Tobin Montessori/Vassal Lane Upper Schools Project
Public Meeting

February 6, 2019

CDM Smith

Meet our Project Team

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Presentation Outline

- Site History
- Site Conditions
  - Current and Future
  - Geotechnical and Environmental Investigations
- Site Challenges to School Construction
- Next Step – Feasibility Study
- Conclusions

Project Approach

- First step – understand the existing site conditions ***(completed)***
  - Geotechnical and Environmental Investigations
  - Current site conditions present no risk to school occupants or the community

- Next step – Feasibility Studies
  - Develop options for new site programming (Perkins Eastman)
  - Evaluate alternatives for design and construction (CDM Smith)

Challenges to Construction of the New Schools

- Geotechnical
  - Subsurface conditions present challenges for foundation design and construction of the new schools
- Environmental
  - Site preparation will disturb soil, groundwater, and air requiring specialized handling techniques

We have the engineering tools and expertise to overcome these challenges and prepare the site for construction in a manner that is protective of the students, the community, construction workers, and the environment

Site History

Historic Site Activities

- Once used for clay mining
- After mining ceased, clay pit was used as municipal dump (1930s -1950s)
- Tobin Field and Father Callanan Playground built in 1938
- School constructed in 1971

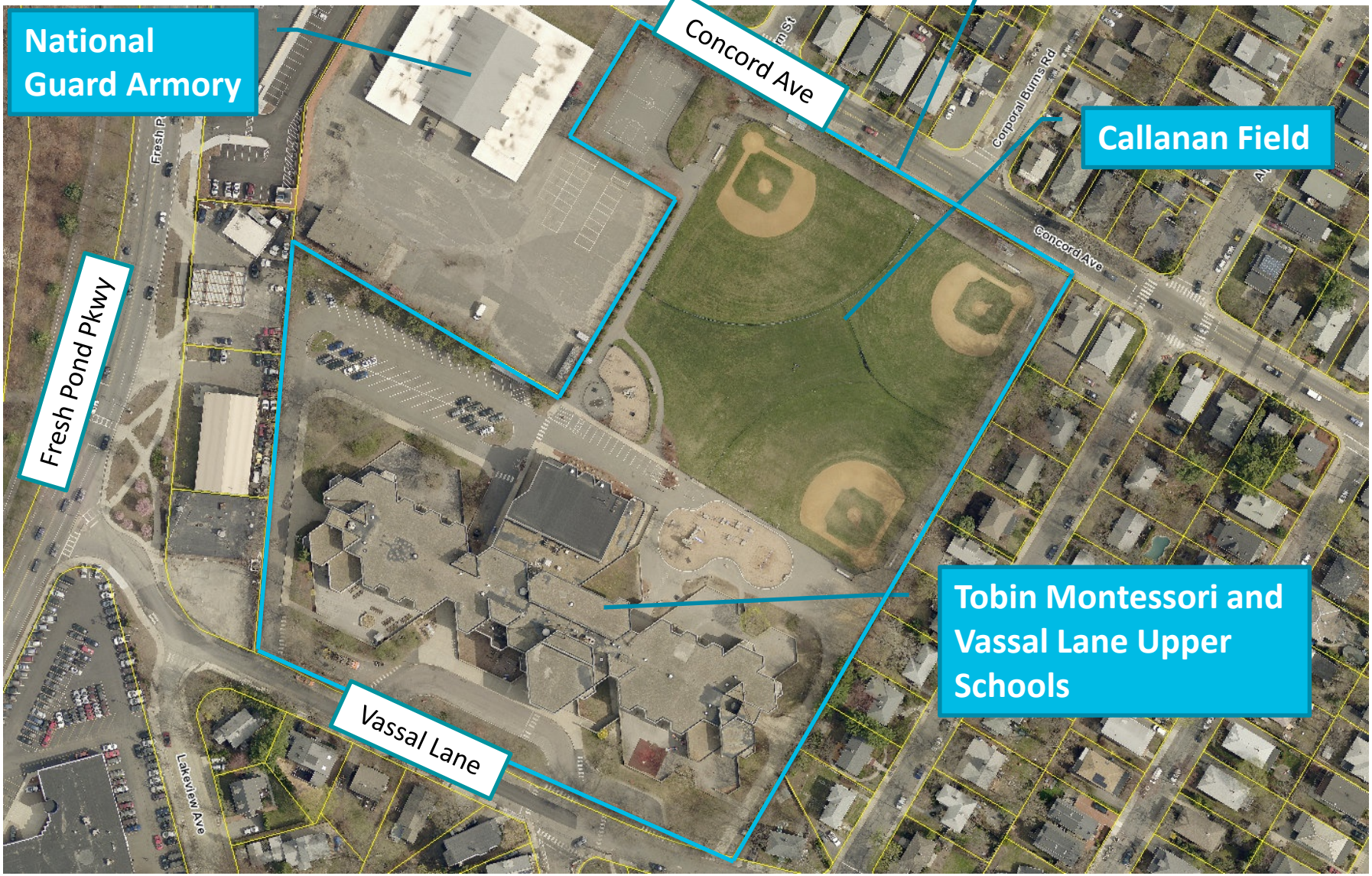
Historic Environmental Work

- 1987: indoor air concerns resulted in regulation under the Massachusetts Contingency Plan (MCP)
- 1991: a sub-slab ventilation (SSV) system was installed
  - vents the soil gas from beneath the school to vents on the roof
- 1997/1998: CDM Smith performed environmental assessment
- 1999: The site was closed in accordance with the MCP:
  - Response Action Outcome (RAO)
  - Activity and Use Limitation (AUL)

Site Conditions

Geotechnical Conditions

Tobin School Today



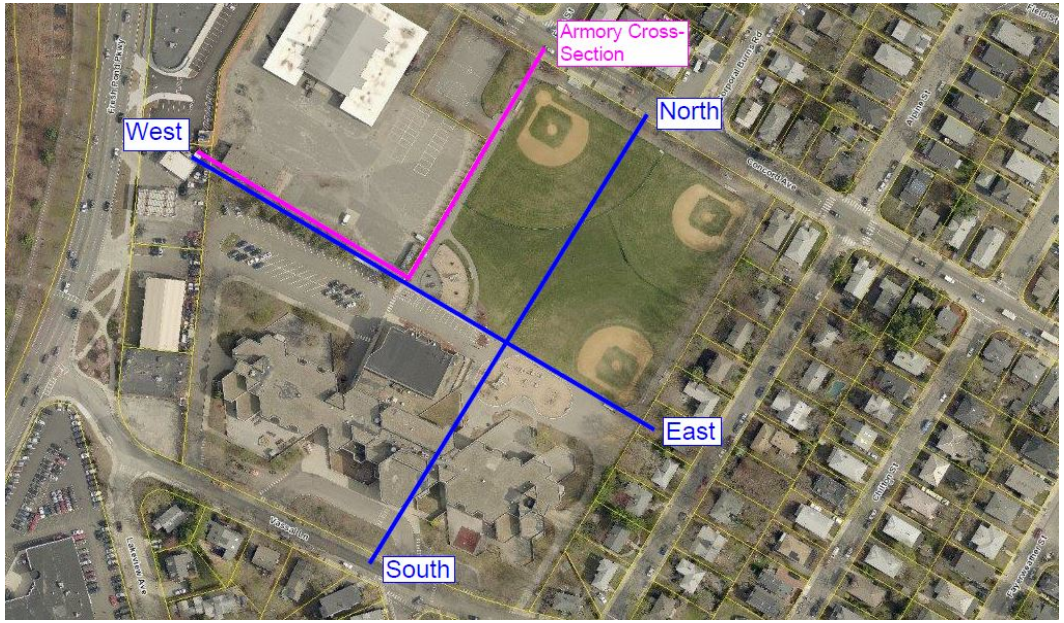
Geotechnical Assessment (2016-2018)

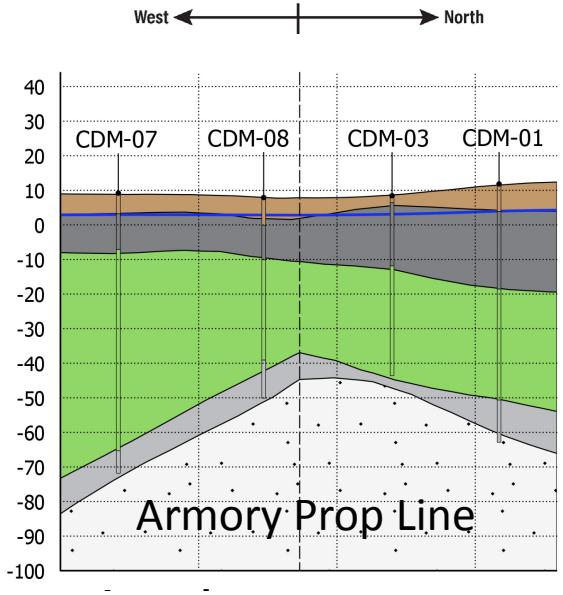
- Soil borings (overburden and bedrock) to characterize subsurface materials
- Test Pits to visually assess materials
- Monitoring wells to assess groundwater
- Laboratory testing of physical and engineering properties of subsurface material

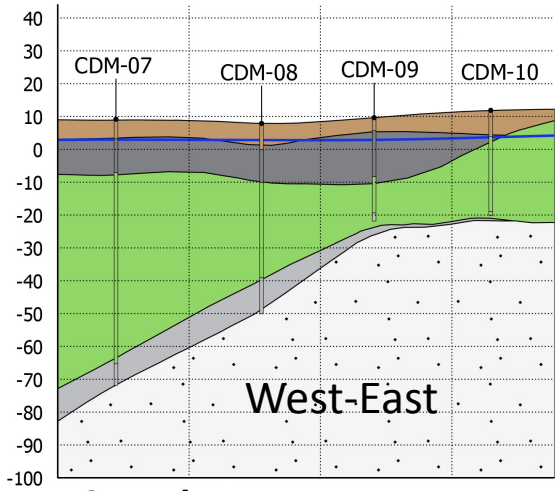
Subsurface Conditions – Soil/Waste Fill/Rock

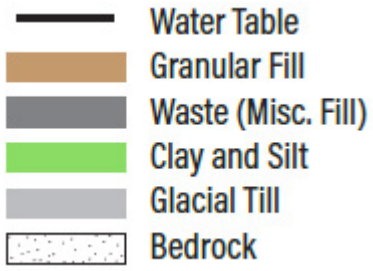
Layer	Thickness	Comments
Pavement or Topsoil	Surface to 18 in.	
Granular or Waste Fill	Varies from not present to 30 ft thick	Varying amounts of gravel, silt, brick, concrete, coal, ash, cinders, slag, metal, glass, wood, leaves, granite blocks, and other miscellaneous material
Clay and Silt	6.5 to 75 ft.	Boston Blue Clay; some miscellaneous fill materials
Glacial Till	0.5 to 13 ft.	
Bedrock		Significant variation in the elevation of top of bedrock across the site

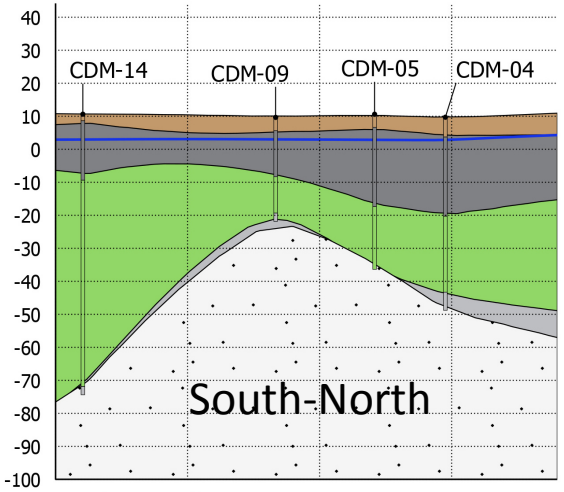
Subsurface Conditions - Strata Cross Section



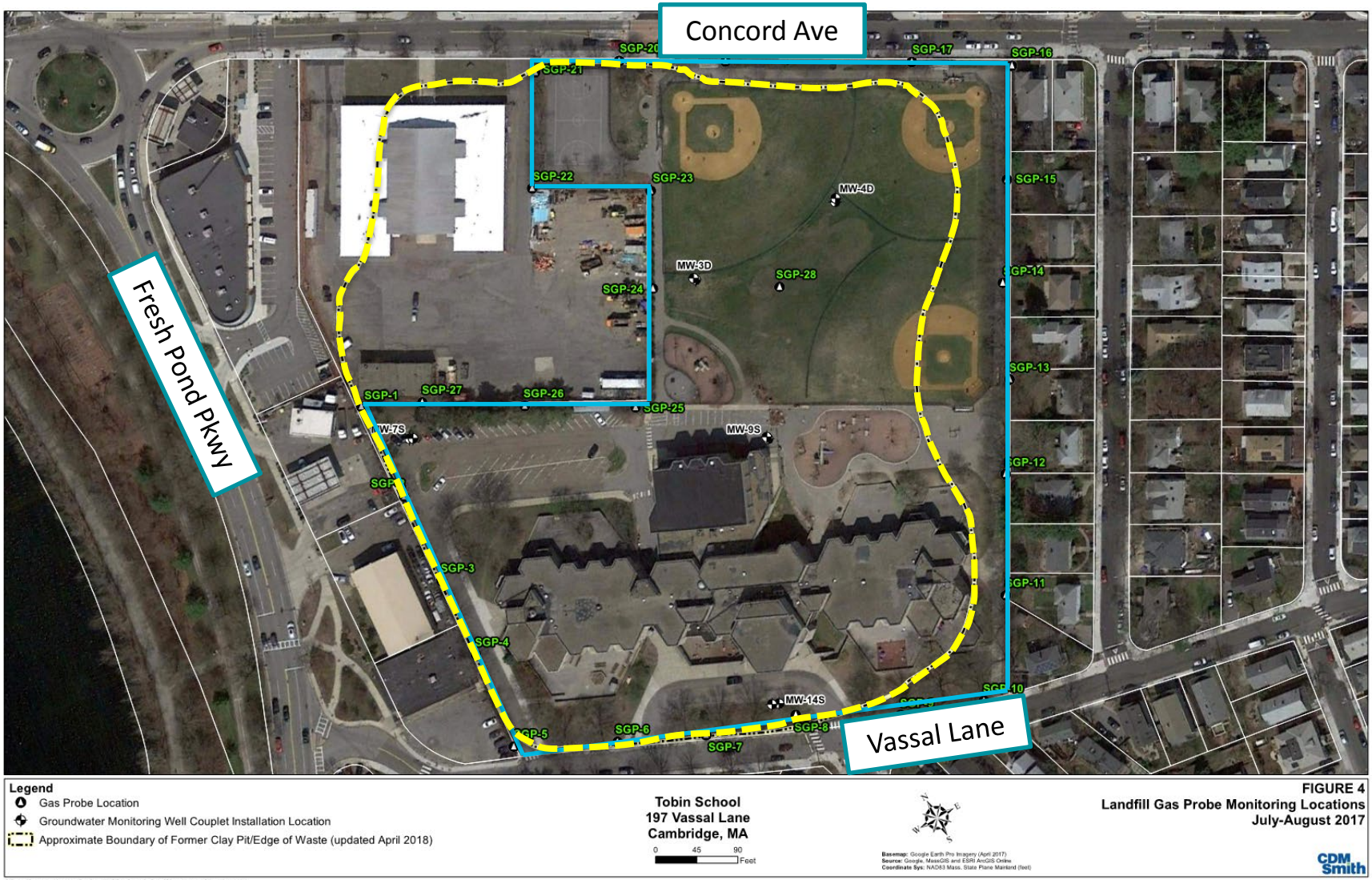








Limits of Waste Material



Subsurface Conditions: Summary

A. Waste fill materials
   - School/fields: 18 – 24 ft thick and extends as deep as 30 ft BGS
   - Property line at Armory: 10 – 22 ft thick and extends as deep at 30 ft BGS
   - Majority is below the water table

B. Variation in content and consistency of waste fill materials:
   - High amount of deleterious materials and debris
   - Generally not suitable for foundation support

C. Relatively shallow groundwater
   - 4.5 – 12 ft BGS
   - Flows to the west/southwest

D. Variation in elevation of top of bedrock:
   - Varies from 32 ft (central portion of site) to 92 ft (southwest corner of site) below ground surface across the site

Environmental Conditions

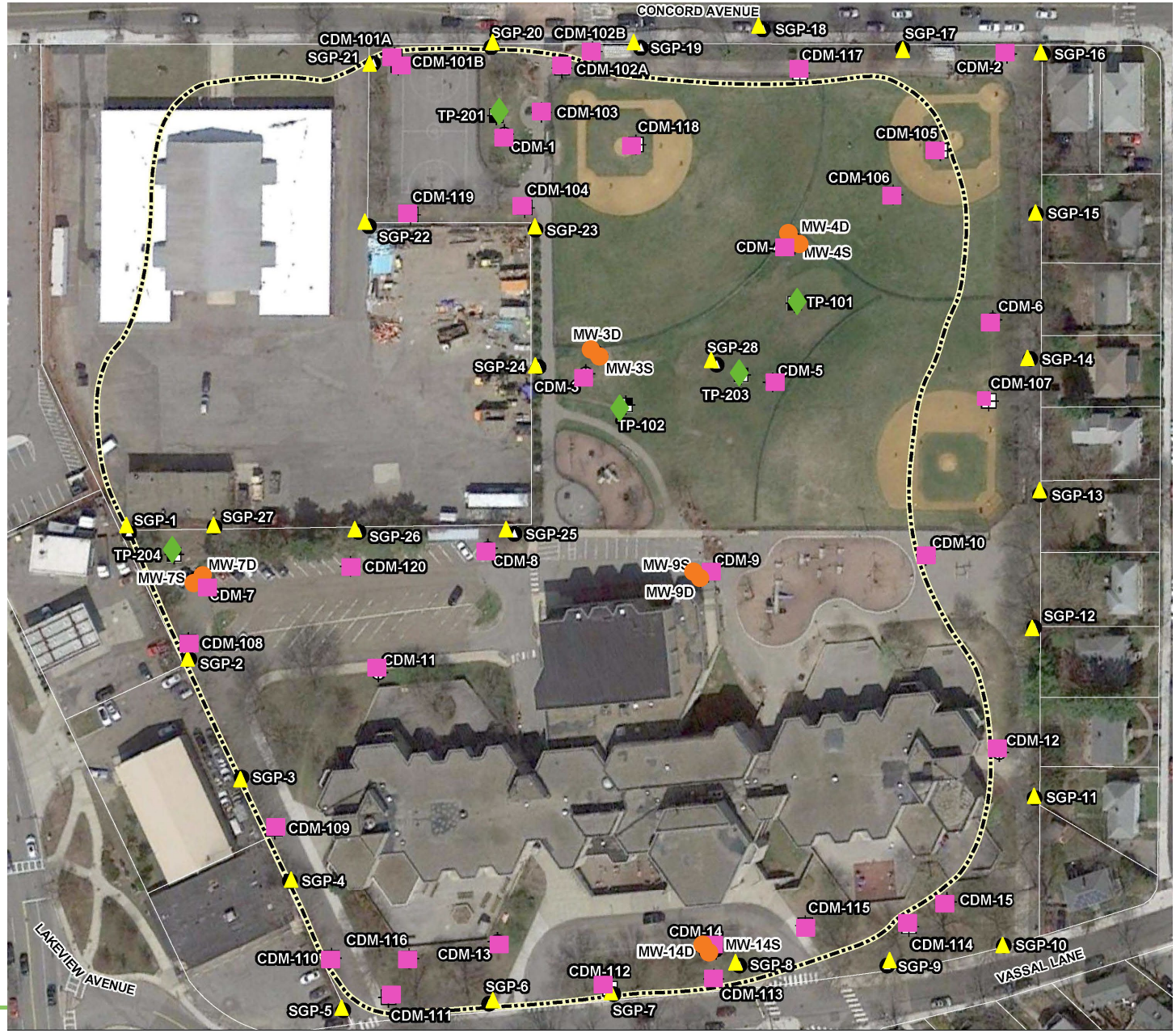
Current Environmental Conditions

- No contact with waste/fill material - three feet of clean soil covering site
- No VOCs found in soil or groundwater above MassDEP standards. Constituents of concern are PAHs/metals – not volatile or mobile
- Existing sub-slab ventilation system - protective of indoor air
  - 2 rounds of subslab sampling and indoor air sampling (2017/2018) – results confirm protection of indoor air
- Groundwater moderately impacted with metals. Other constituents below MCP standards.
- Fresh Pond Reservoir kept artificially high to prevent local groundwater from flowing into reservoir

Environmental Assessment for Future Construction

- Extensive program to determine nature and extent of impacts for following media:
  - Fill and waste materials
  - Groundwater
  - Subsurface landfill gas
- Laboratory Analysis:
  - Volatile and Semivolatile organic compounds (VOCs and SVOCs)
  - Metals
  - PCBs
  - Extractable Petroleum Hydrocarbons (EPH)
- Field Analysis:
  - Gases (methane, carbon dioxide, oxygen, hydrogen sulfide)

Sampling Locations



Environmental Assessment Findings

Media	Findings	Impact
Soil/Waste Fill	• Metals, SVOCs, EPH measured above MassDEP standards • No VOCs measured above MassDEP standards • No PCBs measured above detection limits	• Soil removed during construction will required special handling and disposal • Constituents found are not highly mobile nor volatile
Groundwater	• Metals measured above MassDEP standards • No VOCs, SVOCs, EPH above MassDEP standards • No PCBs measured above detection limits	• Groundwater will require treatment as part of construction dewatering • Compounds are not volatile therefore no risk of inhalation
Landfill Gas	• Elevated levels of methane found within the waste material • No methane detected outside of the waste/fill boundary	• Landfill gases will need to be monitored and mitigated during construction

Site Challenges

Environmental Challenges

A. Safety measures will need to be put in place during excavation of waste material, e.g. air monitoring, gas venting
B. Treatment of dewatered water will be required
C. Engineering controls for odor and dust
D. Waste extends on to Armory property
E. Removal of all waste may not be necessary to prevent risk
F. Sustainability of the alternatives will be evaluated
G. Long term strategies to prevent exposure (e.g. soil stabilization and/or gas controls)
H. Regulatory mechanisms - property will be managed under the provisions of the Massachusetts Contingency Plan (MCP)

Geotechnical Challenges

A. Type of foundation system to support new structures will depend on siting of buildings and how much of the waste fill is removed
B. Removal of all waste fill would create a deep excavation (>30 feet) well below groundwater level
C. Dewatering required for deep excavation/removal of waste
D. Ground improvement for waste stabilization will be considered:
   - For any fill waste material remaining in place
   - For groundwater cutoff where waste is not removed (e.g., at Armory property line)
   - For excavation support
   - Several methods exist depending on composition of waste material (e.g., deep soil mixing, jet grouting, etc.).

Next Step: Feasibility Study

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- Further evaluations required to determine:
  - Optimum combination of remediation alternatives (e.g., removal of waste, in-situ treatment of waste, partial removal and capping of waste)
  - Foundation and excavation requirements
- Key Areas to be Addressed:
  1. Management of Landfill Gases
  2. Excavation Soil Management
  3. Dewatering
  4. Excavation Support Systems
  5. In-Situ Soil/Waste Fill Stabilization
  6. MassDEP MCP Requirements

1. Management of Landfill Gases

- Control of landfill gases during excavation of waste for the health and safety of on-site workers and the surrounding community
  - Health & Safety Plan
  - Personal protective equipment
  - Air monitoring units
  - Gas collection system

2. Dewatering with Treatment Prior to Discharge

- To allow for excavation below groundwater (4.5 to 12 ft BGS)
- Discharge treated to be protective of the environment

3. Excavation Support System

- Allows removal of deep waste materials
- Limits extent of excavation (keep within property lines, reduce total volume)
- Protects nearby facilities (residences, Armory, roads, utilities, trees)
- May also provide groundwater/landfill gas cutoff

4. Excavated Soil Management

- Managed in accordance with the MCP
- Approximately 260,000 cubic yards of waste/soil
- Feasibility Study will determine waste removal vs. stabilization
- Excavated soil will be shipped to disposal facilities
- Excavations backfilled with clean material

5. In-Situ Stabilization

- Soil Mixing
- Jet Grouting

Conclusions

- The project will be completed in a manner that will be protective of the health and safety of onsite workers, the residential neighborhood, the surrounding community, future occupants of the new schools, and the environment

- The next step – Feasibility Study – will include detailed evaluation of alternatives for remediation and construction to establish requirements for design of the new facilities

CITY OF CAMBRIDGE: COMMUNITY MEETING 2/6/19

PERKINS EASTMAN

TOBIN MONTESSORI AND VASSAL LANE UPPER SCHOOLS

MEET OUR TEAM

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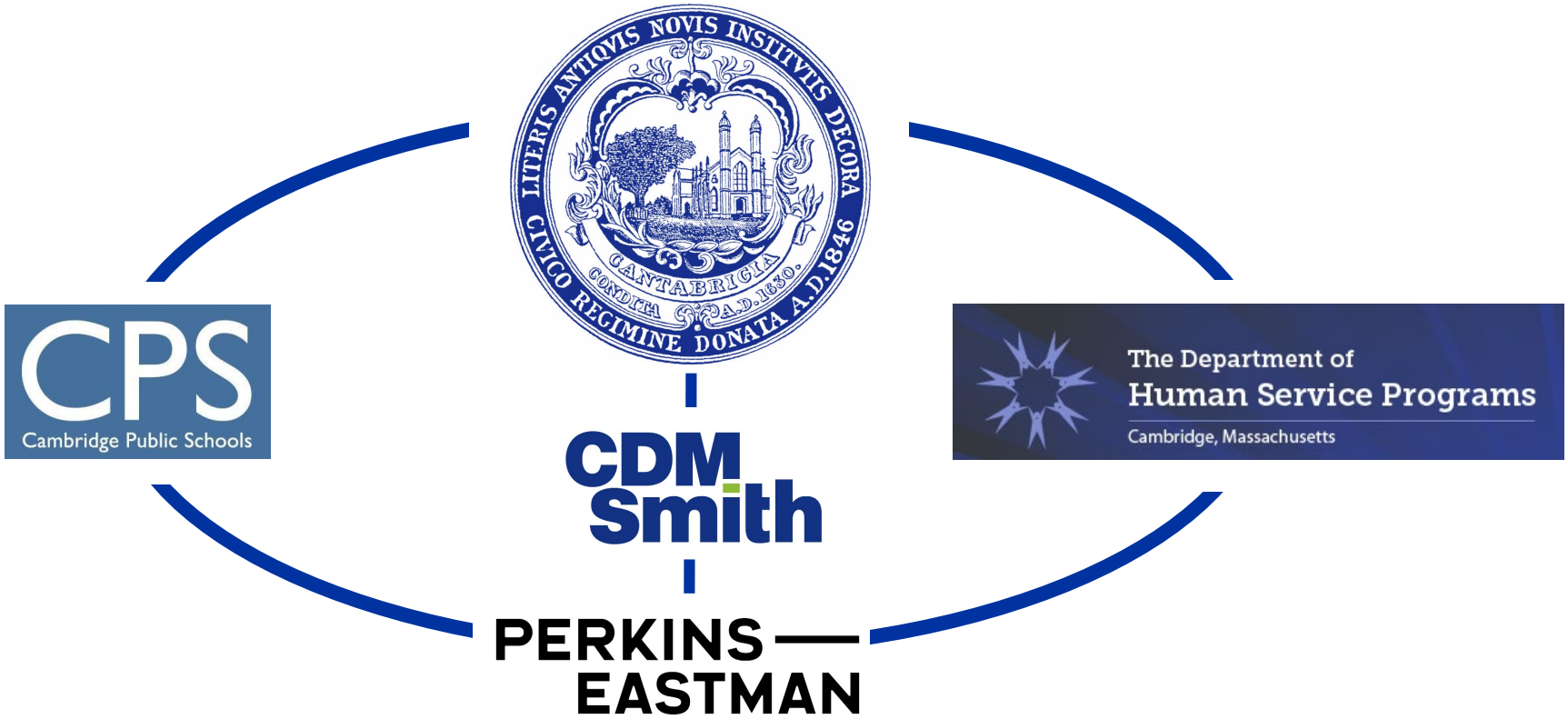
WORKING TOGETHER



Questions