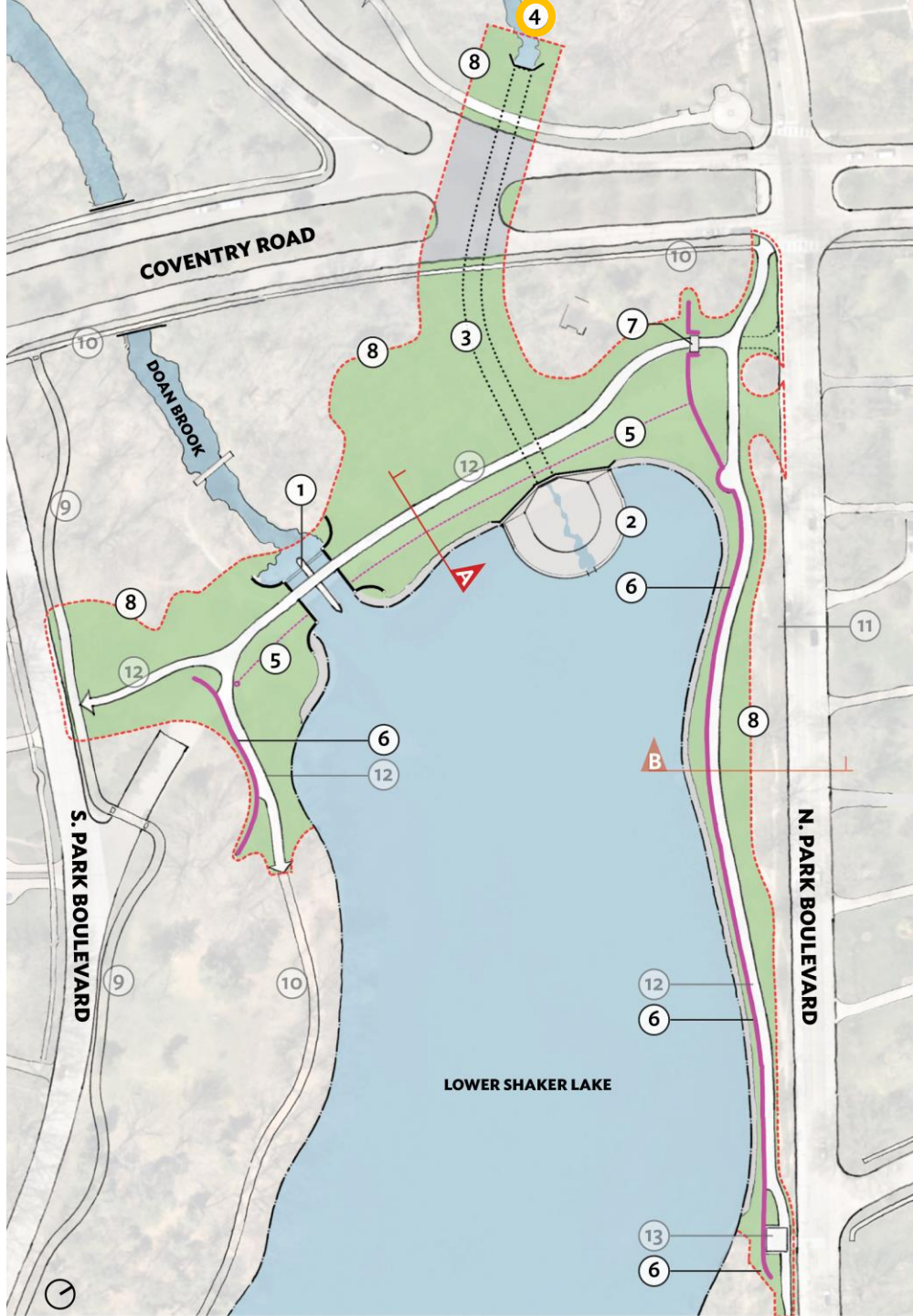

Northeast Ohio Regional Sewer District

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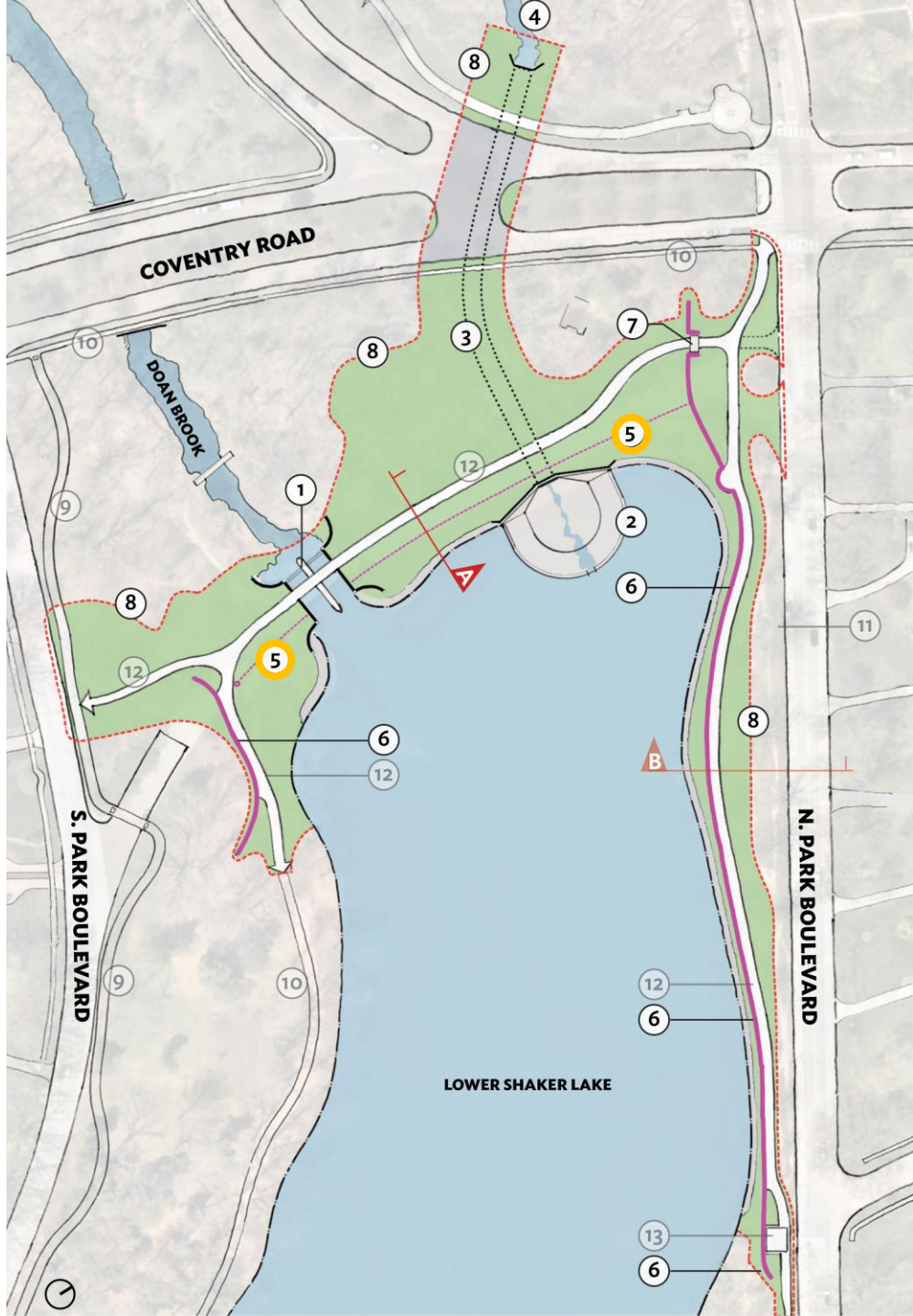
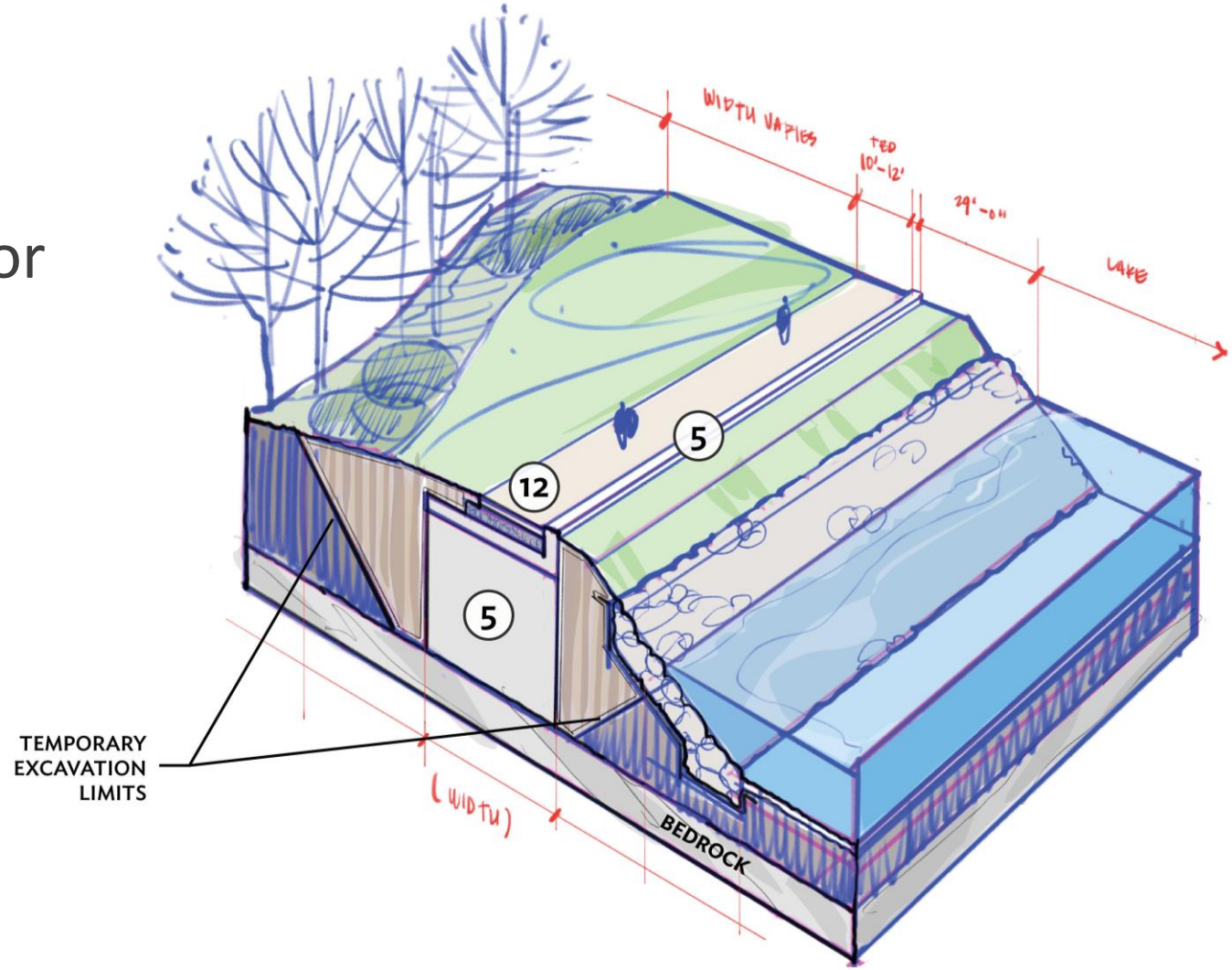


Northeast Ohio Regional Sewer District

Gravity Dam

- Provides overtopping protection for the dam



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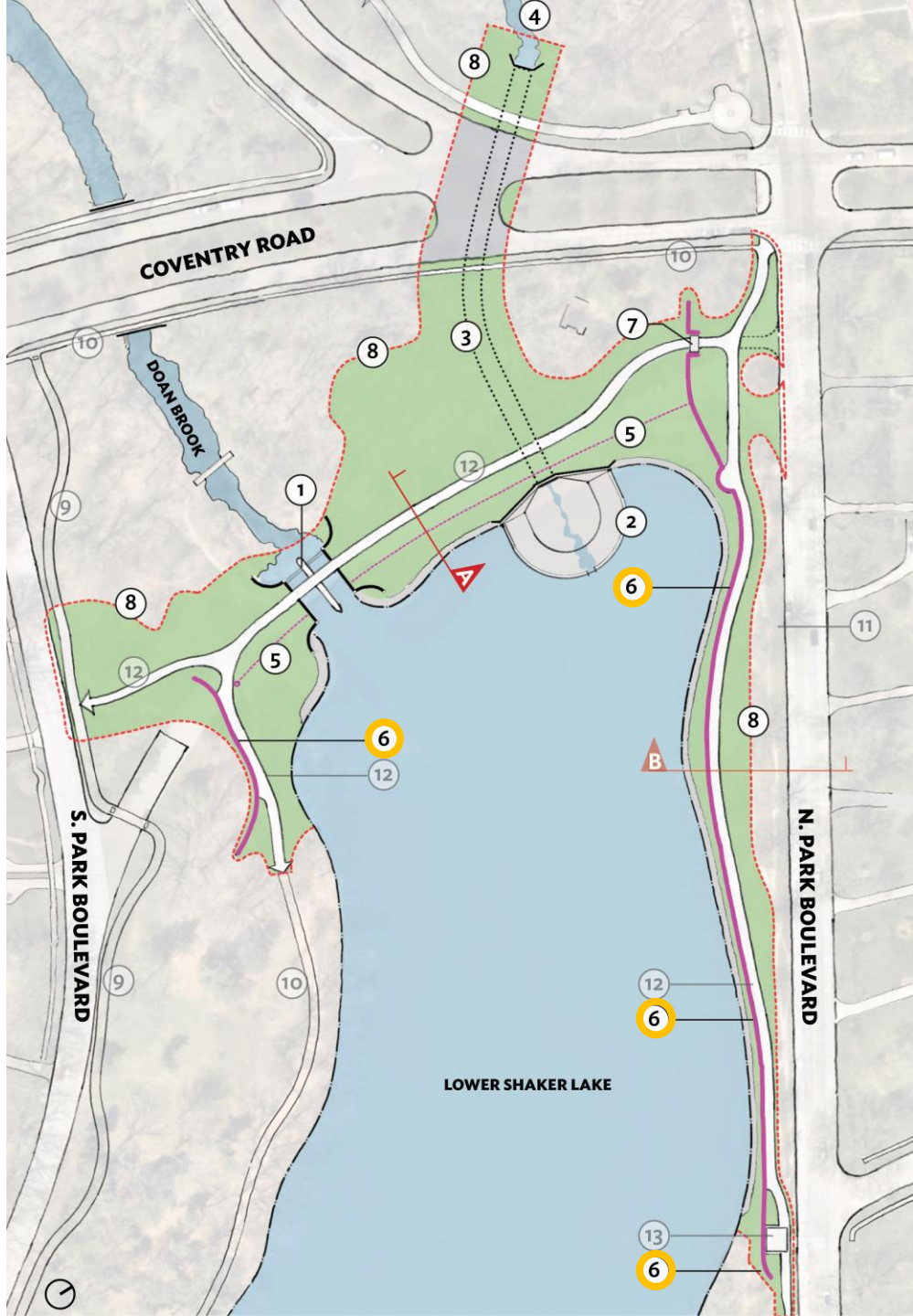

Northeast Ohio Regional Sewer District

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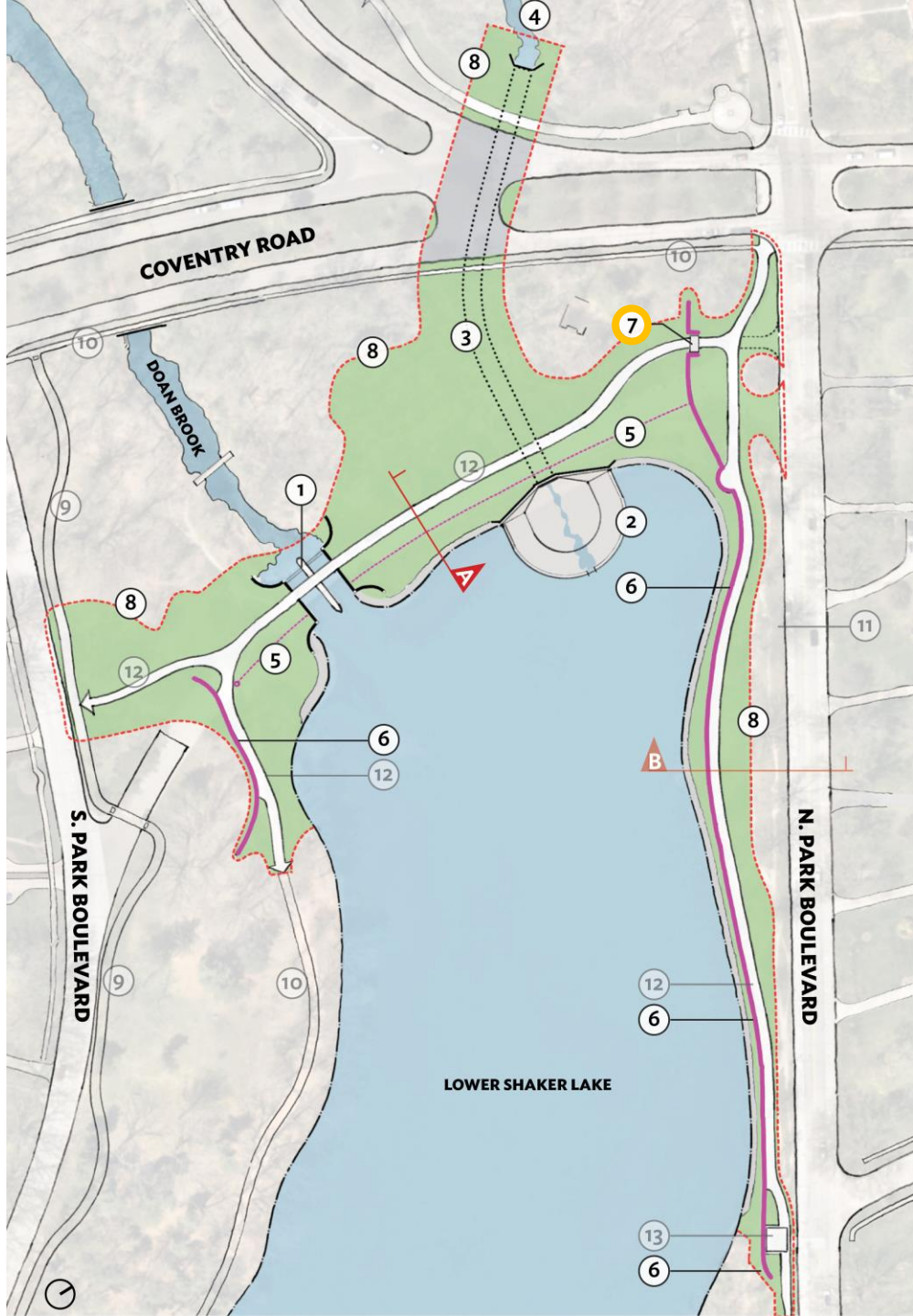

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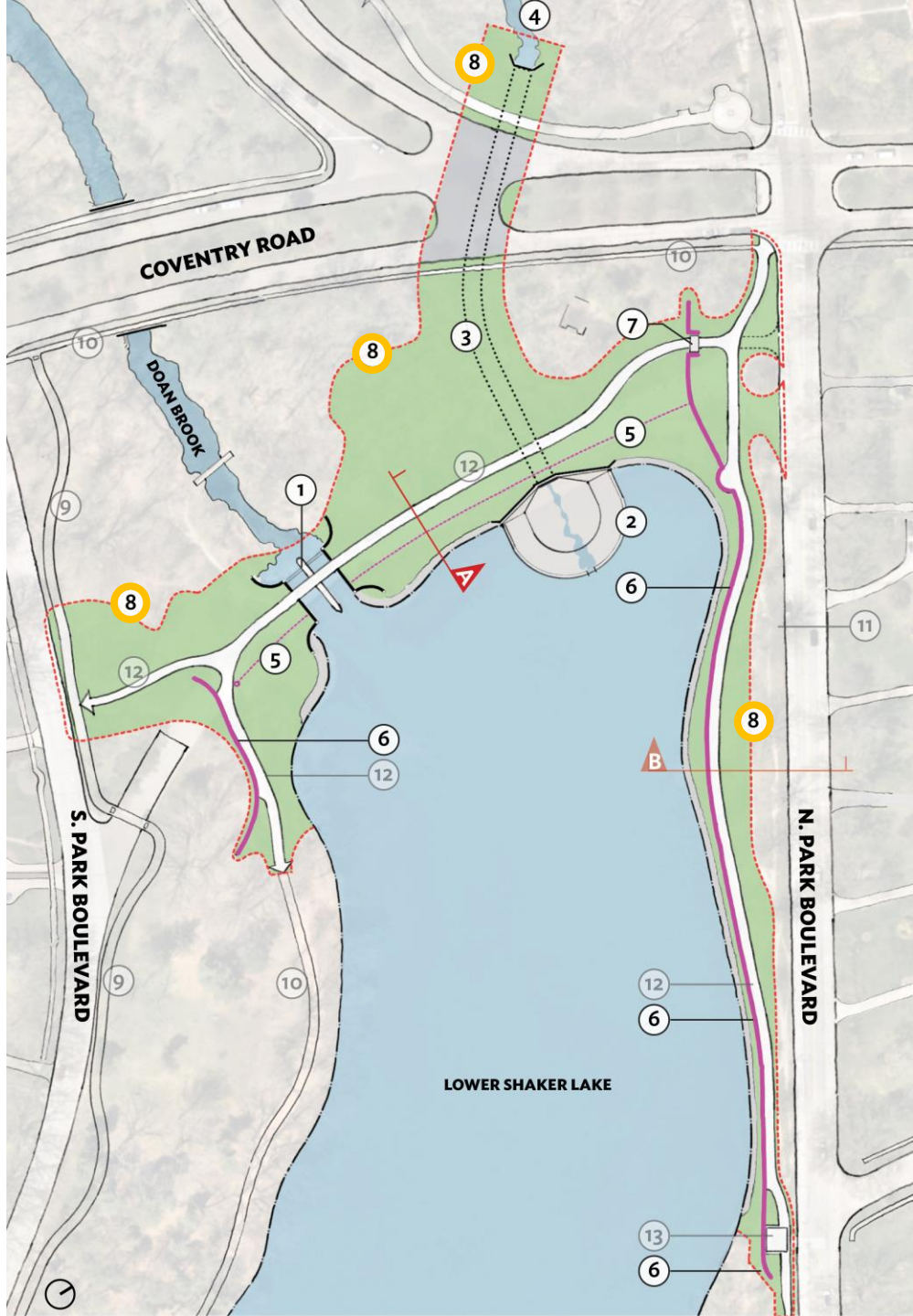
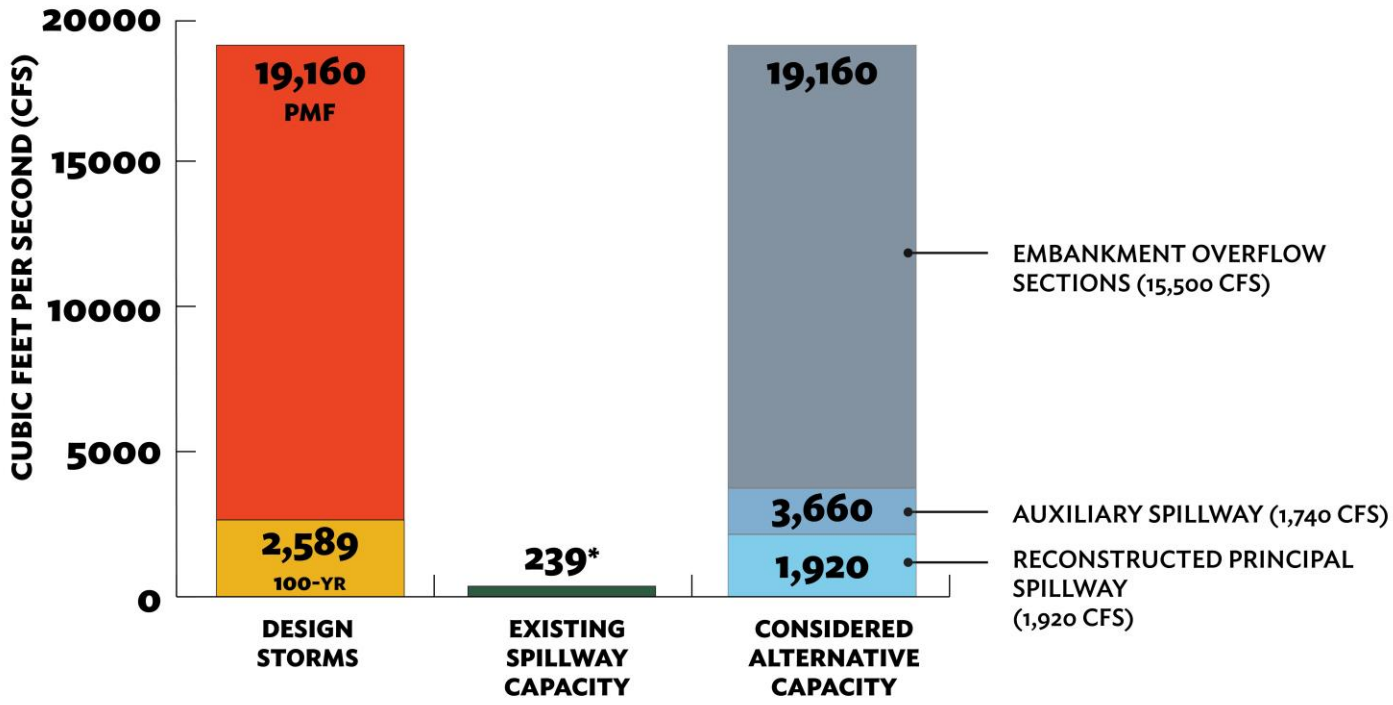


Northeast Ohio Regional Sewer District

Dam Operation/Function

- Expanded Spillway Capacity
  - Principal Spillway
  - Auxiliary Spillway
- Embankment Armoring
- Floodwalls



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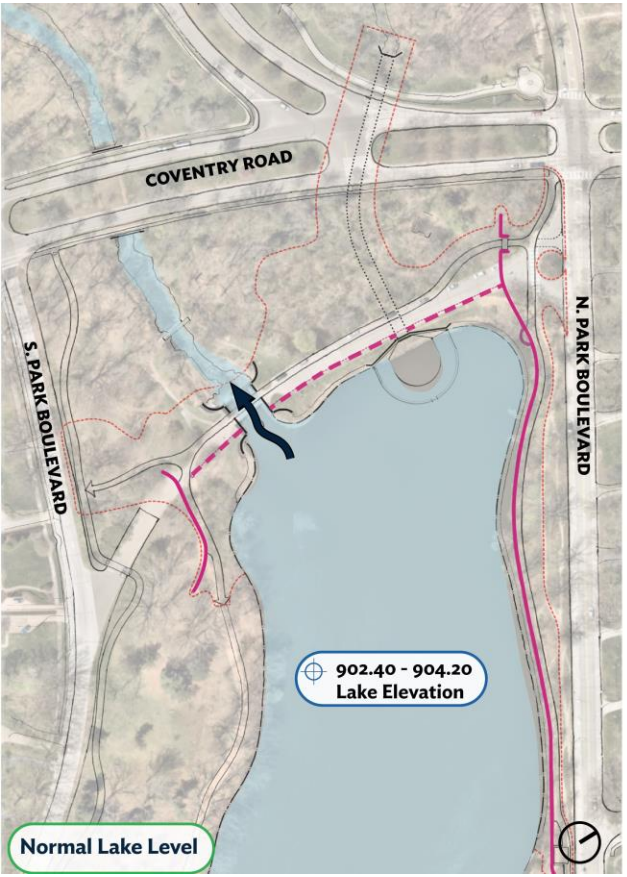

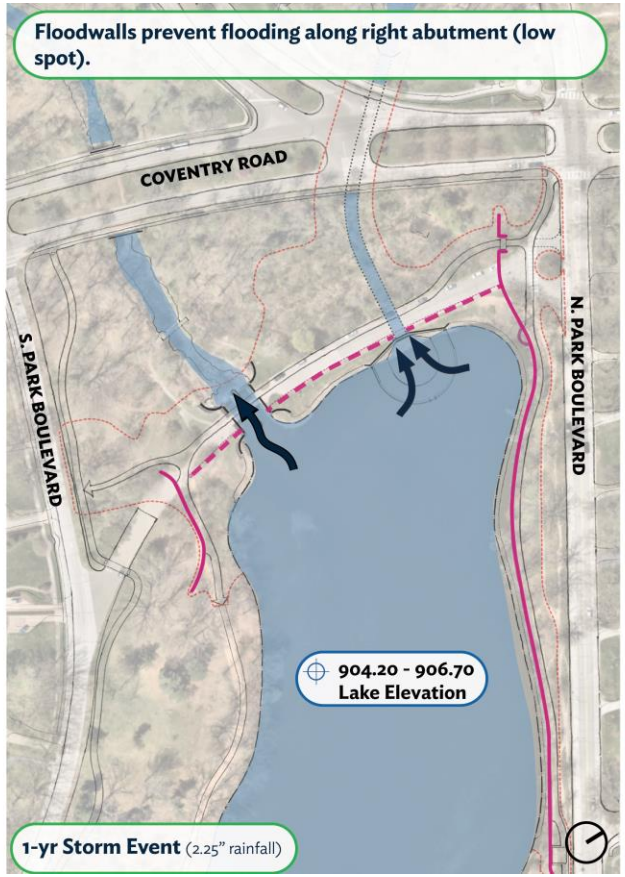

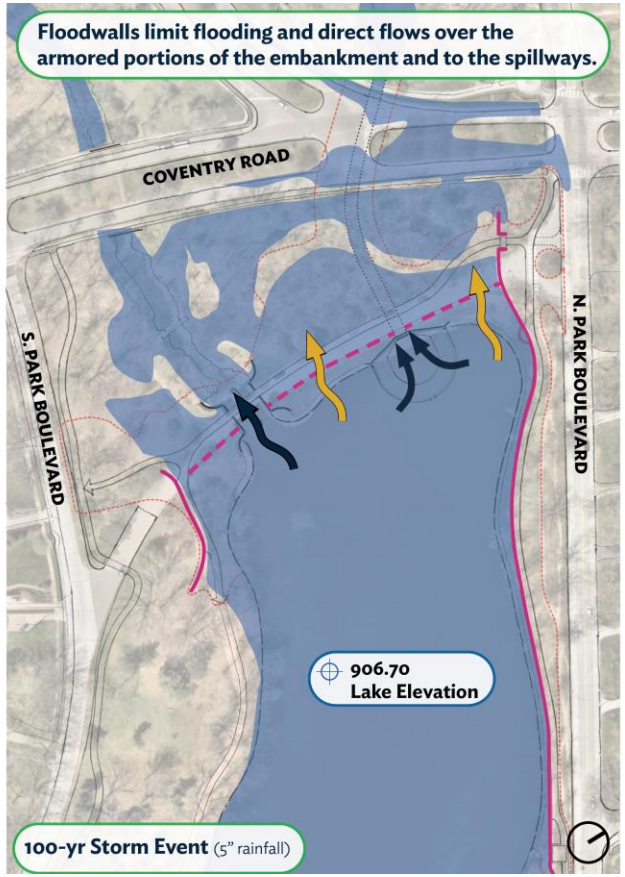

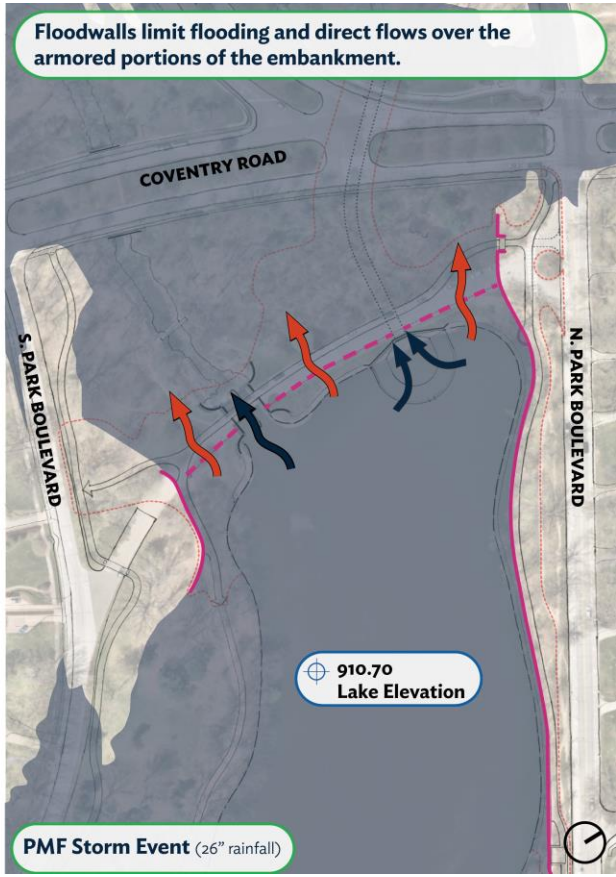

Northeast Ohio
Regional Sewer District

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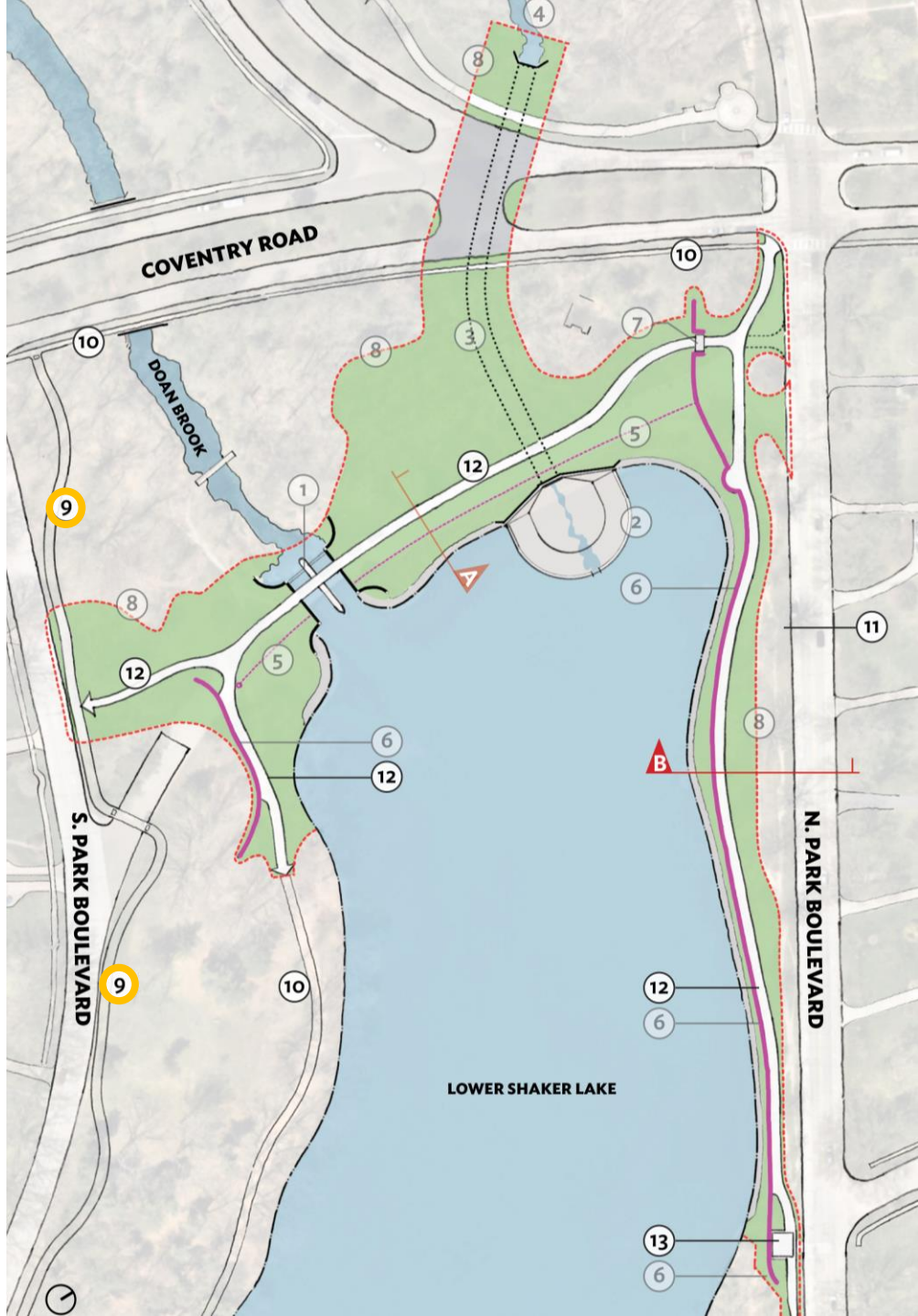

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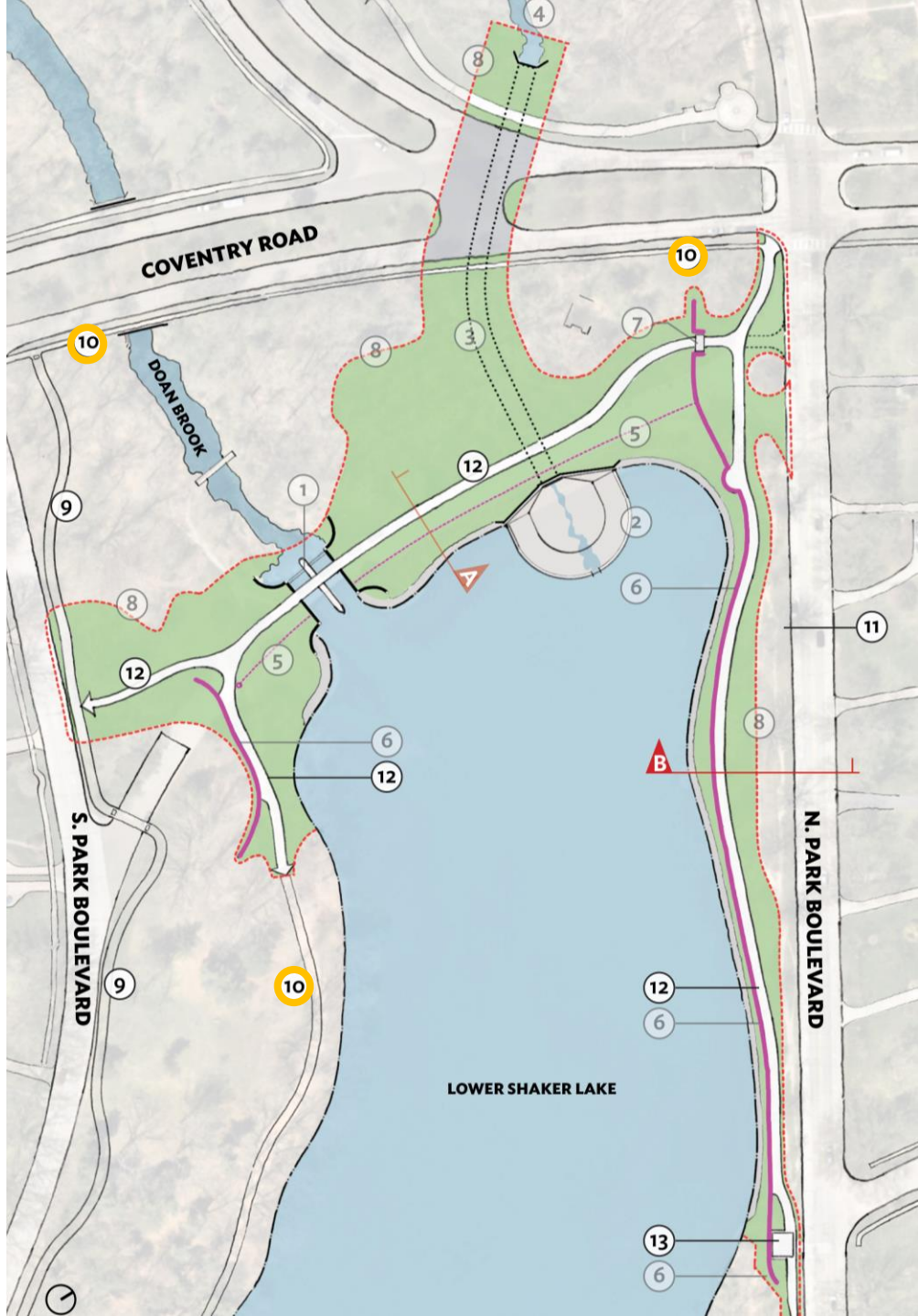

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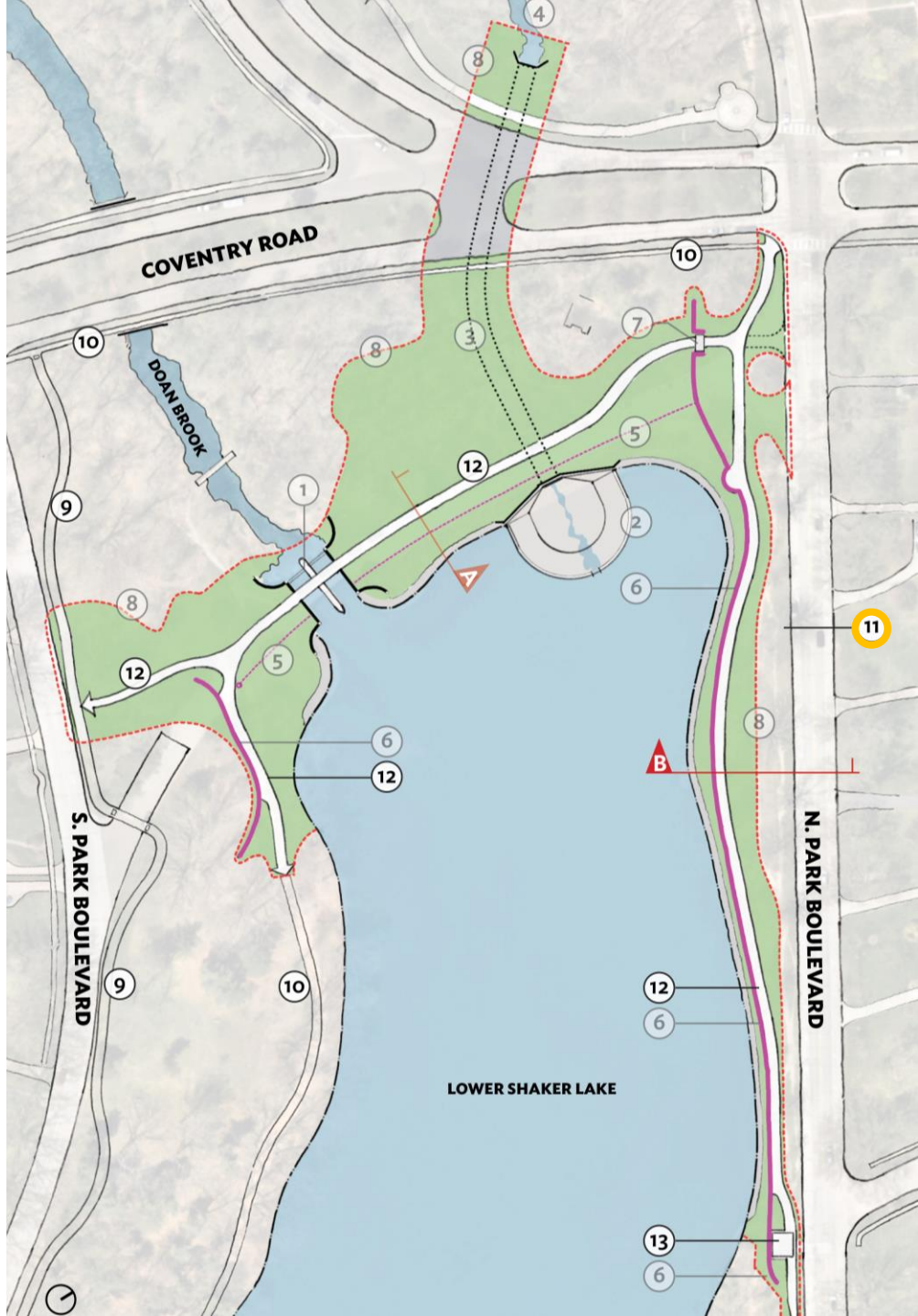

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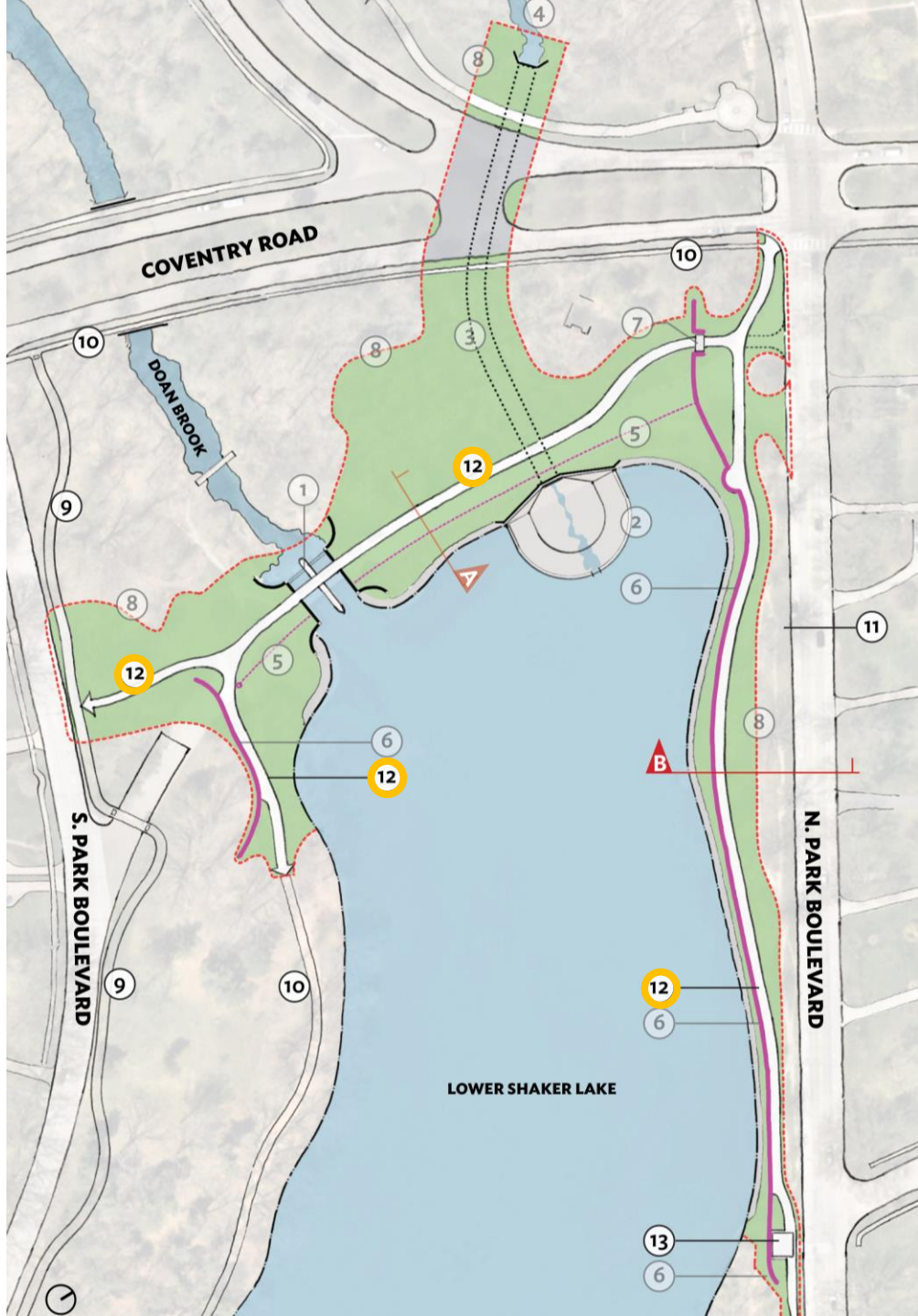

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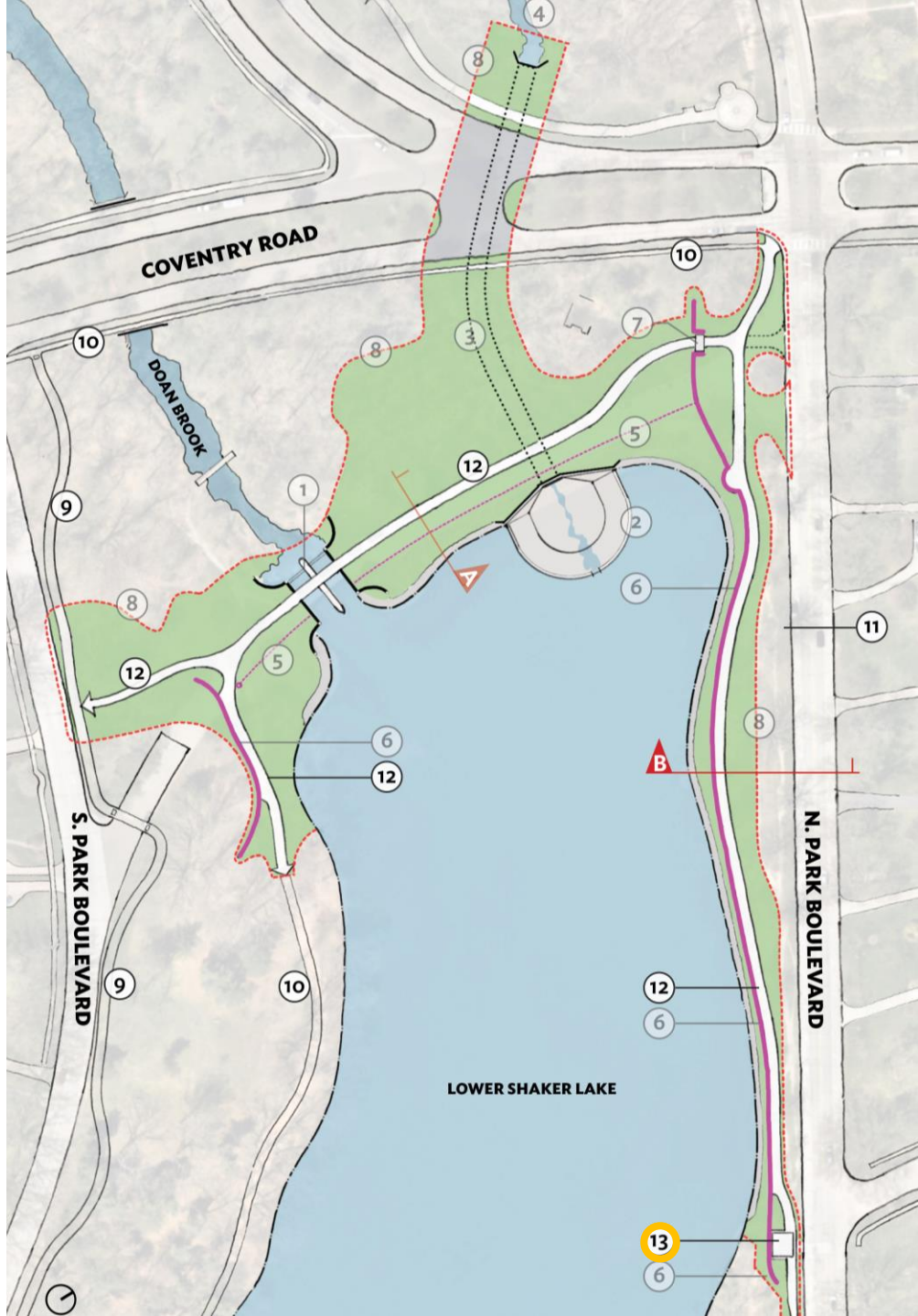
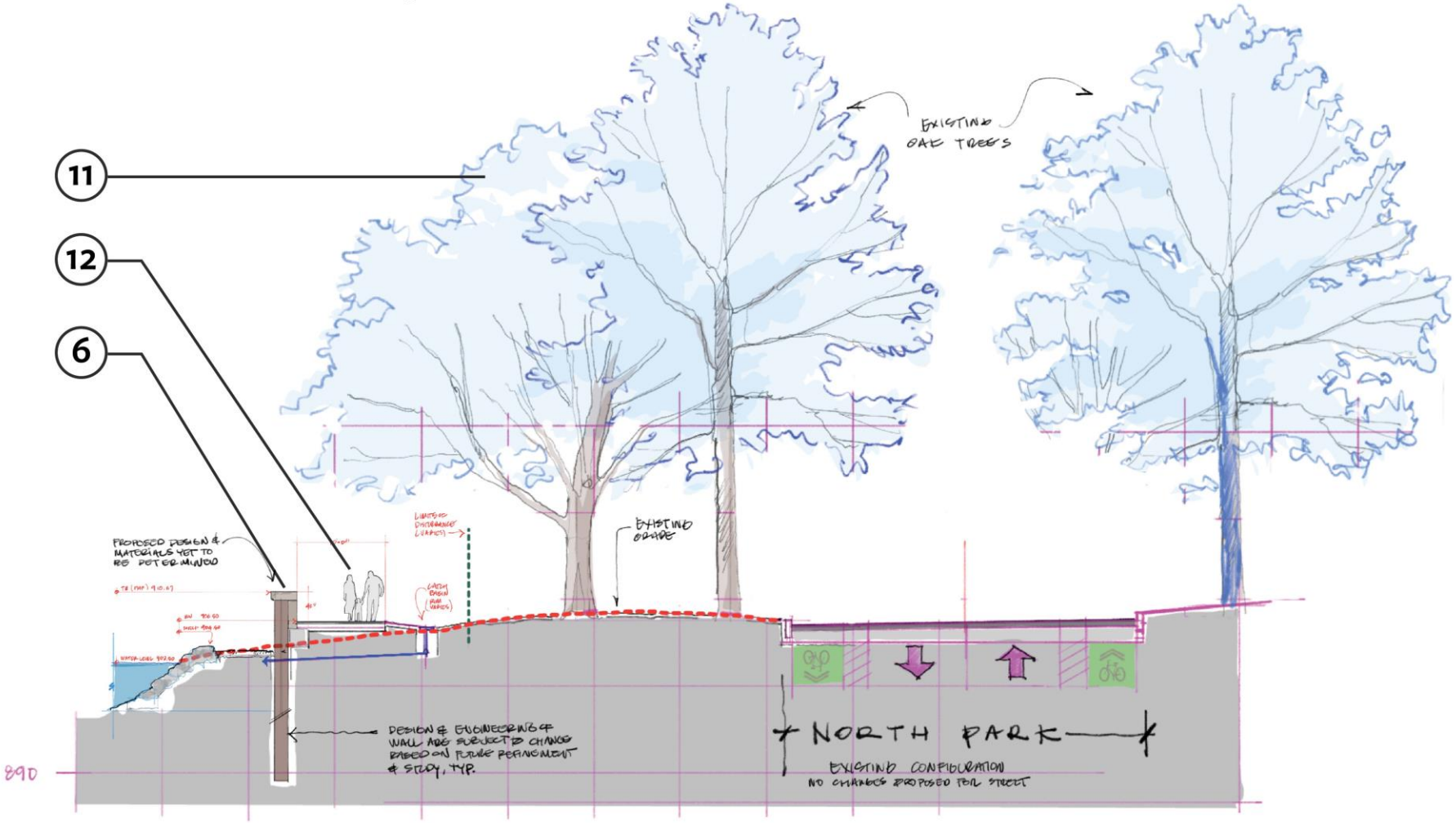


Northeast Ohio Regional Sewer District

Floodwall along North Park Boulevard



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9 SHAKER HEIGHTS MULTIPURPOSE TRAIL (BY OTHERS)
10 EXISTING WALK / PATHWAY
11 EXISTING LIBERTY OAK (TYPICAL)
12 PATHWAY CONNECTION
13 TRAIL NODE

Next Steps

- Continued Concept Development (Pre-Design)
- Evaluation of Alternatives (Pre-Design)
- Next Public Meeting (Fall 2024)
- Detailed Design (Fall 2024)

Summary of Park Space Changes

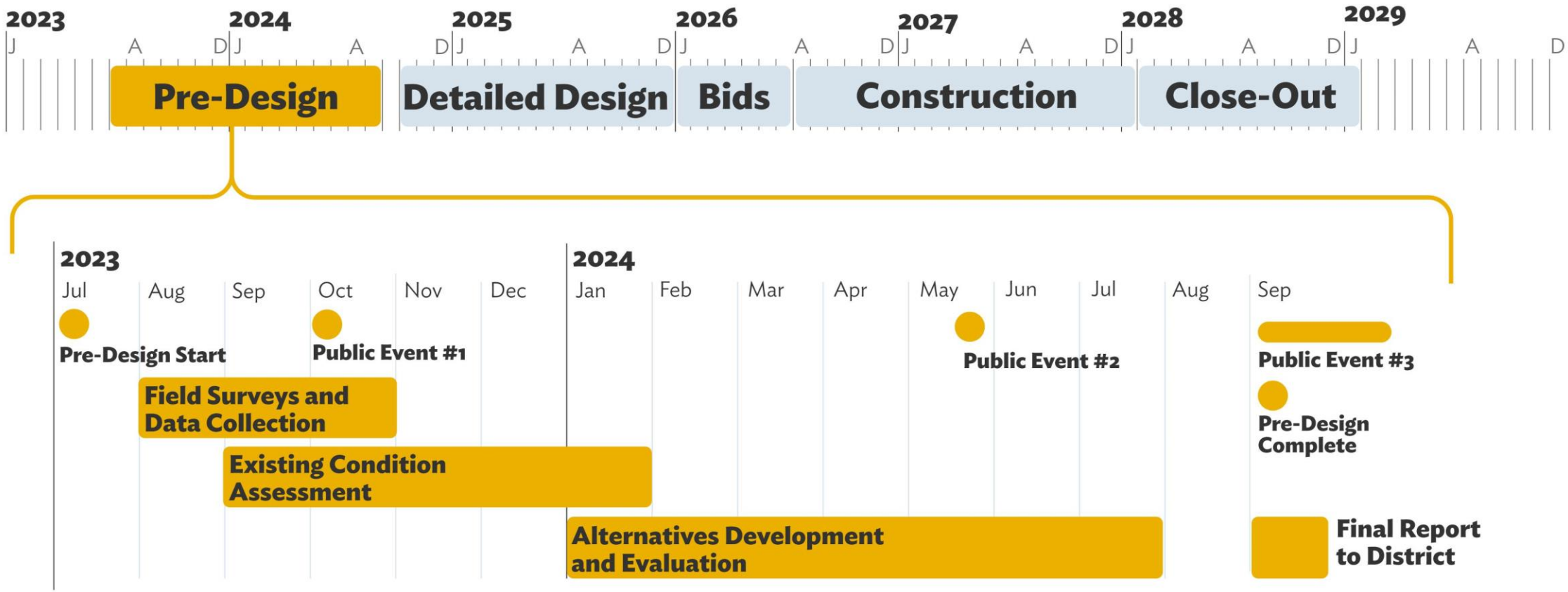
- Overtopping Protection / Armoring
- Floodwalls
- Reconstructed Principal Spillway
- Expanded Spillway Capacity

Summary of Park Space Changes

- Brook Road parking eliminated; alternative parking is being explored
- Tree preservation considerations

Pre-Design Phase

Timeline



Northeast Ohio Regional Sewer District

Public Engagement

Public Engagement

- May 21 at Nature Center at Shaker Lakes
  - 2600 South Park Boulevard
  - 11A – 1P and
    5P – 7P
- Doan Brook's Take to the Lake
- Pop-up events around town

neorsd.org/LowerLake

PROJECT UPDATES, PRESENTATION RECORDINGS, FAQ AND MORE!