

MEMORANDUM

To: Michael McGovern, City of Lowell
From: Stephen Vetere, PE, LSP, Nobis Engineering
Subject: Summary of Geoenvironmental Findings, Existing Lowell HS and Cawley Site
Date: May 11, 2017

The following is a brief summary of the findings of subsurface environmental investigations conducted during the MSBA Feasibility Study for the Lowell High School.

Existing Lowell High School

- The focus of Phase II site assessment activities was on the portion of the campus located to the west of the canal, since this is where the vast majority of demolition and construction (and therefore direct contact with soil) would occur under the proposed Addition/Renovation Options included in the February 2017 Preliminary Design Program.
- The portion of the existing high school west of the canal is built on the former location of the Merrimack Manufacturing Company. Most of the area was formerly occupied by tenement homes for mill workers, but the extreme northwest corner of the campus was formerly part of the mill complex.
- The existing high school is underlain by 5 to 8 feet of historical fill material consisting of sand and gravel with traces of brick, concrete, coal, and ash. In one soil boring, the remnants of what is believed to be an old concrete foundation were encountered.
- The presence of historical fill does not, in and of itself, represent a hazard to site users. Fill materials are currently inaccessible to site occupants because they are either beneath the building foundations or covered by vegetated topsoil material.
- However, historical fill materials do tend to contain anthropogenic contaminants such as polycyclic aromatic hydrocarbons (PAHs) and heavy metals. These contaminants are ubiquitous in urban areas as a consequence of the combustion of wood or coal (i.e. wood ash or coal ash), as a component of asphalt pavement, or from the burning of fossil fuels.
- Ten soil samples were collected from the existing high school site to evaluate soil conditions in areas where potential future construction activities would result in exposure to soils by construction workers and generation of excess soils requiring off-site reuse or disposal.
- Review of soil sampling results suggests that historical fill materials present throughout the existing high school site contain levels of PAHs and lead that would not permit reuse of excess soils on site, therefore excess soils generated during construction activities would need to be transported to an off-site landfill for disposal.



- Review of soil sampling results indicates that arsenic concentrations in shallow soils located adjacent to the railroad tracks are above levels that are suitable for a school campus, and therefore require removal and off-site disposal. MassDEP has been notified of this condition, and plans are underway to have these soils removed from the site.
- Budgeting for a school addition/renovation project on the existing high school site should include provisions for the handling and management of contaminated soils, since it is likely that fill materials in the upper 5 to 8 feet contain PAHs and metals typical of urban fill. Provisions should include health and safety planning to protect workers during construction activities, soil characterization to identify off-site reuse/disposal locations, and transportation and off-site disposal of excess soils generated during construction activities.

Cawley Site

- The Cawley Site has been used for recreational purposes since at least 1938.
- Nobis has completed a Phase I site assessment for the Cawley Site, but no Phase II activities have been conducted. A Phase I assessment does not include any sample collection or analysis.
- Based on the review of historical records, as well as subsurface investigation records from explorations completed by other consultants during the Feasibility Study, the primary environmental concern for this site is the presence of historical fill material in the northern portion of the site, beyond the outfield fence of the Martin Softball Field.
- Soil borings and test pits excavated in this area identified fill materials including soil with traces of metal, brick, glass, and concrete. Although no soil samples have been collected for laboratory analysis, similar to above, it is likely that anthropogenic contaminants typical of urban fill material are present in this soil.
- Budgeting for a school construction project on this portion of the Cawley Site should include provisions for the handling and management of contaminated soils, since it is possible that fill materials in the upper 5 to 15 feet contain PAHs and metals typical of urban fill. Provisions should include health and safety planning to protect workers during construction activities, soil characterization to identify off-site reuse/disposal locations, and transportation and off-site disposal of excess soils generated during construction activities.
- A second minor environmental concern was identified through the review of environmental records for the Cawley Site. A former gasoline filling station located at 780 Rogers Street remains open from a MassDEP regulatory perspective. This former retail gasoline facility contains both soil and groundwater contamination associated with a historical release from a gasoline underground storage tank. The inferred groundwater flow direction is from this site toward the extreme southern portion of the Cawley Site, toward the parking area south of the Alumni Baseball Field. The extent of groundwater contamination does not currently extend beneath the Cawley Site, however if extensive withdrawal of groundwater were to occur during construction of a new school, it is possible that contamination could be drawn toward the site. Considering the proposed school plan for the Cawley Site, this scenario is considered unlikely and therefore does not warrant consideration for additional project cost.

INTRODUCTION:

UEC was contracted by Perkins Eastman to conduct the following services at the Lowell High School, Lowell, MA. Inspections and sampling were performed September-October 2016 and April 2017.

- Asbestos Containing Materials (ACM) determination inspection and sampling;
- Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures inspection;
- PCB's Caulking Inspection;
- Lead Based Paint (LBP) inspection;
- Mercury in Rubber Flooring inspection and sampling;
- Airborne Mold inspection and sampling;
- Radon sampling;

FINDINGS:**Asbestos Containing Materials (ACM)**

The majority of ACM found during the survey are considered non-friable and were found to be in good condition.

1. Lab table was found to contain asbestos.
2. Glazing caulking for borrowed lite was found to contain asbestos.
3. Light grey/white vinyl floor tile was found to contain asbestos.
4. Vinyl floor tile and mastic were found to contain asbestos.
5. Sink damproofing was found to contain asbestos.
6. Glue daub for ceiling plaster was found to contain asbestos.
7. Glazing caulking for vision lite in metal door was found to contain asbestos.
8. Vertical white caulking in CMU wall was found to contain asbestos.
9. Exterior transite panel was found to contain asbestos.
10. Exterior door framing caulking was found to contain asbestos.
11. Exterior residue door framing caulking on brick was found to contain asbestos.
12. Glue holding blackboard was assumed to contain asbestos.
13. Pipe insulation was assumed to contain asbestos.
14. Stage fire curtain was assumed to contain asbestos.
15. Glue holding tectum deck at the pool building was assumed to contain asbestos.
16. Exterior flashing protruding from foundation was found to contain asbestos.
17. Underground sewer pipes were assumed to contain asbestos.
18. Roofing materials were assumed to contain asbestos.
19. Damproofing on exterior and foundation walls was assumed to contain asbestos.

Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures

Ballasts in light fixtures were assumed not to contain PCB's. Tubes in light fixtures, thermostats, signs and switches were assumed to contain mercury.

PCB's in Caulking:

Building materials and caulking were assumed to contain PCB's in all areas constructed prior to 1978.

Lead Based Paint (LBP):

LBP was assumed to exist on painted surfaces in all areas constructed prior to 1978.

Mercury in Rubber Flooring:

Rubber flooring indicated the presence of mercury.

Airborne Mold:

Based on comparisons with historical data from projects of similar type, building utilization, geographic location and season, indoor airborne levels are considered acceptable.

Radon:

The measured radon concentrations of most of the samples were found to be lower than the EPA guideline of 4 picoCuris of radon per liter of air (pCi/L).

Traffic Impact Analysis Summary

Lowell High School
Lowell, Massachusetts

Traffic Operations Summary

Quick References

Current School Hours
7:50 AM to 2:30 PM

School AM Peak Hour
7:15 AM to 8:15 AM

School PM Peak Hour
2:30 PM to 3:30 PM

Existing Populations
Students 3,225±
Staff 440±

Projected Populations
Students 3,520
Staff 500

Downtown Analyzed Build Year
2024

Cawley Analyzed Build Year
2022

Cawley School Busing Program
46 buses (per City)
Anticipated Capacity 2,000±
Maximum Capacity 2,300

General Traffic Operations

In general, a school generates traffic congestion twice a day (during the morning arrival and the afternoon dismissal) for about 15 to 30 minutes each school day during the entire school year.

Overall Traffic Operations

Downtown Site

The existing Lowell High School is congested during the morning school peak hour and especially during the afternoon school peak hour. The intersections in the study area are operating at fair to poor levels of services during both peaks.

It is anticipated that the proposed school in the Downtown area will be slightly more congested than the current traffic operations found at the school due to the projected increase of the student and staff populations.

Cawley Site

For any alternate site in the City, the existing school traffic (plus the projected new traffic) that is currently being generated at the Downtown site will be moved from the Downtown area to the new site location.

At the Cawley site specifically, the intersections surrounding the proposed school are anticipated to operate at poor levels of service during the school peaks (twice a day, during the school year).



Traffic Impact Analysis Summary

Lowell High School
Lowell, Massachusetts

Cawley Site Mitigation

Due to the increase in traffic and the projected poor levels of service, intersection improvements (retiming/rephasing of the existing traffic signals along Rogers Street (Route 38), signing, striping, potential roadway widening to accommodate turn lanes, etc.) can be investigated to improve operations.

The following intersections do not meet traffic signal warrants:

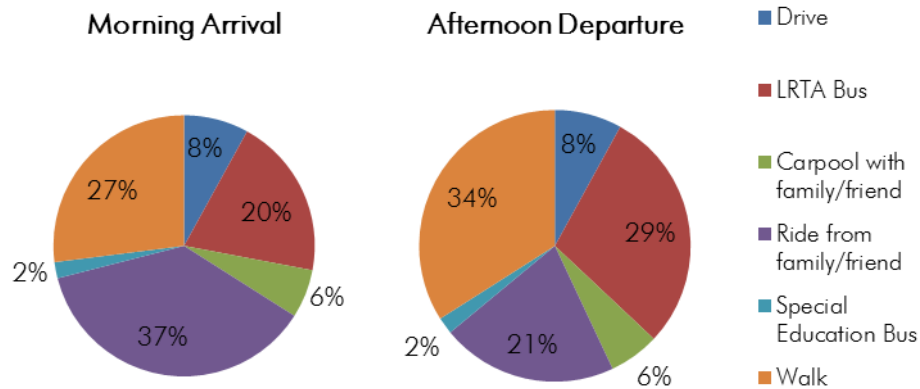
- o Rogers Street (Route 38) and Village Street
- o Andover Street (Route 133) and Douglas Road

Although a traffic signal warrant analysis was not requested for the intersection of Andover Street and Clark Road, preliminary findings suggest that this intersection may meet warrants for signalization. Additional traffic data (that was not collected) is required for a complete analysis.

Other Traffic Impact Information

Existing Mode of Transportation

Estimated Student Mode of Transportation for the Downtown Site
Based on January and April 2017 Survey Results



Traffic Impact Analysis Summary

Lowell High School
Lowell, Massachusetts

Anticipated Trip Generation

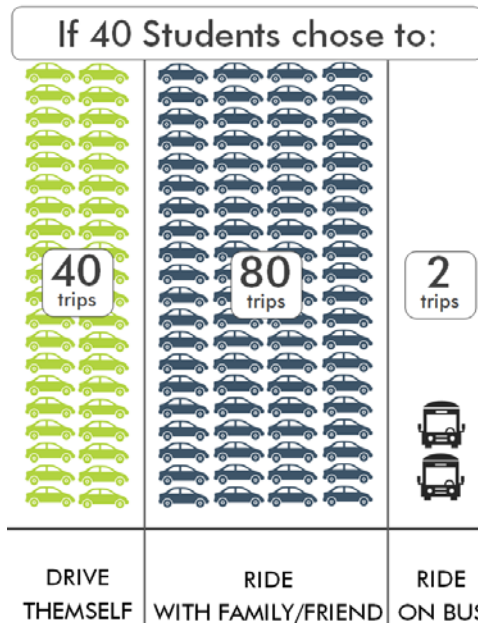
How the Modes translate to Anticipated Vehicle Trips

The mode of transportation surveys identified three basic vehicular modes that a student uses to travel to and from the high school:

1. driving and parking,
2. riding with family and friends, or
3. riding the bus.

The largest generator of vehicle trips of these three modes is a student that is dropped-off/ picked-up by rides from family and friends (see figure), since they require an entering and an exiting trip.

Number of Vehicle Trips Generated During a School Peak Hour
Based on Vehicle Mode



If fewer parking spaces are provided, there would be fewer students driving themselves, which would result in an increased number of students being dropped-off and picked-up.

Downtown Site Trip Generation

The additional trips anticipated for the additional high school population were based on the existing modes of transportation that students and staff are currently traveling to and from the high school.



Traffic Impact Analysis Summary

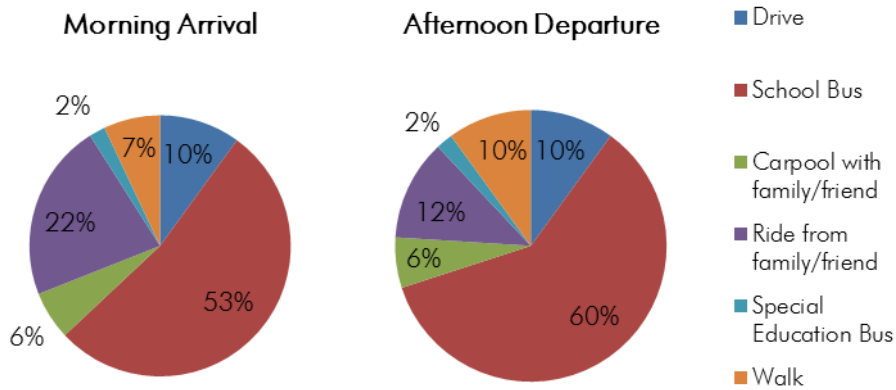
Lowell High School
Lowell, Massachusetts

Anticipated Generated New Vehicle Trips Summary Downtown Site

Time Period	Direction	New Vehicle Trips
School A.M. Peak Hour	Enter	159
	Exit	91
School P.M. Peak Hour	Enter	35
	Exit	100

Cawley Site Trip Generation

Anticipated Student Mode of Transportation for the Cawley Site



Anticipated Number of Students Using Each Mode under Build Conditions Cawley Site

Mode	Morning Arrival	Afternoon Departure
Drive	352	352
School Bus	1,866	2,112
Ride - Carpool	211	211
Ride - Drop-off/Pick-up	775	423
Special Education Bus	70	70
Walk	246	352
TOTAL	3,520	3,520



Traffic Impact Analysis Summary

Lowell High School
Lowell, Massachusetts

Anticipated Vehicle Trips Generated under Build Conditions During School A.M. Peak Cawley Site

Mode	School A.M. Peak				
	Students	Staff	Total	Entering	Exiting
Drive	352	357	709	709	0
LRTA Bus	N/A	8	0	0	0
School Bus	46	N/A	92	46	46
Ride - Carpool	N/A	8	8	8	0
Ride - Drop-off	775	N/A	1,550	775	775
Special Education Bus	11	N/A	22	11	11
TOTAL			2,381	1,549	832

Anticipated Vehicle Trips Generated under Build Conditions During School P.M. Peak Cawley Site

Mode	School P.M. Peak				
	Students	Staff	Total	Entering	Exiting
Drive	352	333	685	0	685
LRTA Bus	N/A	7	0	0	0
School Bus	46	N/A	92	46	46
Ride - Carpool	N/A	7	7	0	7
Ride - Pick-up	423	N/A	846	423	423
Special Education Bus	11	N/A	22	11	11
TOTAL			1,652	480	1,172

Cawley Site Parking

New High School Parking Requirement

City of Lowell's *Zoning Book* (with amendments through 10.22.2013)

High School 6 parking spaces per instructional room

Depending on the City's interruption of an 'instructional' room, the minimum number of on-site parking spaces is **840 parking spaces**.

The final Cawley site design may require on-site parking variance.



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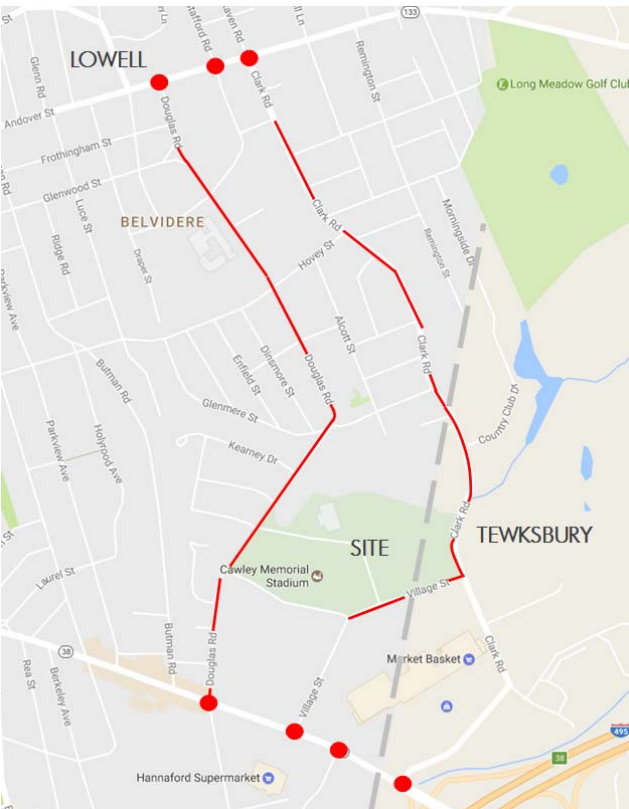
Anticipated parking demand for the Cawley site

An anticipated parking demand can be developed based on the amount of estimated vehicles that are currently parking around the existing Downtown high school site by students and staff.

Anticipated Parking Demand for Staff/Visitors	500 parking spaces
Anticipated that 10% of Students will Drive and Park	<u>350 parking spaces</u>
TOTAL Anticipated On-site Parking Demand	850 parking spaces

Cawley Sidewalk/ Pedestrian Improvements

All possible improvements outlined here should be further investigated by the City for feasibility (e.g. available right-of-way, grades, utilities, vegetation, etc.).



Existing Sidewalk Areas

In general, the existing sidewalks on the study roadways require:

- Installation/reconstruction of curb ramps (aka wheelchair ramps) at all side streets and marked crosswalks;
- Spot reconstruction of existing sidewalks due to poor condition or inadequate sidewalk width;
- Installation of pedestrian improvements to the existing Andover Street/Douglas Road crosswalk previously investigated by the City; and
- Upgrade existing/ install additional pedestrian signal heads and pushbuttons at signalized intersections on Rogers Street/Main Street (Route 38).

No Sidewalk Areas

Douglas Road and Clark Road do not provide a connection for pedestrians between Andover Street (Route 133) and Rogers Street (Route 33) and the proposed school site. Sidewalks are not necessarily needed on both sides of these two roadways. The City can propose to install a sidewalk on only one side of a road, rather than both sides, due to physical and/or budget constraints. However, if the City decides to install sidewalk on the west side, for instance, then a crosswalk with curb ramps will need to be marked and signed to allow pedestrians to cross and continue on the sidewalk on the east side of the road.

