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King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

# Roxhill Wetland Hydrology Study

## Initial Findings

February 11, 2020

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# For today:

- History of Change at Roxhill Park
- Describe the existing hydrology of the wetland
- Discuss the implications and next steps



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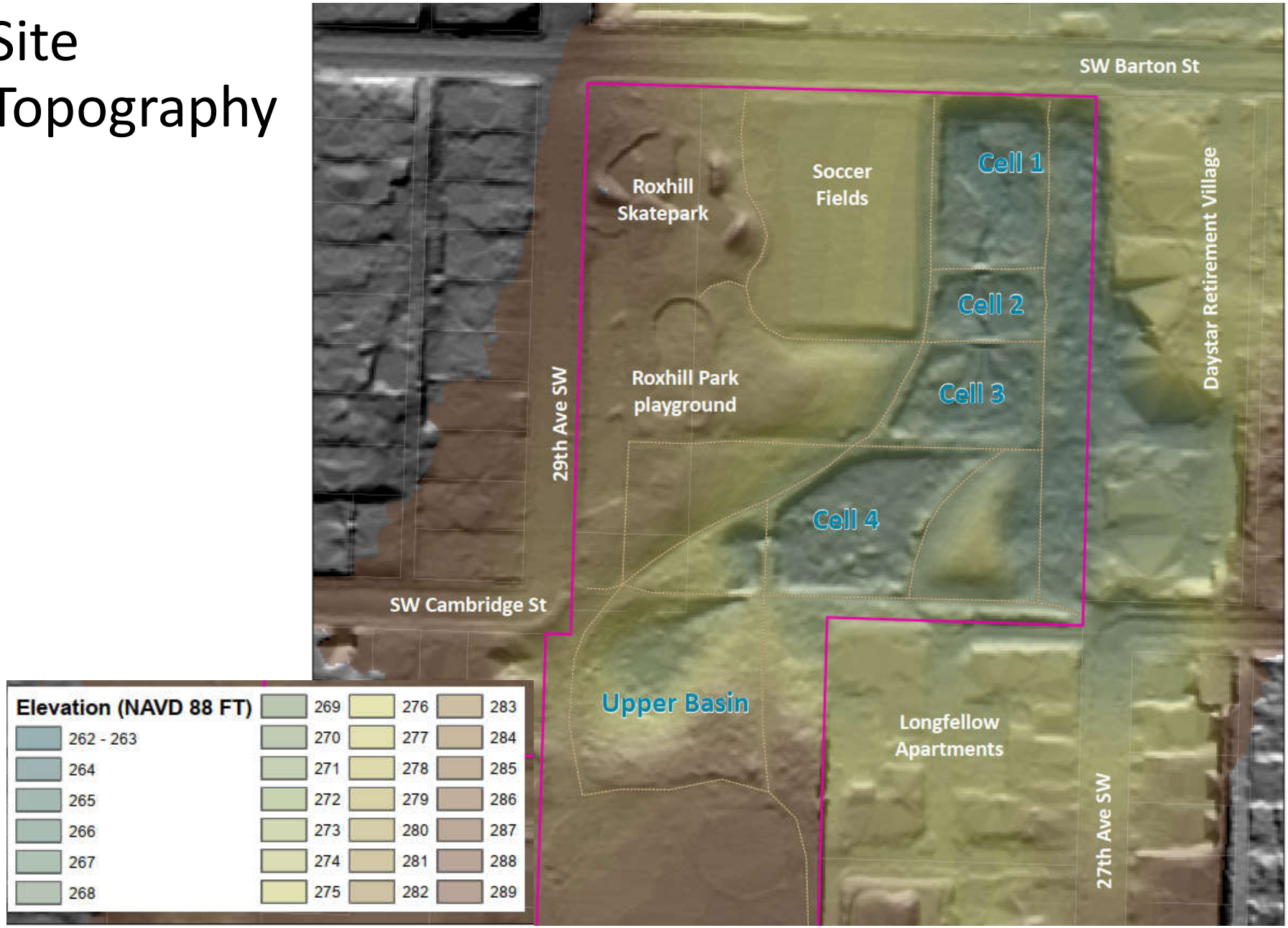
# Site Overview

# Site Topography





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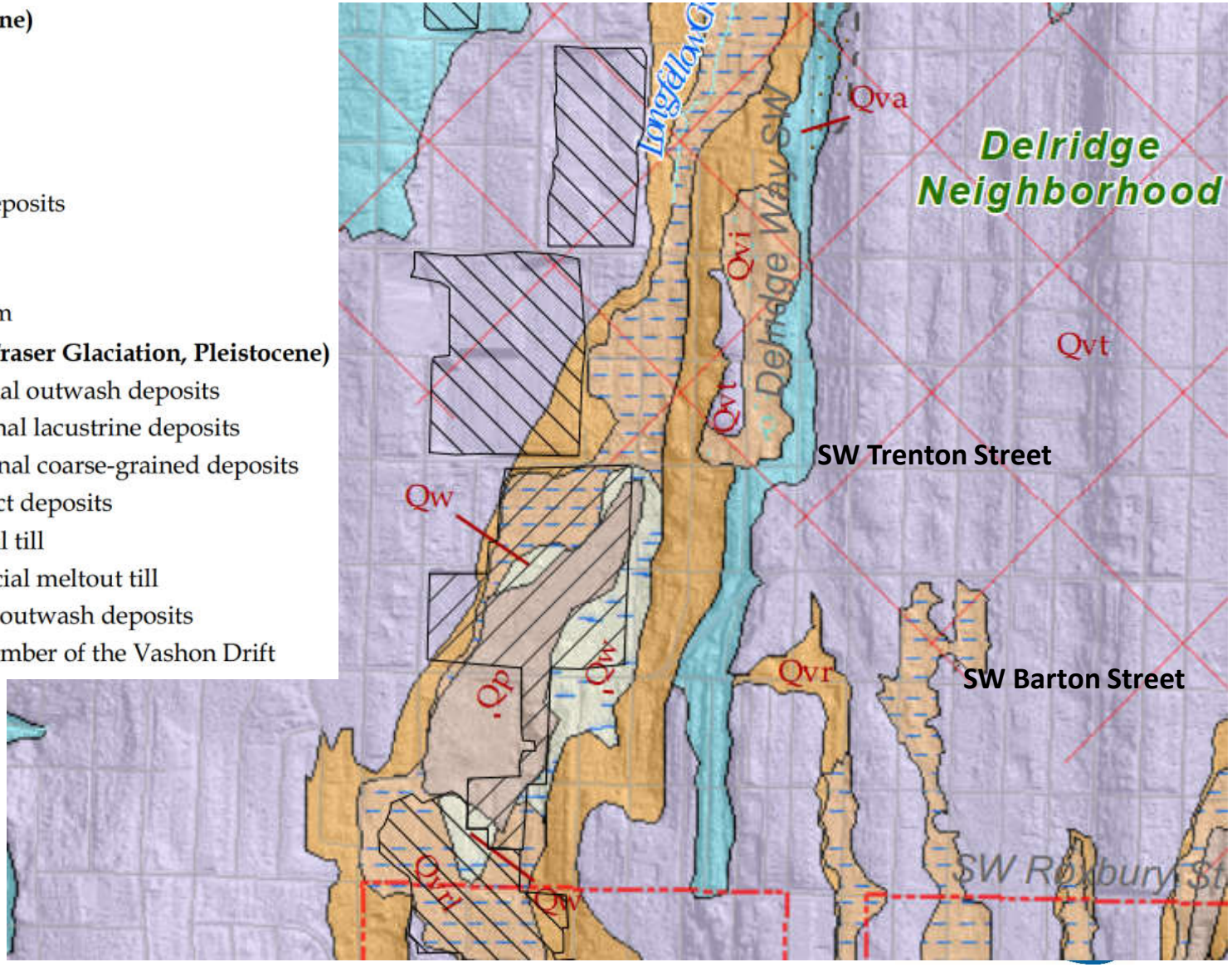
# USGS Geologic Mapping

**Nonglacial Deposits (Holocene)**

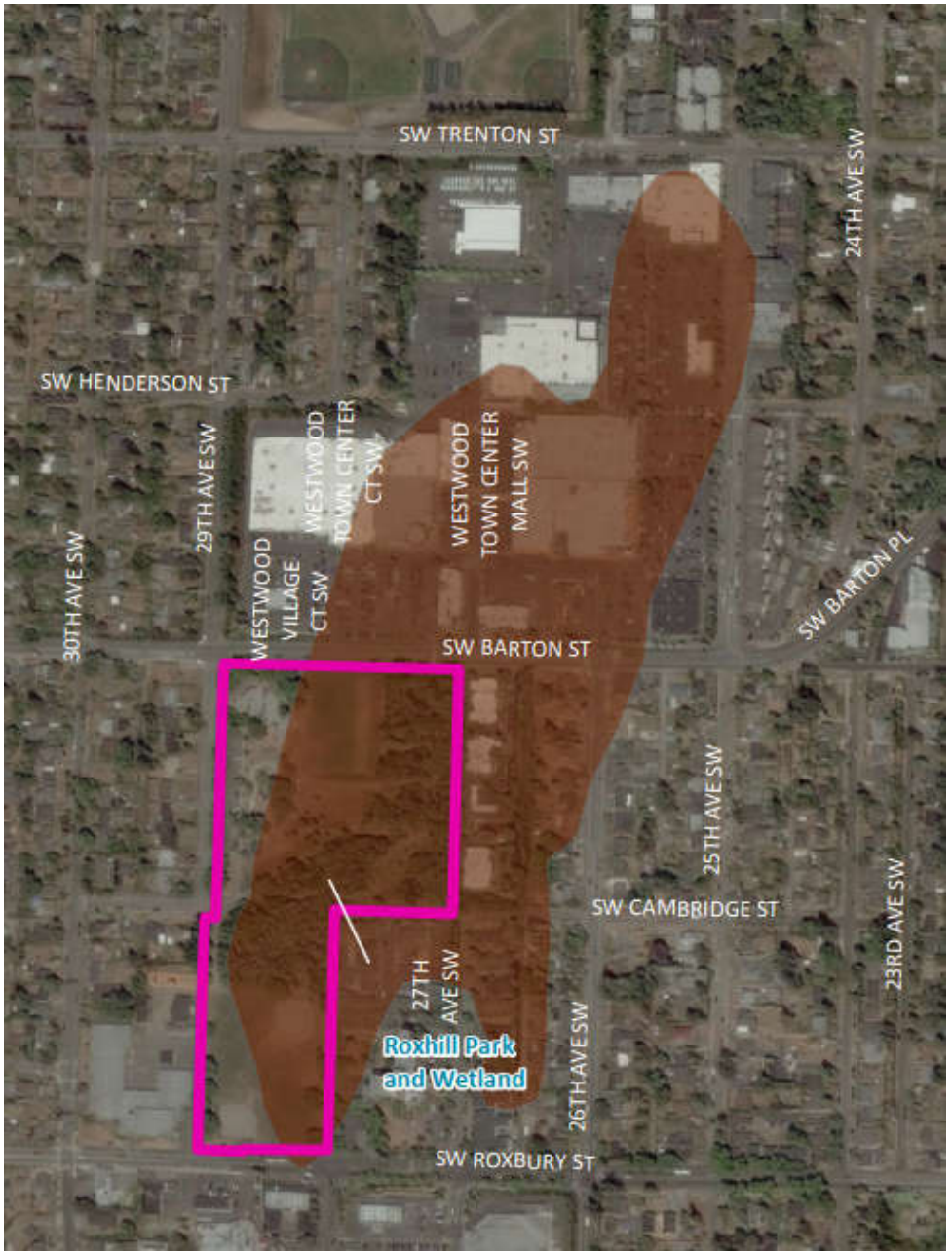
- water
- Qw - Wetland deposits
- Qp - Peat
- Qb - Beach deposits
- Qbu - Uplifted beach deposits
- Qtf - Tideflat deposits
- Qal - Alluvium
- Qyal - Younger alluvium

**Younger Glacial Deposits (Fraser Glaciation, Pleistocene)**

- Qvr - Vashon recessional outwash deposits
- Qvrl - Vashon recessional lacustrine deposits
- Qvrc - Vashon recessional coarse-grained deposits
- Qvi - Vashon ice-contact deposits
- Qvt - Vashon subglacial till
- Qvtm - Vashon subglacial meltout till
- Qva - Vashon advance outwash deposits
- Qvlc - Lawton Clay member of the Vashon Drift



# USGS Geologic Mapping



# Glaciolacustrine sediments at roughly 8 feet below ground

# Post 1851:

- Phase 1: – timber felling and drainage
- Phase 2: Post WWII urbanization
- Phase 3: ~1999 to present restoration

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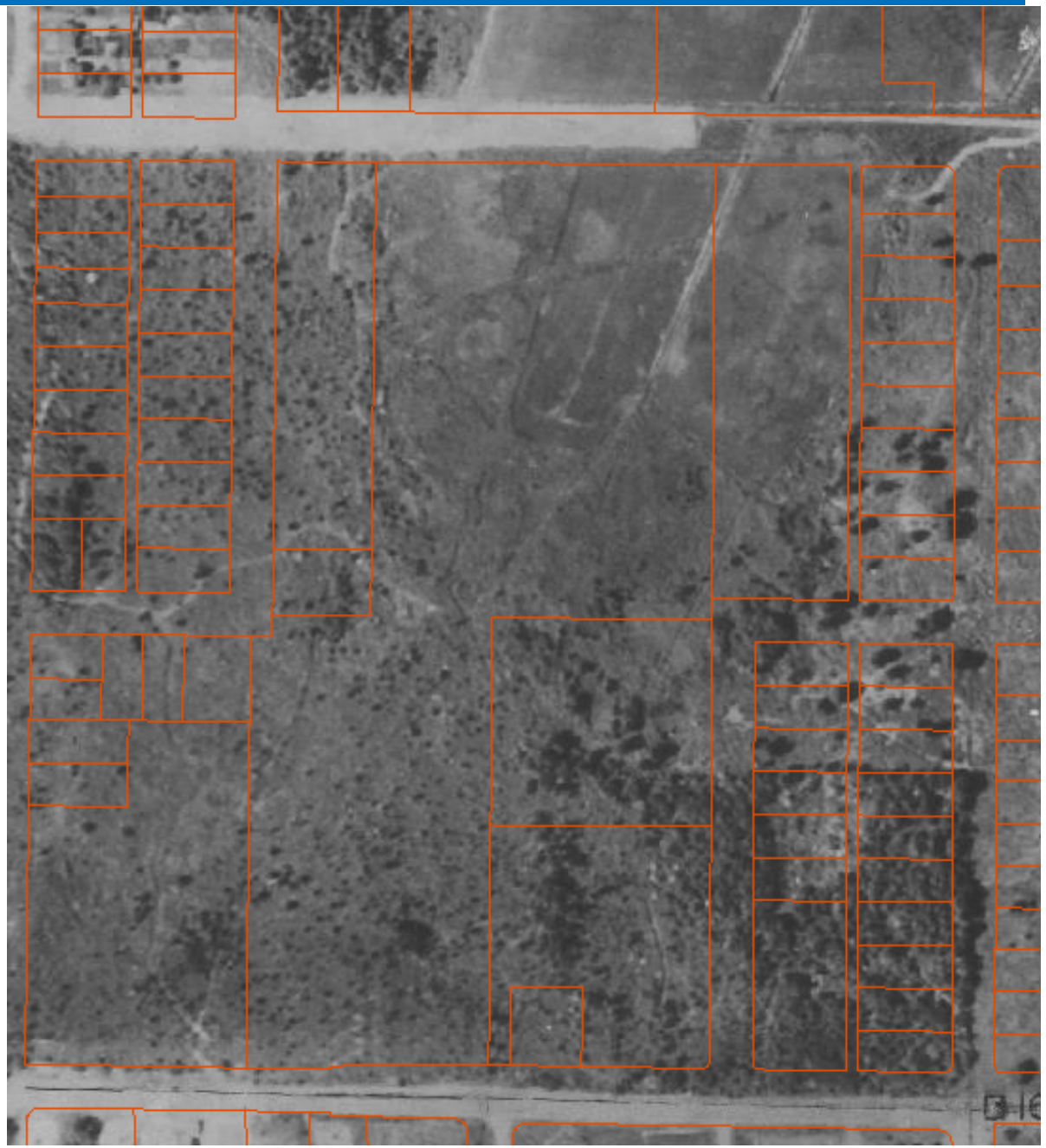
# 1936 View


SW Trenton ST
SW Barton ST
35th Ave SW
26th Ave SW
SW Roxbury ST
0.3km
0.2mi
47.53324 -122.38224 Degrees

# 1936 View



# 1961 Osaki farm (north of Roxhill)

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# 1950s – Peat as resource


*From West Seattle Herald Archives*

**Seola peat area**

The Seola peat area (12 acres) is south of the West Seattle district of the city of Seattle. The streets and avenues are numbered on the Seattle system. There is access to the peat by a private road which leads west from 28th Avenue S.W. near 104th Street S.W. (map, fig. 70).

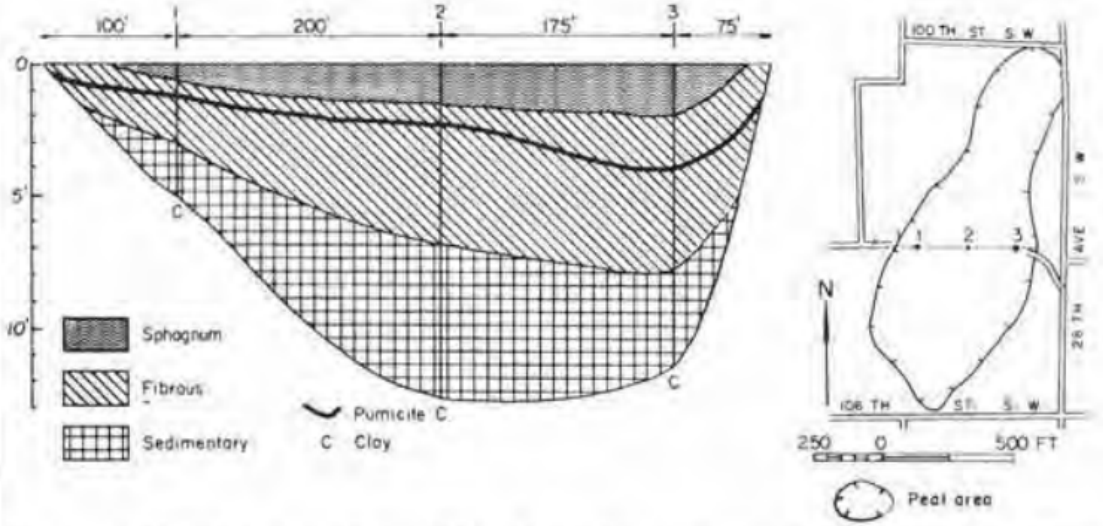


FIGURE 70.—Map and profile of Seola peat area (12 acres). Map adapted from U. S. Department of Agriculture soil map of King County and U. S. Army Map Service photomosaic.

*From Rigg 1955*



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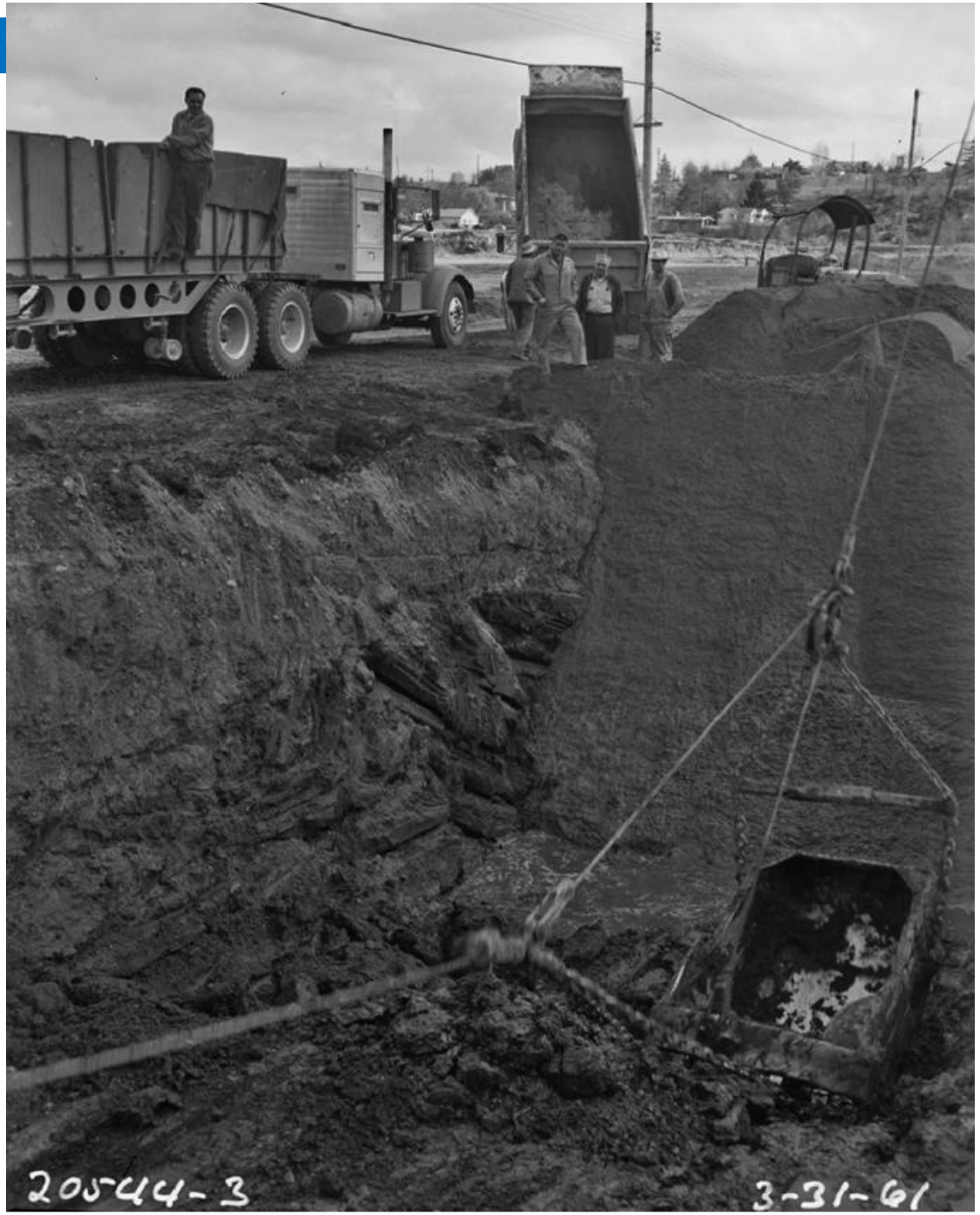
# 1961 Paving Barton

*Courtesy of the Seattle Municipal Archives 66618*



# 1969 View

*Courtesy of the Seattle Municipal Archives 77618*



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# 1969 View

*Courtesy of the Seattle Municipal Archives 78193*



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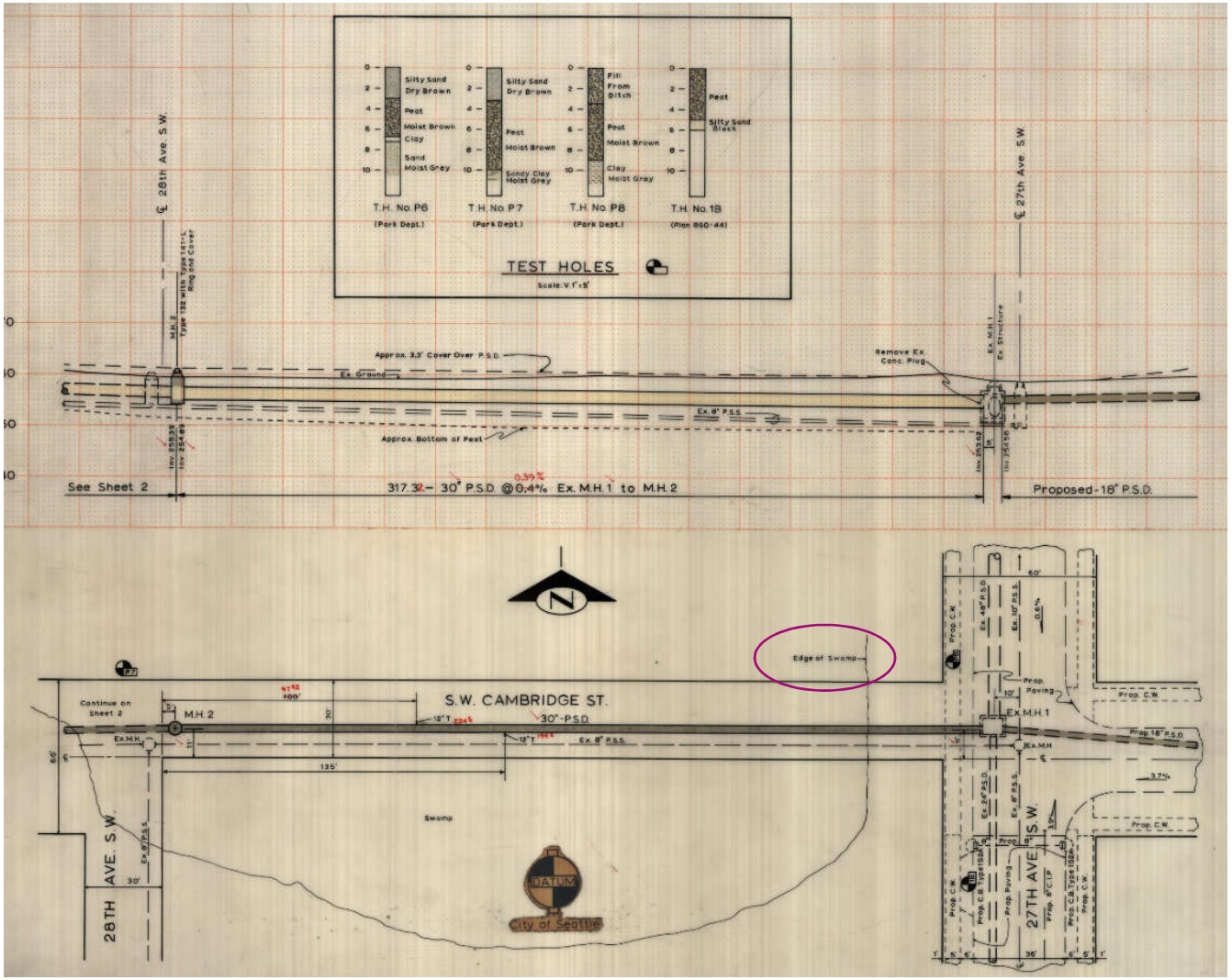
# 1969 Sewer Plans – SW Cambridge



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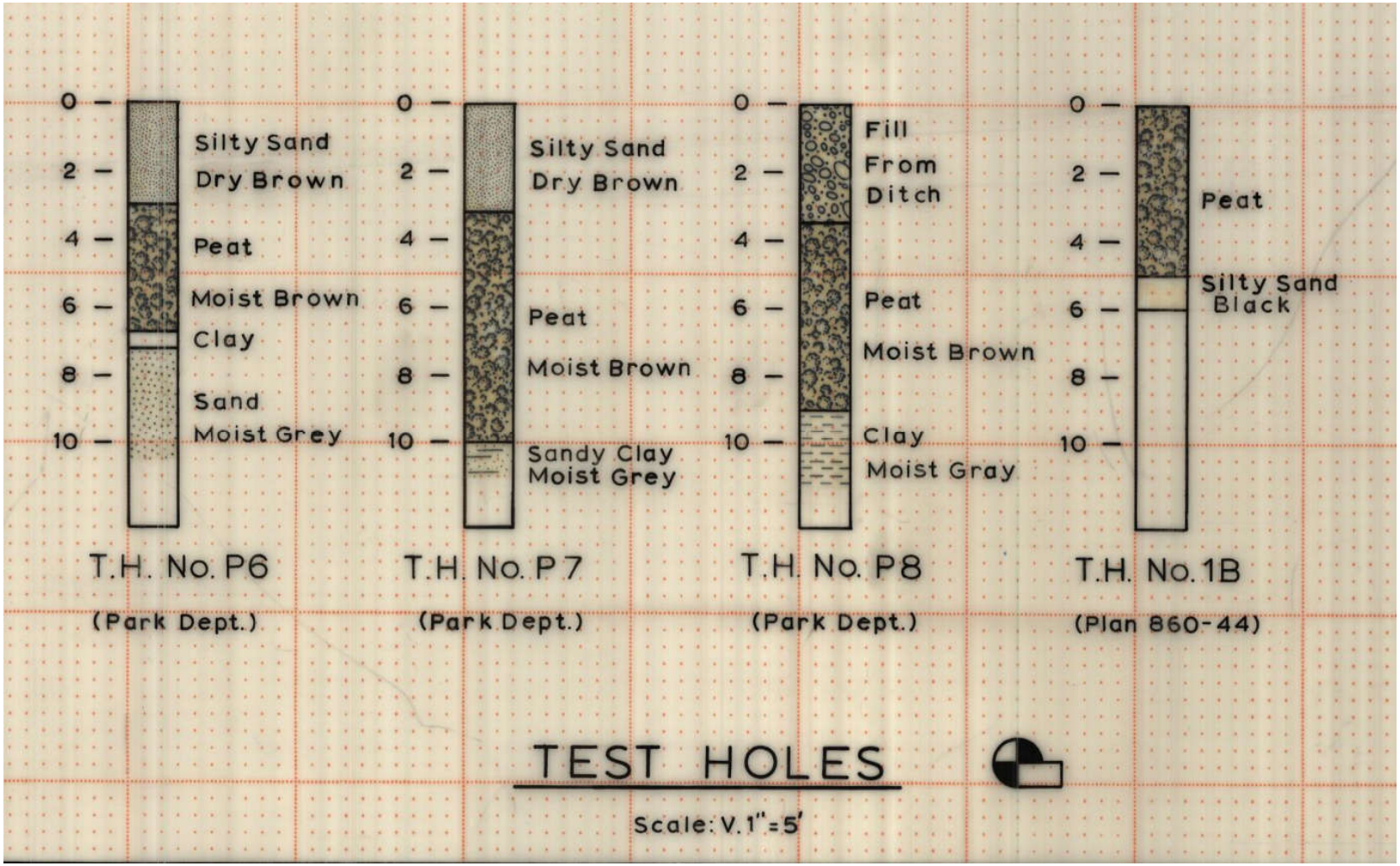
# 1969 Sewer Plans



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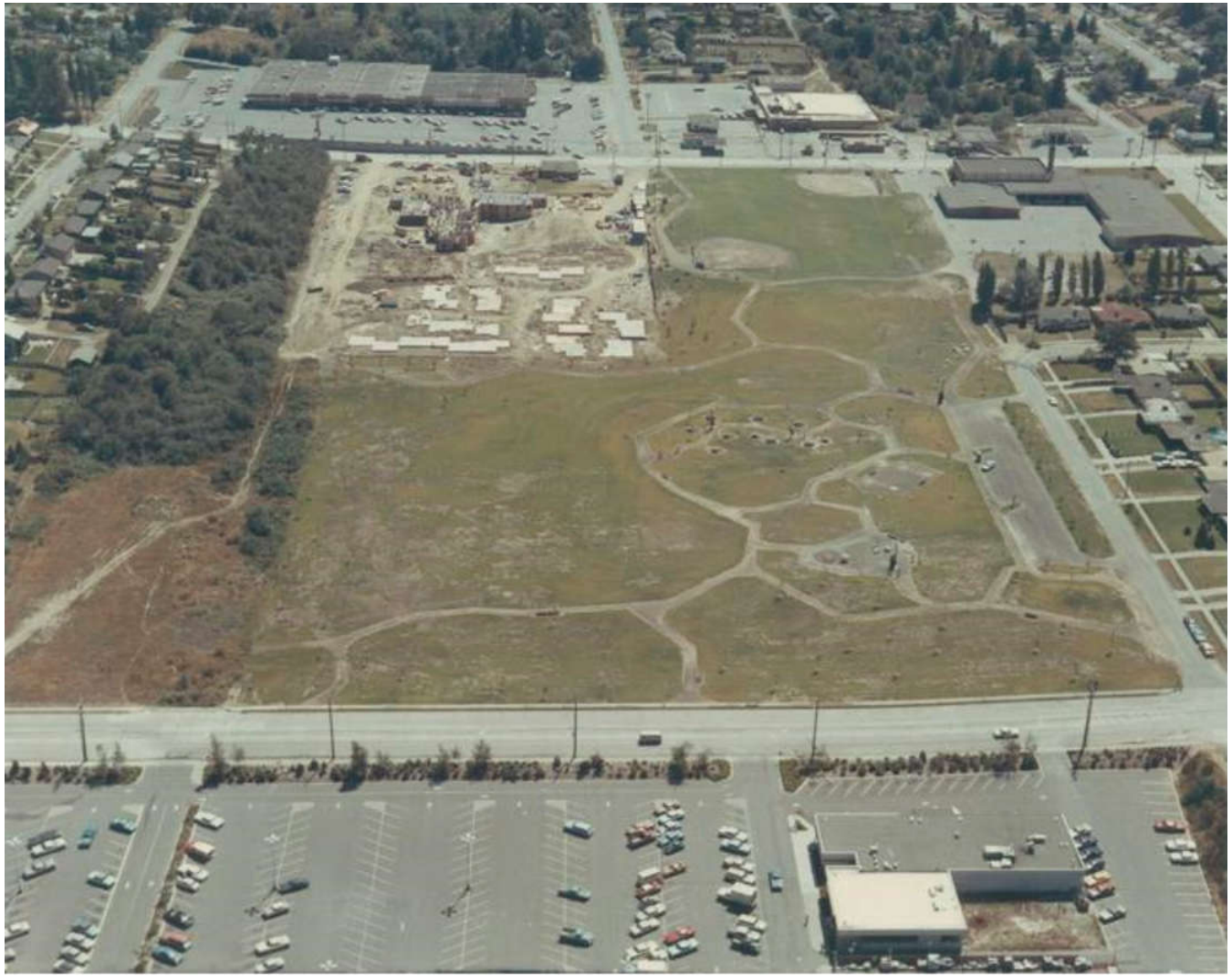
# 1970 View



*Courtesy of the Seattle Municipal Archives 78199*



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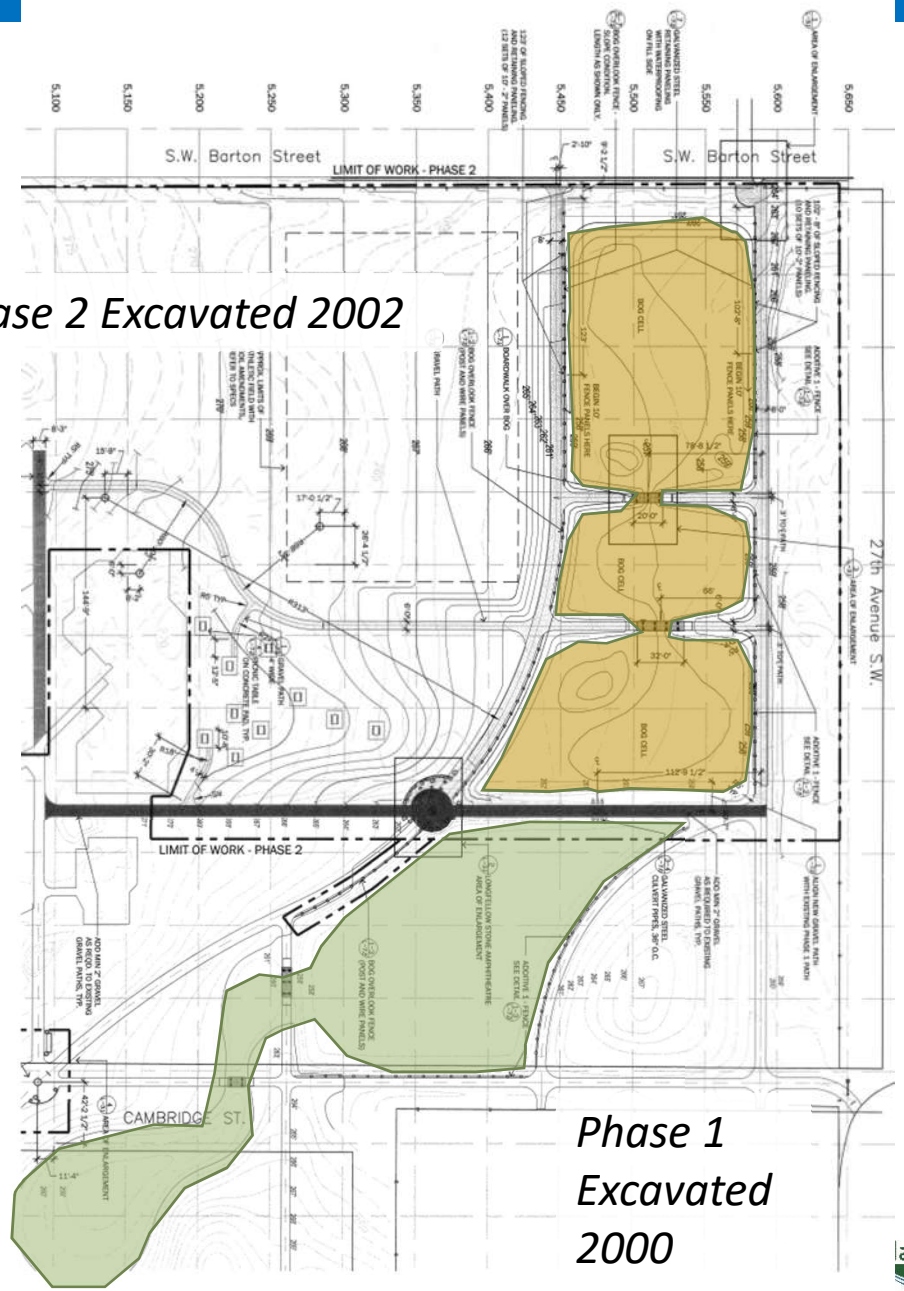
# Late 1990s Restoration




*Phase 2 Excavated 2002*

*Phase 1 Excavated 2000*



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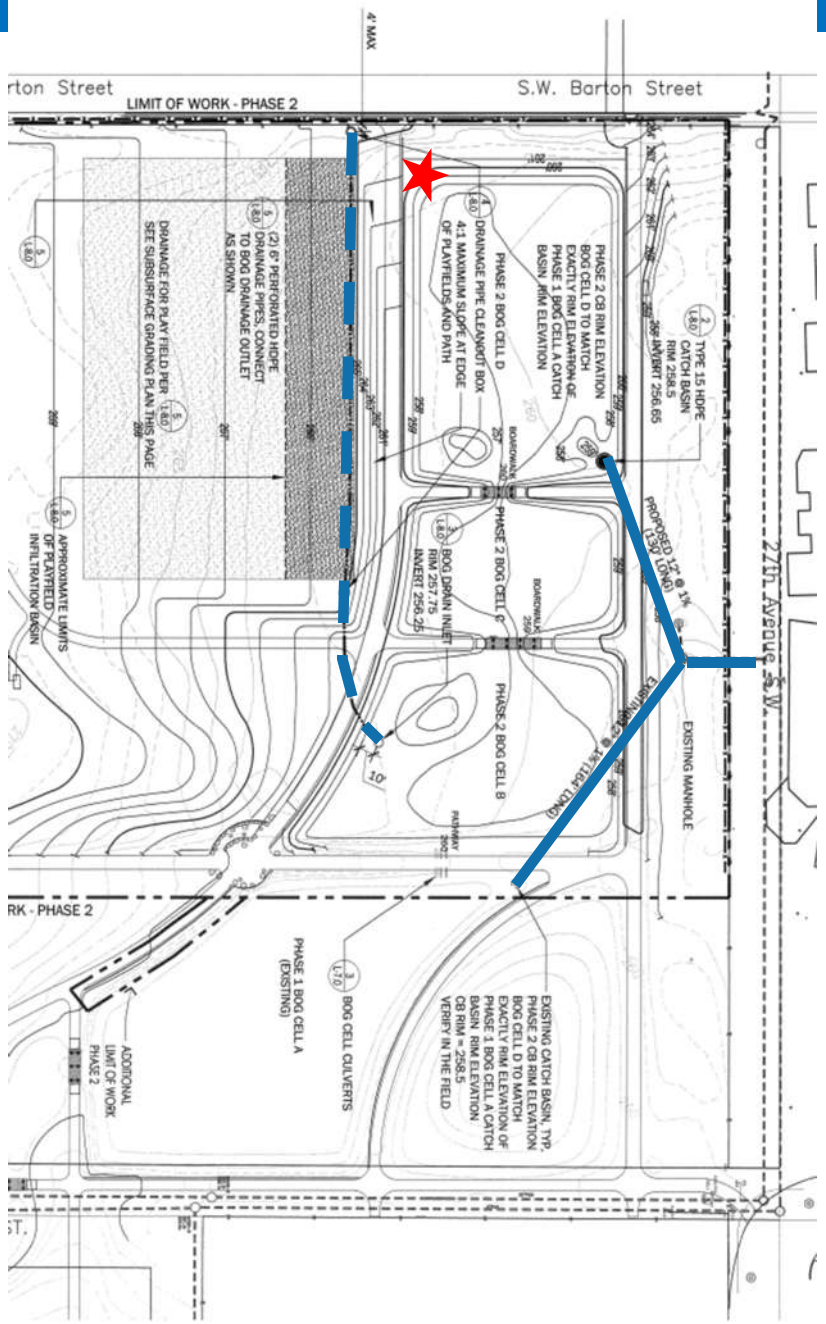
# Drainage Infrastructure



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# What do we know about the current hydrology?

- Data were collected in 1999 to support the initial restoration
- Observations since that time
- Our focused field effort in late 2019



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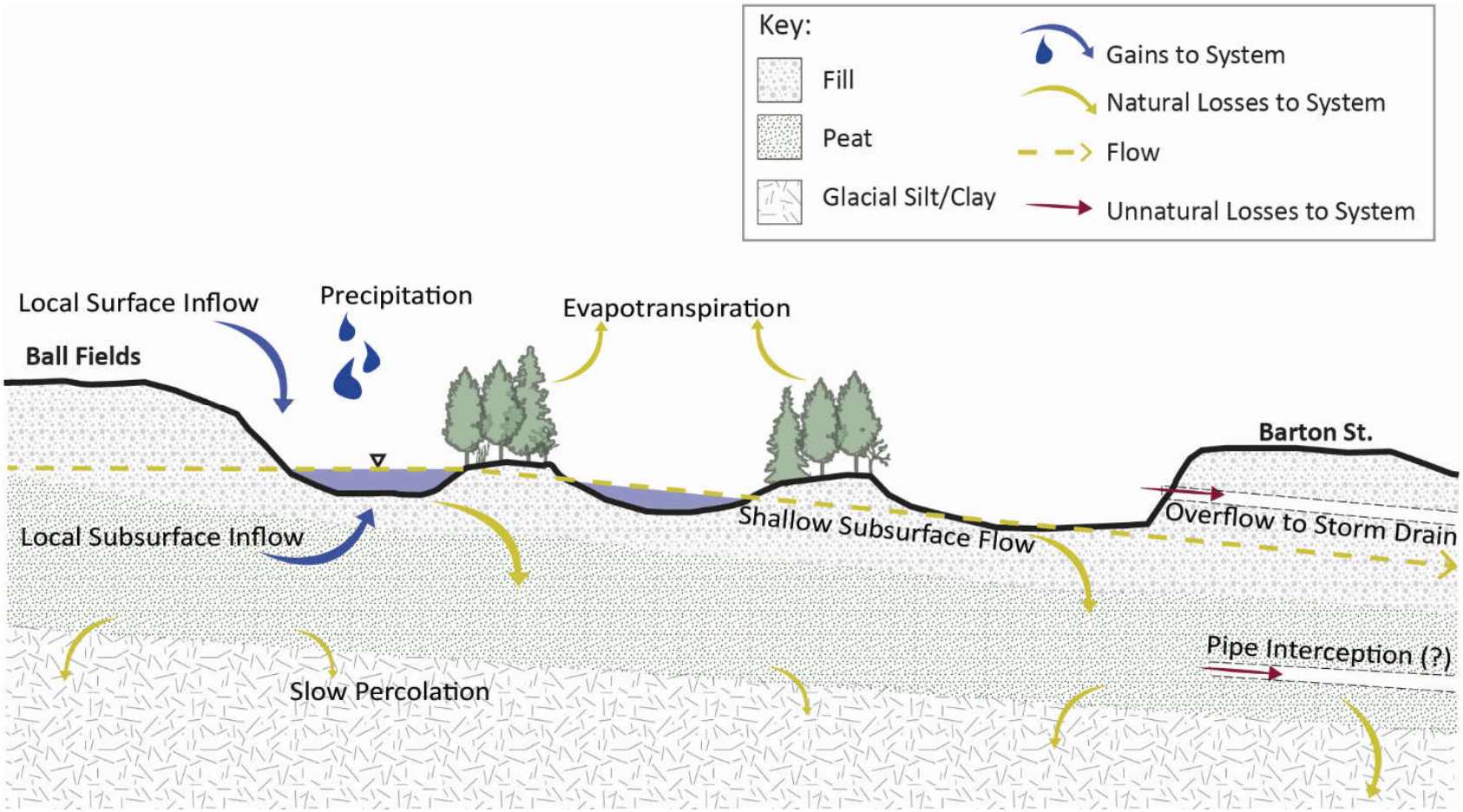
# Groundwater Conceptual Model



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# Changes in watershed area

# Late 1990s Restoration




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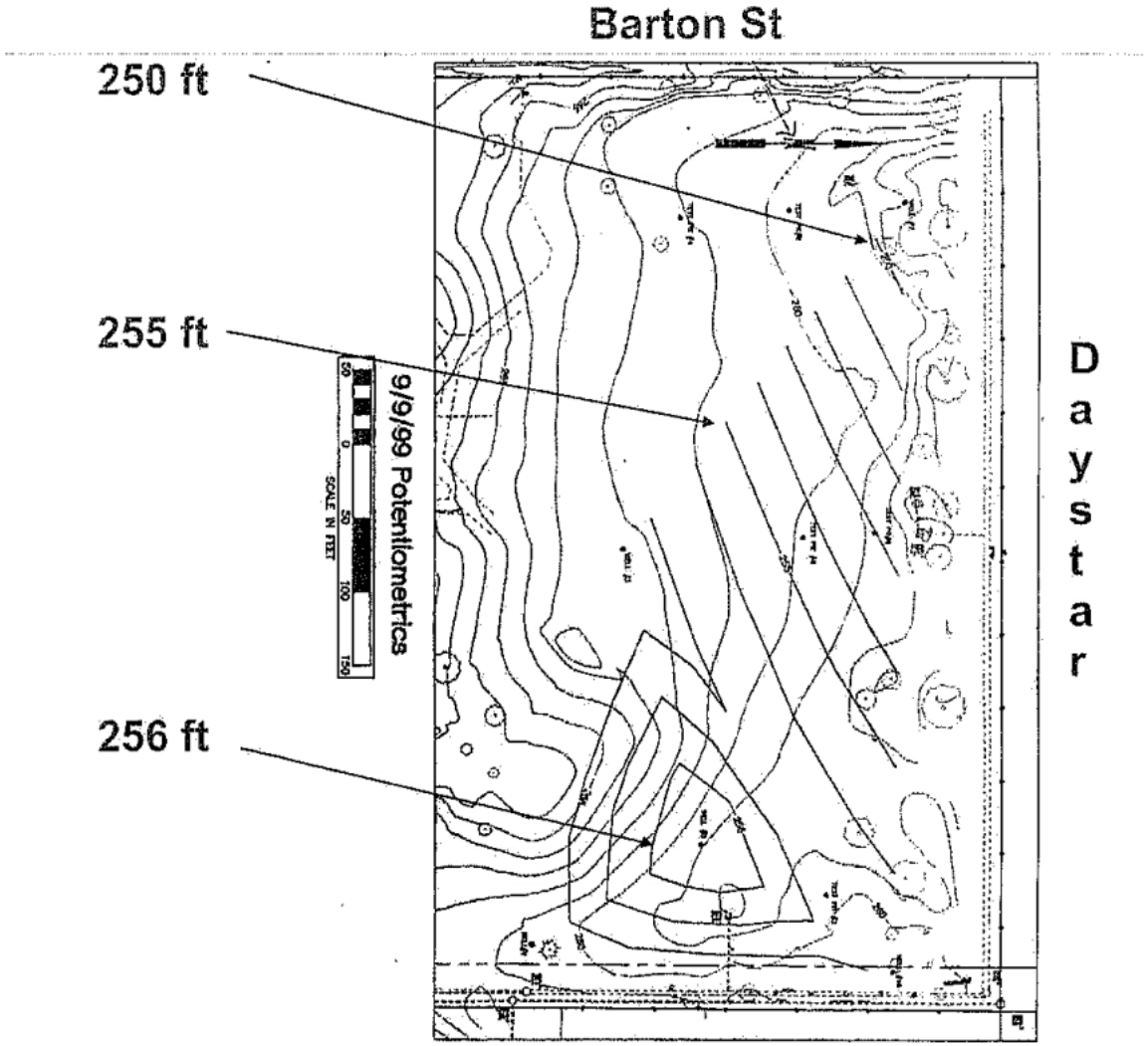
# 1999 Groundwater Mapping Annotated



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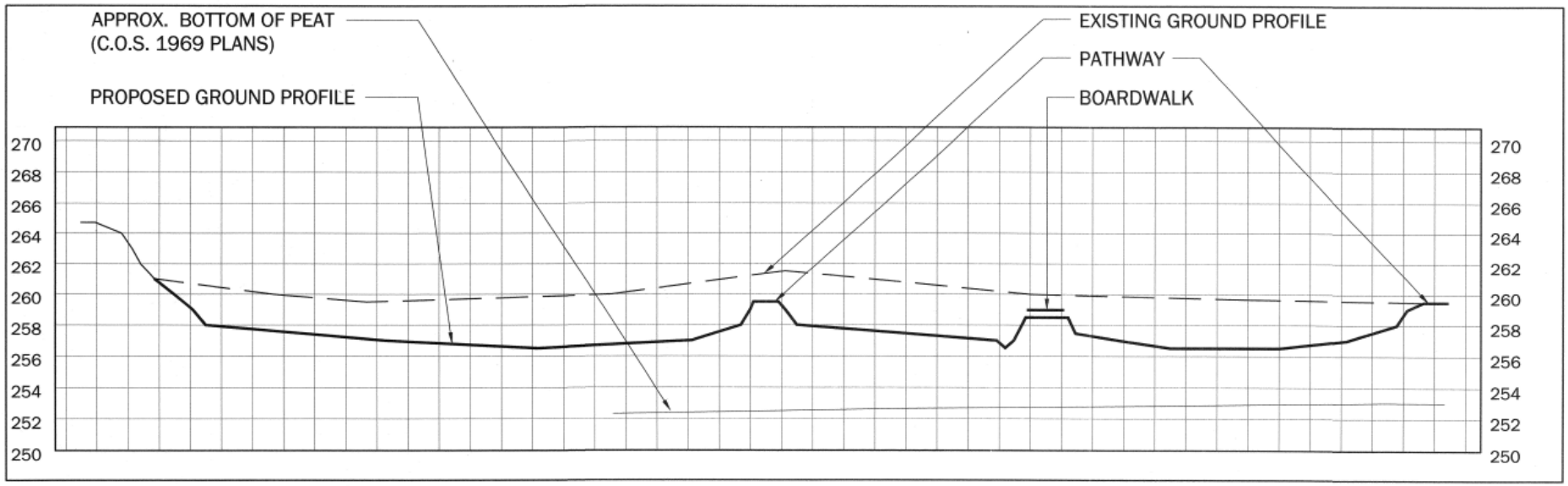
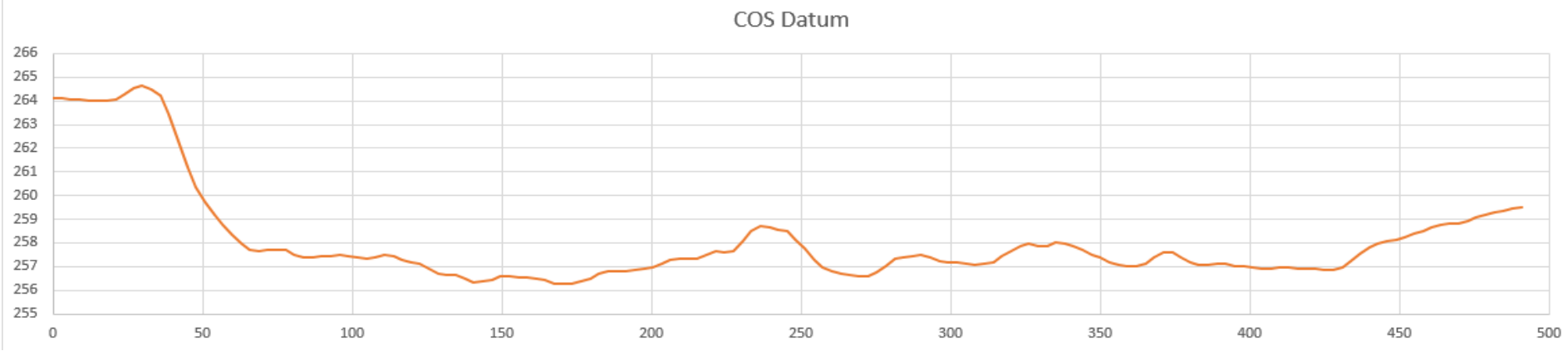
# 2002 Phase 2 Grading




*Orange shows 2016 LiDAR with -9.7 ft conversion to old COS vertical datum*



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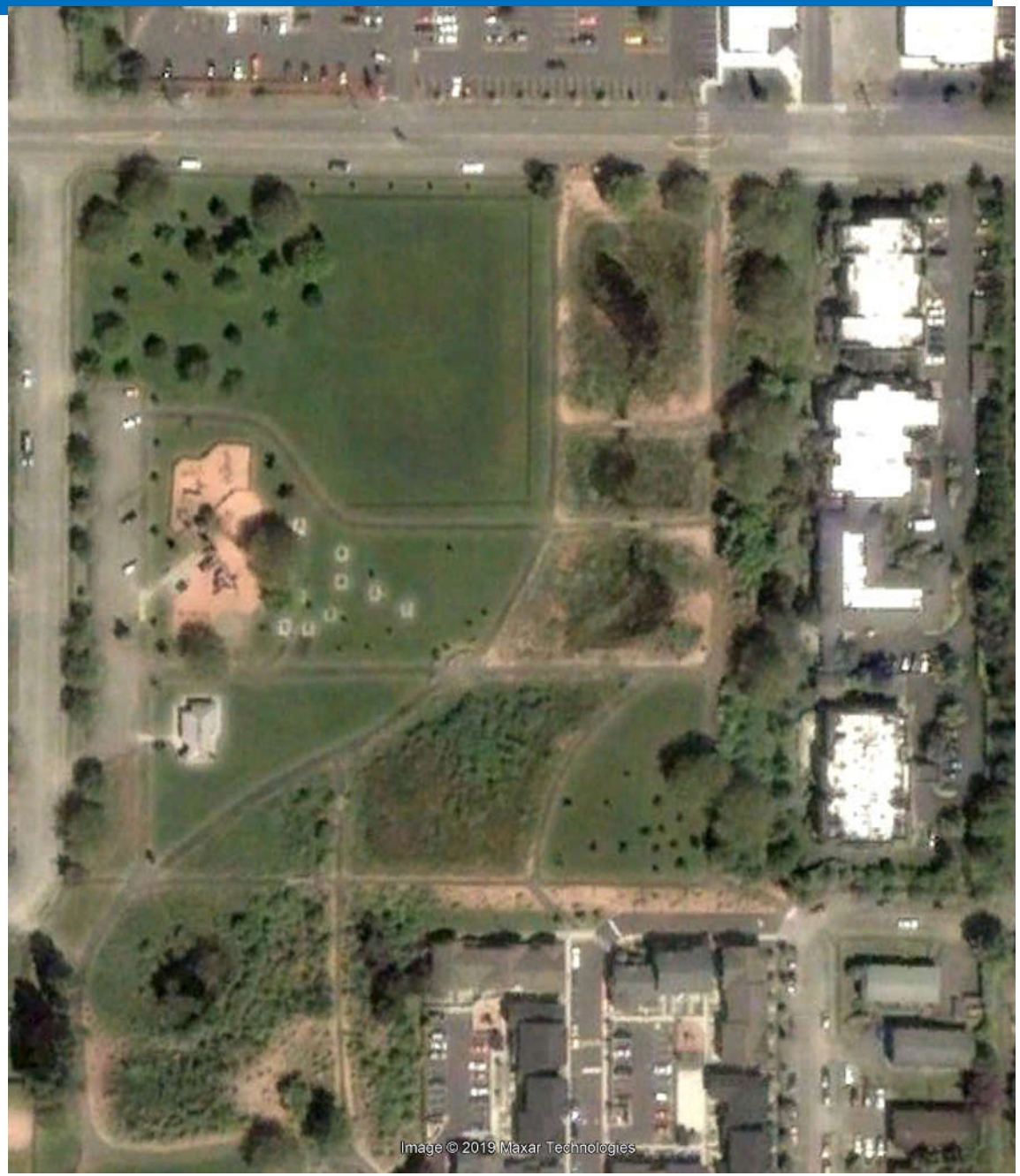
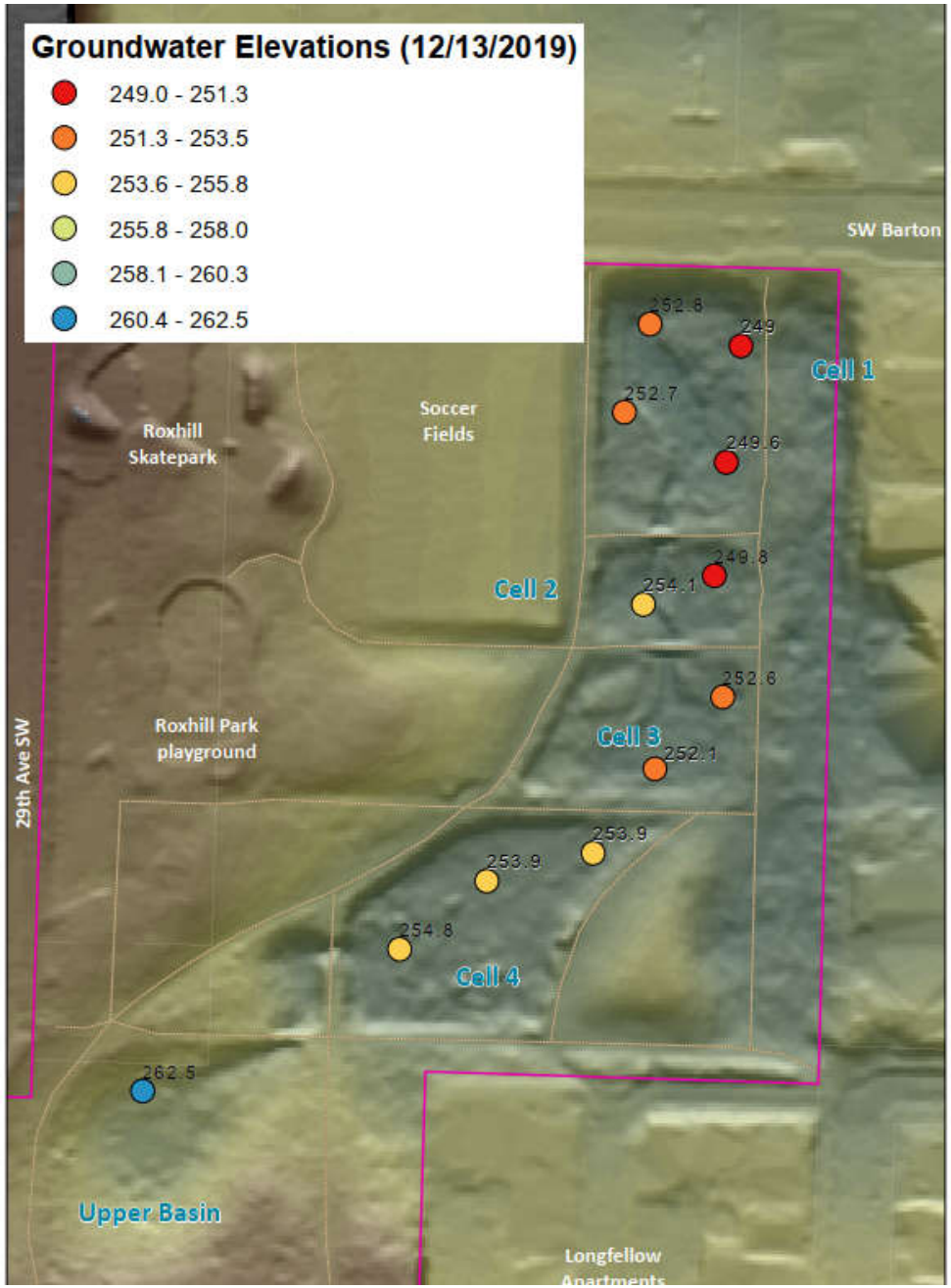
# May 2005 – water evident in the bottom of cells 1-3



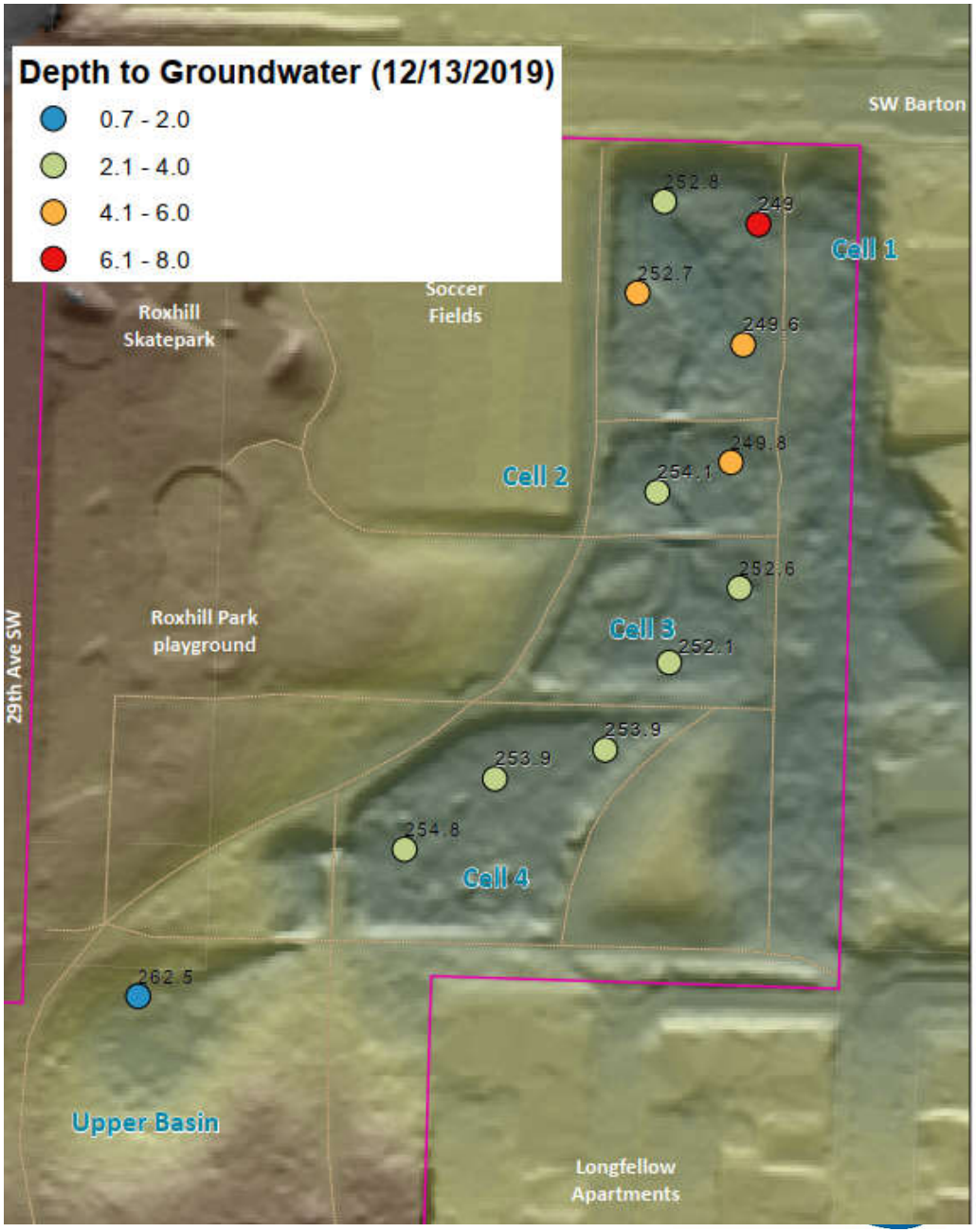
# 2019 Groundwater investigations

- Excavated 12 auger holes and surveyed groundwater



# 2019 Groundwater investigations

- We reviewed these locations during the 12/20 storm event and water levels typically rose 1-1.5 feet



# 2019 December 20 Storm Event

# 2019 Soil Investigations

- We encountered voids (macropores) in 6 out of the 12 soil investigations
- Development of voids is consistent with the literature for drained peat wetlands

# 2019 Soil Investigations



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# Initial Findings for Lack of Hydrology

- **Increased Evapotranspiration Rates**
  - Soil exposure and vegetation development will increase water uptake and evaporation
  - Magnitude of ET during the winter does not explain the significant lack of water and severe gradient in groundwater in the lower cells
- **Reduced inflows**
  - The built stormwater system reduces surface inflows from ~90 acres to ~17 acres
- **Increased subsurface flow rates**
  - Excavation to install utilities and SW Barton street
  - Peat deposit degradation results in voids that allow for accelerated lateral water loss

# Next Steps

- **Continued data collection**
  - Well install with continuous sensors to watch seasonal patterns
- **Water Budget Model**
  - Allows for quantification of how much water is flowing into, through, and out of the
  - Peat deposit degradation results in voids that allow for accelerated
- **Feasibility Analysis of Potential Enhancement Options**
  - Adding more (treated) stormwater – potentially from Cambridge East of the park
  - Reducing outflows by installing subsurface blocks