Schematic Design
Beverly Public Schools

architects

BUILDING BRIGHT FUTURES

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research-based learning

August 6, 2015

Report Prepared by:

Ai3 Architects, LLC
526 Boston Post Road
Wayland, MA 01778

Project Number: 1403.00

August 6, 2015

Report Prepared for:

Beverly School Building Committee
City of Beverly
502 Cabot Street
Beverly, MA 01915

Evaluation Team:

Architect:
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526 Boston Post Road
Wayland, MA 01778

Structural Engineer:
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350 Main Street
Malden, MA 02148

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12 Kendrick Road
Wareham, MA 02571

Civil/Site Engineer & Landscape Architect:
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10 Lincoln Road, Suite 103
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Technology Consultant:
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526 Boston Post Road
Wayland, MA 01778

Environmental Consultant:
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12 Brewster Road
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Code Consultant:
Cosentini Associates
101 Federal Street, Suite 600
Boston, MA 02110

Accessibility Consultant:
Kessler McGuinness & Associates, LLC
1121 Washington Street
Newton, MA 02465

Geotechnical Consultant:
Lahlaf Geotechnical Consulting, Inc.
23 McGinness Way
Billerica, MA 01821

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Introduction

Summary of Preferred Solution

Subsequent to the submittal of the Preferred Schematic Report on February 12, 2015, the Designer and the Owner's Project Manager (Heery International) have been working collaboratively with the Owner to further refine the Space Summary, as well as to review and develop the Preferred Schematic Report option for consideration by the School Building Committee and the City Council. We continue to meet on a weekly basis with the Working Group and School Department; including City officials and key members of both City and School Administration staff. Discussions during the meetings included all elements of the project. The design team also conducted numerous user group programming meetings with the middle school faculty, staff, and administration to gather more detailed input related to the proposed program spaces.

The preferred solution is the construction of an "all new" 231,509gsf middle school serving 1,395 students in grades 5-8. The new school will be located on the existing Memorial Building site located at 502 Cabot Street. The existing Memorial Building would be vacated prior to construction activities on the site and would be abated and demolished as part of an early phase or package; allowing for the expeditious start of new construction. The existing playfields on the site would remain in their current location; although renovation and some reconfiguration will occur. The new four-story middle school will be constructed and positioned with presence on Cabot Street following the demolition of the existing Memorial Building.

On May 18, 2015, the design team updated the MSBA with a summary of improvements to the proposed new middle school design. The evolution of the design continued as additional input provided by the Working Group, School Administration, and School Building Committee was gathered by the design team. The input resulted in refinement of the preferred solution, further strengthening the connection between the educational vision, educational program, the building floor plans, and the proposed site plan.

On May 15, 2015, the City selected Agostini-Bacon Construction as the Construction Manager at Risk for the proposed project. Agostini-Bacon has been engaged in the process immediately following selection and award, and has provided helpful input related to project schedule, building and site costs, and construction sequencing.

The design and construction process will require the design team to release a series of early design packages to achieve Substantial Completion during the summer of 2018:

Phase I: Abatement and demolition of the Existing Memorial Building

Early design package #1 will be released in December 2015 for the abatement and demolition of the existing Memorial Building. Abatement and demolition of the existing Memorial Building is planned to occur in the early winter of 2016.

Phase II: Ground Improvements, Civil, and Landscaping

Early design package #2 will be released in March 2016 for the required ground improvements

and related site work. Ground improvements are planned to occur during the summer of 2016.

Phase III: Foundation & Structure

Early design package #3 will be released in April 2016 for the required foundation and structural steel. Foundation placement and structural steel erection is planned to occur in the fall and late winter of 2016.

Phase IV: Building Construction & Site Work

Construction of the new building and all other amenities within the site construction boundaries will occur until Substantial Completion of the project in the summer of 2018.

On March 25, 2015, the MSBA Board of Directors approved the Preferred Schematic Report submission for the Beverly Middle School project.

The proposed "all new" building concept of a newly-created middle school for grades 5 through 8 received overwhelming support from the City, Committees, Boards, School Department, and the greater community. The discussion and evaluation of the new building includes numerous advantages such as:

- Most efficient building footprint and envelope
- Best adjacencies of programmatic areas
- Better able to meet the goals of educational visioning and program
- Less costly
- Shorter construction timeframe
- Able to provide each grade level with an ideal learning environment
- Economical long-term operational costs
- Better educational layout for the building
- Better organization for connections between 5th and 6th grade students
- Better organization for sharing of key resources between all grade levels
- Less unknowns or unanticipated conditions during construction

Introduction

Community Education Process

Subsequent to the submittal of the Preferred Schematic Report (PSR), the Designer and the Owner's Project Manager have been working collaboratively with the Owner to further refine the proposed Space Summary, study the proposed building massing, study the building materials and exterior aesthetics, and plan organization for educational compliance, sustainable design strategies, and site circulation and parking for consideration by the School Building Committee.

The City assembled key administration staff to attend weekly working group meetings, and the School Department assembled key administration, faculty, and staff from the Beverly Middle School and elementary schools for multiple discussions related to the topics mentioned above, along with numerous other topics to assist with refining the building organization.

The Designer, Owner's Project Manager, along with District and City representatives met with the local Fire Chief, Building Commissioner, City Solicitor, and Director of Planning to provide an overview of the project, discuss specific City requirements, regulations, and permitting guidelines for the new middle school project.

The project team (Designer, OPM, and CM-R following selection in May 2015) has conducted public meetings to review the project throughout the Schematic Design Phase. The new Beverly Middle School was openly discussed and reviewed at the following meetings listed below:

March 10, 2015	School Building Committee Presentation
March 31, 2015	School Building Committee Presentation
April 14, 2015	School Building Committee and City Council Presentation
May 12, 2015	School Building Committee Presentation
June 9, 2015	School Building Committee Presentation
June 15, 2015	City Council Presentation
July 28, 2015	School Building Committee Presentation

The City's support for the new Middle School project remains overwhelmingly positive.

District's Total Project Budget

Introduction

Total Project Budget

City of Beverly New Beverly Middle School **School Building Committee Reviewed on:** **7/28/2015**

Total Project Budget: All costs associated with the project are subject to 963 CMR 2.16(5)	Estimated Budget	Scope Items Excluded from the Estimated Basis of Maximum Facilities Grant or Otherwise Ineligible	Estimated Basis of Maximum Total Facilities Grant[1]	Estimated Maximum Total Facilities Grant[1]
Feasibility Study Agreement				
OPM Feasibility Study	$275,000	$0	$275,000	
A&E Feasibility Study	$925,000	$0	$925,000	
Environmental & Site	$175,000	$0	$175,000	
Other	$125,000	$0	$125,000	
Feasibility Study Agreement Subtotal	**$1,500,000**	**$0**	**$1,500,000**	**$0**
Administration				
Legal Fees	$25,000	$0	$25,000	**$0**
Owner's Project Manager				
Design Development	$123,000	$0	$123,000	
Construction Contract Documents	$281,000	$0	$281,000	
Bidding	$135,000	$0	$135,000	
Construction Contract Administration	$2,376,400	$0	$2,376,400	
Closeout	$72,659	$0	$72,659	
Extra Services	$200,000	$0	$200,000	
Reimbursable & Other Services	$75,000	$0	$75,000	
Cost Estimates	$150,000	$0	$150,000	
Advertising	$5,000	$0	$5,000	
Permitting	$50,000	$0	$50,000	
Owner's Insurance	$0	$0	$0	
Other Administrative Costs	$150,000	$0	$150,000	
Administration Subtotal	**$3,643,059**	**$0**	**$3,643,059**	**$0**
Architecture and Engineering				
Basic Services				
Design Development	$2,405,416	$0	$2,405,416	
Construction Contract Documents	$3,372,520	$0	$3,372,520	
Bidding	$174,615	$0	$174,615	
Construction Contract Administration	$1,340,210	$0	$1,340,210	
Closeout	$128,410	$0	$128,410	
Other Basic Services		$0	$0	
Basic Services Subtotal	**$7,421,171**	**$0**	**$7,421,171**	
Reimbursable Services				
Construction Testing	$0	$0	$0	
Printing (over minimum)	$75,000	$0	$75,000	
Other Reimbursable Costs	$100,000	$0	$100,000	
Hazardous Materials	$200,000	$0	$200,000	
Geotech & Geo-Env.	$250,000	$0	$250,000	
Site Survey	$45,000	$0	$45,000	
Wetlands	$37,500	$0	$37,500	
Traffic Studies	$24,500	$0	$24,500	
Architectural/Engineering Subtotal	**$8,153,171**	**$0**	**$8,153,171**	**$0**
CM & Risk Preconstruction Services				
Pre-Construction Services	$192,064	**$0**	$192,064	**$0**
Site Acquisition				
Land / Building Purchase	$0	$0	$0	
Appraisal Fees	$0	$0	$0	
Recording fees	$0	$0	$0	
Site Acquisition Subtotal	**$0**	**$0**	**$0**	**$0**
Construction Costs				
SUBSTRUCTURE				
Foundations	$8,661,726	$0		
Basement Construction	$0	$0		
SHELL	$0			

Total Project Budget

City of Beverly New Beverly Middle School **School Building Committee Reviewed on:** **7/28/2015**

Total Project Budget: All costs associated with the project are subject to 963 CMR 2.16(5)	Estimated Budget	Scope Items Excluded from the Estimated Basis of Maximum Facilities Grant or Otherwise Ineligible	Estimated Basis of Maximum Total Facilities Grant[1]	Estimated Maximum Total Facilities Grant[1]
SuperStructure	$8,055,454	$0		
Exterior Closure	$8,798,120	$0		
Exterior Walls		$0		
Exterior Windows		$0		
Exterior Doors		$0		
Roofing	$1,727,670	$0		
INTERIORS	$0			
Interior Construction	$7,459,477	$0		
Staircases	$0	$0		
Interior Finishes	$3,442,232	$0		
SERVICES	$0			
Conveying Systems	$430,000	$0		
Plumbing	$3,008,324	$0		
HVAC	$8,137,370	$0		
Fire Protection	$951,036	$0		
Electrical	$8,542,653	$0		
EQUIPMENT & FURNISHINGS	$0			
Equipment	$1,285,974	$0		
Furnishings	$2,290,884	$0		
SPECIAL CONSTRUCTION & DEMOLITION				
Special Construction	$35,000	$0		
Existing Building Demolition	$632,500	$0		
In-Bldg. Hazardous Material Abatement	$1,735,000	$0		
Asbestos Cont'g Floor Mat'l Abatement	$0	$0		
Other Hazardous Material Abatement		$0		
BUILDING SITEWORK				
Site Preparation	$1,776,765	$0		
Site Improvements	$2,344,492	$0		
Site Civil / Mechanical Utilities	$1,214,424	$0		
Site Electrical Utilities	$656,040	$0		
Other Site Construction	$202,677	$0		
Scope Excluded Site Cost		$0		
Construction Trades Subtotal	$71,387,818	$0		
Contingencies (Design and Pricing)	$6,747,967	$0		
D/B/B Sub-Contractor Bonds	$394,405	$0		
D/B/B Insurance	$765,062	$0		
D/B/B General Conditions	$5,118,342	$0		
D/B/B Overhead & Profit	$1,038,829	$0		
GMP Insurance	$0	$0		
GMP Fee	$1,623,316	$0		
GMP Contingency	$0	$0		
Escalation to Mid-Point of Construction	$3,053,693	$0		
Overall Excluded Construction Cost		$0		
Construction Budget	**$90,129,432**	**$0**	**$90,129,432**	**$0**
Alternates				
Ineligible Work Included in the Base Project	$0	$0	$0	
Alternates Included in the Total Project Budget	$0	$0	$0	
Alternates Excluded from the Total Project Budget	$0		$0	
Subtotal to be Included in Total Project Budget	**$0**	**$0**	**$0**	**$0**
Miscellaneous Project Costs				
Utility Company Fees	$50,000	$0	$50,000	
Testing Services	$150,000	$0	$150,000	
Swing Space / Modulars		$0	$0	

Total Project Budget

City of Beverly New Beverly Middle School **School Building Committee Reviewed on:** **7/28/2015**

Total Project Budget: All costs associated with the project are subject to 963 CMR 2.16(5)	Estimated Budget	Scope Items Excluded from the Estimated Basis of Maximum Facilities Grant or Otherwise Ineligible	Estimated Basis of Maximum Total Facilities Grant[1]	Estimated Maximum Total Facilities Grant[1]
Other Project Costs (Mailing & Moving)	$100,000	$0	$100,000	
Misc. Project Costs Subtotal	**$300,000**	**$0**	**$300,000**	**$0**
Furnishings and Equipment				
Furnishings	$837,000	$0	$837,000	
Equipment	$837,000	$0	$837,000	
Computer Equipment	$1,674,000	$0	$1,674,000	
FF&E Subtotal	**$3,348,000**	**$0**	**$3,348,000**	**$0**
Soft Costs that exceed 20% of Construction Cost		$0		
Project Budget	**$107,265,726**	**$0**	**$107,265,726**	**$0**

Board Authorization	
Design Enrollment	1,395
Total Building Gross Floor Area (GSF)	231,509
Total Project Budget (excluding Contingencies)	$107,265,726
Scope Items Excluded or Otherwise Ineligible	$0
Third Party Funding (Ineligible)	$0
Estimated Basis of Maximum Total Facilities Grant[1]	$107,265,726
Reimbursement Rate	56.19%
Est. Max. Total Facilities Grant (before recovery)[1]	$0
Cost Recovery [2]	$0
Estimated Maximum Total Facilities Grant[1]	$0

Construction Contingency[3]	$2,703,883
Ineligible Construction Contingency[3]	$0
"Potentially Eligible" Construction Contingency[3]	$0
Owner's Contingency[3]	$1,000,000
Ineligible Owner's Contingency[3]	$0
"Potentially Eligible" Owner's Contingency[3]	$1,000,000
Total Potentially Eligible Contingency[3]	$0
Reimbursement Rate	56.19%
Potential Additional Contingency Grant Funds[3]	$0
Maximum Total Facilities Grant	$0
Total Project Budget	$110,969,609

51.42	Reimbursement Rate Before Incentive Points
4.77	Total Incentive Points
56.19%	MSBA Reimbursement Rate

NOTES

This template was prepared by the MSBA as a tool to assist Districts and consultants in understanding MSBA policies and practices regarding potential impact on the MSBA's calculation of a potential Basis of Total Facilities Grant and potential Total Maximum Facilities Grant. This template does not contain a final, exhaustive list of all evaluations which the MSBA may use in determining whether items are eligible for reimbursement by the MSBA. The MSBA will perform an independent analysis based on a review of information and estimates provided by the District for the proposed school project that may or may not agree with the estimates generated by the District using this template.

1. Does not include any potentially eligible contingency funds and is subject to review and audit by the MSBA.

2. The proposed demolition of the _____ School is expected to result in the MSBA recovering a portion of state funds previously paid to the District for the ____ project at the existing facilities completed in ___. The MSBA will perform an independent analysis based on a review of information and estimates provided by the District for the proposed school project that may or may not agree with the estimated cost recovery generated by the District and its consultants using this template.

3. Pursuant to Section 3.20 of the Project Funding Agreement and the applicable policies and guidelines of the Authority, any project costs associated with the reallocation or transfer of funds from either the Owner's contingency or the Construction contingency to other budget line items shall be subject to review by the Authority to determine whether any such costs are eligible for reimbursement by the Authority. All costs are subject to review and audit by the MSBA.

Introduction
Project Description

The new Beverly Middle School will be 231,509gsf serving 1,395 students in grades 5-8. It will be located on the existing Memorial Building site at 502 Cabot Street. The site is approximately 17.71 acres of land. The existing Memorial Building would be vacated prior to construction activities on the site. The existing playfields on the site would remain in their current location; although renovation and some reconfiguration will occur. The new four-story middle school will be constructed and positioned with presence on Cabot Street following the demolition of the existing Memorial Building.

The total project budget for the new Beverly Middle School is $110,969,609. PLEASE REFER TO THE TOTAL PROJECT BUDGET WITHIN THIS REPORT.

The project involves the construction of a new 231,509gsf Beverly Middle School located at 502 Cabot Street in Beverly, Massachusetts. The construction delivery method will be Construction Manager at Risk (CM-R). On May 15, 2015, the City selected Agostini-Bacon Construction as the Construction Manager at Risk for the proposed project.

The project includes the abatement and demolition of the existing Memorial Building, construction of the proposed new building, including related site work, subsurface ground improvements, underground utilities, parking, on-site service and fire access roadways, and new multi-purpose play fields. The project has been designated as a Leadership-in-Energy-and-Environmental-Design ("LEED") project with an anticipated goal rating of Gold.

PHASING:

The design and construction process will require the design team to release a series of early design packages to achieve Substantial Completion during the summer of 2018:

Phase I: Abatement and Demolition of the Existing Memorial Building

Early design package #1 will be released in December 2015 for the abatement and demolition of the existing Memorial Building. Abatement and demolition of the existing Memorial Building is planned to occur in the early winter of 2016.

Phase II: Ground Improvements, Civil, and Landscaping

Early design package #2 will be released in March 2016 for the required ground improvements and related site work. Ground improvements are planned to occur during the summer of 2016.

Phase III: Foundation & Structure

Early design package #3 will be released in April 2016 for the required foundation and structural steel. Foundation placement and structural steel erection is planned to occur in the fall and

late winter of 2016.

Phase IV: Building Construction & Site Work

Construction of the new building and all other amenities within the site construction boundaries will occur until Substantial Completion of the project in the summer of 2018.

ALTERNATES:

No alternates have been identified at the Schematic Design stage of the design process.

On March 25, 2015, the MSBA Board of Directors approved the Preferred Schematic Report submission for the Beverly Middle School project.

The proposed "all new" building concept of a newly-created middle school for grades 5 through 8 received overwhelming support from the City, Committees, Boards, School Department, and the greater community. The discussion and evaluation of the new building includes numerous advantages such as:

- Most efficient building footprint and envelope
- Best adjacencies of programmatic areas
- Better able to meet the goals of educational visioning and program
- Less costly
- Shorter construction timeframe
- Able to provide each grade level with an ideal learning environment
- Economical long-term operational costs
- Better educational layout for the building
- Better organization for connections between 5th and 6th grade students
- Better organization for sharing of key resources between all grade levels
- Less unknowns or unanticipated conditions during construction

Introduction
Visual Aids

The following are Visual Aids of the Beverly Middle School for use by the MSBA at the September Board Meeting Presentation. Electronic copies of the Visual Aids are also being provided. These Visual Aids include overall floor plans, site plan, exterior elevations, front entry perspectives, and various perspectives around the building perimeter.

Main Entrance and Academic Wing - East Facing along Cabot Street

Outdoor Learning Environment and Student Dining - Southeast Facing

Outdoor Learning Environment and Student Dining - Southeast Facing

Close-up View of Main Entrance - East
Facing along Cabot Street

Main Entrance, Academic Wing, and Media Center - East Facing along Cabot Street

East Exterior Elevation

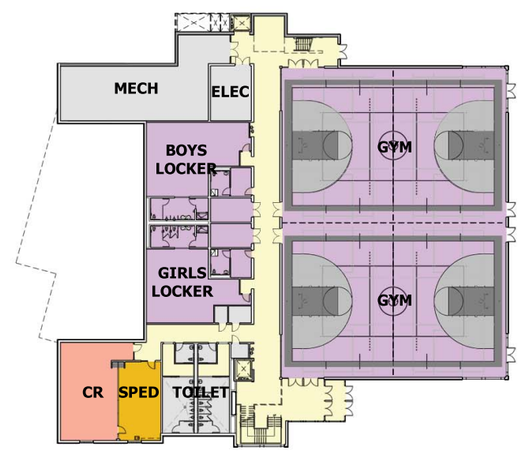
Southeast Exterior Elevation

South Exterior Elevation

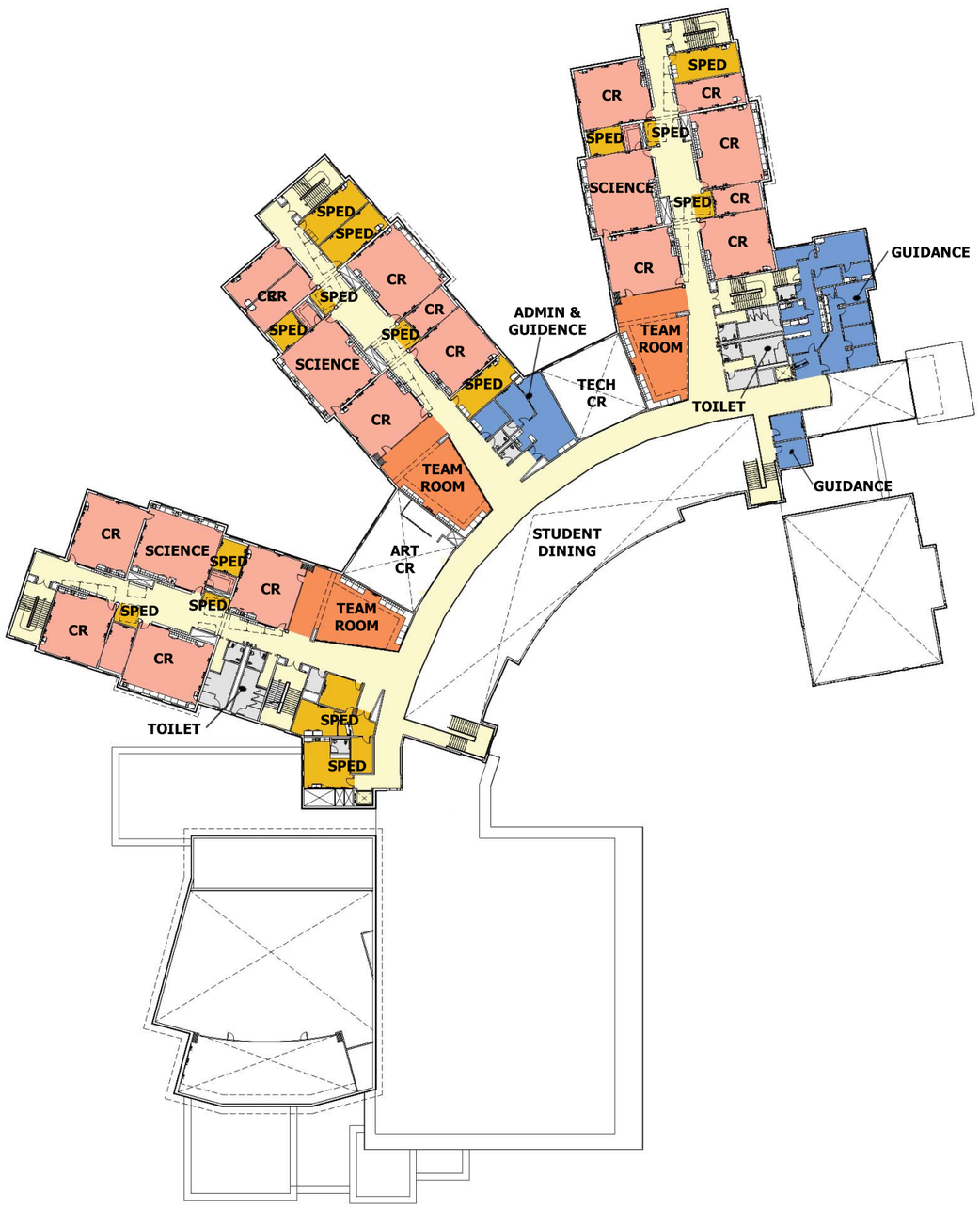
West Exterior Elevation

First Floor Plan

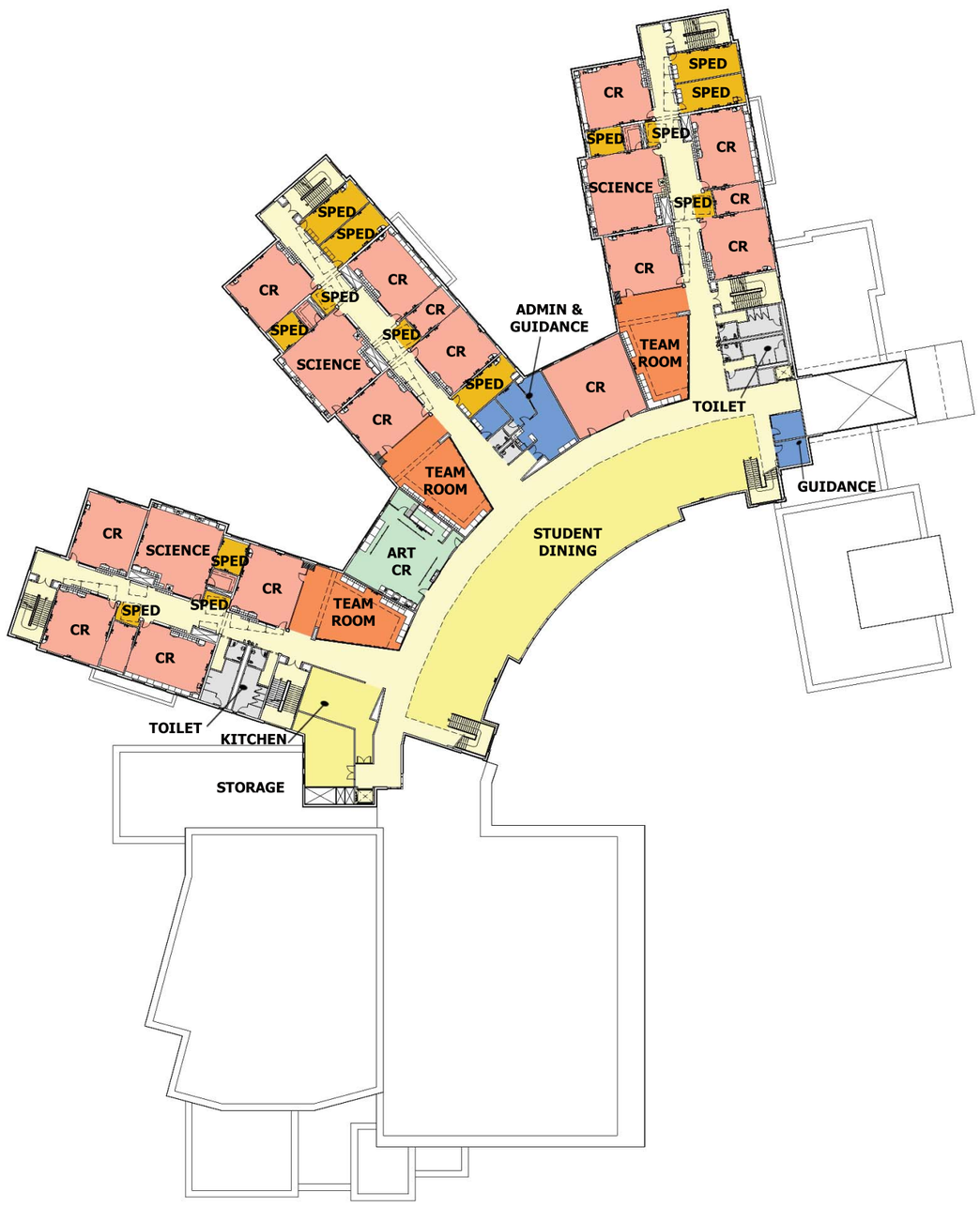
Lower Level Plan



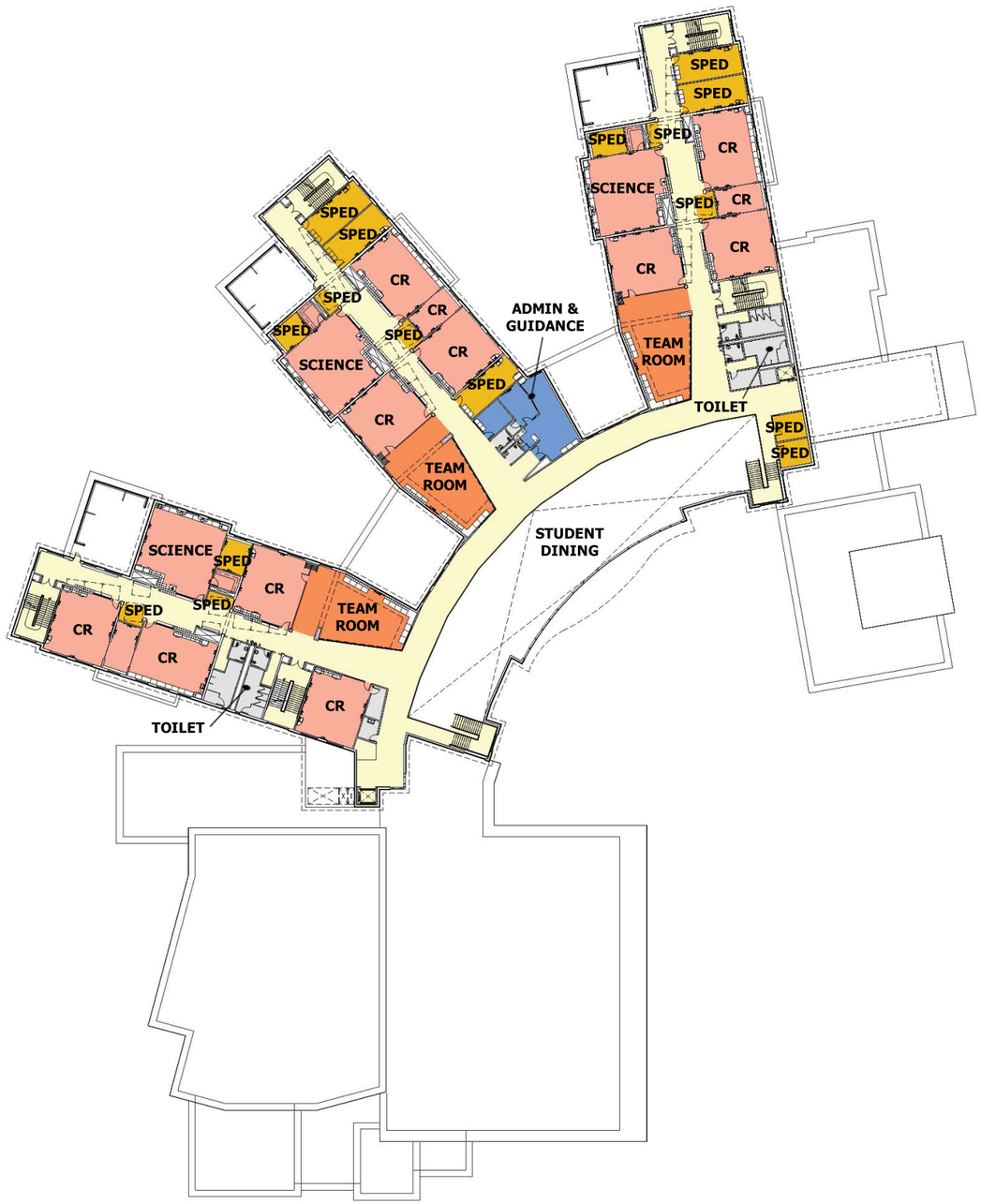
Second Floor Plan



Third Floor Plan



Fourth Floor Plan



Introduction

MSBA Preferred Schematic Report Review and District Response

March 17, 2015

Massachusetts School Building Authority (MSBA)
40 Broad Street
Suite 500
Boston, MA 02109
ATTN: Sarah Blache, Project Coordinator

Re: Proposed Beverly Middle School
MSBA – Preferred Schematic Report Review

Dear Ms. Blache:

In response to the MSBA's March 4, 2015 letter to Mayor Cahill in reference to the MSBA's review of the Beverly Middle School Preferred Schematic Report (PSR) submission and the associated MSBA review comments, the District has conducted review meetings for purposes of responding to the individual review comments, provided the attached response document, including additional documentation requested for clarification.

We have also included a revised space summary dated March 17, 2015 reflecting the deletion of the Dental Clinic and the proposed building's resultant net and gross square footage.

Sincerely,

Troy L Randall, AIA, LEED AP
Principal, Ai3 Architects, LLC

cc: Mayor Cahill, Mayor - City of Beverly
Paul Guanci, President, Beverly City Council
Paul Manzo, President, Beverly School Committee
Bryant Ayles, Director of Municipal Finance, City of Beverly
Denise Deshamps, Economic Development Planner, City of Beverly
Stephen Hiersche, Superintendent of Schools
Matt Poska, Beverly Middle School Principal
Thomas Ellis, OPM, Heery
Mark Lyons, OPM, Heery
Al Calcagno, OPM, Heery
L Scott Dunlap, Ai3 Architects, LLC

526 Boston Post Road Wayland, MA 01778 P 508.358.0790 F 508.358.0791 www.ai3architects.com

Massachusetts School Building Authority

Deborah B. Goldberg
Chairman, State Treasurer

John K McCarthy
Executive Director

March 4, 2015

The Honorable Michael P. Cahill
Mayor, City of Beverly
Beverly City Hall
191 Cabot Street
Beverly, MA 01915

Re: City of Beverly, Briscoe Middle School

Dear Mayor Cahill:

The Massachusetts School Building Authority (the "MSBA") is forwarding review comments for the Module 3 Feasibility Study Preferred Schematic Report submission for the Briscoe Middle School project received by the MSBA on February 12, 2015.

Responses to the attached comments shall be forwarded to the assigned Project Coordinator, Sarah Blache (Sarah.Blache@MassSchoolBuildings.org), through the Owner's Project Manager. Please review and return responses within 14 days of receipt of this letter.

If you have any questions or comments, please do not hesitate to contact Caulen Finch (Caulen.Finch@MassSchoolBuildings.org).

Sincerely,

Mary Pichetti
Director of Capital Planning

Attachments:
Attachment 'A' Preferred Schematic Report Review Comments
Attachment 'B' Preferred Schematic Report Space Summary

Cc: Legislative Delegation
Paul M. Guanci, President, Beverly City Council
Paul A. Manzo, President, Beverly School Committee
Dr. Steven A. Hiersche, Superintendent, Beverly Public Schools
Jean Sherburne, Director of Finance and Operations, Beverly Public Schools

40 Broad Street, Suite 500 • Boston, MA 02109 • Tel: 617-720-4466 • Fax: 617-720-5260 • www.MassSchoolBuildings.org

Page 2
March 4, 2015
Beverly Preferred Schematic Report Review Comments

Bryant Ayles, Director of Municipal Finance, City of Beverly
Denise Deshamps, Economic Development Planner, City of Beverly
Al Calcagno, Owner's Project Manager, Heery International, Inc.
Mark Lydon, Owner's Project Manager, Heery International, Inc.
L. Scott Dunlap, Designer, Ai3 Architects
File: 10.2 Letters (Region 3)

Attachment 'A'-Module 3 Preferred Schematic Report Review Comments

District: City of Beverly School: Briscoe
Middle School Submittal Due Date:
February 12, 2015
Submittal Received Date: February 12, 2015
Review Date: February 13 -25, 2015
Reviewed by: C. Finch

MSBA REVIEW COMMENTS:

The following comments[1] on the Preferred Schematic Report submittal are issued pursuant to a review of the project submittal document for the replacement of the Briscoe Middle School presented as a part of the Feasibility Study submission in accordance with the MSBA Module 3 Guidelines, as produced by Ai3, Architects, Inc. and its consultants. Certain supplemental components from the Owner's Project Manager (OPM) -Heery International, Inc. are included.

3.3 Preferred Schematic Report

Preferred Schematic Report shall include the following:

- OPM certification of completeness & conformity-*Complete.*
- Table of Contents-*Complete.*
- Introduction –*Complete.*
- Evaluation of Existing Conditions –*Complete. Refer to comments shown in italics.*
- Final Evaluation of Alternatives-*Complete. Refer to comments shown in italics.*
- Preferred Solution-*Complete. Refer to comments shown in italics.*
- Local Actions and Approval Certification-*Complete. Refer to comments shown in italics.*

3.3.2 Evaluation of Existing Conditions

Describe any changes resulting from new information that informs the conclusions of the evaluation of the existing conditions and its impact on the final evaluation of alternatives. If changes are substantive, provide an updated Evaluation of Existing Conditions and identify as final. Identify additional testing that is recommended during future phases of the proposed project and indicate

[1] The written comments provided by the MSBA are solely for purposes of determining whether the submittal documents, analysis process, proposed planning concept and any other design documents submitted for MSBA review appear consistent with the MSBA's guidelines and requirements, and are not for the purpose of determining whether the proposed design and its process may meet any legal requirements imposed by federal, state or local law, including, but not limited to, zoning ordinances and by-laws, environmental regulations, building codes, sanitary codes, safety codes and public procurement laws or for the purpose of determining whether the proposed design and process meet any applicable professional standard of care or any other standard of care. Project designers are obligated to implement detailed planning and technical review procedures to effect coordination of design criteria, buildability, and technical adequacy of project concepts. Each city, town and regional school district shall be solely responsible for ensuring that its project development concepts comply with all applicable provisions of federal, state, and local law. The MSBA recommends that each city, town and regional school district have its legal counsel review its development process and subsequent bid documents to ensure that it is in compliance with all provisions of federal, state and local law, prior to bidding. The MSBA shall not be responsible for any legal fees or costs of any kind that may be incurred by a city, town or regional school district in relation to MSBA requirements or the preparation and review of the project's planning process or plans and specifications.

when the investigations and analysis will be completed. – *The Existing Conditions narrative indicates that the existing square footage of the Memorial building was reviewed and updated from 54,000 gsf to 103,000 gsf. The report identifies the incorrect 54,000 gsf in multiple narratives. Most notably in the summary of the District's preferred solution, citing that the existing building is "relatively small" and any addition / renovation option would primarily be an expansion. Please confirm that the updated existing square foot measurement did not affect the selection or costs associated with any of the options as presented.*

Response: Please find this as a confirmation that the updated existing Memorial Building square foot measurements did not impact the District's decision to select OPTION 1a as the Preferred Option. Also, the updated square foot measurements were included within the renovation options (OPTION 2a and OPTION 2b) within the third party cost estimate produced by PM&C and also contained within the Preferred Schematic Report submission dated February 12, 2015.

3.3.3 Final Evaluation of Alternatives - *On the first page of the Introduction section, the last paragraph indicates that the District and its consultants considered several variations of the new construction option. Please provide an overview of those options with any applicable graphics and narratives. Additionally, please provide an overview of the process in which the forwarded Option 1a was selected as the District's preferred new construction option.*

Response: The Owner briefly considered options 1c, 1d, and 1e as part of an evaluation of alternative building organizations and layout. Each of these options resulted in significant compromise to the priority goals identified in the educational program. Additionally, they resulted in much larger building footprints that resulted in a loss of site amenities such as parking and play areas. They were determined to be non-viable and not worthy of continued evaluation against the more viable options of 1a, 1b, 2a, and 2b. They were not included in the final preferred schematic document because it was determined that including them would suggest that they are worthy of consideration when compared to options 1a, 1b, 2a, and 2b; which they are not.

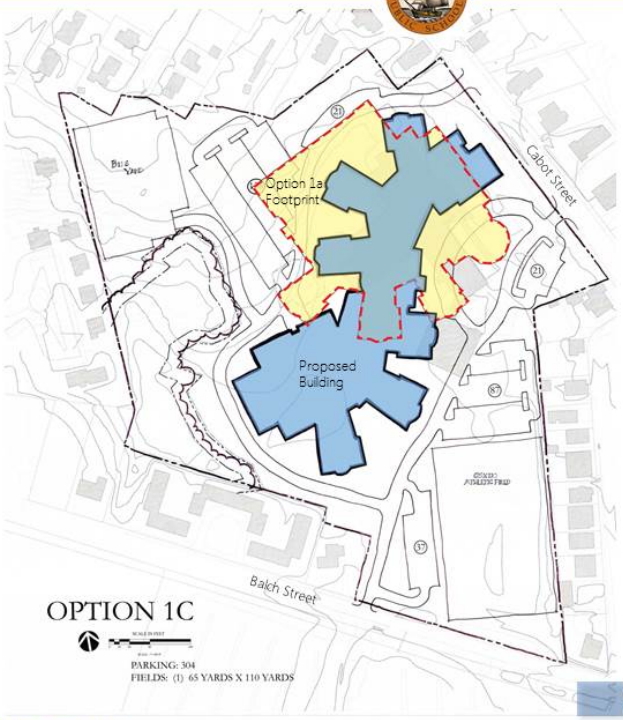
Option 1c: New Construction

FLOOR 1

Beverly Middle School - Beverly, MA

March 18, 2015

Option 1c: New Construction



- Parking quantity is approximately the same as Option 1a
- Parent drop off area proposed in Option 1a gets converted to parking area in this Option.
- Loss of one playfield.
- Significant fill and/or cut required with this option.
- Approximately 20% larger footprint than Option 1a

SITE PLAN

Beverly Middle School - Beverly, MA

March 18, 2015

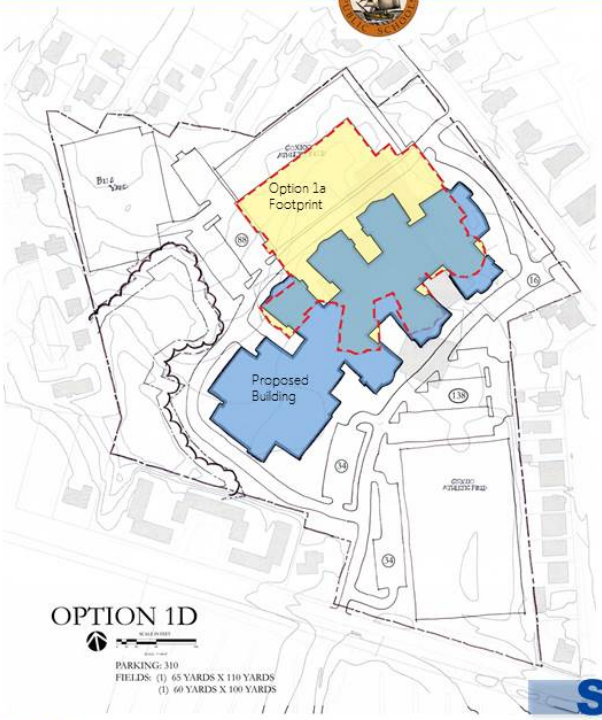
Option 1d: New Construction

FLOOR 1

Beverly Middle School - Beverly, MA

March 18, 2015

Option 1d: New Construction



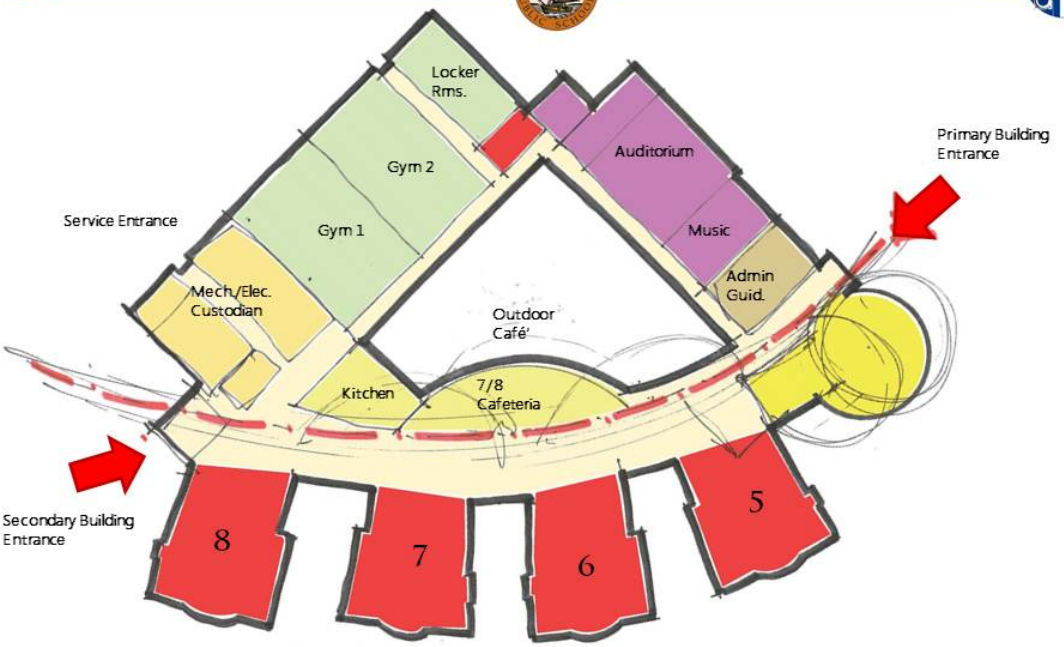
- Parking quantity is approximately the same as Option 1a
- Parent drop off area proposed in Option 1a gets converted to parking area in this Option.
- Two playfields can exist on site but must be separated.
- Significant fill and/or cut required with this option.
- Approximately 25% larger footprint than Option 1a

SITE PLAN

Beverly Middle School - Beverly, MA

March 18, 2015

Option 1e: New Construction

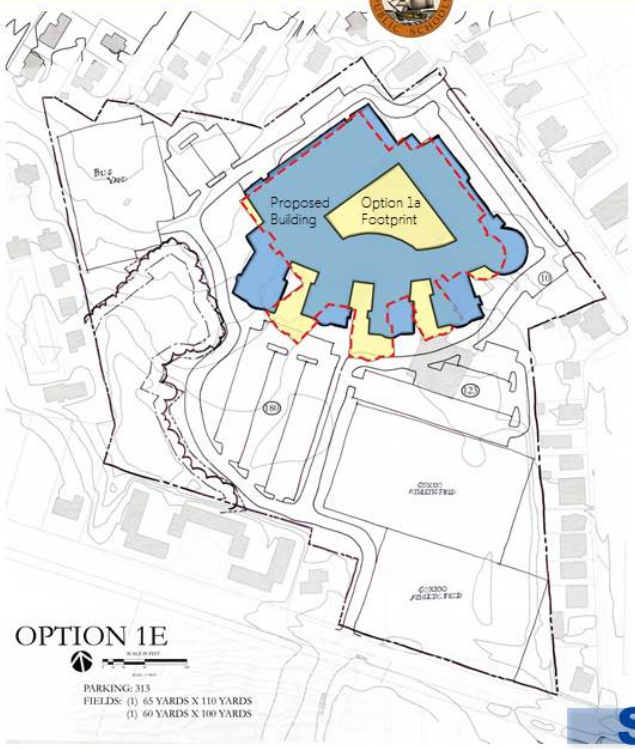


FLOOR 1

Beverly Middle School - Beverly, MA

March 18, 2015

Option 1e: New Construction



- Site characteristics similar to Option 1a
- Vertically stacks academies/neighborhoods
- Approximately 10% larger footprint than Option 1a

SITE PLAN

Beverly Middle School - Beverly, MA

March 18, 2015

Include at least three potential alternatives, with at least one renovation and/or addition option. Include the following for each alternative where appropriate:

- An analysis of each prospective site including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access, and surrounding site features; - *The second paragraph of the site analysis recommends that, although the review of the Beverly City Open Space Inventory did not determine any restrictions against the development of the portion of the site referred to as the Memorial Wildlife Sanctuary, that there be "further review with the City in order to determine how this parcel may or may not be utilized as part of future development. "Later in the section it is stated that future development may require that a bus storage facility be accommodated on the site. The site plans of each option show a proposed bus facility on this protected portion of the site. Please provide clarity and confirm how this portion of the site will be impacted by the proposed project.*

  Response: Upon further review with the City, the area identified as a "Wildlife Sanctuary" is an undefined area (marked by a sign placed by a prior student and/or instructor), NOT restricted from future development, and NOT protected or managed by any local or state agencies (i.e., MassWildlife). The "area" is considered open land and may be utilized as part of the future development of the site.

- An outline of the major building structural systems; - *The proposed foundation system outlined in this report is different than the systems indicated in the Preliminary Design Program. Please provide a rationale for this change and describe the impact to scope and budget.*

  Response: The proposed foundation system has not changed from the Preliminary Design Program (PDP) submission to the Preferred Schematic Report (PSR) submission. As a result of the preliminary information gathered by the Geotechnical investigations, the existing subsurface conditions are not suitable to support shallow foundations. As a result, the design team has considered several approaches to the foundation and slab design, including precast pre-stressed concrete (PPC) piles, concrete filled steel pipe (CFP) piles, steel H-piles, geo-concrete columns (GCC) and pre-consolidation, and continues to explore the most cost effective approach to the design of the substructure. This information is collectively reported in the Preliminary Design Program (PDP) submission (November 25, 2014), the response document to the MSBA review comments (dated January 13, 2015), and the structural system narrative contained in the Preferred Schematic Report (PSR) submission (dated February 12, 2015).

  The design team will continue to evaluate the Memorial Building site and subsurface conditions during the Schematic Design phase as part of the Phase II – Geotechnical investigations.

- The source, capacities, and method of obtaining all utilities; - *The source of all utilities has been identified; however, the capacity of the sewer, water (hydrant flow), electricity and gas systems has not been determined. Please provide a timeline to complete this work as this will have an impact to scope, budget and schedule moving forward in schematic design.*

  Response: The capacity of the existing utilities (sewer, water, hydrant flow, electricity and gas systems) will be reviewed during the Schematic Design phase of the project. The information we currently have gathered, and which will be confirmed during the Schematic Design phase, does not appear to have an impact on the overall budget beyond what has been considered thus far. Additional information will be provided within the Schematic Design submission.

- A narrative of the major building systems; – *The building systems narratives do not indicate the proposed use of proprietary products, however, several references to single source manufacturers have been found within. Should proprietary products be considered, provide a list identifying all proprietary items with an affidavit which shall indicate that an elected body of the district (school committee, city or town council, or selectmen, -but not ad-hoc building committee) has been presented with proposals for proprietary requirements approval action, has had an opportunity to investigate, or to require staff or consultant investigation upon each item so proposed, and has majority voted in an open public session that it is in the public interest to do so. Provide MSBA with a certified copy of the vote of the elected body. For each item of material or equipment, the specifications shall provide for a minimum of three named brands of material or equipment and the words "or equal" or a description of material or equipment which can be met by a minimum of three manufacturers or producers, and the words "or equal". Proprietary products shall not be specified except as provided by M.G.L.* c. *30, §39M; however, when they are specified, proprietary specifications are subject to the "or equal" provisions of* c. *30, §39M*

  Response: The proposed use of proprietary products will be considered and discussed with the City and District at the appropriate stage in the design process. To date, no proprietary products have been identified nor has there been any vote(s) by the elected body to accept proprietary products. Please consider this response as confirmation that the District will provide the required documentation in compliance with M.G.L. c.30, §39M(b) as part of a future submission to the MSBA.

- Permitting requirements and associated approval schedule; - *The Permitting Requirements section indicates that multiple permits will be required from different granting authorities, each with a different timeline:*
  - *Site Plan Review for Parking- Beverly Planning Board (5-6 months)*
  - *Building Height Special Permit- Beverly Zoning Board of Appeals (5-6 Months.) Please note that, as the potential rejection of a special permit can result in the need for significant redesign, the MSBA requires the Town to secure all local building height special permits prior to Board*

authorization for a Project Scope and Budget agreement.

- *Notice of Intent for work within wetland buffers -Beverly Conservation Commission, Massachusetts Department of Environmental Protection (60-75 Days)*
- *Drainage Alterations permit-Beverly Engineering Department (60-75 Days)*

Please incorporate into the project work plan a general timeline associated with the application process for each of the permits above, and provide MSBA with a copy of the Massachusetts Historic notification form filed with the Massachusetts Historical Commission for the proposed project.

Response: The site permitting requirements will be incorporated into the project work plan and general timeline and included as part of the Schematic Design submission.

In conformance with Massachusetts General Law 950, CRM 71.00, the Project Notification Form will be filed with the Massachusetts Historical Commission (MHC) for the proposed project. A copy of the documentation will be included as part of the Schematic Design submission.

- Completed Table 1 - MSBA Summary of Preliminary Design Pricing spreadsheet. -*On February 24, 2015, a corrected Preliminary Design Pricing table was provided to the MSBA. No further action required.*

3.3.4 Preferred Solution

- **Educational Program**
  - Summary of key components and how the preferred solution fulfills the educational program-*As discussed at the February 25, 2015 Facilities Assessment Subcommittee meeting, please provide a narrative describing the District's current and proposed procedures regarding professional development for staff Please describe anticipated topics under consideration, focusing on those professional development areas concentrated on preparing teachers for the new facility and the incorporation of the 5'" grade into the proposed middle school.*

    Response: Please reference the Beverly Public Schools letter dated March 10, 2015 attached to this response.

    - Proposed variances to, and benefits of, any changes to the current grade configuration (if any) and a related transition plan-*In response to the MSBA 's Preliminary Design Program comments, the District provided a review of the current grade configuration, meeting minutes from the School Committee Meeting on February 26, 2014 where the Middle School Grade Reconfiguration was discussed and approved, and the Strategic Planning Committee's report from November 15, 2011 recommending the transition to a grade 5-8 Middle School configuration. No further action required.*

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- **Preferred Solution Space Summary**
  - Updated MSBA Space Summary spreadsheet - *Refer to detailed comments in 'Attachment B'.*
  - Itemization and explanation of variations from the initial space summary (and MSBA review) included in the Preliminary Design Program- *Adjustments were made to the Space summary in response to the MSBA's Preliminary Design Program review comments. The MSBA acknowledges that the proposed total net square footage for the project has not changed since these concerns were addressed. No further action required.*

- **Building Plans-** As discussed at the February 25, 2015 Facilities Assessment Subcommittee meeting, please address the following:
  - Classroom utilities -*Please provide a narrative that explores the advantages of providing sinks in each classroom. Please provide conceptual layouts and associated costs that would support this design feature.*

    Response: During the Schematic Design Phase, the design team will be exploring with the Middle School faculty, staff, and administration the advantages and disadvantages of providing sinks in each instructional classroom, the associated costs, and relevance to the established educational vision and program. The resultant findings will be submitted with the Schematic Design submission.

  - Accessibility-*Please provide a narrative that describes handicapped accessibility within the proposed four-story building should elevator access be rendered inoperable. Also please indicate the proposed distance from vehicle drop-off areas to the building entrance(s) and describe design opportunities that could offer limited exposure to inclement weather conditions at the drop-off areas.*

    Response:

    Accessibility – The preferred option (Option 1a – New Construction) currently includes a 4-story academic zone of the building. The proposed building floor plans identify two elevators, one located on each end of the academic zone easily accessed from the academies/neighborhoods. The inclusion of two elevators into the design anticipates that if one elevator is rendered inoperable, the second elevator would serve as a means of accessibility between floor levels.

    Also, in the event of an emergency, an area of refuge will be designed at each stairway in accordance with the Massachusetts State Building Code (780 CMR) and Massachusetts Architectural Access Board (521 CMR) to provide a person who is unable to use the stairway a safe location to remain temporarily to await instruction or assistance during emergency evacuations.

    Drop-off: The preferred schematic site plan (Option 1a) includes two drop-off zones located adjacent to the primary and secondary building entrances. The primary building entrance, located along Cabot Street, includes an access drive from Cabot Street and a vehicular drop-off zone parallel to the proposed building and entrance. The drop-off area begins approximately 50'-0" - 60'-0" from the building entrance. The secondary entrance (adjacent to the Gymnasium) is on the southwest side of the

building. The entrance area includes a vehicular and bus drop-off loop. The drop-off area begins approximately 20'-0" - 30'-0" from the building entrance. At both building entrances, the design would include an exterior canopy to provide protection adjacent to the entrance area to protect students/visitors from inclement weather conditions.

- Security-*Please provide a narrative that supports the proposed use of transparent glazing at academic spaces located at ground level of the proposed building. Also, please provide a description of design opportunities that could provide less-visible student movements from the exterior from a security perspective.*

  Response: The educational vision and program describes the concept that the new Middle School building will provide students and staff with a safe and secure environment by including measures that support and foster safety and confidence. Students and staff must feel safe and confident in their environment, without the inclusion of over-restrictive physical barriers that compromise the educational environment.

  At this point in the process, the amount of transparency in the building has not been defined. The design team will be reviewing many topics with the faculty, staff, and administration during the Schematic Design phase related to safety and security, including the quantity, locations, and types of transparency within the interior and exterior building wall surfaces, daylighting, entry sequence – supervision and observation (primary and alternative entry locations), classroom visibility, classroom, among many other topics.

  The goal is to promote a positive learning environment while providing the safe and secure space to allow the staff and students to feel confident within the spaces that foster teaching and learning.

- **Site Plans-** Provide clearly labeled site plans of the preferred solution including, but not limited to:
  - *Zoning setbacks and limitations; - Zoning and setback limitations are discussed in the Site Analysis section of the report, but are not explicitly shown on the conceptual site plan. Please revise and confirm that the proposed building does not interfere with the setback requirements.*

  Response: The zoning setback information previously provided in the existing conditions site plans has been included in the attached proposed site plan (Option 1).

  - *Easements and environmental buffers; The Site Analysis Conservation Commission Section indicates that work is anticipated within the existing buffer zones, however, the proposed plans do not clearly illustrate this. Please clarify.*

  Response: The information gathered as a result of our consultant's preliminary review of the Mass GIS data, the wetland area, regulatory buffer zones, and local 25' no-disturbance zone has been included in the attached proposed site plan (Option 1). A survey of the site is scheduled to occur during the Schematic Design phase, including delineation of the wetland area and resultant easements. This information will be

further refined and added to the existing conditions plan and included as part of the Schematic Design submission.

- *Emergency vehicle access; - Not specifically identified on plans. Please provide.*

Response: Please reference the attached revised proposed site plan for emergency vehicle access defined in a red dashed line connecting Cabot Street and Balch Street and providing access to the perimeter of the proposed building.

- *Safety and security features; - Not indicated. Please update site plan to show any proposed safety and security features.*

Response: The site plans will take into consideration safety and security features relative to site design. These features would include raised crosswalks, directional signage, speed tables, site fencing, and dedicated drop-off areas. Many of these features will be further evaluated during the Schematic Design phase of the project and incorporated into the proposed plans.

- *Utilities; -Not indicated. Please update site plan to show /mown or proposed locations of utilities.*

Response: Please reference the attached revised proposed site plan for existing utility information.

- *Athletic fields and outdoor educational spaces -As discussed at the February 25, 2015 Facilities Assessment Subcommittee meeting, the proposed design features a courtyard to be utilized for educational purposes. Please provide a plan describing the educational aspects of the courtyard and the associated maintenance plans for this space.*

Response: The courtyard is a secure natural environment for use by students, teachers, and staff. Conceptually, the courtyard is intended to serve a variety of educational functions that provide a change in environment and alternate opportunities from teaching inside the school building. Although the exact uses of the courtyard have not currently been defined, discussions have included topics such as:

1. *Mini performance Area:* Located adjacent to the performing arts program for theatrical and musical performances and social functions.
2. *Outdoor Instructional Space*: Secure instructional space for, as an example, art activities/projects when indirect and direct natural lighting is required.
3. *Exploration and Adventure:* Science-oriented themes, solar studies, rain gardens, weather station, and sensory stimulation designs strategically placed along an interactive trail/path, within a defined a space, or at varying elevations.
4. *Outdoor Dining:* A secure area designed as an extension of the indoor student dining space.
5. *Student Garden:* The controlled/secure environment is an excellent place for planting vegetable, butterfly, or sensory gardens that provide a learning experience related to the understanding of naturally grown foods, nutrition, visual and textural qualities of plantings, etc.

The current building configuration and function of the spaces surrounding the courtyard can accommodate student activity with higher noise levels without potentially disturbing quieter building program areas such as the typical instructional classrooms and the library media center.

The design of a natural learning environment that promotes the use of an outdoor space for education will also assist the District in obtaining additional points related to Leadership in Energy and Environmental Design (LEED) certification via the Innovation in Design category by using the school as a teaching tool.

It is understood that a commitment to maintaining the courtyard is vital to the long-term effectiveness and successful use of the space as an educational tool. There are many design and material choices that have an impact on the educational usefulness and required level of maintenance in a courtyard. Some examples include the proper balance of hardscaping vs. landscaping, use of native planting materials, balance of stone vs. grass, traffic patterns and level of activity influencing the selected patio and/or walking surface material, man-made vs. natural shading devices, variation in topography to define zones, seating material selection (i.e., wood, concrete, steel, rock), etc. All of these topics, along with many others, will be defined in greater detail as we continue through the design process.

Continued discussions with the District will occur through the Schematic Design phase to help further define the opportunities within the courtyard space, its direct coordination with the educational curriculum, and required maintenance program.

- **Budget-** Provide an overview of the Total Project Budget and local funding including the following:
  - List of other municipal projects currently planned or in progress; - *The District has indicated that it is currently developing a 5 year capital plan, and will provide a copy when completed. Please indicate when the MSBA can expect to receive this information.*

Response: The City currently anticipates providing the MSBA with an updated 5-year Capital Plan on or before April 10, 2015.

3.3.5 Local Actions and Approvals to include:

Certified copies of the School Building Committee meeting notes showing specific submittal approval vote language and voting results, and a list of associated School Building Committee meeting dates, agenda, attendees and description of the presentation materials-*A certified copy of the School Building Committee meeting notes was subsequently provided to the MSBA on February 18, 2015. No further action required.*

- (Applicable for Districts proposing grade reconfiguration and/or redistricting) Certified copies of the School Building Committee meeting notes showing specific grade reconfiguration and/or redistricting vote language and voting results, and a list of associated School Building Committee meeting dates, agenda, attendees and description of the presentation materials –*In response*

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to the MSBA's Preliminary Design Comments, the District provided a review of the current grade configuration, meeting minutes from the School Committee Meeting on February 26, 2014 where the Middle School Grade Reconfiguration was discussed and approved, and the Strategic Planning Committee 's report from November 15, 2011 recommending the transition to a grade 5-8 Middle School configuration. Please confirm that there are no further local required actions to complete the proposed District-wide grade reconfiguration.

Response: The City and District have confirmed that there are no further local actions required to complete the proposed District-wide grade reconfiguration. Reference the attached District letter dated March 12, 2015.

End.

1

Attachment 'B'-Module 3 Preferred Schematic Space Summary Review

District: City of Beverly School: Briscoe
Middle School Submittal Due Date:
February 12, 2015
Submittal Received Date: February 12, 2015
Review Date: February 13 -25, 2015
Reviewed by: C. Finch, C. Forde

The Massachusetts School Building Authority (the "MSBA") has completed its review of the proposed space summary of the preferred alternative as produced by Ai3, Architects, Inc. and its consultants. This review involved evaluating the extent to which the Briscoe Middle School School's proposed space summary conforms to the MSBA guidelines and regulations.

The MSBA considers it critical that the Districts and their Designers aggressively pursue design strategies to achieve compliance with the MSBA guidelines for all proposed projects in the new program and strive to meet the gross square footage allowed per student and the core classroom space standards, as outlined in the guidelines. The MSBA also considers its stance on core classroom space critical to its mission of supporting the construction of successful school projects throughout the Commonwealth that meet current and future educational demands. The MSBA does not want to see this critical component of education suffer at the expense of larger or grander spaces that are not directly involved in the education of students.

The following review is based on the submitted new construction option with an agreed upon design enrollment of 1,395 students in grades 5-8.

The MSBA review comments are as follows:

- **Core Academic**-The District is proposing to provide a total of 68,390 net square feet (nsf) which exceeds the MSBA guidelines by 3,080 nsf. The proposed area in this category has increased by 850 nsf since the Preliminary Design Program submittal as a result of the Health Classroom space being moved from the Health and Physical Education category to Core Academic as requested in the MSBA's PDP review comments. The MSBA notes that the overage in this category is largely attributed to the proposed academic team rooms that support the delivery of the District's proposed Educational Program as part of the "Neighborhood Commons." The MSBA will continue to review whether these spaces should be carried within the 1.5 grossing factor or remain as net generating area.

- **Special Education**-The District is proposing to provide a total of 15,850 nsf which exceeds the MSBA guidelines by 750 nsf. The proposed area in this category has not changed since the Preliminary Design Program submittal. Please note that the Special Education program is subject to approval by the Department of

Elementary and Secondary Education (DESE). The District should provide the information required for this submittal within the schematic design submittal.

Formal approval of the District's proposed Special Education program by the DESE is a prerequisite for executing a Project Funding Agreement with the MSBA.

- **Art and Music/ Voc-Tech**-The District is proposing to provide a combined total of 16,150 nsf which meets the MSBA guidelines. The proposed area in this category has not changed since the Preliminary Design Program submittal. No further action required.

- **Health and Physical Education**-The District is proposing to provide a total of 15,400 nsf which exceeds the MSBA guidelines by 7,000 nsf. The proposed area in this category has decreased by 850 nsf since the Preliminary Design Program submittal as a result of the Health Classroom space being moved to the Core Academic category as requested in the MSBA's PDP review comments. In response to the MSBA's PDP review comments, the District provided scheduling information and utilization rates for the proposed additional Gymnasium teaching stations. The MSBA accepts this variation to the guidelines. No further action required.

- **Media Center**-The District is proposing to provide a total of 8,401 nsf which meets the MSBA guidelines. The proposed area in this category has not changed since the Preliminary Design Program submittal. No further action required.

- **Dining and Food Service**-The District is proposing to provide a total of 15,872 nsf which meets the MSBA guidelines. The proposed area in this category has decreased by 5,700 nsf since the Preliminary Design Program submittal as a result of the Auditorium space being moved from the Dining & Food Service category to the "Other" category as requested in the MSBA's PDP review comments. No further action required.

- **Medical**-The District is proposing to provide a total of 910 nsf which meets the MSBA guidelines. The proposed area in this category has not changed since the Preliminary Design Program submittal. No further action required.

- **Administration and Guidance** – The District is proposing to provide a total of 4,796 nsf which meets the MSBA guidelines. The proposed area in this category has not changed since the Preliminary Design Program submittal. No further action required.

- **Custodial and Maintenance** – The District is proposing to provide a total of 2,870 nsf which meets the MSBA guidelines. The proposed area in this category has not changed since the Preliminary Design Program submittal. No further action required.

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- **Other** - The District is proposing to provide a total of 6,870 nsf which exceeds the MSBA guidelines by 6,870 nsf. The proposed area in this category has increased by 5,700 nsf since the Preliminary Design Program submittal as a result of the Auditorium space being moved from the Dining and Food Service category as requested in the MSBA's PDP review comments. The District has documented its desire to include a 5,700 nsf Auditorium in the proposed facility; however, MSBA space standards do not include auditoriums for middle schools. The MSBA accepts inclusion of the auditorium space into the project but will consider this space non-reimbursable. The category also includes a 1,170 nsf Dental Clinic, which will continue to provide services to students, and therefore the MSBA accepts inclusion of the proposed dental clinic space into the project but will also consider this space non-reimbursable.

  Response: The City has decided to relocate the existing Dental Clinic to other available space within the District and remove the programmed space from the proposed new Middle School project. As a result, the net square footage and gross square footage has been updated in the attached proposed Space Summary dated March 18, 2015. The revisions result in a reduced net square footage of 5,700 in the category "Other". The revisions also result in a revised Total Building Gross Floor Area of 231,509 gsf.

- **Total Building Net Floor Area**-The District is proposing to provide a total of 155,509 nsf which exceeds the MSBA guidelines by 17,700 nsf. The proposed area has not changed since the Preliminary Design Program submittal. Based on the comments provided above the MSBA accepts this variation to the guidelines. No further actions required.

- **Total Building Gross Floor Area**-The District is proposing to provide a total of 233,624 gsf which exceeds the MSBA guidelines by 26,553 gsf. As a result of a adjusting the MSBA Space Template to reflect the allowable grossing factor of 1.5, the proposed area has decreased by 18,661 gsf since the Preliminary Design Program submittal. Based on the comments provided above the MSBA accepts this variation to the guidelines. No further actions required.

Please note that upon moving forward into subsequent phases of the proposed project, the Designer will be required to provide, with each submission, a signed, updated space summary that reflects the design and demonstrates that the design remains, except as agreed to in writing by the MSBA, in accordance with the guidelines, rules, regulations and policies of the MSBA. Should the updated space summary demonstrate changes to the previous space summary include a narrative description of the change(s) and the reason for the proposed changes to the project.

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Steven A. Hiersche, Ed.D.
Superintendent of Schools

Suzanne M. Charochak
Assistant Superintendent

March 10, 2015

Currently, in Beverly, we have utilized a variety of strategies in providing professional development to staff. We have a Professional Development Committee that meets regularly to create a Professional Development Plan for the district. The plan identifies opportunities for face-to-face sessions, blended opportunities as well as dissemination of independent opportunities that align with district, building and teacher goals. We hope to continue to capitalize on these opportunities as well as to increase access to offerings through partnerships with local colleges (Endicott, Salem State and Fitchburg State).

At the Middle School level, teachers access Moodle as a communicative platform that enables them to extend their Professional Development opportunities in a blended learning format. Currently, we have provided differentiated modules for staff on the Moodle platform itself, as well as in the area of integrating technology in their classrooms. Our plan is to continue in this manner to expand offerings on a variety of topics. These topics were developed with staff at a forum (held on February 12) in which teacher input was obtained. Among the topics to be incorporated in the next 3-5 year PD plan for the middle school are:

1. 21st Century Skills and Global Education
2. Blended Learning for Middle School Classrooms
3. Technology Education (redesign of current program)
4. Licensure – content specific offerings for teachers to enhance flexibility of staffing
5. Interdisciplinary Approach – (Project/Problem Based Learning, Lesson Planning, Implementation)

Other areas that we currently are working with teachers include the continuation of our visioning sessions to create an implementation plan that supports the transition from a traditional 6-8 middle school model to a progressive 5-8 21st Century model.

The mission of the Beverly Public Schools is to maximize academic achievement and personal growth of every student.

Beverly Public Schools
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01915
Telephone (978) 921-6100
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Steven A. Hiersche, Ed.D.
Superintendent of Schools

March 12, 2015

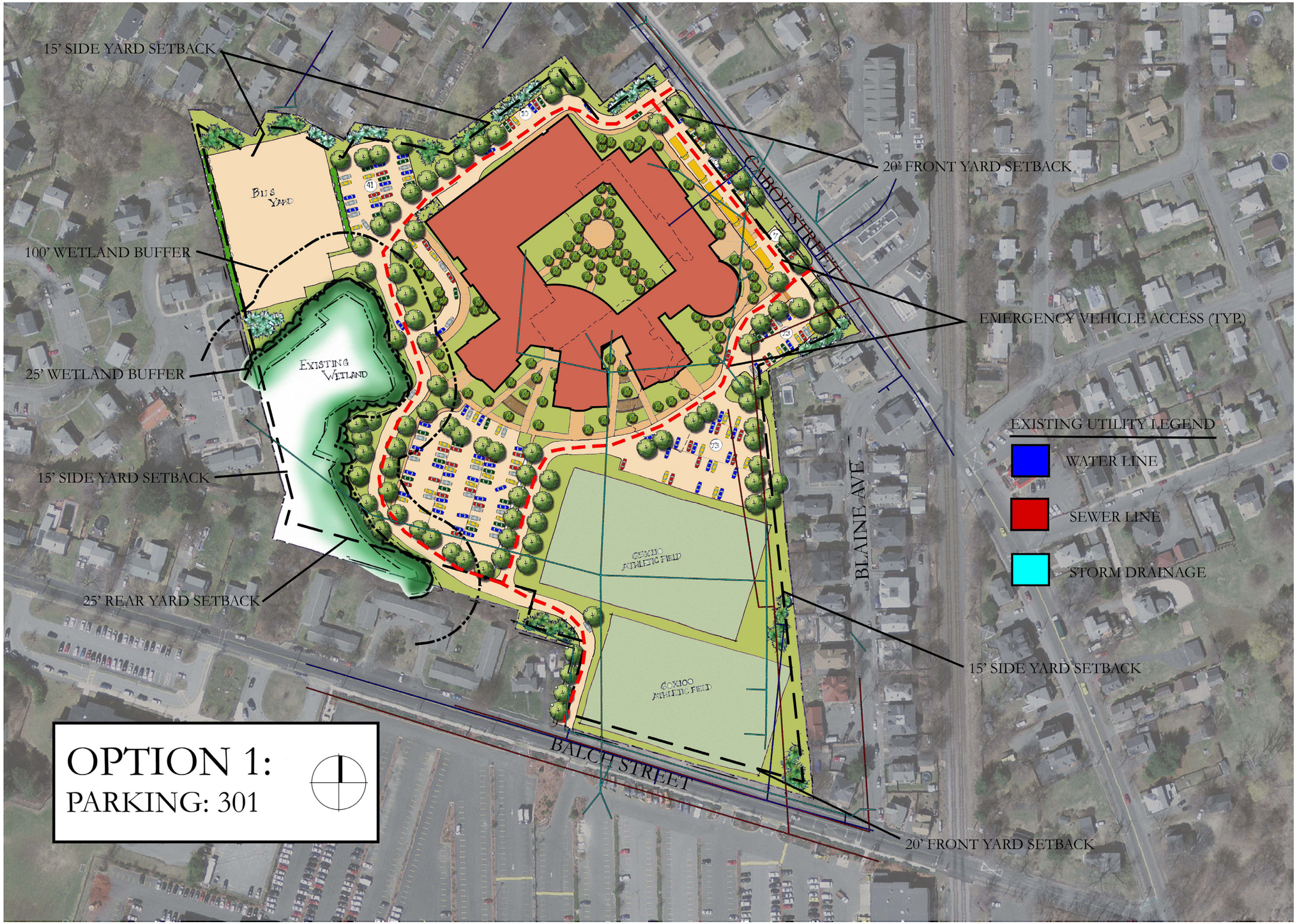
To MSBA:

Preferred Schematic Report
3.3.5

This is to confirm that no further actions are required in Beverly to complete the proposed 5-8 Middle School reconfiguration.

Steven A. Hiersche, Ed.D
Superinterintendent

The mission of the Beverly Public Schools is to maximize academic achievement and personal growth of every student.


15' SIDE YARD SETBACK
20' FRONT YARD SETBACK
CABOT STREET
BUS YARD
100' WETLAND BUFFER
EMERGENCY VEHICLE ACCESS (TYP.)
25' WETLAND BUFFER
EXISTING WETLAND
EXISTING UTILITY LEGEND
WATER LINE
SEWER LINE
STORM DRAINAGE
15' SIDE YARD SETBACK
BLAINE AVE
60X110 ATHLETIC FIELD
25' REAR YARD SETBACK
15' SIDE YARD SETBACK
60X100 ATHLETIC FIELD
BALCH STREET
20' FRONT YARD SETBACK
OPTION 1:
PARKING: 301

Proposed Space Summary - Beverly Middle School

Grades 5-8

3.17.15

5-8 BEVERLY MIDDLE SCHOOL	Existing Conditions			PROPOSED: Existing to Remain/Renovated			PROPOSED: New			PROPOSED: Total			MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
CORE ACADEMIC SPACES			**31,524**			**0**			**68,390**			**0**			**65,310**	
(List classrooms of different sizes separately)																
Classroom - General		*34*					850	50	42,500				950	51	48,450	850 SF min - 950 SF max
English	600	2	1,200													
	640	3	1,920													
	675	1	675													
	755	1	755													
	763	1	763													
	725	1	725													
Math	585	2	1,170													
	640	2	1,280													
	675	1	675													
	725	3	2,175													
	788	1	788													
Foreign Language	700	2	1,400													
	820	1	820													
	588	1	588													
	680	1	680													
Reading	680	1	680													
	900	1	900													
Social Studies	600	2	1,200													
	640	3	1,920													
	655	1	655													
	679	1	679													
	688	1	688													
	741	1	741													
Small Group Seminar (20-30 seats) / Resource			0				175	12	2,100				500	3	1,500	
		10	0													
Science Classroom / Lab	648	2	1,296				1,200	12	14,400				1,200	12	14,400	1 period / day / student
	656	1	656													
	668	2	1,336													
	730	4	2,920													
	1,200	1	1,200													
Prep Room	75	3	225				80	12	960				80	12	960	
Academic Team Room							465	12	5,580							
Teacher Collaboration Room							500	4	2,000							
Health Classroom	814	1	814				850	1	850							
SPECIAL EDUCATION			**8,895**			**0**			**15,850**			**0**			**15,100**	
(List classrooms of different sizes separately)																
Self-Contained SPED	800	1	800				850	7	5,950				950	10	9,500	assumed 8% of pop. in self-contained SPED
	711	1	711													
	675	1	675													
	665	2	1,330													
	610	1	610													
	586	1	586													
Self-Contained SPED Toilet			0				60	7	420				60	10	600	
ESL - English as a Second Language	238	1	238													
ASL - American Sign Language	660	1	660													
Speech / Testing	75	4	300													
OT Office	175	1	175													
Resource Room	400	3	1,200				425	12	5,100				500	7	3,500	1/2 size Genl. Clrm.
	347	1	347													
	390	1	390													
Small Group Room / Reading	665	1	665				215	12	2,580				500	3	1,500	1/2 size Genl. Clrm.
Small Inclusion Room							75	24	1,800							1/2 size Genl. Clrm.
Special Education Chair Office	208	1	208													
ART & MUSIC			**3,896**			**0**			**6,550**			**0**			**6,550**	
Art Classroom	802	1	802				1,250	2	2,500				1,200	3	3,600	assumed use - 50% population 2 times / week
Art Workroom w/ Storage & kiln	550	1	550				175	2	350				150	3	450	
Band / Chorus - 100 seats	917	2	1,834				2,300	1	2,300				1,500	1	1,500	assumed use - 50% population 2 times / week
Music Practice / Ensemble	710	1	710				75	4	300				200	5	1,000	
MIDI Lab							500	1	500							
STEAM Academic Support							50	12	600							
VOCATIONS & TECHNOLOGY			**4,649**			**0**			**9,600**			**0**			**9,600**	
Tech Clrm. - (E.G. Drafting, Business)	2,382	1	2,382										1,200	3	3,600	Assumed use - 25% Population - 5 times/week
Tech Shop - (E.G. Consumer, Wood)			0										2,000	3	6,000	Assumed use - 25% Population - 5 times/week
ComputerTechnology #1	1,584	1	1,584													
Computer Technology #2	683	1	683													
Integrated Academic Production Lab							500	12	6,000							
Multimedia & Video Applications Lab							1,000	1	1,000							
Technology Applications & Production Lab							1,600	1	1,600							
Set Design & Construction Applications Lab							1,000	1	1,000							
HEALTH & PHYSICAL EDUCATION			**8,677**			**0**			**15,400**			**0**			**8,400**	
Gymnasium	4,607	1	4,607				6,000	2	12,000				6,000	1	6,000	
Gym Storeroom			0				150	2	300				150	1	150	
Health Instructor's Office w/ Shower & Toilet	125	2	250				250	2	500				250	1	250	
Locker Rooms - Boys / Girls w/ Toilets	3,820	1	3,820				1,300	2	2,600				1,000	2	2,000	
MEDIA CENTER			**2,177**			**0**			**8,401**			**0**			**8,401**	
Media Center / Reading Room	2,177	1	2,177				8,401	1	8,401				8,401	1	8,401	
DINING & FOOD SERVICE			**8,389**			**0**			**15,872**			**0**			**15,872**	
Cafeteria / Dining	5,130	1	5,130				10,463	1	10,463				10,463	1	10,463	2 seatings - 15SF per seat
Stage	885	1	885				1,600	1	1,600				1,600	1	1,600	
Chair / Table / Equipment Storage			0				665	1	665				665	1	665	
Kitchen	2,374	1	2,374				2,695	1	2,695				2,695	1	2,695	1600 SF for first 300 + 1 SF/student Add'l
Staff Lunch Room			0				449	1	449				449	1	449	20 SF/Occupant
MEDICAL			**362**			**0**			**910**			**0**			**910**	
Medical Suite Toilet							60	1	60				60	1	60	
Nurses' Office / Waiting Room							250	1	250				250	1	250	
Examination Room / Resting	362	1	362				100	6	600				100	6	600	
ADMINISTRATION & GUIDANCE			**2,660**			**0**			**4,796**			**0**			**4,795**	
General Office / Waiting Room / Toilet	740	1	740				798	1	798				798	1	798	
Teachers' Mail and Time Room			0				100	1	100				100	1	100	
Duplicating Room			0				200	1	200				200	1	200	
Records Room			0				200	1	200				200	1	200	
Principal's Office w/ Conference Area	230	1	230				375	1	375				375	1	375	
Principal's Secretary / Waiting			0				125	1	125				125	1	125	
Assistant Principal's Office - AP1	175	1	175				150	1	150				150	1	150	
Assistant Principal's Office - AP2	200	1	200				150	2	300				150	2	300	
Supervisory / Spare Office			0				150	1	150				150	1	150	
Conference Room	247	1	247				350	1	350				350	1	350	
Guidance Office	120	4	480				150	7	1,050				150	7	1,050	
Guidance Waiting Room	238	1	238				100	1	100				100	1	100	
Guidance Storeroom			0				50	1	50				50	1	50	
Teachers' Work Room	350	1	350				848	1	848				848	1	848	
CUSTODIAL & MAINTENANCE			**328**			**0**			**2,870**			**0**			**2,870**	
Custodian's Office							150	1	150				150	1	150	
Custodian's Workshop							250	1	250				250	1	250	
Custodian's Storage							375	1	375				375	1	375	
Recycling Room / Trash							400	1	400				400	1	400	
Receiving and General Supply							565	1	565				565	1	565	
Storeroom							930	1	930				930	1	930	
Network / Telecom Room	328	1	328				200	1	200				200	1	200	
OTHER			**10,066**			**0**			**5,700**			**0**			**0**	
Other *(specify)*																
Dental Clinic																
Reception	210	1	210													
Exam	112	1	112													
Exam	90	1	90													
X-ray	132	1	132													
Clean Room	83	1	83													
Office																
Auditorium (Existing: 1,200 seats)	9,439	1	9,439				5,700	1	5,700							
Total Building Net Floor Area (NFA)			**81,623**			**0**			**154,339**			**0**			**137,808**	
Proposed Student Capacity / Enrollment									1,395						**1,395**	
Total Building Gross Floor Area (GFA)[2]			144,349						231,509						**223,200**	
Grossing factor (GFA/NFA)			**1.77**						1.50			**#DIV/0!**			**1.62**	

Version
11.24.2010

Middle School Space Summary

Proposed Space Summary - Beverly Middle School

Grades 5-8

3.17.15

5-8 BEVERLY MIDDLE SCHOOL	Existing Conditions			PROPOSED									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments

[1] **Individual Room Net Floor Area (NFA)** Includes the net square footage measured from the inside face of the perimeter walls and includes all specific spaces assigned to a particular program area including such spaces as non-communal toilets and storage rooms.

[2] **Total Building Gross Floor Area (GFA)** Includes the entire building gross square footage measured from the outside face of exterior walls

Architect Certification

I hereby certify that all of the information provided in this "Proposed Space Summary" is true, complete and accurate and, except as agreed to in writing by the Massachusetts School Building Authority, in accordance with the guidelines, rules, regulations and policies of the Massachusetts School Building Authority to the best of my knowledge and belief. A true statement, made under the penalties of perjury.

Name of Architect Firm: Ai3 Architects, LLC

Name of Principal Architect: Troy L. Randall

Signature of Principal Architect:

Date: 3.17.15

May 18, 2015

Massachusetts School Building Authority (MSBA)
40 Broad Street
Suite 500
Boston, MA 02109
ATTN: Caulen Finch, Project Manager

Re: Proposed Beverly Middle School
Design Improvements Summary

Dear Caulen,

As per your request, we are providing the following summary and attached slide presentation and floor plans outlining improvements made to the proposed Beverly Middle School as the design has continued to evolve through the schematic design phase. The floor plan organization is not substantially different from that approved by the Board in March, but some revisions have been made to address some of the concerns expressed by the Educational Facilities Assessment Subcommittee, particularly regarding access to and maintenance of the courtyard. Subsequent to the Subcommittee's comments, the Beverly Middle School Building Committee requested that we explore options which would open one edge of the courtyard directly to outdoor access, such that it would be more easily available for maintenance purposes. As a result of this exploration, we found that there were many advantages associated with outdoor access to one edge of the courtyard, including some educational advantages. You will see this adjustment reflected in the attached slide presentation and updated floor plans. We also found through our solar and building envelope analysis that mirroring the building on the site offered some significant energy efficiency benefits. The opening of the courtyard and the mirroring of the floor plan are the two fundamental adjustments in the proposed design. Please note that these adjustments do not impact the organization of the academic academies, student dining, or other fundamental educational programs and strategies. In fact, many educational program elements have been enhanced by the evolution of the building design. Some highlights are as follows:

- Opening the courtyard provides better sunlight into this area, thereby making it a more useful outdoor learning environment.
- Educators felt that access to remaining site amenities directly from the courtyard would improve the efficiency of its educational use.
- Educators felt that allowing students to enter and exit the building through the courtyard (morning arrival, afternoon departure) would greatly improve the student experience.
- Opening the courtyard provides a larger variety of instructional and exhibit areas in addition to more recreational area within this space.
- Facilities staff felt that direct outdoor access would improve their ability to maintain this area with a good balance of green space and vibrant plantings.
- Opening the courtyard allows for a better indoor/outdoor connection flowing from the academic neighborhoods, through the project labs, across the dining/work space, and into the courtyard.

526 Boston Post Road Wayland, MA 01778 P 508.358.0790 F 508.358.0791 www.ai3architects.com

The Building Committee also requested that we evaluate the Educational Facilities Assessment Subcommittee's feedback regarding increasing the efficiency of the building circulation through the elimination of single-loaded corridors. We ultimately eliminated a portion of the single-loaded corridors on the first floor, but kept the sweeping spine that engages each of the academic neighborhoods. This adjustment is reflected in the attached floor plans.

Although it was initially done for day-lighting, solar, and energy efficiency benefits, the mirroring of the floor plan has the added benefit of placing the academic classrooms on the more quiet north side of the site and the courtyard on the more active (noisy) side of the site. It also allows students to flow directly out of the courtyard to the outdoor playfields. The mirroring places the gymnasium in closer proximity to the outdoor playfields, another benefit identified by the Building Committee.

We believe the evolving schematic plan addresses the issues raised by the Educational Facilities Assessment Subcommittee, while simultaneously reinforcing and enhancing the positive attributes identified by the Subcommittee. Many of the enhancements are identified in the attached presentation, but if you have any additional questions please feel free to contact us.

Sincerely,

L. Scott Dunlap, AIA, LEED AP
Principal, Ai3 Architects LLC

cc: Mark Lyons, OPM, Heery
Troy Randall, Principal, Ai3 Architects LLC

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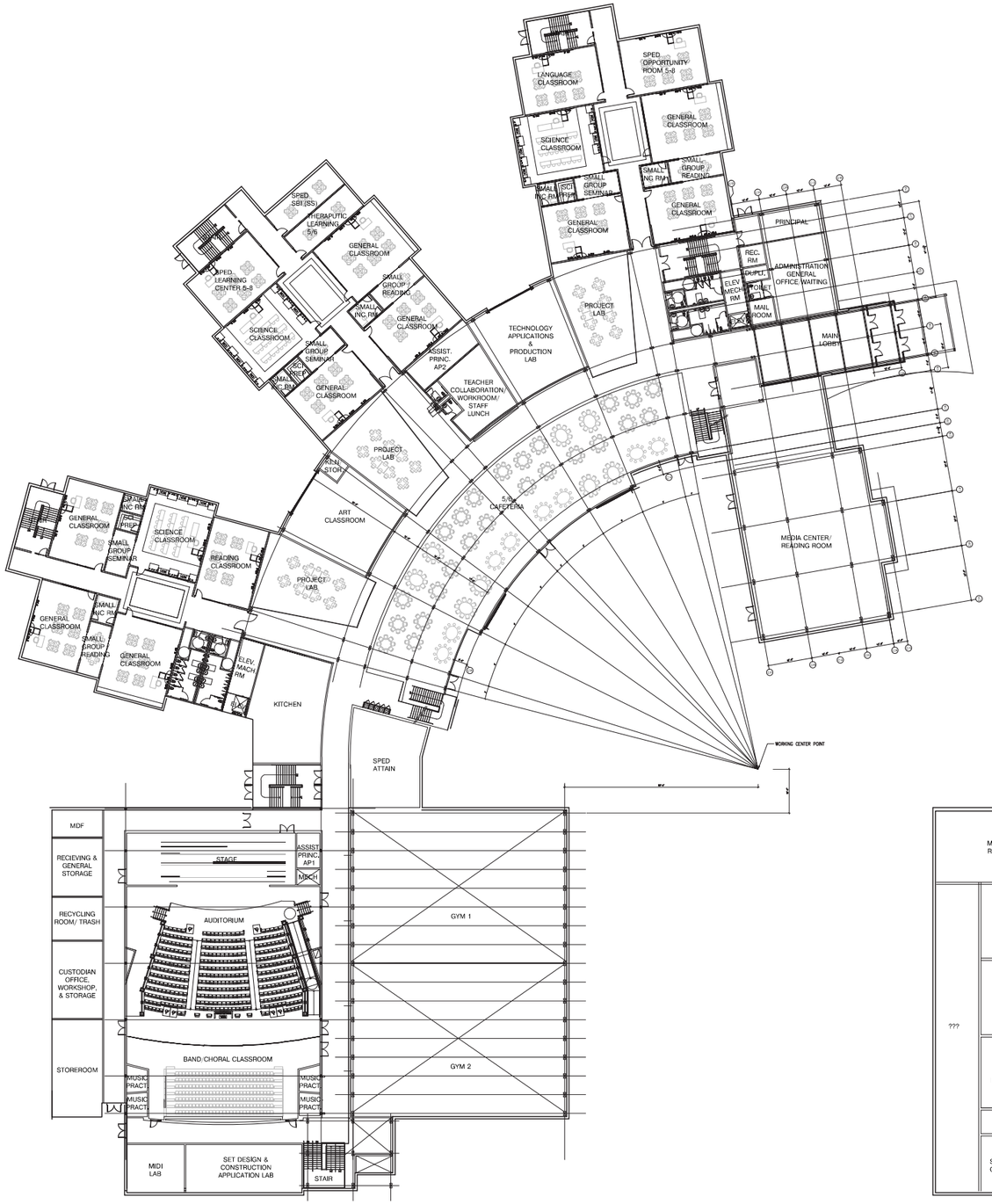
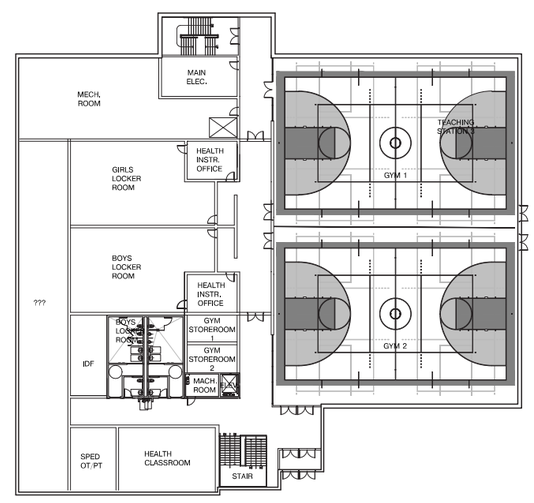


First Floor Plan



Lower Level Floor Plan

Progress Set - Schematic Floor Plans
Beverly Middle School

May 18, 2015

ai3 architects
526 Boston Post Rd
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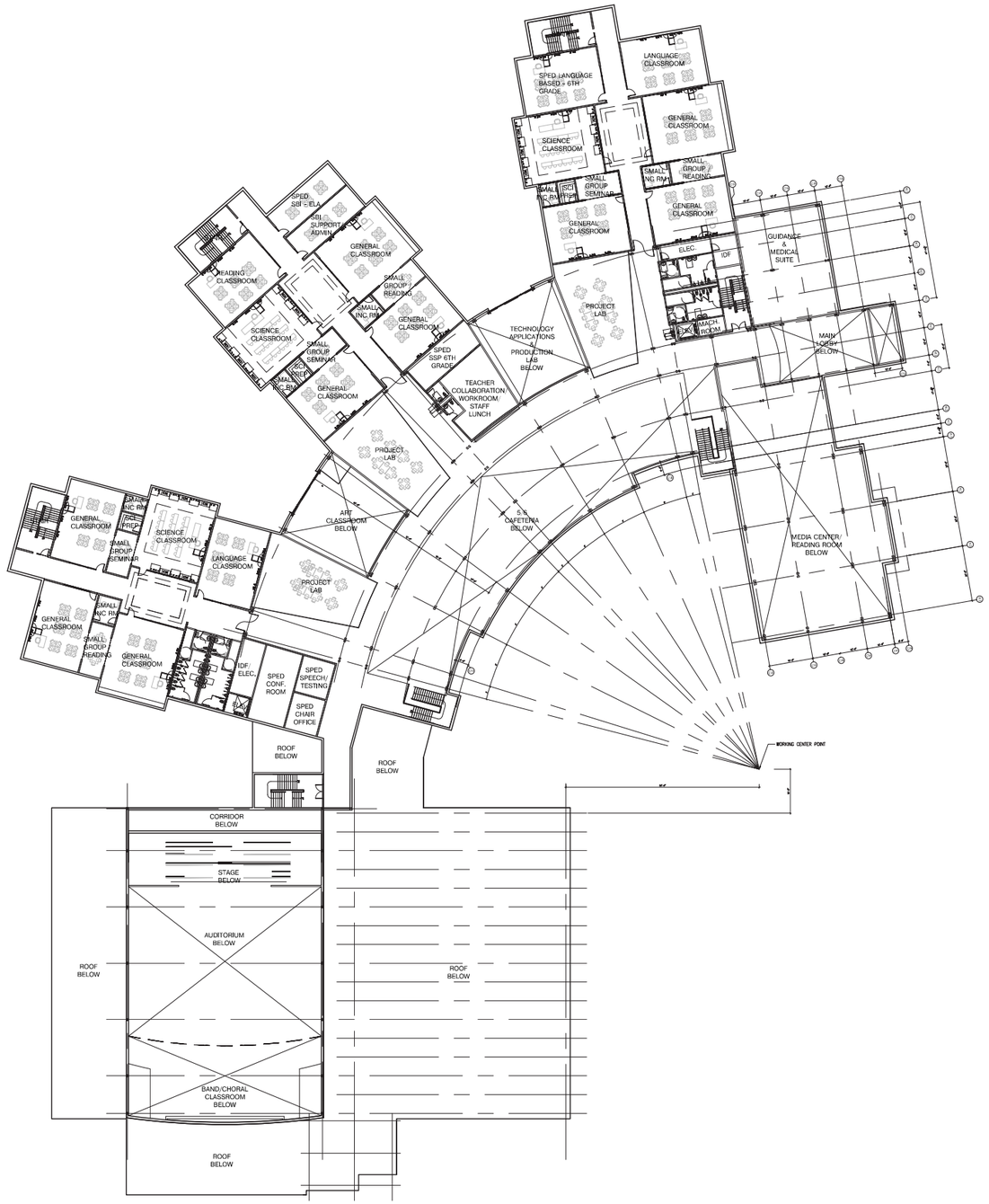
Wayland, MA
www.ai3architects.com



Second Floor Plan

Progress Set - Schematic Floor Plans
Beverly Middle School

May 18, 2015

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526 Boston Post Rd
508.358.0790
Wayland, MA
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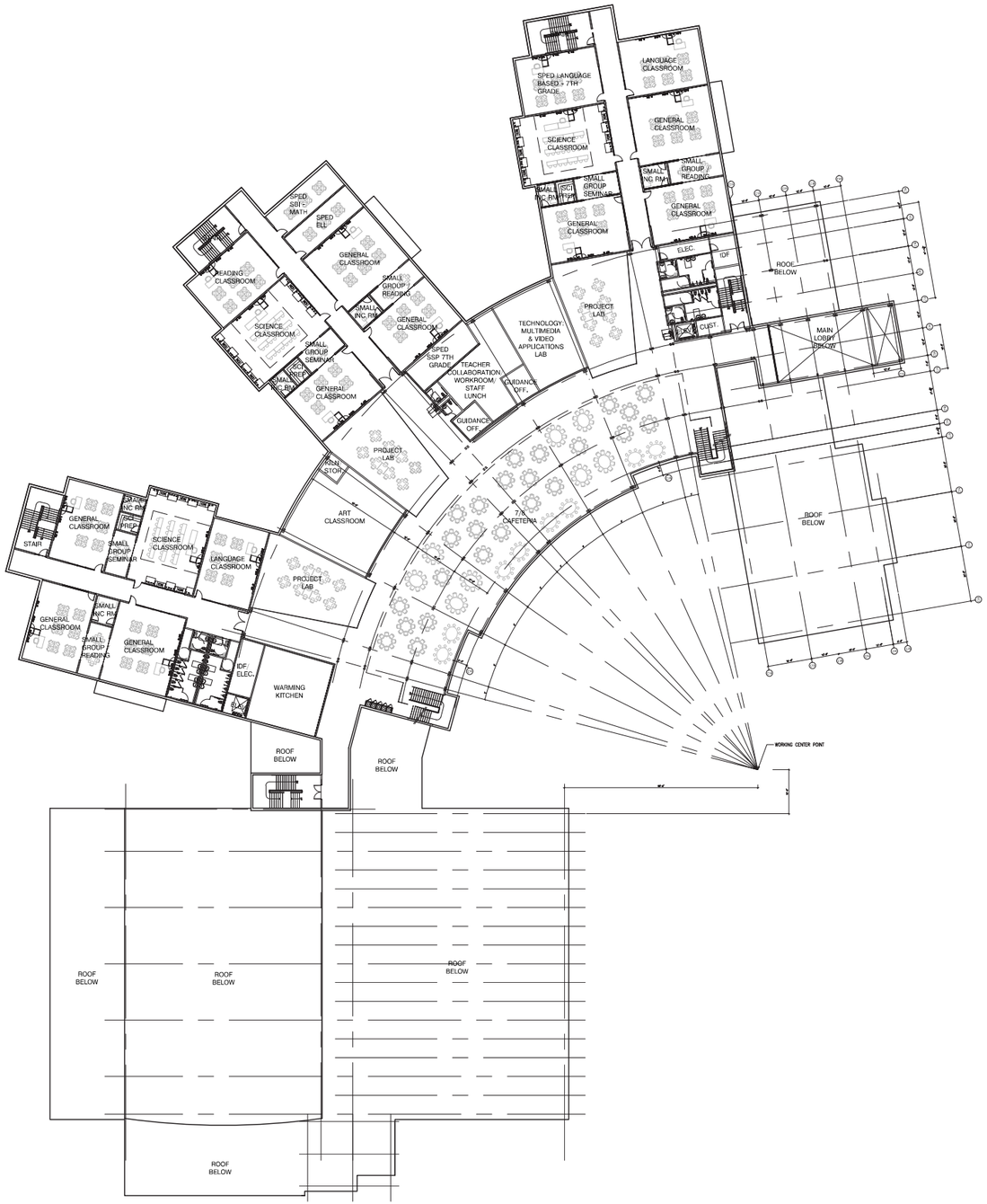

Third Floor Plan

May 18, 2015

Progress Set - Schematic Floor Plans
Beverly Middle School

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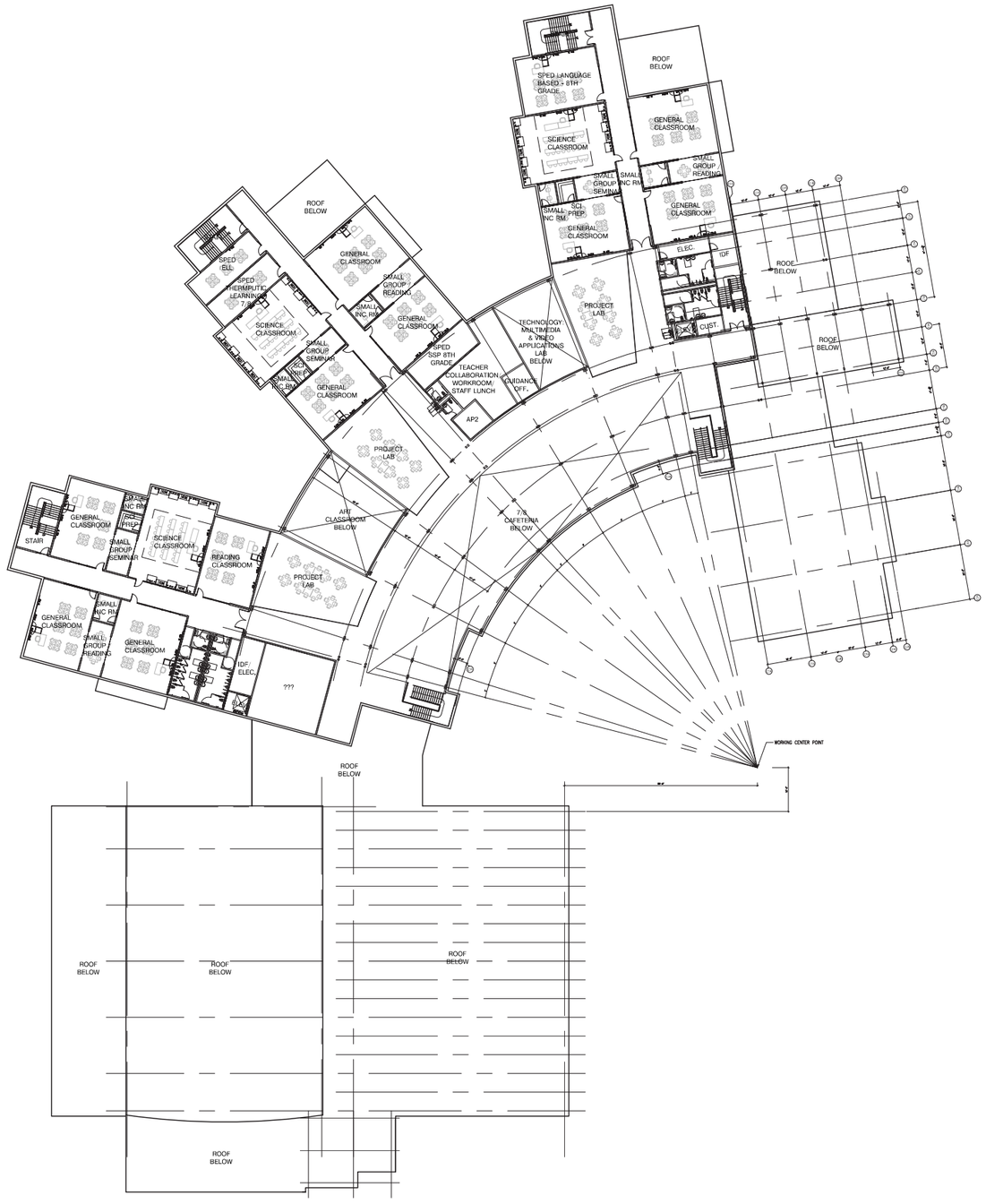
526 Boston Post Rd Wayland, MA
508.356.0790 www.a3architects.com



Forth Floor Plan

Progress Set - Schematic Floor Plans
Beverly Middle School

May 18, 2015

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Site Plan

Progress Set - Schematic Floor Plans
Beverly Middle School

May 18, 2015

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Transformative Learning Through Architecture

The Beverly Middle School

Flexible Learning Academy

Flexible Classroom Studios

Flexible Configurations

Flexible Support

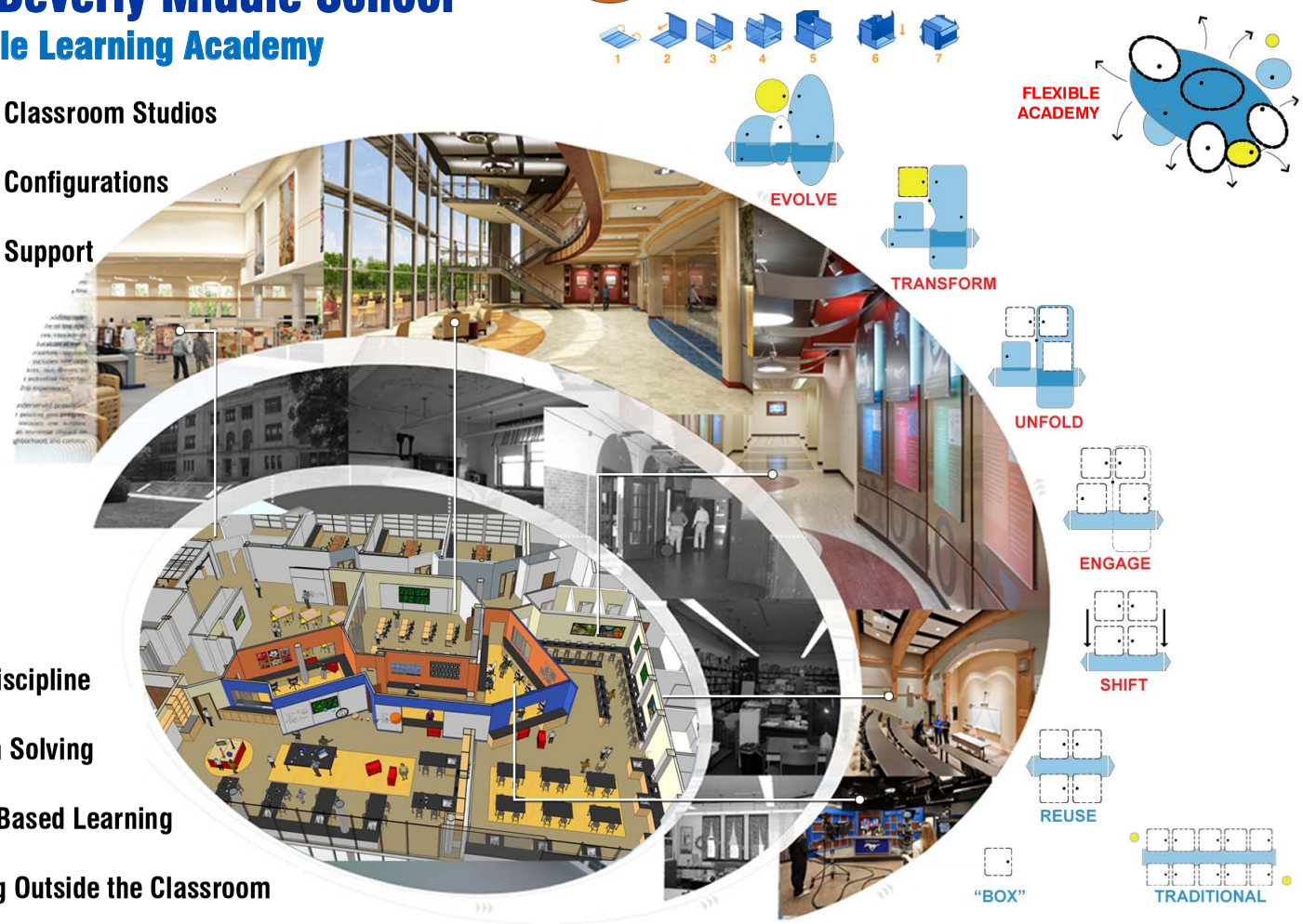
Exhibits

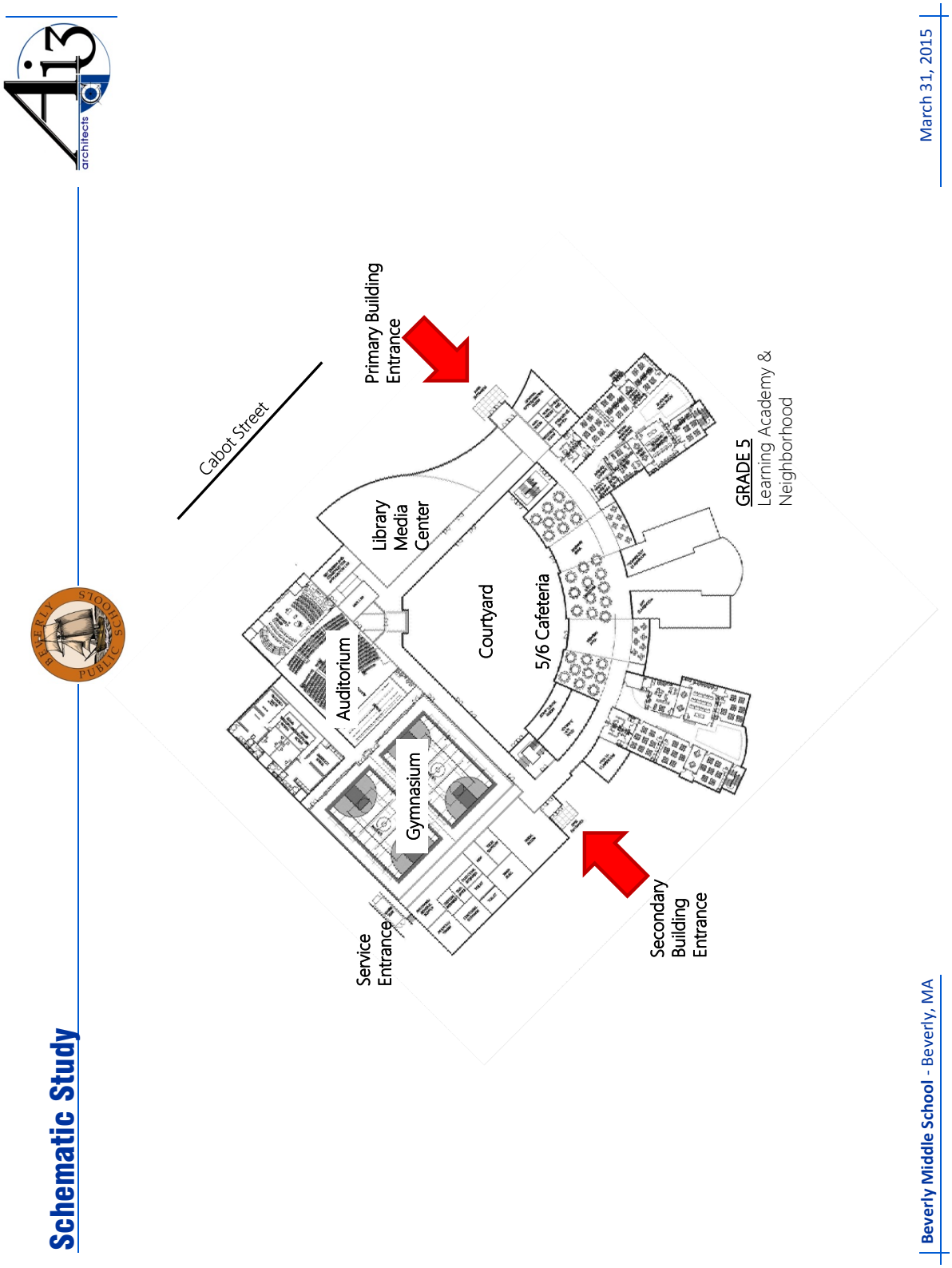
Cross Discipline

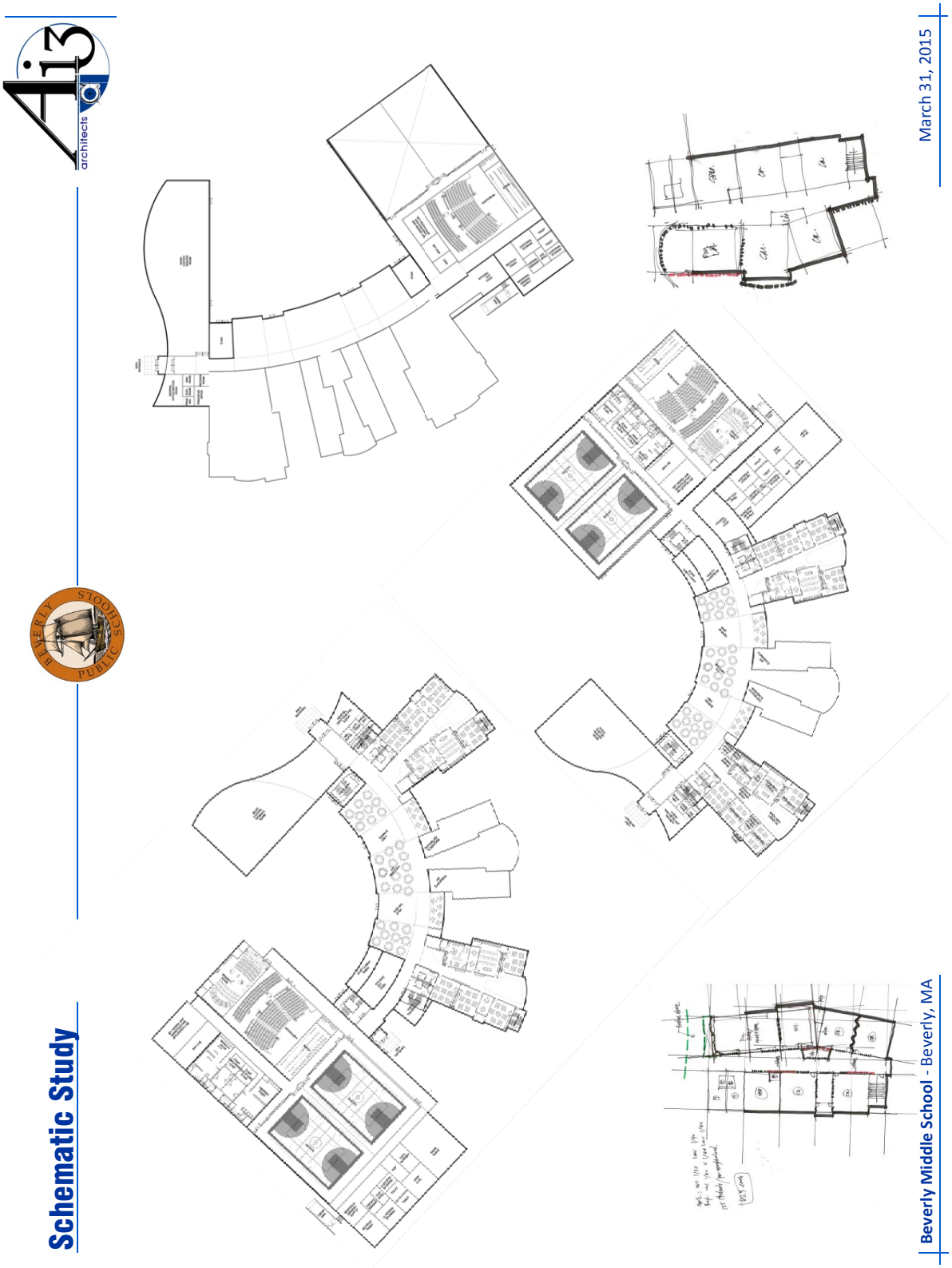
Problem Solving

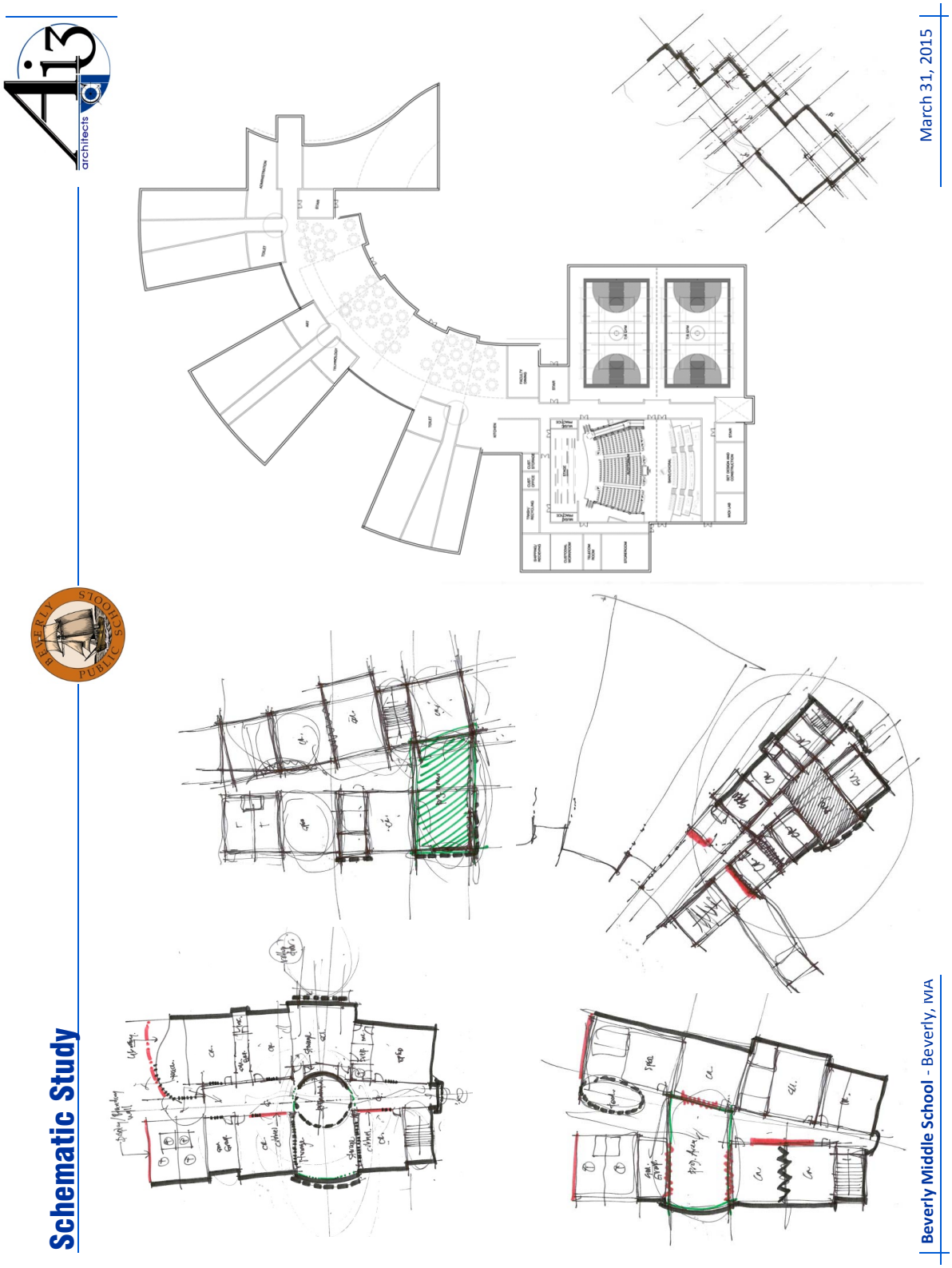
Project Based Learning

Learning Outside the Classroom




Schematic Study
Cabot Street
Primary Building Entrance
Library Media Center
Courtyard
5/6 Cafeteria
GRADE 5
Learning Academy & Neighborhood
Auditorium
Gymnasium
Service Entrance
Secondary Building Entrance
Beverly Middle School - Beverly, MA
March 31, 2015


Schematic Study
Beverly Middle School - Beverly, MA
March 31, 2015

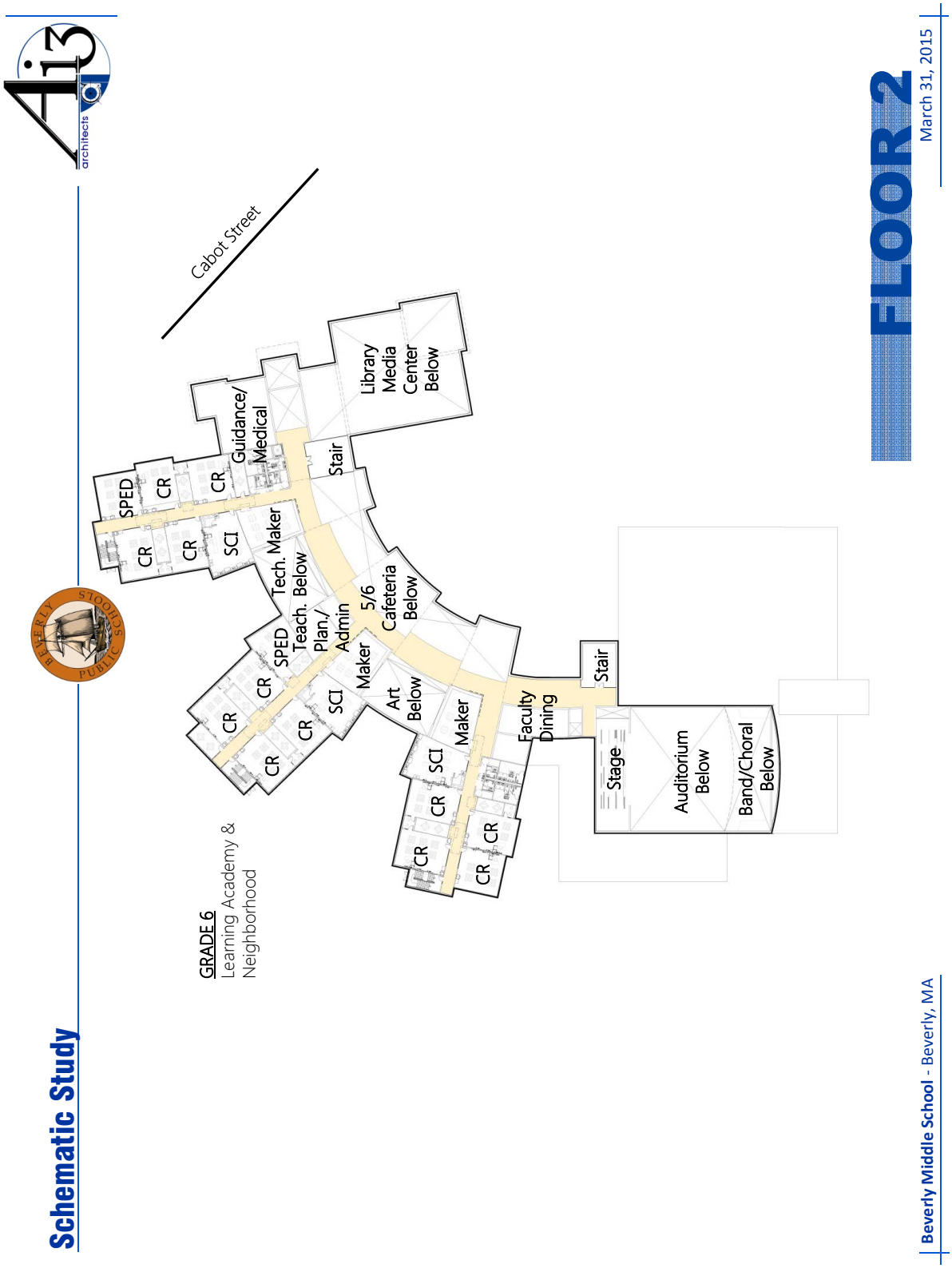

Schematic Study
Beverly Middle School - Beverly, MA
March 31, 2015

Schematic Study

- More **interesting building façade/entry** along Cabot Street – Not just a flat facade
- More **efficient building layout**
- Greater efficiency with **building circulation** (less single loaded corridors)
- **Reduction** in overall building **footprint**
- **Reduction** in overall **building envelope** area
- Better **connection and flow** between neighborhoods / project labs (maker spaces) / cafeteria / outdoor learning environment
- **Art / Technology** spaces centrally located with exterior access (integration of STEAM)
- Easier **building separation** between educational space and community space
- More **compact organization** and **direct relationship** between auditorium and music spaces
- More **efficient use of exterior solar treatment** (cafeteria vs. classroom neighborhoods)
- Potential for **green roof area** (south facing) above gymnasium/ auditorium via 3rd floor access

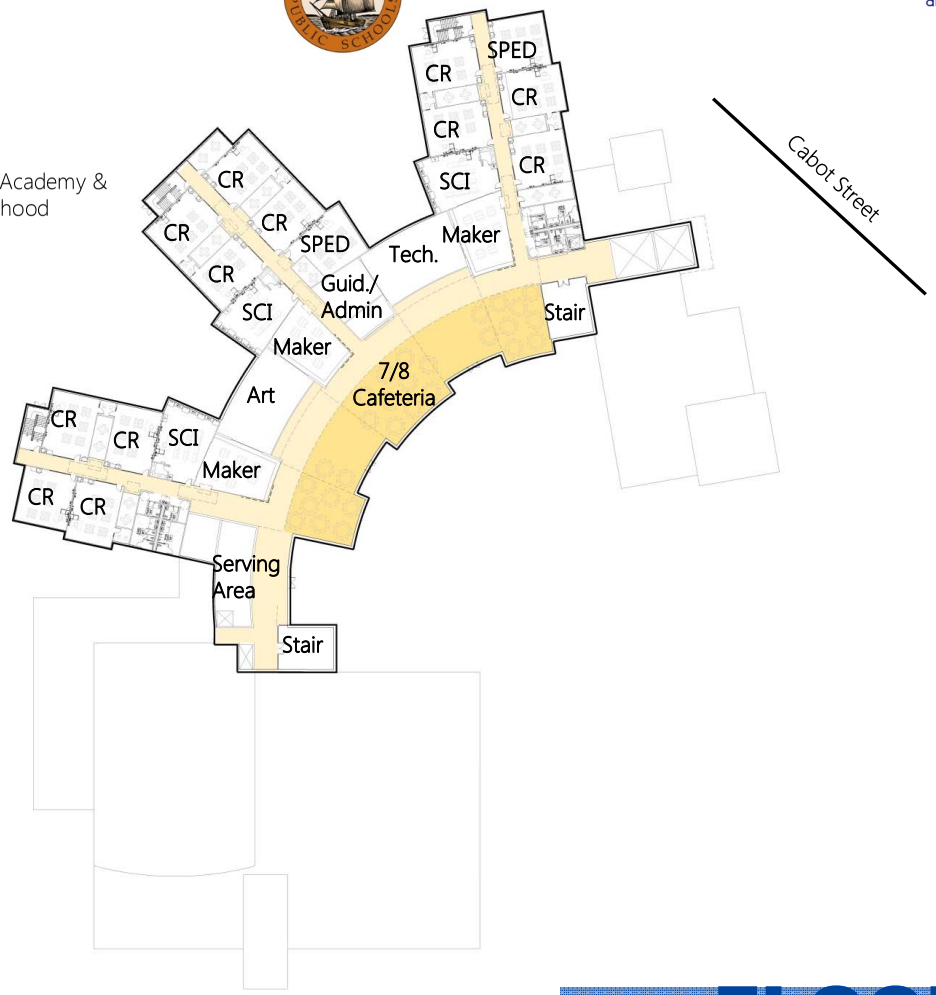
Beverly Middle School - Beverly, MA

March 31, 2015


Schematic Study
Cabot Street
GRADE 6
Learning Academy &
Neighborhood
SPED
CR
CR
CR
Guidance/
Medical
Library
Media
Center
Below
Stair
CR
CR
SCI
Tech. Maker
Below
SPED
Teach.
Plan./
Admin
5/6
Cafeteria
Below
CR
CR
CR
SCI
Maker
Art
Below
Faculty
Dining
Stair
CR
CR
SCI
Maker
Stage
Auditorium
Below
Band/Choral
Below
FLOOR 2
March 31, 2015
Beverly Middle School - Beverly, MA

Schematic Study

GRADE 7
Learning Academy & Neighborhood



FLOOR 3

Beverly Middle School - Beverly, MA

March 31, 2015

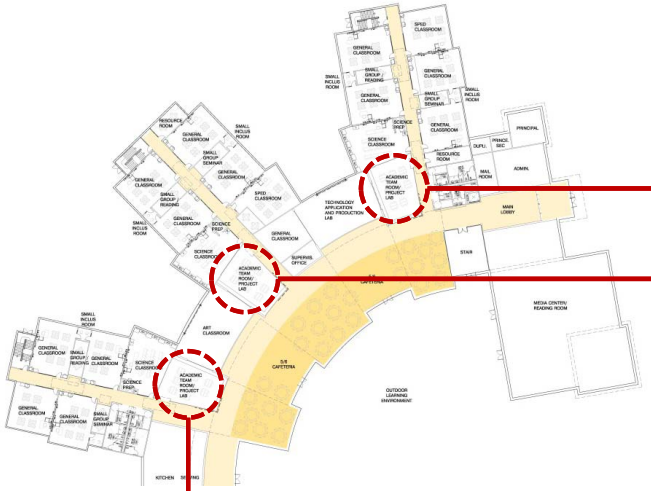
Schematic Study

GRADE 8
Learning Academy & Neighborhood

FLOOR 4

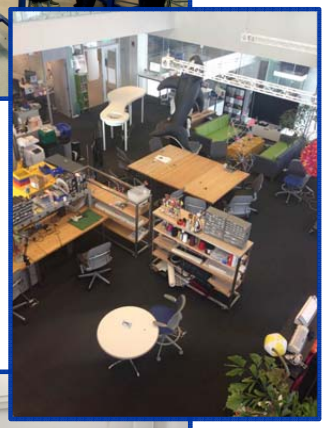
Schematic Study

Maker Space



Schematic Study

Maker Space



Schematic Study

Site Plan

- Maintain **separation** of bus and vehicular **drop-off areas**
- Building organization more closely blends with **natural topography** of site (less cut and fill)
- **Less glazing** exposure on south façade
- **Increased parking and efficiency of parking organization**
- **Outdoor Learning Space** – Southern exposure / greater sun exposure
- Closer proximity of gymnasium/lockers to **outdoor playing fields**
- Direct access from **parking area** to gymnasium and/or auditorium via a separate entry lobby
- More **flexible student arrival procedures** (via main entry, gym entry or outdoor learning space)
- Outdoor access to **Art and Technology spaces**
- **Loading area** at the "back" of the building

Schematic Study

Outdoor Learning Environment

- Educational Advantages:
  - Outdoor **dining area**
  - Outdoor **amphitheater**
  - **Exhibit** and **work areas**
  - Open **green space**
  - Outdoor **classroom** space
  - Outdoor **science** space
  - Outdoor **project space** – extension of maker/builder space
  - Examples……
    - *Science:* (Raised planting beds, testing cars in physics projects, heat transfer, weather analysis, water features, engineering elements: pulleys, planes, etc.)
    - *Humanities:* (Socratic Debate, drama, poetry, Greek myths)
    - *Arts:* (3D installations, sculpture, etc.)
- Maintain a **secure** outdoor environment
- **Defined pathway** from drop off area to building entry
- Outdoor holding space for early arrivals and late departures
- Varying elevations of **"Educational Zones"**: more clearly defined areas
- Direct access from **Cafeteria**
- Maintain **privacy** from classroom neighborhoods
- Easy access from **centralized circulation stairs** for all grade levels
- Easy access for **maintenance equipment / staff**
- Greater potential for separate **structured community use**

From: Troy Randall
To: Kristen Baker
Subject: FW: Beverly MS - Design Improvements Summary
Date: Monday, June 22, 2015 7:34:58 PM
Attachments: 062415-Local Action Approval Update.pdf
Beverly Prelim Design Pricing 6.17.15.pdf

Kristen,
The below email and attachments can be included within **Section 2.6 PSSR responses**....

Troy L. Randall AIA, LEED AP BD+C
Partner | Ai3 Architects, LLC
508.358.0790 | www.ai3architects.com

From: Troy Randall
Sent: Saturday, June 20, 2015 3:02 PM
To: 'Caulen Finch'; Lydon, Mark C. (mlydon@heery.com); Scott Dunlap
Cc: Sarah Blache; John Jumpe; Chris Alles; shiersche@beverlyschools.org; Mayor (mayor@beverlyma.gov); Ellis, Thomas (TEllis@heery.com)
Subject: RE: Beverly MS - Design Improvements Summary

Dear Caulen,
As per your request, we are providing the following responses and supporting documentation as part of a Preferred Schematic update as referenced within your email dated May 22, 2015 (below).

1. *Revised Educational Program (include an executive summary that prefaces revisions)*
   Response: There are no changes to the educational program, it remains consistent with the document previously issued as part of the Preferred Schematic Report (PSR) in February 2015 and as presented at the sub-sequent Facilities Assessment Subcommittee meeting. The Building Committee and the educational leaders within the Beverly Public Schools believe that the submitted educational plan clearly identifies the goals and values that will support a comprehensive, long-term educational program and provides an appropriate roadmap for the district. The School Building Committee and the Beverly Public Schools feel the adjustments made to the proposed floor plans and associated site plan allow the building design to better support the priorities and goals identified in the previously submitted educational program by strengthening the relationship between the established educational vision and the building organization.

2. *Confirmation from the District that programming is complete and the attached update reflects the Schematic Design Submission under development;*
   Response: The educational visioning and programming has been completed, and the submitted schematic design continues to reflect the priorities and goals established during this process. As design development proceeds, specific user group meetings will be conducted to delineate the specific needs within the individual program spaces.

3. *Notification of any adjusted components of the educational program as a result of the updated work;*
   Response: As indicated herein, the educational program remains the same.

4. *Updated space summary and narrative description of the variances from the MSBA space summary guidelines and the reasoning for the variance;*

Response: The Total Building Gross Floor Area (GFA) of 231,509 is identical to the size reported within the Preferred Schematic Report Proposed Space Summary dated January 7, 2015. Additionally, each proposed program category total gross square footage remains consistent with the MSBA Guidelines and MSBA (Module 3) Preferred Schematic Report Space Summary Review comments dated March 4, 2015.

5. *Narrative description of variances between updated space summary and PSR space summary;*

Response: As indicated above, each proposed program category within the proposed space summary remains consistent with the Preferred Schematic Space Summary. As project planning continues, the specific location of these spaces within the floor plan and the specific allocation to individual spaces within a particular category continues to undergo refinement as follows:

The Library Media Center remains at 8,401sf. In keeping with the priorities and goals established during educational visioning and educational programming, portions of the Library media Space will be located within the academic areas and adjacent to the dining (socialization areas). This allocation is reflected in the schematic floor plans.

The programmed Teacher Collaboration Room, Staff Lunch Room, and Teacher's Work Room spaces are being combined and then divided equally into four areas, one on each academic floor level. Distributing these program spaces into each grade level academy as a combined Collaboration/Lunch/Work space on each academic floor level is consistent with the desired goals and priorities identified in the educational visioning and the educational program.

The programmed Guidance space remains the same, minor adjustments have been made to individual spaces within this category to allow for the inclusion of a single dedicated guidance conference room. The space for this conference room was created through a small reduction in the proposed size of guidance offices. The staff and administration reviewed the size of current and proposed offices and have confirmed that this adjustment allows for appropriately sized offices while simultaneously meeting and educational program need for a dedicated guidance conference room.

6. *Updated Preliminary Design Pricing Table that includes this new option;*

Response: Please reference an updated Summary of Preliminary Design Pricing matrix that includes the Total Building Gross Floor Area of 231,509 and is reflective of the currently proposed schematic design.

7. *Summary of why and confirmation that the updated option represents the most educationally appropriate and cost effective solution of those studied in the feasibility*

study; and

Response: The currently proposed schematic design includes all of the desired features of the preferred schematic option, including the same academic organization. It has undergone some adjustments to improve its support of the educational program, increase its organizational efficiency, improve student flow, enhance solar orientation, and improve ease of maintenance for the internal courtyard. The floor plan organization remains very similar to that provided for the preferred schematic submittal, with the primary adjustments being the opening of the courtyard and the adjustment of the floor plan on the site to improve solar orientation and student access. It remains the most educationally appropriate and cost effective solution, as it involves educational, organizational, and efficiency improvements to the preferred schematic and also results in reduced costs. Its benefits include:

Most Cost Effective Solution

Reduction in single loaded (inefficient) corridors

Reduction in building footprint area (existing sub-surface conditions make this a cost benefit)

More appropriate response to existing site topography

Most Educationally appropriate solution

Reflection of the educational vision and program

Open courtyard provides a larger variety of instructional and exhibit areas and provides ease of maintenance

Some specific educational benefits identified in the March 18, 2015 letter to MSBA include the following:

- Opening the courtyard provides better sunlight into this area, thereby making it a more useful outdoor learning environment.
- Educators felt that access to remaining site amenities directly from the courtyard would improve the efficiency of its educational use.
- Educators felt that allowing students to enter and exit the building through the courtyard (morning arrival, afternoon departure) would greatly improve the student experience.
- Opening the courtyard provides a larger variety of instructional and exhibit areas in addition to more recreational area within this space.
- Facilities staff felt that direct outdoor access would improve their ability to maintain this area with a good balance of green space and vibrant plantings.
- Opening the courtyard allows for a better indoor/outdoor connection flowing from the academic neighborhoods, through the project labs, across the dining/work space, and into the courtyard.

8. *A new Local Actions and Approvals Certification documenting SBC understanding and approval to submit the Preferred Schematic update to the MSBA.*

Response: The District submitted the Preferred Schematic Report (PSR) to the MSBA on February 12, 2015. Since the issuance of this report, the School Department, School Building Committee and City Officials have been working collaboratively with the

professional team to continue the refinement of the Preferred Option – proposed new 5-8 middle school located on the Memorial School site on Cabot Street. This collaborative effort included review of the site topography, existing sub-surface conditions, the organization of the building floor plan related to the educational visioning document and program, sustainable design and energy efficiency, building and site maintenance, and many other topics. On June 9, 2015, the School Building Committee unanimously voted to re-affirm their support of the proposed project and more specifically affirm their support of the adjustments and improvements to the proposed building floor plans and site plan since the issuance of the Preferred Schematic Report. See attached certification of the vote for your records.

Feel free to contact us with any questions.
Thank you,
Troy

Troy L. Randall AIA, LEED AP BD+C
Partner | Ai3 Architects, LLC
508.358.0790 | www.ai3architects.com

From: Caulen Finch [mailto:Caulen.Finch@MassSchoolBuildings.org]
Sent: Friday, May 22, 2015 12:16 PM
To: Lydon, Mark C. (mlydon@heery.com); Scott Dunlap; Troy Randall
Cc: Sarah Blache; John Jumpe; Chris Alles
Subject: Beverly MS - Design Improvements Summary

Mark, Scott and Troy,

I have had the opportunity to review the provided information with others at the MSBA and based on the significant revisions to the previously proposed concept, received by the MSBA on May 18, 2015, the MSBA requests that the following additional information be provided as part of a Preferred Schematic update: (This information needs to be submitted to the MSBA by June 26, 6 weeks prior to the due date associated with the MSBA Board of Director's meeting for which the District is seeking approval of the project scope and budget of the proposed project).

- Revised Educational Program (include an executive summary that prefaces revisions)
- Confirmation from the District that programming is complete and the attached update reflects the Schematic Design Submission under development;
- Notification of any adjusted components of the educational program as a result of the updated work;
- Updated space summary and narrative description of the variances from the MSBA space summary guidelines and the reasoning for the variance;
- Narrative description of variances between updated space summary and PSR space summary;
- Updated Preliminary Design Pricing Table that includes this new option;

- Summary of why and confirmation that the updated option represents the most educationally appropriate and cost effective solution of those studied in the feasibility study; and
- A new Local Actions and Approvals Certification documenting SBC understanding and approval to submit the Preferred Schematic update to the MSBA.

Also, prior to the submission of the District's Schematic Design submittal, the MSBA requests that the District be available to present the updated preferred solution to the FAS should the MSBA determine that an updated presentation is required. This update is to ensure a mutual understanding and agreement of the proposed project scope and to ensure that this scope will be reflected in the District's Schematic Design submittal.

Please let me know if you have any questions. Thank you,

Caulen

Caulen Finch
Project Manager
Massachusetts School Building Authority
caulen.finch@massschoolbuildings.org
www.massschoolbuildings.org
617.720.4466

CITY of BEVERLY
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Mayor
Michael P. Cahill
Chief of Staff
Kevin Harutunian
Executive Secretary
Martha A. Lewis

June 24, 2015

Ms. Diane Sullivan
Senior Capital Program Manager
40 Broad Street
Boston, Massachusetts 02109

Dear Ms. Sullivan:

The Beverly Middle School, School Building Committee ("SBC") completed its review of the Feasibility Study [*Preferred Schematic Report*] for the Beverly Middle School project (the "Project"), and on February 12, 2015, the SBC voted to approve and authorize the Owner's Project Manager to submit the Feasibility Study related materials to the MSBA for its consideration. Subsequent to the submission of the Preferred Schematic Report the project team working with the designer updated the floor plans and site plan to improve the organization and efficiency of the new middle school facility in response to comments received from members of the SBC as well as members of the MSBA Board at the Beverly Middle School FAS meeting. As requested by the MSBA the School Building Committee confirmed their support of the improvements and at their School Building Committee Meeting on June 09, 2015, voted to authorize the OPM to submit an updated Local Actions and Approval Certification. The motion language was as follows:

The Beverly School Building Committee agrees that the revisions proposed by the architect and reflected in the updated floor plans improve the overall organization and efficiency and are compliant with and support the Educational Program. The SBC approves and authorizes the OPM to submit an updated Local Actions and Approvals Certification documenting SBC understanding and approval to submit the Preferred Schematic floor plan update to the MSBA.

The motion passed unanimously with 15 in favor 0 opposed and 0 abstaining. A copy of the SBC meeting minutes, which includes the specific language of the vote and the number of votes in favor, opposed, and abstained, will be provided once the meeting minutes are finalized and approved by the SBC.

If you have any questions or require any additional information, please contact Mark Lydon, Project Manager/OPM, (781) 494-9000

By signing this Local Action and Approval Certification, I hereby certify that, to the best of my knowledge and belief, the information supplied by the District in this Certification is true, complete, and accurate.

By:

Title: Chief Executive Officer

Date: 6/17/15

By signing this Local Action and Approval Certification, I hereby certify that, to the best of my knowledge and belief, the information supplied by the District in this Certification is true, complete, and accurate.

By:

Title: Superintendent of Schools

Date: 6/17/15

By signing this Local Action and Approval Certification, I hereby certify that, to the best of my knowledge and belief, the information supplied by the District in this Certification is true, complete, and accurate.

By:

Title: Chair of the School Committee

Date:

Beverly Middle School

Preliminary Design Pricing Table

= Formula do not edit

6.17.15

Option (Description)	Total Gross Square Feet	Square Feet of Renovated Space ($*/SF)	Square Feet of New Construction ($*/SF)	Site, Building Takedown, Haz Mat Etc. ($*)	Estimated Total Construction** ($*)	Estimated Total Project Costs ($)
1 - New Construction at Memorial Site	231,509 sf	- sf	231,509 sf	$ 2,456,000	$ 97,469,609	$ 120,902,773
		$ - $/sf	$ 410.41 $/sf		$ 421.02 $/sf	

** Marked Up Construction Costs*
*** Does not include Construction Contingency*
****** District's Preferred Solution***

Final Design Program

Desired Architectural Characteristics

The new Beverly Middle School will be 231,509gsf serving 1,395 students in grades 5-8. The District's educational vision and program identified a variety of needs for the proposed new building, including;

1. A desire to "break down the scale" of the building into small learning communities, recognizing the need to create spaces that promotes safety, identity, personalization, pride, belonging, support and confidence.
2. The building should be warm and welcoming upon arrival.
3. The building should display the activity occurring within.
4. The building should also scale appropriately along Cabot Street.
5. Auditorium/Gymnasium should be located in close proximity to the multi-purpose playfields and separated from the remaining building program for after hours and weekend public use.
6. "Secure" outdoor educational environment with easy and direct access from the cafeteria and neighborhoods.

The new building will be located on the existing Memorial Building site at 502 Cabot Street. The existing sub-surface soils conditions consist of a significant depth of soft blue clay. This will require more significant ground improvements than use of typical spread footings foundation system.

In order to satisfy these needs and goals, the building took on a curvilinear shape, includes a compact building footprint, closely blends with the natural topography of the site, and is organized with a 4-story classroom core that includes the vertical stacking of each academy (grade) by floor level and each academy further divided into small learning communities (neighborhoods).

The main entry of the proposed building is located along Cabot Street, including a three story lobby and adjacent administration with an appropriate amount of glass providing visual and physical access will serve as the main entry and control point with during the school day. One of the three 4-story classroom neighborhoods is angled from Cabot Street and acts a backdrop to the 2-story administration/guidance/nurse program, the 3-story main lobby, and the 1 ½ story media center.

The after-hours community component (auditorium/gymnasium) located on the south side of the building consolidates the gymnasium and locker rooms, and performing arts - inclusive of the band, choral, and auditorium and is in close proximity to the multipurpose play fields.

Connecting the main entry, library and administration control point along Cabot Street with the community component is a curved cafeteria/multipurpose educational space exposed to the south. This curved space is accented with a glass wall that allows visibility of the activity within along with visual and physical connection between the neighborhood, cafeteria, and

the secure outdoor learning environment.

The building's exterior includes the use of "natural" low-maintenance materials, including; simulated wood rain screen, cementitious panels, exposed architectural concrete, and stone veneer.

The design solution creates a warm, inviting building that retains the human scale in building mass, carefully blends the building to the existing topography and landscaping, and maximizes the maximizes efficiency, reduces the building's footprint and responds to the educational vision and goals with the 4-story building.

Final Design Program
Educational Space Summary Narrative

There have been a few minor deviations in the Educational Space Summary than was originally submitted in the Preferred Schematic Report (PSR).

Core Academic Spaces:

The overall square footage for the Core Academic Spaces remains at 68,390sf.

General Classrooms

In the PSR, a quantity of 50 general classrooms was identified, the Health Classroom was identified at 850sf, the Academic Team Rooms were identified at 465sf, and the Science Classrooms were identified at 1,200sf. During Schematic Design, after more programming sessions with the Owner, based upon the intended use and needs of the Classroom (team teaching) and Academic Team rooms, the spaces were redistributed to include the following:

General Classrooms: 27 at 850sf

General Classrooms: 6 at 1,025sf

Language Classrooms: 6 at 850sf

Reading Classrooms: 5 at 850sf and 2 at 425sf

Science Classrooms: 6 at 1,025sf (grades 5/6) and 6 at 1,200sf (grades 7/8)

Academic Team Room: 12 at 820sf

Health Classroom: 1 at 840sf

Special Education:

The overall square footage for the Special Education category remains at 15,850sf.

In the PSR submittal, seven (7) Self-contained SPED classrooms were identified at 850sf, with the same amount of Self-Contained SPED toilets at 60sf. Twelve (12) Resource Rooms were identified at 425sf. During the Schematic Design, after more programming meetings with the District administration, SPED District Chairperson, SPED Faculty and staff and a more detailed understanding of the District's Special Education programs and methodology, the spaces were redistributed. Please review the DESE submittal and proposed space summary for further explanation and delineation of spaces and square footages.

Art & Music:

The overall square footage for the Art & Music category remains at 6,550sf.

Music Storage and Music Office

The Music Storage and Music Office were not originally delineated as distinct spaces in the proposed space summary. The Owner requested a separate space for musical instrument storage and an office for two instructors. The Band Room, Practice Rooms and MIDI Lab/ Ensemble square footages were adjusted to accommodate this request. The Schematic Design

identifies three practice rooms in lieu of four at 75sf (same as PSR), a reduction in Music Room from 2,300sf to 2,000sf, supply rooms located between the two art classrooms that range in size from 70 to 100 square feet. The total square footage of these four spaces is 300sf.

Vocations & Technology:

The overall square footage for the Vocations & Technology category remains at 9,600sf.

Multimedia & Video Applications Lab and Technology Applications & Production Lab

Minor redistribution of square footage between the two spaces to equalized them at 1,300sf each. The PSR identified the Multimedia & Video Production Lab at 1,000sf and the Technology Applications & Production Lab at 1,600sf.

Health & Physical Education:

No modifications were made to the Health & Physical Education program. The size of the Health & Physical Education category remains at 15,400sf.

Media Center:

No modifications were made to the Media Center program. The size of the Media Center category remains at 8,401sf.

Dining & Food Service:

The overall square footage for the Dining & Food Service category remains at 15,872sf.

Dining & Food Service

The overall size of the Dining & Food Service program remains at 15,872sf. The square footage in the Schematic Design was divided equally in the proposed space summary to reflect the distributed dining described in the Educational Program with the 5/6 Student Dining (5,231sf) located on the first floor and the 7/8 Student Dining (5,232sf) located on the third floor.

Medical:

The overall square footage for the Medical category remains at 910sf.

Medical

The overall Medical program size remains at 910sf. The Nurses waiting area was increased from 250sf to 350 sf to accommodate an open area for one of the two nurses. Exam Rooms has been reduced in quantity from 6 to 2 spaces. Two Resting areas have been added at 150sf each, totaling 300sf. Nurse

Administration & Guidance:

The overall square footage for the Administration & Guidance category remains at 4,796sf.

Administration & Guidance

The overall square footage of the Administration & Guidance Suite remains at 4,796sf. However, specific room square footages have been adjusted. The number of Guidance offices was redistributed and reduced in size as follows: Four guidance offices reduced from 150sf to 110sf, two instructional coaches' offices (Math/Literacy) remain at 150sf, two School adjustment counselors (SAC) offices remain at 150sf. A student work area was added into the Guidance Suite increasing the size from 100sf to 110sf.

Custodial & Maintenance:

No modifications were made to the Custodial & Maintenance program. The overall square footage for the Custodial & Maintenance category remains at 2,870sf.

Other (Auditorium):

No modifications were made to the Other (Auditorium) program. The overall square footage for the Other (Auditorium) category remains at 5,700sf.

Proposed Space Summary - Beverly Middle School

Grades 5-8

7.20.15

5-8 BEVERLY MIDDLE SCHOOL	Existing Conditions			PROPOSED: Existing to Remain/Renovated			PROPOSED: New			PROPOSED: Total			MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
CORE ACADEMIC SPACES			**31,524**			**0**			**68,390**			**0**			**65,310**	
(List classrooms of different sizes separately)																
Classroom - General		34					850	57	48,450				950	51	48,450	850 SF min - 950 SF max
							1025	6	6,150							
English	600	2	1,200													
	840	1	1,920													
	675	1	675													
	765	1	765													
	763	1	763													
	725	1	725													
Math	585	2	1,170													
	640	2	1,280													
	675	1	675													
	725	3	2,175													
	788	1	788													
Language	700	2	1,400				850	6	5,100							
	820	1	820													
	588	1	588													
	660	1	660													
Reading	580	1	580				850	5	4,250							
	900	1	900				425	2	850							
Social Studies	600	2	1,200													
	640	3	1,920													
	555	1	555													
	679	1	679													
	668	1	668													
	741	1	741													
Small Group Seminar (20-30 seats) / Resource			0				175	12	2,100				500	3	1,500	
		10														
Science Classroom / Lab: 5/6 Grades	648	2	1,296				1,095	6	6,570				1,200	12	14,400	1 period / day / student
Science Classroom / Lab: 7/8 Grades							1,200	6	7,200							
	656	1	656													
	668	2	1,336													
	730	4	2,920													
	1,200	1	1,200													
Prep Room	75	3	225				80	12	960				80	12	960	
Academic Team Room							820	12	9,840							
Teacher Collaboration Room							500	4	2,000							
Health Classroom	814	1	814				840	1	840							
SPECIAL EDUCATION			**8,895**			**0**			**15,850**			**0**			**15,100**	
(List classrooms of different sizes separately)																
Self-Contained SPED	800	1	800				425	1	425				950	10	9,500	assumed 8% of pop. in self-contained SPED
Language Based - 5th Grade							425	1	425							
Language Based - 6th Grade							425	1	425							
Language Based - 7th Grade							425	1	425							
Language Based - 8th Grade							425	1	425							
Opportinity Room - 5/6 Grades							800	1	800							
Learning Center - 5/6 Grades							425	1	425							
Learning Center - 7/8 Grades							425	1	425							
Strategies Based Instruction (SBI) - ELA							425	1	425							
Strategies Based Instruction (SBI) - Math							425	1	425							
Strategies Based Instruction (SBI) - ELA							425	1	425							
Strategies Based Instruction (SBI) - Reading							425	1	425							
Student Support Program (SSP) - 5th Grade							425	1	425							
Student Support Program (SSP) - 6th Grade							425	1	425							
Student Support Program (SSP) - 7th Grade							425	1	425							
Student Support Program (SSP) - 8th Grade							425	1	425							
Attain (Autism) 5/6 - 7/8 Grades							1,200	1	1,200							
Thermpulic Learning 5/6 Grades							425	1	425							
Thermpulic Learning 7/8 Grades							425	1	425							
ELL - English Language Learners							425	2	850							
SWAP							425	1	425							
	711	1	711													
	675	1	675													
	665	2	1,330													
	610	1	610													
	588	1	588													
Self-Contained SPED Toilet			0				60	1	60				60	10	600	
ESL - English as a Second Language	238	1	238													
ASL - American Sign Language	660	1	660													
Speech / Testing	75	4	300				250	1	250							
OT Office	175	1	175													
Resource Room	400	3	1,200										500	7	3,500	1/2 size Gen. Clrm.
	347	1	347													
	390	1	390													
Small Group Room / Reading	665	1	665				415	12	2,580				500	3	1,500	1/2 size Gen. Clrm.
Small Inclusion Room							75	24	1,800							1/2 size Gen. Clrm.
SPED Conference Room							280	1	280							
SPED Meeting Room							175	1	175							
Special Education Chair Office	208	1	208				200	1	200							
ART & MUSIC			**3,896**			**0**			**6,550**			**0**			**6,550**	
Art Classroom	802	1	802				1,250	2	2,500				1,200	3	3,600	assumed use - 50% population 2 times / week
Art Workroom w/ Storage & kiln	550	1	550				175	2	350				150	3	450	assumed use - 50% population 2 times / week
Band / Chorus - 100 seats	917	2	1,834				2,000	1	2,000				1,500	1	1,500	assumed use - 50% population 2 times / week
Band Storage							300	1	300							
Music Practice / Ensemble	710	1	710				225	1	225				200	5	1,000	
Music Office							125	1	125							
MIDI Lab / Ensemble							450	1	450							
STEAM Academic Support							50	12	600							
VOCATIONS & TECHNOLOGY			**4,649**			**0**			**9,600**			**0**			**9,600**	
Tech Clrm. - (E.G. Drafting, Business)	2,382	1	2,382										1,200	3	3,600	Assumed use - 25% Population - 5 times/week
Tech Shop - (E.G. Consumer, Wood)			0										2,000	3	6,000	Assumed use - 25% Population - 5 times/week
ComputerTechnology #1	1,584	1	1,584													
Computer Technology #2	663	1	663													
Integrated Academic Production Lab							500	12	6,000							
Multimedia & Video Applications Lab							1,300	1	1,300							
Technology Applications & Production Lab							1,300	1	1,300							
Sell Design & Construction Applications Lab							1,000	1	1,000							
HEALTH & PHYSICAL EDUCATION			**8,677**			**0**			**15,400**			**0**			**8,400**	
Gymnasium	4,607	1	4,607				6,000	2	12,000				6,000	1	6,000	
Gym Storeroom			0				150	2	300				150	1	150	
Health Instructor's Office w/ Shower & Toilet	125	2	250				250	2	500				250	1	250	
Locker Rooms - Boys / Girls w/ Toilets	3,820	1	3,820				1,300	2	2,600				1,000	2	2,000	
MEDIA CENTER			**2,177**			**0**			**8,401**			**0**			**8,401**	
Media Center / Reading Room	2,177	1	2,177				8,401	1	8,401				8,401	1	8,401	
DINING & FOOD SERVICE			**8,389**			**0**			**15,872**			**0**			**15,872**	
Cafeteria / Dining (5/6)	5,130	1	5,130				5,231	1	5,231				10,463	1	10,463	6 seatings - 1.95SF per seat
Cafeteria / Dining (7/8)							5,232	1	5,232							
Stage	885	1	885				1,600	1	1,600				1,600	1	1,600	
Chair / Table / Equipment Storage			0				665	1	665				665	1	665	
Kitchen	2,374	1	2,374				2,695	1	2,695				2,695	1	2,695	1600 SF for first 300 + 1.9F/student/adult
Staff Lunch Room			0				449	1	449				449	1	449	20 SF/Occupant
MEDICAL			**362**			**0**			**910**			**0**			**910**	
Medical Suite Toilet							60	1	60				60	1	60	
Nurses' Office / Waiting Room							350	1	350				250	1	250	
Examination Room	362	1	362				100	1	100				100	6	600	
Reading							400	2	800							
ADMINISTRATION & GUIDANCE			**2,660**			**0**			**4,796**			**0**			**4,795**	
General Office / Waiting Room / Toilet	740	1	740				798	1	798				798	1	798	
Teachers' Mail and Time Room			0				100	1	100				100	1	100	
Duplicating Room			0				200	1	200				200	1	200	
Records Room			0				200	1	200				200	1	200	
Principal's Office w/ Conference Area	230	1	230				375	1	375				375	1	375	
Principal's Secretary / Waiting			0				125	1	125				125	1	125	

Version
11.24.2010

Middle School Space Summary

Educational Space Summary & Space Measurement Analysis

Final Design Program

Schematic Design - Beverly Public Schools

Proposed Space Summary - Beverly Middle School

Grades 5-8

7.20.15

5-8 BEVERLY MIDDLE SCHOOL	Existing Conditions			PROPOSED									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
Assistant Principal's Office - AP1	175	1	175				150	1	150				150	1	150	
Assistant Principal's Office - AP2	200	1	200				150	2	300				150	2	300	
Supervisory / Spare Office			0				150	1	150				150	1	150	
Conference Room	247	1	247				350	1	350				350	1	350	
Guidance Office	120	4	480				110	4	440				150	7	1,050	
Instructional Coaches (Math / Literary)							150	2	300							
School Adjustment Counselor (SAC)							150	2	300							
Guidance Waiting Room	238	1	238				110	1	110				100	1	100	
Guidance Storeroom			0				50	1	50				50	1	50	
Teachers' Work Room	350	1	350				848	1	848				848	1	848	
CUSTODIAL & MAINTENANCE			328			0			2,870			0			2,870	
Custodian's Office							150	1	150				150	1	150	
Custodian's Workshop							250	1	250				250	1	250	
Custodian's Storage							375	1	375				375	1	375	
Recycling Room / Trash							400	1	400				400	1	400	
Receiving and General Supply							565	1	565				565	1	565	
Storeroom							930	1	930				930	1	930	
Network / Telecom Room	328	1	328				200	1	200				200	1	200	
OTHER			10,066			0			5,700			0			0	
Other *(specify)*																
Dental Clinic																
Reception	210	1	210													
Exam	112	1	112													
Exam	90	1	90													
X-ray	132	1	132													
Clean Room	83	1	83													
Office																
Auditorium (Existing: 1,200 seats)	9,439	1	9,439				5,700	1	5,700							
Total Building Net Floor Area (NFA)			81,623			0			154,339			0			137,808	
Proposed Student Capacity / Enrollment									1,395						1,395	
Total Building Gross Floor Area (GFA)[2]			144,349						231,509						223,200	
Grossing factor (GFA/NFA)			1.77						1.50			#DIV/0!			1.62	

[1] **Individual Room Net Floor Area (NFA)** Includes the net square footage measured from the inside face of the perimeter walls and includes all specific spaces assigned to a particular program area including such spaces as non-communal toilets and storage rooms.

[2] **Total Building Gross Floor Area (GFA)** Includes the entire building gross square footage measured from the outside face of exterior walls

Architect Certification

I hereby certify that all of the information provided in this "Proposed Space Summary" is true, complete and accurate and, except as agreed to in writing by the Massachusetts School Building Authority, in accordance with the guidelines, rules, regulations and policies of the Massachusetts School Building Authority to the best of my knowledge and belief. A true statement, made under the penalties of perjury.

Name of Architect Firm: R3 Architects, LLC

Name of Principal Architect: Troy U. Randall

Signature of Principal Architect:

Date: 7.20.15

Final Design Program
Educational Program Narrative

The design team has been working closely with the working group, district administration, middle school faculty and staff, elementary school (5th grade) faculty, and the school building committee to develop a building layout that supports the district's educational plan and educational vision. Many of the individuals who participated (local officials, district administrators, faculty, and staff) in the visioning sessions conducted early in the feasibility study phase remain involved during weekly working group meetings, user group programming meetings, and school building committee meetings.

As part of the review of the Schematic Design process, the design team along with the Building Committee re-visited the desired design concepts that were inherent in the bubble diagrams generated during the educational visioning and educational programming sessions. The School Building Committee recently re-confirmed their support of the preferred "all new" construction option and the evolving schematic plan, reinforcing and enhancing the connection between the building floor plans and the educational goals described within the educational program and below:

LEARNING NEIGHBORHOODS

Beverly Middle School, as currently configured, embraces a traditional middle school model that emphasizes teaming students. The team consists of four general education teachers (Mathematics, Science, English Language Arts, and Social Studies), as well as Special Education Liaison(s) associated with Special Education programs connected to that particular team. While a team approach is utilized, the physical layout of the building inhibits the teachers' ability to provide interdisciplinary opportunities on a regular basis. In order for teachers to be able to facilitate the blending of multiple disciplines of academic instruction, teams must be organized into "Teaching Neighborhoods". These teaching neighborhoods contain four general education classrooms, a dedicated science classroom, and a "Neighborhood Commons" space to facilitate inquiry, presentation, community, project-based learning, teaming, and STEAM. Each neighborhood includes opportunities for small group work and study areas which allow students to move in and out of the classroom area without interruption. Special Education spaces for reading, resource, and inclusion are an inherent part of each neighborhood. There is adequate space for student belongings without the need for "industrial looking" steel lockers lining the walls of hallways and corridors. A shared teacher work and planning area in each neighborhood is an integral piece of the design and allows collaboration on assignments, student progress, and the planning of rigorous cross-disciplinary opportunities. Although organized for efficient interaction within the team, these neighborhoods share a common connection with other neighborhoods and are able to facilitate integration with the remaining school environment.

NO MORE "CELLS AND BELLS"

The industrial model approach to educational design is often jokingly referred to as "Cells and Bells" because it organized classrooms along a corridor, much like holding cells. Corridors are lined with industrial-style lockers for each student. Each classroom space exists in a state of isolation, with no visual connection to the corridor other than a door. Students move from "cell-to-cell" under the direction of bells...hence the name "Cells and Bells". This organizational

structure has many disadvantages and includes an outdated approach to many 21st Century educational practices including:

- The evolution of technology has almost eliminated the need for student lockers. Lockers were created to hold books and personal belongings, all of which are minimized for the modern middle school student. The use of this valuable space for numerous underutilized lockers is a waste, and one goal of the new middle school will be to reduce or possibly eliminate corridor lockers; utilizing technology to reduce the need for books and other storage solutions to address personal belongings.

- The middle school staff has seen increasing success with students who are able to work in small groups outside of the boundaries of the classroom. These students currently only have the corridor space available to them, which unfortunately limits the circumstances under which they can be allowed to complete small group study outside the classroom. However, the results associated with allowing students to assemble in small workgroups outside of the classroom have been very positive despite the spatial limitations. There should really be no "corridors" in a modern facility, as one could argue that this space is the most underutilized space in the entire building. These "corridors" should become part of the "Neighborhood Commons" area with transparency to the classroom, such that they can be utilized during the entire school day as an area for small group study, independent research, and numerous other academic pursuits. The design of the academic neighborhood incorporates viable, usable, learning-supportive spaces within the "corridor" with the small group inclusion areas. Each academic neighborhood also allows for direct, easy access to the project lab/maker space with an abundance of transparency between spaces.

SMALL LEARNING COMMUNITIES

One of the critical strategies identified in the visioning sessions was the need to break the school into smaller learning communities. There was significant discussion regarding the characteristics of these learning communities and it is clear that their organizational attributes go well beyond this simple designation of various neighborhoods to a specific community. These learning communities must be created in a manner which promotes safety, identity, personalization, pride, belonging, support, and confidence. They must recognize that these feelings can be fostered by a well-organized community which responds to student needs from morning arrival until end-of-day departure. The student must feel a personal connection to the staff and students of their community, and such connection begins at arrival. In designing the new facility we must consider providing entry points for each community, and weigh the advantages of this approach versus an approach which forces a large number of students through a single entry point. The entry point locations identified in the current design provide the administration the option to control the flexibility of entry points and allow for a single entry or multiple entry points during the course of a day, week, or year. The middle school academic core is organized by academy (i.e. grade level). The academies are stacked vertically by floor, creating a four-story academic core. Each academy is further divided horizontally into three neighborhoods. This organizational approach successfully supports the educational vision and educational program discussed regularly with the District since the feasibility study phase.

FLEXIBLE PROJECT AND INSTRUCTIONAL SPACE; THE FLEXIBLE CLASSROOM – MAKER/ BUILDER SPACE

Spaces utilized for 21st Century instructional practices should not segregate instruction from application. The modern comprehensive middle school environment must be a flexible space that accommodates both instruction and application. The maker/builder spaces that are dedicated to project-based learning should be highly integrated to the remaining academic classrooms and/or environment. It should allow for students to be creative and grow as learners throughout the course of their day. Additionally, teachers can collaborate with colleagues more easily through flexible spaces.

The flexible classroom is meant to describe an "area" rather than a specific room defined by four or more enclosing walls. Staff and students agree that learning within a group of spaces that allow for varying approaches and environments, facilitated by a teacher or combination of co-teachers, provides the best opportunity for varying learning styles and progress. In some instances, having as many as three contiguous spaces with the necessary supervision can allow the facilitators to customize the learning program for each student. Transparency between these spaces will be a key factor in the successful use of these collective spaces as a "flexible classroom". There was much discussion about the need for small group spaces integrated within the classrooms and neighborhoods. These spaces require a high level of transparency for supervision and connectivity to remaining neighborhood spaces. There are also numerous physical characteristics required within these classrooms including ubiquitous technology and large-scale instructional walls which allow "every wall to be a teaching and collaboration wall". For further explanation of the maker/builder space integration within each academic neighborhood, please refer to the District's response to the MSBA review comments contained within the Preferred Schematic Report submission dated February 12, 2015.

PERSONALIZATION OF INSTRUCTION AND EXPERIENCE

The teaching neighborhoods and flexible project and instructional space known as the "neighborhood commons" are key elements in the personalization of instruction for all students. These spaces will allow educators to meet the needs of all students in an engaging, creative, and collaborative way. Combining these neighborhoods into a grade-level community of three neighborhoods will allow for the creation of manageable grade-level learning communities which offer personalization of each student's experience. This strategy of breaking down the larger school population into smaller learning communities is critical to the successful personalization of the student experience.

COMMUNITY CONNECTIONS

The new Beverly Middle School will be a welcoming environment for not only students and staff but also for community members. The proposed facility will be designed in a way that allows community members to experience student activity and work, and to provide support for such in meaningful ways. The library media center is strategically positioned adjacent to the main entry lobby to provide the visitor with immediate visual connection with the student work and activity. Being able to connect with the community through both ease of facility use and the presentation and display of student work is of vital importance. Because community members will not necessarily be privy to the day-to-day learning experiences of students, providing opportunities to view student work that is rigorous and engaging will build a sense of community between the school and Beverly residents. Traditional "lockers" will be removed from the hallways and corridors, and transparency is abundant such that these spaces are available to put student work and student activities on display.

STEAM PARTNERSHIPS

The City of Beverly has a unique opportunity to partner with many engineering and science businesses that are located within the community. This partnership coupled with a focus on STEAM initiatives will allow teachers and students to participate in real world application both inside and outside of traditional classroom spaces. The modern 21st Century middle school environment allows for the integration of the key subjects of Science, Technology, Engineering, Arts, and Math into real world business and scientific applications in an effort to help students understand the importance of these topics individually, and to also understand the way they support each other.

EDUCATIONAL TECHNOLOGY CAMPUS WIDE

Campus-wide wireless access is key to creating a flexible environment where students can complete assignments without the confines or boundaries of a fixed computer lab. The seamless integration of technology through both a high-capacity wireless network coupled with durable small devices (i.e., iPads, Chromebooks, Laptops) for each student will allow students to access information more readily in order to assist in the production of rigorous performance-based tasks that foster creativity and the development of 21st Century skills. The technology goals described previously herein will apply to the entire campus…indoors and outdoors. Additionally, media broadcasting, video editing, and video production are all academic endeavors which will be supported within the academic neighborhoods and through the provisions of the production lab/maker space, small group inclusion, and/or small group reading areas. This will also allow students to create and engage in a variety of community events through the use of a variety of media.

MEDIA CENTER AND THE DISTRIBUTION OF MEDIA

The library media center should be a media distribution and retrieval resource which students can utilize throughout the school environment. The functions of the library media center should be carefully considered throughout the planning process, as the focus on creating academic neighborhoods may warrant the need to satellite some media resources to the individual neighborhoods or grade-level communities. Media research will occur in many places throughout the school environment, and distributing some library/media resources may prove beneficial in creating a more dynamic environment. Media broadcasting, video editing, and video production are all academic endeavors which will occur within the academic neighborhoods in some capacity, but will also require more sophisticated facilities that may be better placed central to a media resource center.

SOCIALIZATION AND STUDENT DINING

Conceptually, the goal is to provide two dining areas, one for the grades 5/6 academy and one for the grades 7/8 academy. This will allow the District to break a very large student population of 1,395 middle school pupils into two groups of approximately 700 pupils. The two dining areas will allow for fewer total lunch periods and make it easier to schedule the building, and also allow for the incorporation of more academic offerings as a result of less interference from multiple dining periods. A first floor dining space would include an attached full service kitchen that would allow preparation of food for both dining areas. Each of the dining areas will include heated and chilled serving areas to allow for salad bars, sandwich stations, etc. One of the dining areas will be located on an upper floor, but will have an adjacent elevator utilized for the transportation of food. It will also include a small satellite warming kitchen that will include the heated and chilled serving components described herein as well as the

necessary support services. All meal selections will be available in both dining areas.

The division and separation of the dining area into two distinct areas achieves several important educational goals that go well beyond the need to break down the large student population and to reduce the overall number of dining periods. The educational programming process resulted in a strong belief that the space dedicated to student dining can be much more "useable" throughout the day if it is more closely linked to the academic neighborhoods. It is not being viewed as a "noisy" space that will be used only during the middle of the day for lunch and that should therefore be separated from the remainder of the academic program areas, but instead is being viewed as an "active" multi-purpose area which can be used for dining, presentations, student projects, large group breakout, and various other educational uses that require direct proximity to the academic neighborhoods. Each of the dining areas would include the appropriate acoustics to insure that they provide appropriate space for students to work on group projects and to conduct student and guest presentations. There was also a strong desire to insure that the location of these dining areas provides indoor/outdoor integration to a secured outdoor area (courtyard), such that activities related to the space could easily spill outdoors when appropriate, and the dining spaces would be filled with natural lighting from outdoors. This connectivity will provide access for students before and after school as well as during lunch. It also allows more direct access for students within the academic neighborhoods to be able to conduct their projects utilizing outdoor resources, such as a garden, both as a learning space and a space to create a portion of the fresh vegetables for the lunch program.

SAFETY AND SECURITY

The new middle school will provide students and staff with a safe and secure environment by including measures that support and foster safety and confidence. Students and staff must feel safe and confident in their environment, without the inclusion of over-restrictive physical barriers that compromise the educational environment. Providing clear and controlled entry will be important, but within the academic neighborhoods safety should prevail without restricting the desired open and transparent connections between the learning areas. A clear approach for students and visitors which promotes supervision and observation at the point of entry will be key to allowing all to access the necessary support services. Safety also includes providing adequate and appropriately located space for support services staff and outside providers who provide necessary mental health support for our students. Students face and are presented with a wide array of mental health issues at early ages; it is therefore vital that space is provided for these services to commence in a suitable space.

INDOOR/OUTDOOR CONNECTIONS

The connection of indoor and outdoor spaces is important to creating a vibrant and energized educational environment. Students can become more engaged in utilizing outdoor space if an effort is made to insure the appropriate visual and physical connection. Outdoor space can be used beyond recreational use and can provide project space, social space, classrooms, study areas, and other support areas for the educational environment. This would also provide an even better connection to the "Nature's Classroom" and "Change Is Simple" programs, which emphasize outdoor learning and creating a green environment and are a cornerstone of the middle school experience.

A significant amount of input has been provided by City Officials, School Building Committee

members, District Administration, faculty, and staff during the Schematic Design process related to the concept of indoor/outdoor connection and the "Outdoor Educational Environment" located adjacent to the cafeteria. There were many educational advantages identified by the educators with the proximity of the academic neighborhoods to the cafeteria and the outdoor learning environments. Some of the examples were:

- Outdoor dining area
- Outdoor amphitheater
- Exhibit and work areas
- Open green space connected to the multipurpose play fields
- Outdoor classroom space
- Outdoor science space, kinetic sculptures
- Outdoor project space – extension of the project maker/builder space
- Outdoor "holding space" for early arrivals and late departures

The District's Design Improvements Summary dated May 18, 2015 provides overall site plans, an enlarged site plan of the outdoor educational environment, and building floor plans, as well as further explanation of the indoor/outdoor connection concepts.

LEARNING BEYOND THE SCHOOL DAY

As students become involved in more activities, the time they spend on the academic campus has expanded. These activities include music, performance, athletics, research, science, academics, and more. Many students study after school as they await upcoming practices, performances, or activities that involve them or their friends. Additionally, there is a strong relationship with the local YMCA which provides a wide array of programming for students after school at their location. Having appropriate space for the YMCA to provide programming in the building would allow for a stronger collaboration between the school and community. Providing appropriate spaces for such activities is a key component of the 21st Century academic environment.

Final Design Program

Instructional Technology

Currently, the existing conditions of the Beverly Middle School present a myriad of technology challenges. The school community has done its best to integrate new technologies into classroom instruction. However, with restricted network access in the classrooms, significant technology integration is limited.

Educational technology should be integrated seamlessly throughout the educational environment. Building-wide wireless access with devices providing high connection densities is critical to creating a flexible environment where students can complete assignments without the confines or boundaries of fixed computer labs. Currently, the school has a few wireless access points. These older device models do not have the throughput or multiple connection capability (density) to sustain a classroom of wireless devices. There is no possibility of full wireless use in every classroom currently, and as such, no possibility of 1-to-1 learning in the current wireless or wired environment.

Current data drops in each classroom are category 5, with a maximum transmission rate of 100MB per second. The current infrastructure installed in new schools is a minimum of 1GB to the desktop, with the category 6A cable capable of 10GB to the desktop. The limitation of network drop speed/bandwidth in each classroom severely limits classroom network and internet capabilities. The cabling needs to be removed and replaced. Current classroom projectors are a mix of unified Smart Board models, short throw wall mounted Epson models, and ceiling mounted models. All projectors are non-interactive older models. Most Smartboards are inoperative. The lack of conduit infrastructure limits the capability of upgrading the classrooms to a more robust and interactive environment. There are no ceiling speakers; the only audio in the classroom is from the projector speaker, which is far from ideal. There is no voice lift currently in use in the school.

There are no document or presentation cameras currently used in the classrooms.

There are no PA system call buttons in the classrooms. There are only 10 phones for teacher use. Not all rooms have phones. The PA system is old and unreliable, and the teachers cannot talk back to the administration area when a classroom page is made. The limited and malfunctioning system is a safety and security concern. The analog clocks are mostly broken, and the bell system is inoperative. The phone system is an analog/digital hybrid system on category 3 cabling that lacks enough phone lines for adequate use. Category 3 cabling will not support a newer voice-over IP phone system.

There appears to be no door contacts or security system (intrusion or access control) in place. There are no cameras in use, either inside or outside the building. This is a security concern, especially the lack of exterior door monitoring by any kind of security system. There is an Aiphone entry system at the front door. There are no panic buttons and no capability to automatically secure the facility in the event of a lockdown.

The new school will have a robust wireless network which will be able to support one-to-one

learning. In addition to a wireless environment, each educational space will have hard-wired data outlets to provide teacher flexibility in the classroom. Each teaching space within the new school will have interactive whiteboards or projectors. Each teaching location shall have a minimum of four data and one voice drop, capable of supporting a voice over IP phone system and up to 10GB data transmission to the desktop.

Each new classroom will feature a facilitative PC, tablet, or laptop application control panel which allows teachers the ability to utilize integrated technology tools such as interactive electronic whiteboards or interactive projectors, presentation cameras, and encoded cable TV and Video-on-Demand content.

Each new classroom would be outfitted with a sound reinforcement and voice amplification system which consists of four ceiling-mounted speakers and two wireless microphones. The amplification system will not only provide sound reinforcement for students, but will also provide the voice amplification as an output for an FM transmitter (the FM transmitter and receiver would be a part of the individual student's system, provided by the student or district) for hearing impaired students' systems.

The new school will be designed with a video distribution system to allow a minimum of ten channels to be distributed within the school. The signal will be displayed on classroom projectors, eliminating the need for additional televisions (if desired) in each classroom. The system shall include a digital signage package to display bulletin board and notification material on TVs or projectors.

Networked cameras (interior and exterior) and a full security system, including door monitoring, lockdown capability, and automatic central monitoring notification of lockdown events via panic buttons shall be provided.

Final Design Program

Functional Relationships & Critical Adjacencies

The functional diagram of the new building places the main entry adjacent to Cabot Street and at the end of the linear/curved school scheme. The main entry lobby is flanked along Cabot Street by Administration, Guidance, and Health Suite to the north/northwest, and the Library Media Center to the south/southeast. The Administration Suite functions as the control point into the school. The highly utilized Library Media Center is directly adjacent to the Main Entry Lobby and Administration Suite and is visible from the main entry; a priority of the educational vision and the district administration. This location will allow quick access for parents to securely enter the building through the main lobby for parent drop-off and pick-up.

The gymnasium, auditorium and music programs are located at the opposite end of the building from the main entrance and facing Balch Street such that they would be closer to the multi-purpose play fields and parking. The auditorium, choral, and band programs were clustered near the gymnasium on the south side of the school so that all noise-generating spaces were consolidated into one area. Functionally, a single lobby with entries on the south side serves the gymnasium and performing arts side of the building and allows efficient crowd dispersion before and after events.

A primary circulation spine connects the main entry lobby with the gymnasium/auditorium area of the building. The academic wing is centrally located along the circulation spine and divided into four academies (grade levels) with each academy stacked vertically by floor, resulting in a four-story academic wing. Each academy is further sub-divided into three neighborhoods. The teacher planning / work spaces are centrally located within each academy, adjacent to the circulation spine and cafeteria to allow for oversight by the faculty, staff, and administration. The project team room / maker builder spaces are integrated within each neighborhood and located adjacent to the circulation spine.

Opposite the academic wing and also located along the circulation spine is the building's student dining spaces. The 5/6 academy student dining is located on the first floor and the 7/8 academy student dining is located on the third floor above the 5/6 grade student dining. The student dining serves multiple functions. Naturally, its primary function is a dining area for students. The organization and disbursement of space adjacent to the academies also allows utilization of the spaces throughout the day as an "active" multipurpose area which can be used for dining, presentations, student projects, large group breakout, and other educational uses that require direct proximity to the academic wing.

The student dining area is adjacent to the outdoor learning environment to the exterior, providing a strong indoor/outdoor connection so activities within the student dining space could easily spill outdoors when appropriate. This space provides a direct connection between the academic neighborhoods, project maker/builder spaces, and student dining for educational uses.

The custodial suite, mechanical room, electrical room, MDF room, and cafeteria/kitchen, are

consolidated and located on the first floor. The close proximity of these programs will allow sharing of equipment, loading docks, and would also consolidate deliveries to one location of the building.

Final Design Program

Security & Visual Access Requirements

The new Beverly Middle School will have a main entrance on the northwest at the end of the building's circulation spine and centrally located along the Cabot Street façade. A secondary entry and lobby will be located at the opposite end of the circulation spine at the south side of the building adjacent to the gymnasium and auditorium. This entry will function as the after-hours entry to the gymnasium and auditorium. The secondary entry will be located on the south building facade aligning with the south parking lot and Balch Street. This entry will allow immediate crowd control before and after gymnasium and auditorium events. The Library Media Center is located on the first floor adjacent to the main entry lobby and across the lobby from the Administration control point.

Access to the Cafeteria will be provided through the outdoor learning environment adjacent to the vehicular drop-off zone. This zone of the site (through a fenced area) and building will be accessible at specific times of the day, controlled by the Administration.

All others doors, including stair egress doors, at the exterior of the school will be egress only and will be locked at all times.

The building's indoor/outdoor security monitoring system will allow staff to monitor the majority of the 17.7-acre campus from a single control point and key entry location points (that typically would be egress only) that will be strategically located to not allow access from the exterior without the use of a programmable card swipe.

The Main Office is designed such that once a visitor is near the main entry, a voice and video display system (monitored by a member of the Main Office) allows individual access to the building's entry vestibule during school hours. The vestibule serves as a check point for visual recognition and sign-in. Once permission is granted to enter the building, the second set of control doors is electronically unlocked to allow visitors to gain access into the General Office and Waiting Area. In the event of a security breech, the security system allows a "Lock Down" message to be transmitted instantaneously to each teacher's laptop in the classroom so that teachers can "lock down" the classroom to prevent an intruder from entering. The Main Office is designed to provide maximum visual connection to the main lobby and the exterior entry approach to the school.

Final Design Program

Site Development Requirements

The existing Memorial Building site, located at 502 Cabot Street, is accessible via two driveways, one entrance and one exit, from Cabot Street and also has frontage, including access to a gravel parking lot, on Balch Street. The site is furnished with paved parking areas and paved driveways off of Cabot Street which are in fair to poor condition due to surface cracks and pavement patches throughout. As previously mentioned, a gravel parking area is located on the south side of the site with access from Balch Street and additional gravel parking located along Balch Street.

The project proposes 295 parking spaces for staff and visitors. The parking is distributed to provide 30 spaces to the north of the proposed building, 66 spaces to the northwest, 30 spaces to the east, and 169 spaces to the south of the building. This distribution allows for parking spaces to be located on all sides of the building as well as additional parking spaces to the south of the building adjacent to the athletic fields.

Zoning Parking Requirements

The parking capacity requirements for schools are 1 space for every 500 square feet of floor space, exclusive of basements as outlined in the Beverly Zoning Ordinance. The future development is schematically programmed to include a 245,000 square foot building. We assume that the parking capacity requirements for the school include the auditorium space, meaning that the Zoning Ordinance requires a total of 490 spaces. However, 490 parking spaces would exceed the actual requirements of the school program and consideration should be made for reducing the final number of spaces. To achieve this, a variance from the City will need to be requested to provide less than the required spaces in the Zoning Ordinance.

Staff Parking Needs

Given the anticipated teaching staff totaling 110, and assuming an additional 20% for administrative, custodial, and nurse positions, 132 spaces are required for staff alone. This number is exclusive of spaces for visitors.

Institute of Transportation Engineers Parking Evaluation

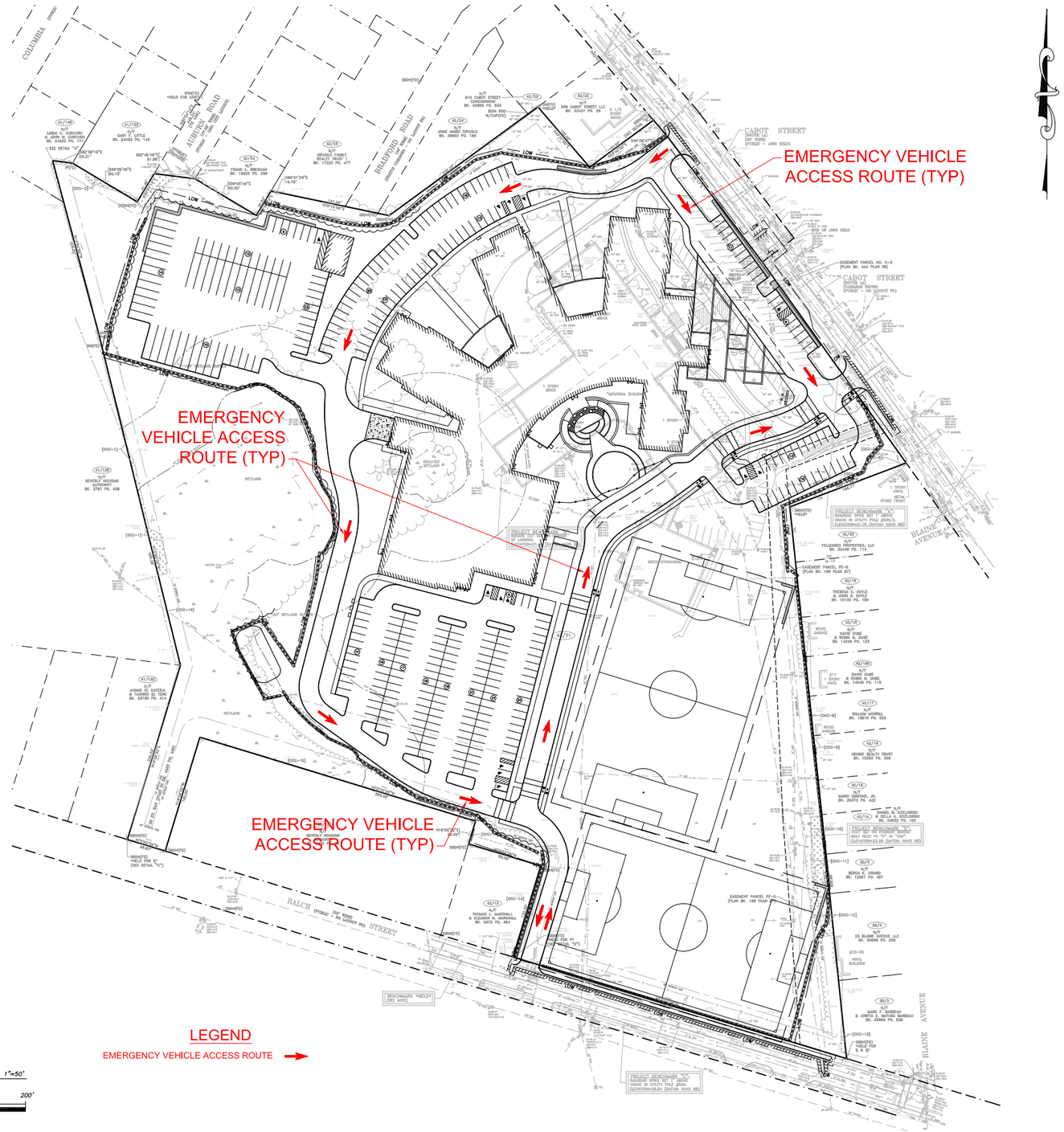
The parking space number was further evaluated by the use of the Institute of Transportation Engineers 4th edition (ITE) of their Parking Generation guidelines for which states that parking in a Middle School/Junior High School parking lot ranges from 0.07 to 0.11 spaces per student. As the middle school is anticipated to teach a potential of 1,400 students, the ITE guidelines recommends 98-154 parking spaces.

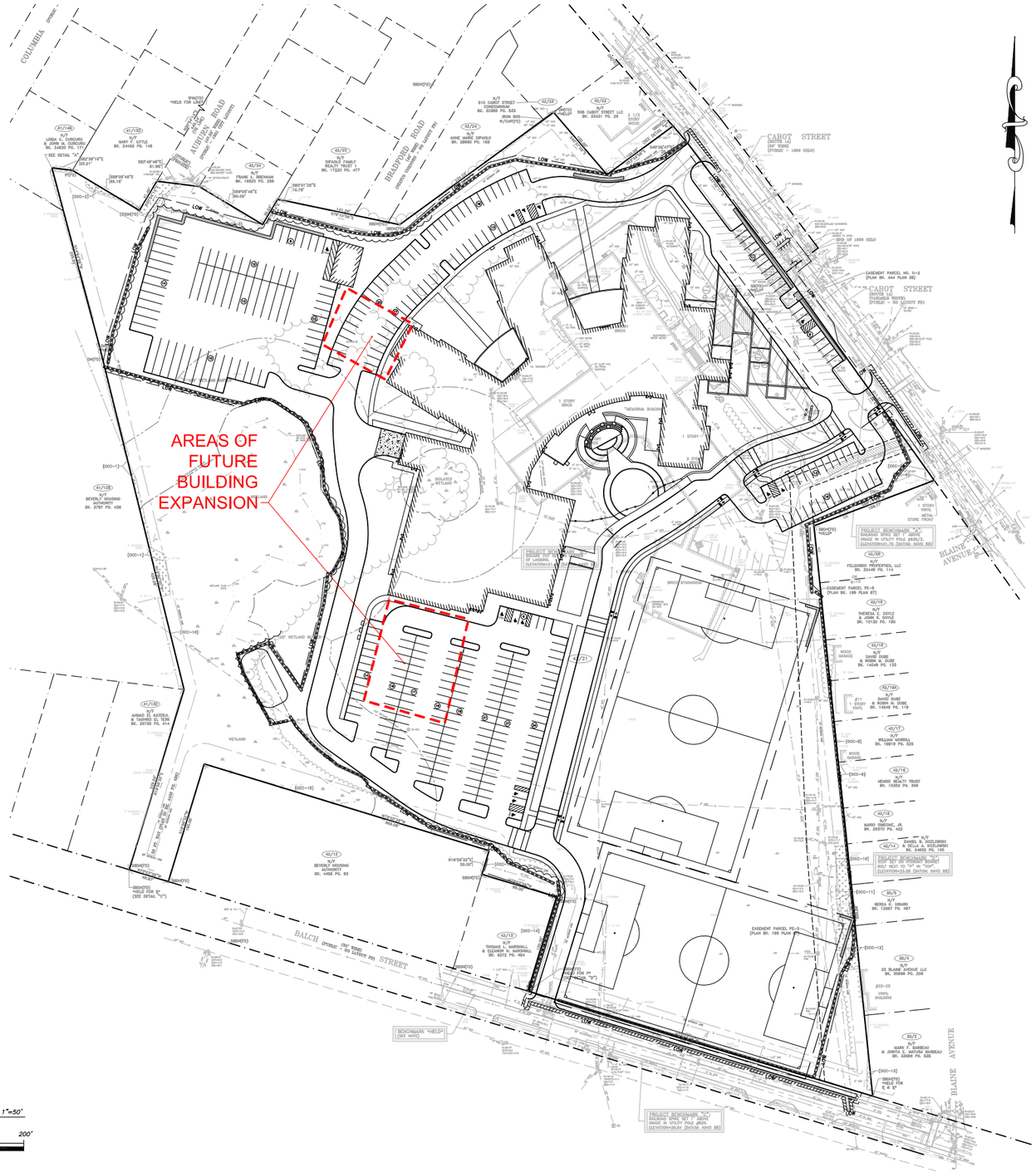
Parking Spaces Provided

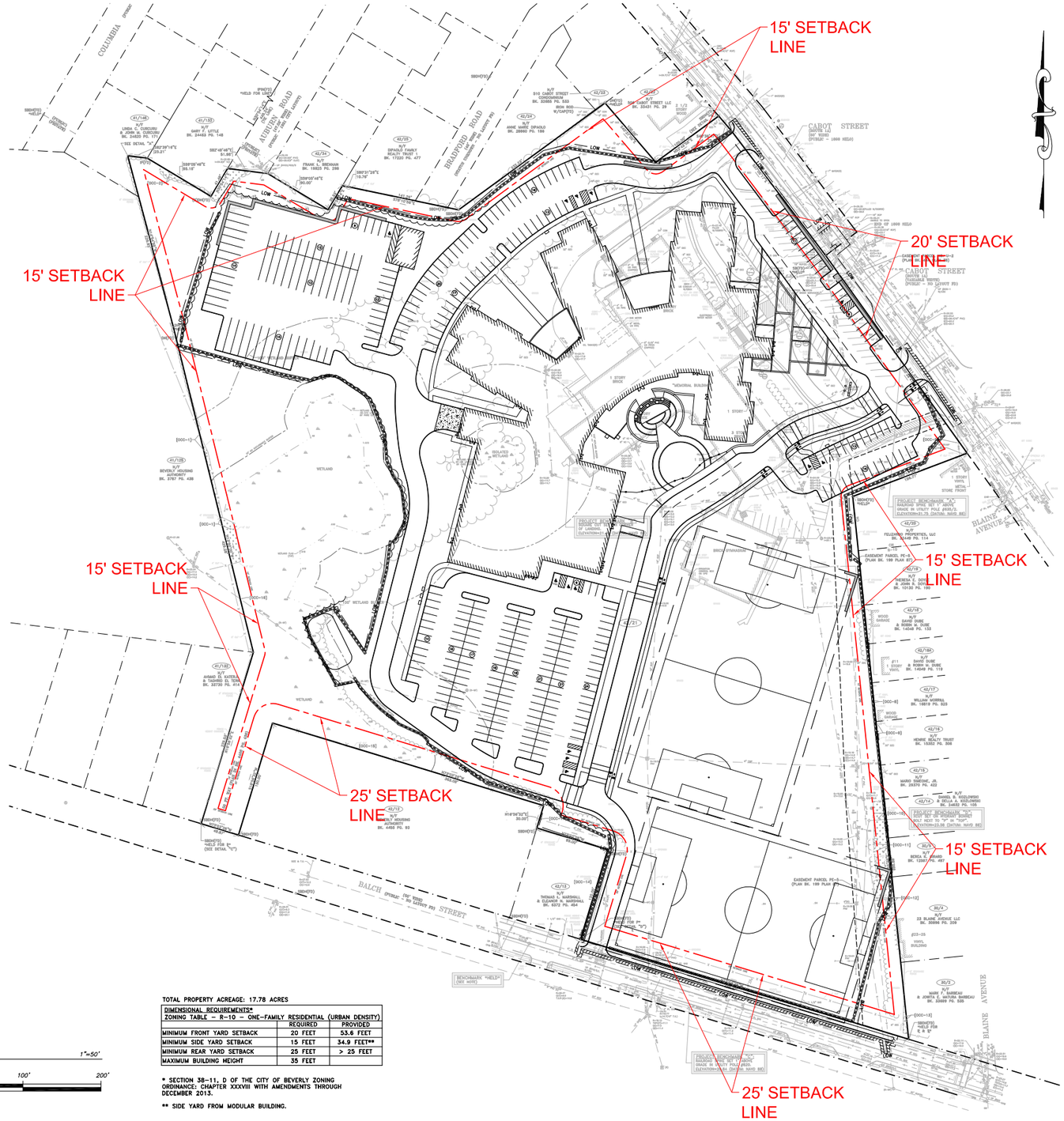
The parking is designed to include spaces for both staff and visitors. This accounts for each of the 132 staff members anticipated at the school. In addition, the parking lot includes 125 spaces for a fully occupied auditorium as well as 30 additional spaces for visitors beyond the staff and auditorium use. The parking spaces provided for the auditorium are based on the Zoning Ordinance at 1 space for every 4 seats in a 500 seat auditorium.

Conclusion

The City Zoning Ordinance requires parking spaces in numbers that would exceed the practical requirements of the school program. The 295 parking spaces provided in the current design exceeds the actual spaces that would be needed if school is in session and the auditorium is fully occupied. As a confirmation to this number, the 295 parking spaces far exceeds the upper limit of the ITE guidelines. A variance from the City will need to be requested to provide less than the required spaces in the Zoning Ordinance and we will continue to coordinate with the school and the City that this will meet their needs.


EMERGENCY VEHICLE ACCESS ROUTE (TYP)
EMERGENCY VEHICLE ACCESS ROUTE (TYP)
EMERGENCY VEHICLE ACCESS ROUTE (TYP)
CABOT STREET
BALCH STREET
BLAINE AVENUE
BRADFORD ROAD
AUBURN ROAD
COLUMBIA
LEGEND
EMERGENCY VEHICLE ACCESS ROUTE
Graphic Scale 1"=50'
50' 25' 0 50' 100' 200'


AREAS OF FUTURE BUILDING EXPANSION
CABOT STREET
BRADFORD ROAD
AUBURN ROAD
BALCH STREET
BLAINE AVENUE
COLUMBIA
Graphic Scale
1"=50'
50' 25' 0 50' 100' 200'



TOTAL PROPERTY ACREAGE: 17.78 ACRES

DIMENSIONAL REQUIREMENTS* ZONING TABLE – R-10 – ONE-FAMILY RESIDENTIAL (URBAN DENSITY)		
	REQUIRED	PROVIDED
MINIMUM FRONT YARD SETBACK	20 FEET	53.6 FEET
MINIMUM SIDE YARD SETBACK	15 FEET	34.9 FEET**
MINIMUM REAR YARD SETBACK	25 FEET	> 25 FEET
MAXIMUM BUILDING HEIGHT	35 FEET	

* SECTION 38-11, D OF THE CITY OF BEVERLY ZONING ORDINANCE: CHAPTER XXXVIII WITH AMENDMENTS THROUGH DECEMBER 2013.

** SIDE YARD FROM MODULAR BUILDING.

Graphic Scale 1"=50'

50' 25' 0 50' 100' 200'

Final Design Program

Desired Visual/Aesthetic Focal Points & Features

The new Beverly Middle School exterior will be composed of low-maintenance and readily available materials, including; a stone base, exposed architectural concrete, simulated wood exterior, and a cementitious wall panel. The goal is to create an aesthetic which appears organic or "Natural" in its use of materials, while simultaneously being long-lasting and easy to maintain.

The primary exterior facade is placed at an angle to Cabot Street, well balanced in its scale and relationship of solid-void surfaces, creating a dramatic 3-story glass entry lobby that appears to pierce through the 4-story classroom wing backdrop. As one approaches the main entry plaza, the curved circulation spine and cafeteria glass wall, connected at the 3-story main entry lobby, can be seen curving in the background over the library media center. The main entry is further emphasized by the introduction of deep roof overhangs with simulated wood brackets and changing horizontal planes with the vestibule dropping to a single story and a deep roof overhang. The main entry canopy also provides a functional purpose of weather protection for students during pick-up and drop-off times.

The 4-story glass wall at the curving cafeteria is accentuated by the deep "eyebrow" overhang at the roof, projected sun screening devices, mullion pattern, and four colorful fabric banners which provide opportunities to instill school pride, branding, and highlight its importance as an architectural element. The glass wall also provides the visual and physical indoor/outdoor connection to the outdoor educational environment with the use of transparency and multiple overhead doors that can be opened at opportune times during the day.

Focal points and visual features are created within the school as well. The main entry lobby begins the experience of the central curvilinear spine through the building. The spine is flanked on the east side by a two story cafeteria (first and third floors) with the glass wall continuing the view out toward the outdoor educational environment. The spine is flanged on the west side by the three academic neighborhoods, project labs / maker building spaces that overlook the cafeteria and serve as an entrance into each neighborhood with the focus on student work on display. The entrance to each neighborhood will also be design to showcase the aspects of neighborhood branding, pride, personalization, etc. The spine continues through to the fine arts and physical education zone of the building where the continuity of the building aesthetic will continue into the two-story secondary (public) lobby and entrance adjacent to the gymnasium and auditorium.

The site design also incorporates visual and physical connections between various components on the site (main entrance plaza and parent drop-off zone) and vistas from the building (i.e. through the cafeteria, outdoor educational environment and multi-purpose play fields) while blending the building with the existing site topography.

Traffic Analysis

Traffic Analysis

A Phase 1 Traffic Analysis was previously performed, and results were provided in the Beverly Public Schools Feasibility Study submittal dated November 25, 2014.

The Phase 2 Traffic Analysis, provided by PARE Corporation, is included herein.

PARE PROJECT NO. 14225.02
REPORT

FINAL TRAFFIC IMPACT ANALYSIS FOR THE BEVERLY MIDDLE SCHOOL BEVERLY, MASSACHUSETTS

SUBMITTED TO:
Ai3 ARCHITECTS
526 BOSTON POST ROAD
WAYLAND, MA 01778

SUBMITTED BY:
PARE CORPORATION
8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865

July 3, 2015

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Appendix A	Traffic Counts
Appendix B	Crash Data and Crash Rate Calculations
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Appendix D	Beverly Census Data
Appendix E	Trip Generation and Distribution
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Introduction

The following represents the final traffic study completed for the expansion and relocation of the middle school in Beverly, Massachusetts.

The middle school currently hosts grades six (6) through eight (8) and is located at 7 Sohier Road, with driveways on both Sohier Road and Colon Street. The school is looking to expand to grades five (5) through eight (8), which will require a larger facility. The site selected for this expansion is the existing Memorial Building property, located at 502 Cabot Street, which is approximately 17 acres in size. The Memorial Building currently hosts several City services including the School District Administration and Superintendent's Office, a pre-K facility, a Police Unit, the Building Commissioner and Inspectional Services, and the Northshore Collaborative School. The Memorial Building currently has driveways on Cabot Street; however, the proposed site will have driveways on both Cabot Street and Balch Street.

Presented within are existing conditions in the vicinity of the project site, a safety analysis of the study area, an analysis of the traffic based on existing, future 2019 no-build and future 2019 build conditions, and potential recommendations or mitigation measures, as necessary. A locus map of the study area is provided in Figure 1 and a layout of the proposed site is provided in Figure 2.

Data Collection

It is anticipated that the busy times for the traffic movements into and out of the proposed school will mimic those of the existing school operations, which occur on weekday mornings and afternoons. As such, manual turning movement counts (MTMC) were completed at the following five (5) study area intersections:

- Cabot Street at County Way/Longmeadow Road/Dodge Street
- Cabot Street at Russell Street
- Cabot Street at Kittredge Street
- Cabot Street at Balch Street
- McKay Street at Balch Street

The counts were performed on Wednesday, October 8, 2014, Thursday, October 9, 2014 and Wednesday, June 3, 2015, during the peak periods. The morning peak was captured from 7:00 a.m. to 9:00 a.m. and the afternoon peak was captured from 2:00 p.m. to 6:00 p.m. to account for school dismissal as well as the commuter peak.

Additionally, automated traffic recorder (ATR) counts were collected from Tuesday, October 7, 2014 to Thursday, October 9, 2014 along Cabot Street, in front of the existing Memorial Building. This data was used to determine the average daily traffic (ADT), for the basis of traffic model projections and volume distribution.

Furthermore, the City of Beverly Public Works Department and the Massachusetts Department of Transportation (MassDOT) were contacted to obtain existing traffic signal plans for the relevant MTMC intersections. The signal plans obtained included timings for roadway projects under design within the study area. These timings were used for all analyses.

Crash data for the roadway network in the vicinity of the project sites was requested and received from MassDOT and the City of Beverly Police Department for January 2010 through December

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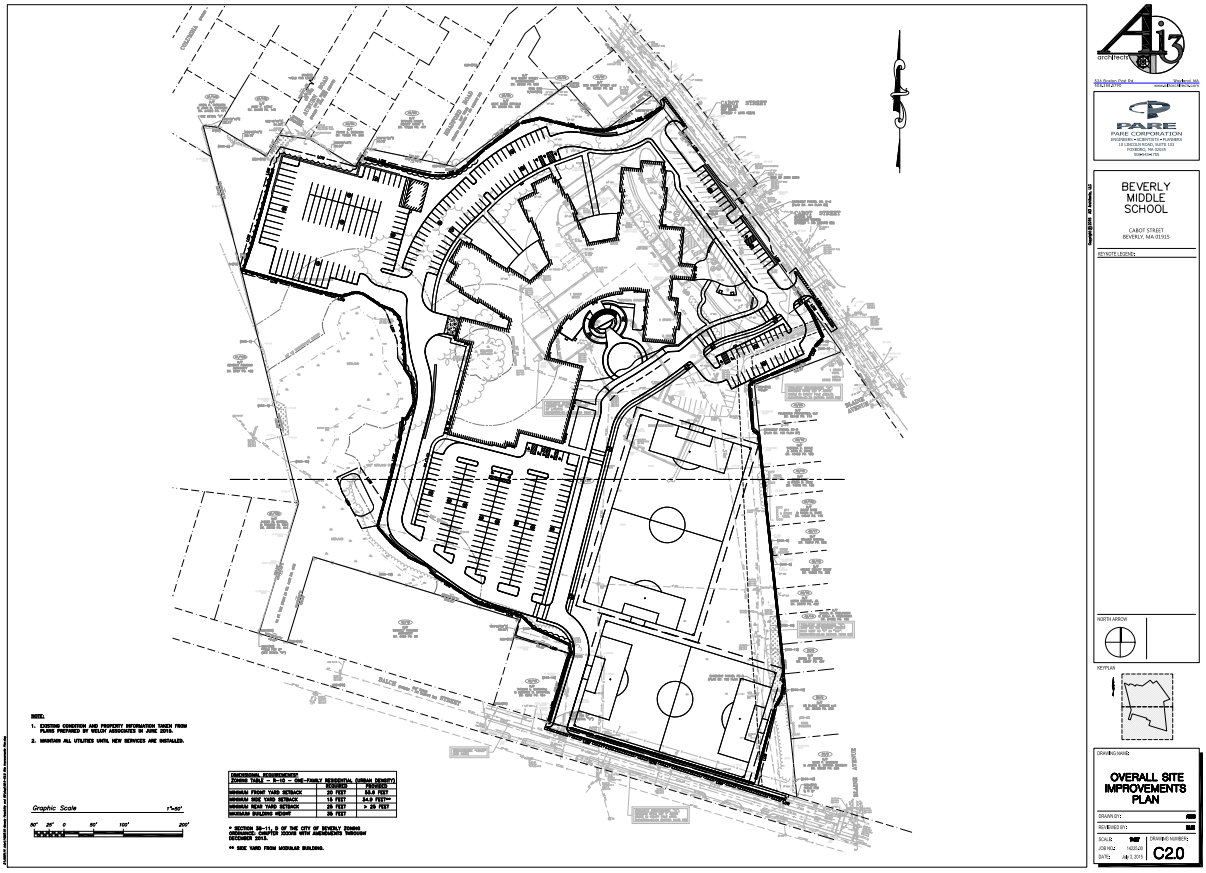
Project No. 14225.02 Date: July 2015

Figure 1 - Study Area

Traffic Impact Analysis
Beverly Middle School

Beverly, Massachusetts


NOTE:
1. EXISTING CONDITION AND PROPERTY INFORMATION TAKEN FROM PLANS PREPARED BY WILLEY ASSOCIATES IN JUNE 2010.
2. MAINTAIN ALL UTILITIES UNTIL NEW SERVICES ARE INSTALLED.
DIMENSIONAL REQUIREMENTS
ZONING TABLE - B-1S - ONE-FAMILY RESIDENTIAL (URBAN DENSITY)
REQUIRED
PROVIDED
MINIMUM FRONT YARD SETBACK 20 FEET 52.5 FEET
MINIMUM SIDE YARD SETBACK 15 FEET 54.5 FEET**
MINIMUM REAR YARD SETBACK 25 FEET > 25 FEET
MAXIMUM BUILDING HEIGHT 35 FEET
* SECTION 50-11.3 OF THE CITY OF BEVERLY ZONING ORDINANCE, CHAPTER 300CMR WITH AMENDMENTS THROUGH DECEMBER 2013.
** SIDE YARD FROM MODULAR BUILDING.
Graphic Scale
1"=50'
50' 25' 0 50' 100' 200'
BEVERLY MIDDLE SCHOOL
CABOT STREET
BEVERLY, MA 01915
KEYNOTE LEGEND:
NORTH ARROW
KEYPLAN
DRAWING NAME:
OVERALL SITE IMPROVEMENTS PLAN
DRAWN BY:
REVIEWED BY:
SCALE:
JOB NO.:
DATE:
DRAWING NUMBER:
C2.0
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FRAMINGHAM, MA
508.872.7700

2013. Additionally, dangerous intersections were identified using the MassDOT Highway Safety Improvement Program's (HSIP) interactive top crash locations database. These top crash locations are classified as clusters and can be triggered by high occurrences of incidents involving vehicles, pedestrians or bicyclists.

The City of Beverly Planning Department was contacted to determine the presence of planned or proposed developments within the city that may generate additional traffic in the vicinity of this project. The department confirmed that there are currently three projects or developments in the planning or construction phase within the vicinity of the proposed middle school sites. The first project is located in the southeast quadrant of the intersection of McKay Street and Balch Street which will convert an old elementary school building into 32 residential units. The second project is located in the northeast quadrant of the intersection of McKay Street and Elliott Street (Route 62) and will consist of a 73 unit condo complex. The third project is a roadway reconstruction of Cabot Street/Rantoul Street (Route 1A) which will add dedicated and shared bike lanes.

A field review of the study area was conducted, with geometric measurements and other field observations recorded along the roadways and at the significant intersections that provide access to and egress from the proposed school site. Observations were also made pertaining to the bus and parent drop-off and pick-up at the existing school. The information obtained was used in the analysis of the study area.

Additionally, bus routes were reviewed for both the Beverly School Department and the Massachusetts Bay Transportation Authority (MBTA).

Existing Roadway Conditions

The study area is defined as the significant roadways and intersections in the vicinity of the proposed Beverly Middle School site that may be impacted by traffic due to its expansion and relocation. The following roadways and intersections are included in the study area for the proposed sites:

Study Area Roadways

- Cabot Street (Route 1A) from County Way/Dodge Street to Balch Street
- Balch Street from McKay Street to Cabot Street

Study Area Intersections

- Cabot Street at County Way/Longmeadow Road/Dodge Street – Signalized
- Cabot Street at Russell Street – Unsignalized
- Cabot Street at Kittredge Street - Unsignalized
- Cabot Street at Balch Street - Signalized
- McKay Street at Balch Street - Unsignalized

Cabot Street and County Way/Dodge Street/Longmeadow Road
The intersection of Cabot Street (Route 1A/Route 97) with County Way, Dodge Street (Route 1A), Longmeadow Road and Scott Street forms a six-legged signalized intersection located to the north of the existing Memorial Building. Scott Street is a one-way road that departs from the intersection to the west. Volumes for access to this street are included in the right-turn movements from Cabot Street southbound and Dodge Street (Route 1A) westbound. Therefore, from an analysis perspective, the intersection operates as a five-legged intersection. Cabot Street runs in a north/south direction and County Way/Dodge Street accounts for the primary east/west movement. Longmeadow Road serves a residential neighborhood east of the intersection. The northbound approach, on Cabot Street (Route 1A), consists of a 12-foot southbound lane, a 12-foot northbound left/through lane and a 12-foot northbound right-turn lane. There is a 5-foot shoulder adjacent to the southbound lane and a 1-foot offset adjacent to the northbound right-turn lane. The southbound approach on Cabot Street (Route 97) consists of a 15-foot northbound lane, an 11-foot southbound left/through lane and an 11-foot southbound right-turn lane. There is a 2-foot offset adjacent to the southbound right-turn lane and a 1-foot offset adjacent to the northbound lane. The eastbound approach, on County Way, consists of a 13-foot westbound lane, an 11-foot eastbound left-turn lane and an 11-foot eastbound left/right-turn lane. There are 1-foot offsets adjacent to the westbound lane and the eastbound left/right-turn lane. The westbound approach on Dodge Street (Route 1A) consists of a 20-foot eastbound lane and a 12-foot westbound lane that splits into a through lane and a channelized right-turn lane. There is a 1-foot offset adjacent to the eastbound lane and a 6-foot shoulder adjacent to the westbound lane, prior to the split. Scott Street and Longmeadow Road are each 24 feet wide with no striping.

There are sidewalks present on both sides of each of the roadways with the exception of Scott Street, which has sidewalk on the north side only. The posted speed limits near this intersection are 25 miles per hour on County Way, 30 miles per hour on Dodge Street (Route 1A), 30 miles per hour on Cabot Street (Route 97) and 35 miles per hour on Cabot Street (Route 1A). There were no speed limits posted on Scott Street or Longmeadow Road. Cabot Street (Route 1A) and Dodge Street (Route 1A) are classified as urban principal arterials. This route is under MassDOT jurisdiction and is part of the National Highway System (NHS). Cabot Street (Route 97) and County Way are classified as urban minor arterials while Scott Street and Longmeadow Road are classified as local roads. These four legs are under City jurisdiction and are not part of the NHS.

Looking Northbound at Intersection

Looking Westbound at Intersection

Cabot Street and Russell Street

One of two intersections identified by the City as a means of cut-through traffic between Cabot Street (Route 1A) and the recently reconstructed high school, the intersection of Cabot Street with Russell Street forms a three-legged unsignalized intersection. Cabot Street runs north-south and is uncontrolled while Russell Street approaches from the east and is stop controlled. Although Russell Street is two-way at the approach to the intersection, it becomes one-way westbound as it approaches the high school to the east. The intersection is spread across a railroad track which runs north-south and is operated by the MBTA. Both the northbound and southbound approaches along Cabot Street are 36 feet wide. This is striped as a 12-foot lane and 6-foot shoulder in each direction on the southbound approach, but only a centerline stripe is present on the northbound approach. The westbound approach on Russell Street is comprised of a 16-foot lane in each direction. There are sidewalks present on either side of Cabot Street and a sidewalk running along the north side of Russell Street. The posted speed limit on Cabot Street is 25 miles per hour and the posted speed limit on Russell Street is 25 miles per hour. Russell Street is classified as a local road. It is under City jurisdiction and is not part of the NHS.

Cabot Street and Kittredge Street

The second intersection identified by the City as a means of cut-through traffic between Cabot Street (Route 1A) and the recently reconstructed high school, the intersection of Cabot Street with Kittredge Street forms a three-legged unsignalized intersection. This intersection is located just 200 feet south of Russell Street, with a Dairy Queen located on the east side of Cabot Street between the two roadways. Cabot Street runs north-south and is uncontrolled while Kittredge Street departs to the east. Kittredge Street is one-way eastbound for its length between Cabot Street and the high school to the east. Both the northbound and southbound approaches along Cabot Street are 36 feet wide with only a centerline stripe present. The east leg on Kittredge Street is 26 feet wide. There are sidewalks present on either side of both streets. However, the sidewalk on the north side of Kittredge Street does not extend all the way to the intersection. The posted speed limit on Cabot Street is 25 miles per hour and the posted speed limit on Kittredge Street is 25 miles per hour. Kittredge Street is classified as a local road. It is under City jurisdiction and is not part of the NHS.

Looking Southbound at Kittredge

Looking Northbound at Russell

Cabot Street and Balch Street

The intersection of Cabot Street (Route 1A) with Balch Street forms a three-legged signalized intersection located to the south of the existing Memorial Building. Cabot Street runs in a north/south direction and Balch Street runs in an east/west direction. The northbound approach, on Cabot Street, consists of a 17-foot southbound lane, an 11-foot northbound left-turn lane and a 14-foot northbound through lane. The southbound approach, on Cabot Street, has a 17-foot lane in each direction. The eastbound approach, on Balch Street, has a 15-foot lane in each direction. There are sidewalks on both sides of each of the roadways separated by a grass strip, with the exception of the east side of the northbound approach where there is no grass strip. There is a railroad crossing on Balch Street, west of the intersection. The posted speed limit on Cabot Street and Balch Street is 30 miles per hour. Cabot Street (Route 1A) is classified as an urban principal arterial. It is under MassDOT jurisdiction and is part of the NHS. Balch Street is classified as an urban collector. It is under City jurisdiction and is not part of the NHS.

Looking Southbound at Intersection

Looking Eastbound at Intersection

McKay Street and Balch Street

The intersection of McKay Street with Balch Street forms a four-legged unsignalized intersection located to the west of the existing Memorial Building. McKay Street runs in a north/south direction and Balch Street runs in an east/west direction. The McKay Street approaches to the intersection are uncontrolled. The Balch Street approach to the intersection is stop-sign controlled. The Beverly Golf and Tennis Club makes up the west leg of the intersection and is stop-sign controlled. The northbound approach, on McKay Street, has a 14.5-foot lane in each direction. There is a sidewalk abutting the west side of the roadway, while the sidewalk on the east side of the roadway is separated by a grass strip. The southbound approach, on McKay

Street, has a 15-foot lane in each direction. There are sidewalks on both sides of the roadway, each separated by a grass strip. The eastbound approach, the Beverly Golf and Tennis Club driveway, is 24 feet wide with no striping and no sidewalks. The westbound approach, on Balch Street, has a 14.5-foot lane in each direction. There are sidewalks on both sides of the roadway, each separated by a grass strip. The posted speed limit on McKay Street and Balch Street is 30 miles per hour. There is no posted speed limit for the Beverly Golf and Tennis Club driveway. McKay Street is classified as an urban minor arterial. Balch Street is classified as an urban collector. Both are under City jurisdiction and are not part of the NHS. The Beverly Golf and Tennis Club driveway is not classified as a roadway.

Looking Westbound at Intersection

Southeast Quadrant of Intersection

Signals and Signage

Existing conditions accommodate the high pedestrian volumes, particularly within the vicinity of the City's schools. The signalized intersections within the study area include push-button actuated pedestrian signals and protected or dedicated pedestrian phases. The roadways approaching the existing middle school, as well as other schools in the area, have flashing school zone speed limit signs.

In addition to the signals associated with the study area intersections, there are crossing signals and gates located to the south of the existing Memorial Building, at the intersection of Cabot Street (Route 1A) and Russell Street.

Vehicle and Pedestrian Signal Equipment at Cabot Street and Dodge Street

School Zone Speed Limit Sign Near Existing Middle School

Existing Site Observations

As part of the field review of the existing middle school and Memorial Building sites, observations were made pertaining to the operations, circulation and capacity of the existing Beverly Middle School during the morning drop-off and afternoon pick-up that may influence the development of the future site and pertaining to the layout and circulation of the existing Memorial Building mid-day.

During the morning drop-off at the Beverly Middle School the following observations were made:

- School drop-offs were performed by standard buses, special needs buses/vans and several parents.
- Parent drop-offs were scattered and did not seem to cause any substantial queueing.
- Crossing guards were present on both roadways abutting the school.
- Several students walked or biked to school.

During the afternoon pick-up at the Beverly Middle School the following observations were made:

- Buses arrived to the school prior to dismissal and queued on-site.
- The lack of on-site queueing areas for parents forced lines of parents onto adjacent and nearby streets as they awaited dismissal.
- Crossing guards were again present in the same locations as the morning.

In addition to observing the drop-off and pick-up, staff members of the school as well as the crossing guards were questioned regarding the operations, circulation and capacity. They offered the following:

- According to the school district's transportation department, approximately 45% of the students (416 of 917) take the bus. The remainder are driven, walk or bike, but no breakdown of those modes was available.
- The on-site bus storage lot currently accommodates approximately 45 buses/vans. These are a combination of the buses used for student pick-up/drop-off for the district's elementary, middle and high schools as well as spare buses, spare vans and large buses used only for sports team transfers.
- The district's pick-up/drop-off begins with the elementary school, followed by the high school and ends with the middle school.
- Although the number of students attending the middle school is expected to increase with the addition of grade 5, the district's overall fleet needs will not differ immediately.
- The number of students walking/biking to school decreases slightly during inclement weather, but remains relatively high year round.

In the mid-day at the Memorial Building the following were observed:

- The area in front of the building is divided into two drive aisles, one along the building face with a few handicap parking spaces and one closer to the street with approximately 60 parking spaces.
- Each drive aisle is approximately 350 feet in length.
- The building has two distinct driveways, both on Cabot Street. Vehicles generally access the site via the northern driveway and exit the site via the southern driveway, with a small number of official use vehicles exiting via the northern driveway.
- There is a notable frequency of illegal u-turns on Cabot Street adjacent to the flexible bollards near the railroad track.

Existing Traffic Volumes

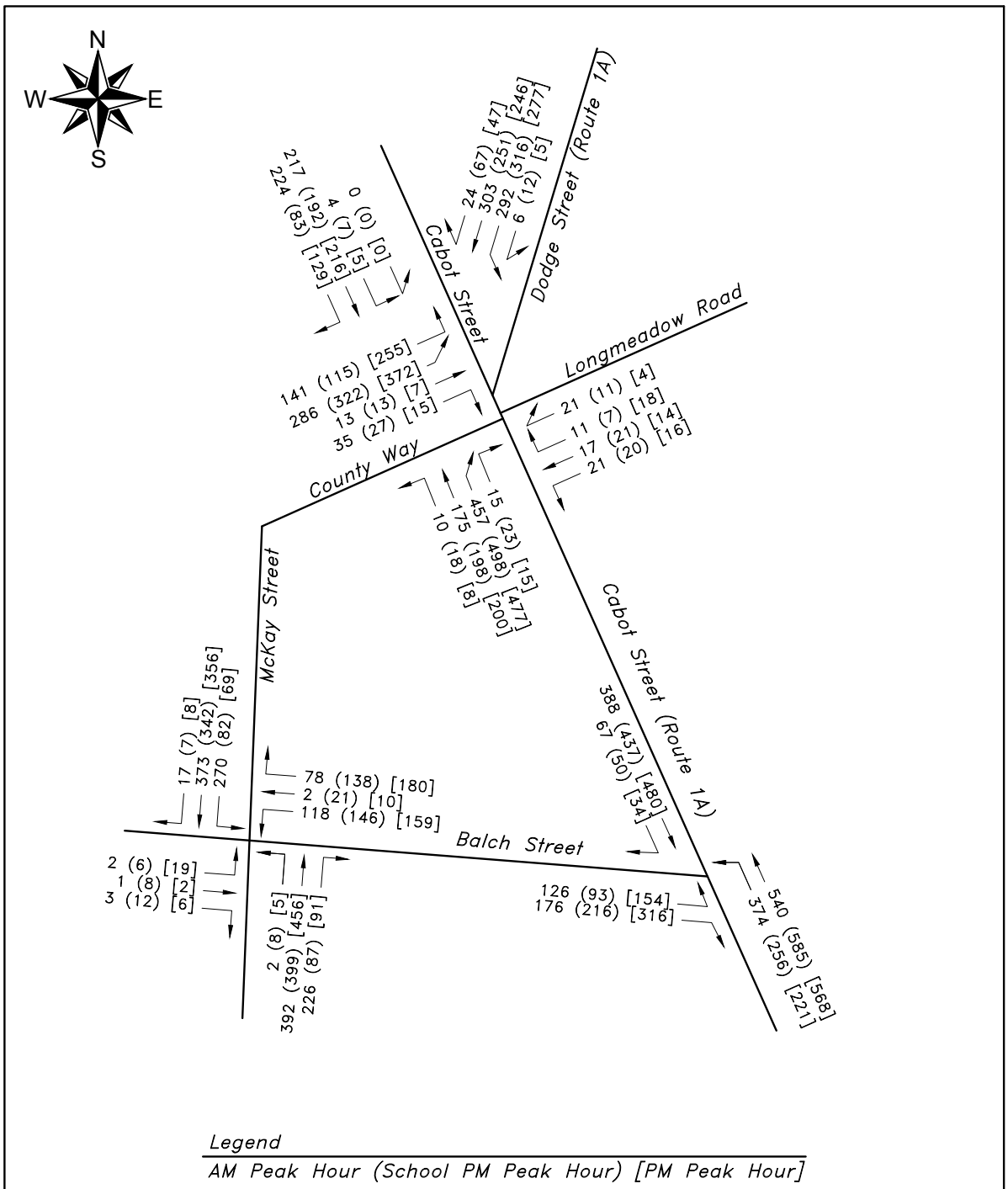
According to the traffic counts completed, the a.m. peak hour was generally 7:30 a.m. to 8:30 a.m., the p.m. school peak hour was 3:00 p.m. to 4:00 p.m. and the p.m. commuter peak hour was generally from 4:30 p.m. to 5:30 p.m. To provide a conservative analysis, the peak hour at each intersection was used in the analysis of the a.m. and p.m. commuter peak hours and the school dismissal was standardized across all intersections to the defined peak.

ATR counts collected on Cabot Street in the vicinity of the proposed site were used in the analysis to determine directional percentages for trip distribution and volume distribution by percent throughout the day.

All counts were completed mid-week of a standard, non-holiday week during the school year. Therefore, no adjustment factors were applied to the existing count data.

Count data showed the highest volumes for all intersections typically occurred during the p.m. commuter peak hour.

Existing traffic volumes are shown in Figures 3 and 4.



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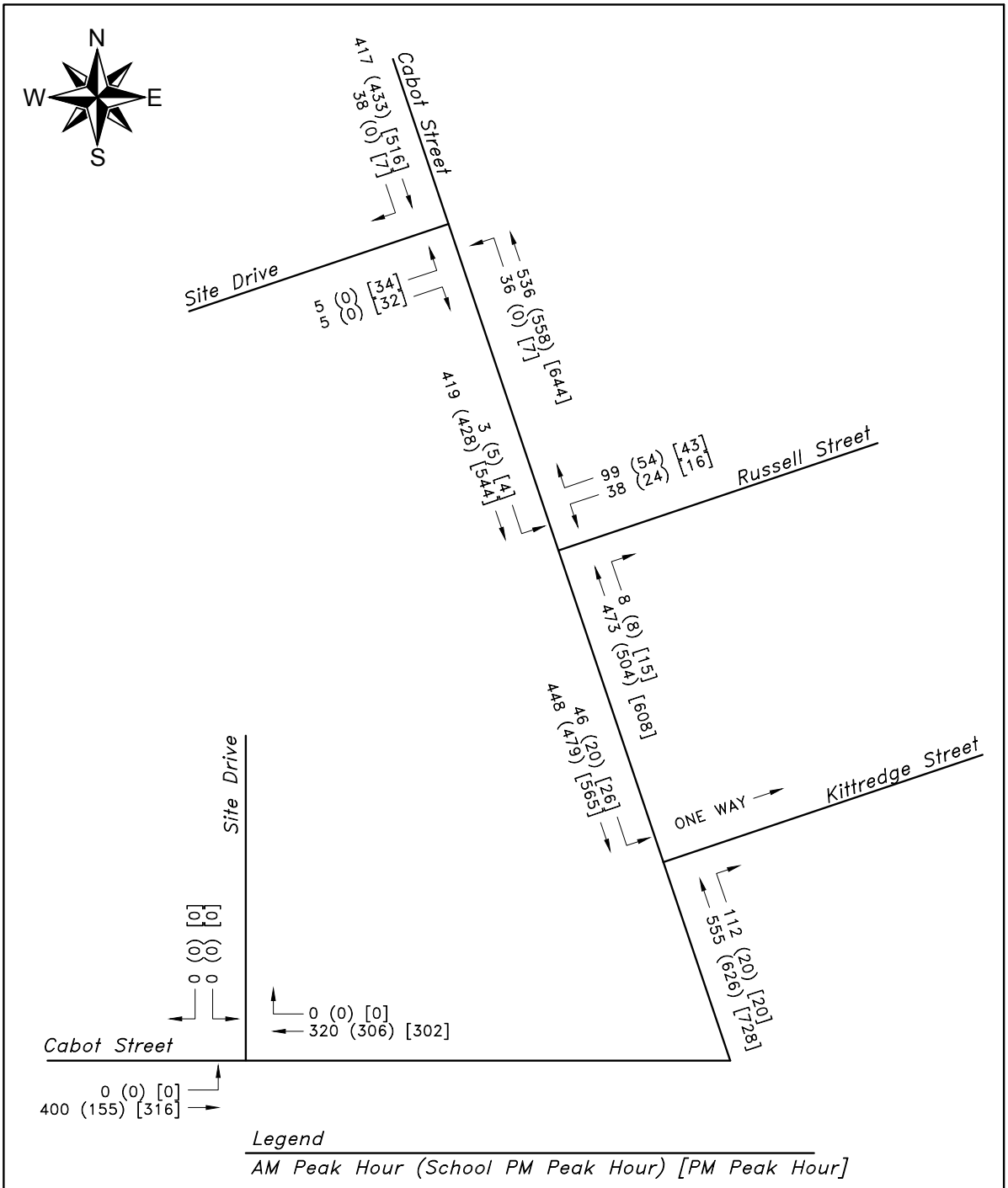
PROJECT NO. 14225.02 DATE: JULY 2015

Figure 3
Beverly Middle School
Existing Traffic Volumes - Major Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS



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PROJECT NO. 14225.02 DATE: JULY 2015

Figure 4
Beverly Middle School
Existing Traffic Volumes - Minor Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS

Safety Analysis

Crash Data
Crash data was received from MassDOT and the City of Beverly Police Department for January 2010 through December 2013 for the intersections and roadways in the vicinity of the proposed sites. Crash data was reviewed to determine the presence of safety concerns within the study area. A summary table of all crash data reviewed and crash rate calculations are provided in Appendix B.

According to the data received, there were 86 incidents on roadways within the study area that were not specifically at one of the study area intersections. There were 81 incidents on Cabot Street and five (5) incidents on Balch Street. Of these incidents, 27 resulted in non-fatal injuries, with a total of 37 injured persons, and none resulted in fatal injuries. Four (4) of the incidents on Cabot Street involved a pedestrian. A breakdown of the number of injuries and type of incident can be seen below.

Of the incidents involving pedestrians, one had no further explanation; one was an errant vehicle striking a gas pump and its attendant on the east side of Cabot Street; one was a drunk and disorderly individual struck by a homeowner who was backing out of a driveway; and the last was a seven-year-old who was admittedly not paying attention and ran into the side of a vehicle while trying to run across a side street. These incidents are all isolated and do not have any relation or trend.

Table 1: Crash Summary for Study Area Roadways

Roadway	Non-Fatal Injuries	Fatal Injuries	Angle	Head-On	Object	Other	Rear-End	Side-Swipe
Cabot Street	35	0	22	3	15	0	31	10
Balch Street	2	0	1	0	1	0	1	2

According to the data received, there were 52 incidents within the study area that were specifically at one of the study area intersections. There were 32 incidents at the intersection of Cabot Street and County Way/Dodge Street /Longmeadow Road (Cabot/Dodge), one (1) incident at the intersection of Cabot Street and Russell Street, 12 incidents at the intersection of Cabot Street and Balch Street and seven (7) incidents at the intersection of McKay Street and Balch Street. Of these incidents, 11 resulted in non-fatal injuries, with a total of 12 injured persons, and none resulted in fatal injuries. None of the incidents involved a pedestrian. There were no incidents specifically reported at the intersection of Cabot Street with Kittredge Street or at the existing Memorial Building site driveways. A breakdown of the number of injuries and type of incident can be seen below.

Table 2: Crash Summary for Study Area Intersections

Intersection	Non-Fatal Injuries	Fatal Injuries	Angle	Head-On	Object	Other	Rear-End	Side-Swipe
Cabot/Dodge	6	0	13	1	5	0	11	2
Cabot/Russell	0	0	0	0	1	0	0	0
Cabot/Balch	5	0	5	0	1	1	5	0
McKay/Balch	1	0	4	0	1	0	2	0

The frequency of incidents at the study area intersections were compared to the state and district averages. The crash rates, portrayed as crashes per million entering vehicles, can be seen in Table 3. The frequency of incidents at the intersection of Cabot Street and County Way/Dodge Street/Longmeadow Road (Cabot/Dodge) was lower than the state average and just over the district average. The frequency of incidents at the intersections of Cabot Street with Russell Street, Cabot Street with Balch Street and McKay Street with Balch Street were well below both the state and district averages. As noted previously, there were no incidents within the study time period at the intersection of Cabot Street with Kittredge Street or at the site driveways.

Table 3: Crash Rate Averages for Intersections

	Signalized Crash Rate	Unsignalized Crash Rate
Statewide	0.80	0.60
District 4	0.77	0.58
Cabot/Dodge	0.79	-
Cabot/Russell	-	0.05
Cabot/Balch	0.40	-
McKay/Balch	-	0.30

Using MassDOT's interactive map for top crash locations, the study area was also reviewed for the presence of HSIP clusters. The intersection of Cabot Street with County Way/Dodge Street/Longmeadow Road was identified as a vehicular cluster location for the most recent three (3) years available.

Speed Study

A spot speed study was performed on Cabot Street in the vicinity of the existing site driveways to determine the average and 85th percentile speeds. The data collected is summarized below while the complete study can be found in Appendix C.

Table 4: Speed Data Results

	Posted Speed Limit	Average Speed	True Median (50th Percentile)	85th Percentile	10 MPH Pace	% over 30 MPH
Cabot Street (Route 1A)						
Northbound	35	31	31	34	27-36	6
Southbound	35	34	33	37	29-38	23

Sight Distance

In the vicinity of the existing Memorial Building, the posted speed limit is 25 miles per hour south of the building and 35 miles per hour north of the building. A speed study was conducted just north of the site. The 85th percentile speed for Cabot Street was found to be 35 miles per hour overall, with 85th percentile speeds of 34 miles per hour and 37 miles per hour in the northbound and southbound directions respectively. Based on this data, the recommended design speed for Cabot Street is 40 miles per hour and the recommended design speed for Balch Street is 35 miles per hour. According to the American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy on the Geometric Design of Highways and Streets, Sixth Edition 2011,* the minimum safe stopping sight distances (SSD) for the posted and design speeds can be seen below.

Table 5: Minimum Stopping Sight Distance (SSD)

Speed (mph)	SSD (ft)
25	155
30	200
35	250
40	305

The stopping sight distances were observed from the proposed driveways of the future site. Along Cabot Street, the northern driveway will remain in its current location and the southern driveway will shift approximately 40 feet to the north. Along Balch Street, the proposed driveway will be located approximately 500 feet west of Blaine Avenue.

At the existing Memorial Building, there is clear visibility along Cabot Street to the pedestrian crossing/Roosevelt Avenue to the north and the near/far bollards to the south from the northern and southern driveways respectively. These limits are 600 feet to the north and 600 feet to the south of the northern site driveway and 600 feet to the north and 400 feet to the south of the proposed southern site driveway.

Along Balch Street, sight distance to the east is limited by a vertical curve located at Blaine Avenue, approximately 500 feet east of the proposed driveway. Given the straight horizontal alignment of Balch Street, there is clear sight distance for over 1,500 feet to the west to the intersection of McKay Street and Balch Street.

For both sites, the stopping sight distance available from each existing driveway exceeds the minimum required for both the posted and design speeds.

Future Conditions

To account for background growth along the roadways within the vicinity of the project site, the existing traffic volumes were projected over a five-year horizon from 2014 to 2019. Recent Census data for the City of Beverly were reviewed and the City of Beverly Planning Department was consulted to determine the appropriate growth rate. The available Census data, provided as Appendix D, showed a growth rate of -0.9% from 2000 to 2010. To provide a conservative analysis of the project area, a growth rate of 0.5% per year was used for the five-year projection. This rate was recommended by the Beverly Planning Department.

The future 2019 no-build condition represents the existing conditions, inflated by the recommended growth rate. Traffic projections for the proposed residential properties to be located in the southeast quadrant of the intersection of McKay Street and Balch Street were computed. The generated volumes were negligible and were not added to the 2019 no-build volumes. Additionally, the traffic impact analysis study for the proposed condos to be located in the northeast quadrant of the intersection of McKay Street and Elliott Street (Route 62) was reviewed and also showed negligible volumes, if any, entering the study area. Therefore this development was not included in the 2019 no-build condition. It is reasonable to assume that these minor volumes generated by the two proposed developments are already captured in the annual growth projection. Traffic volumes for the future 2019 no-build condition are shown in Figures 5 and 6.

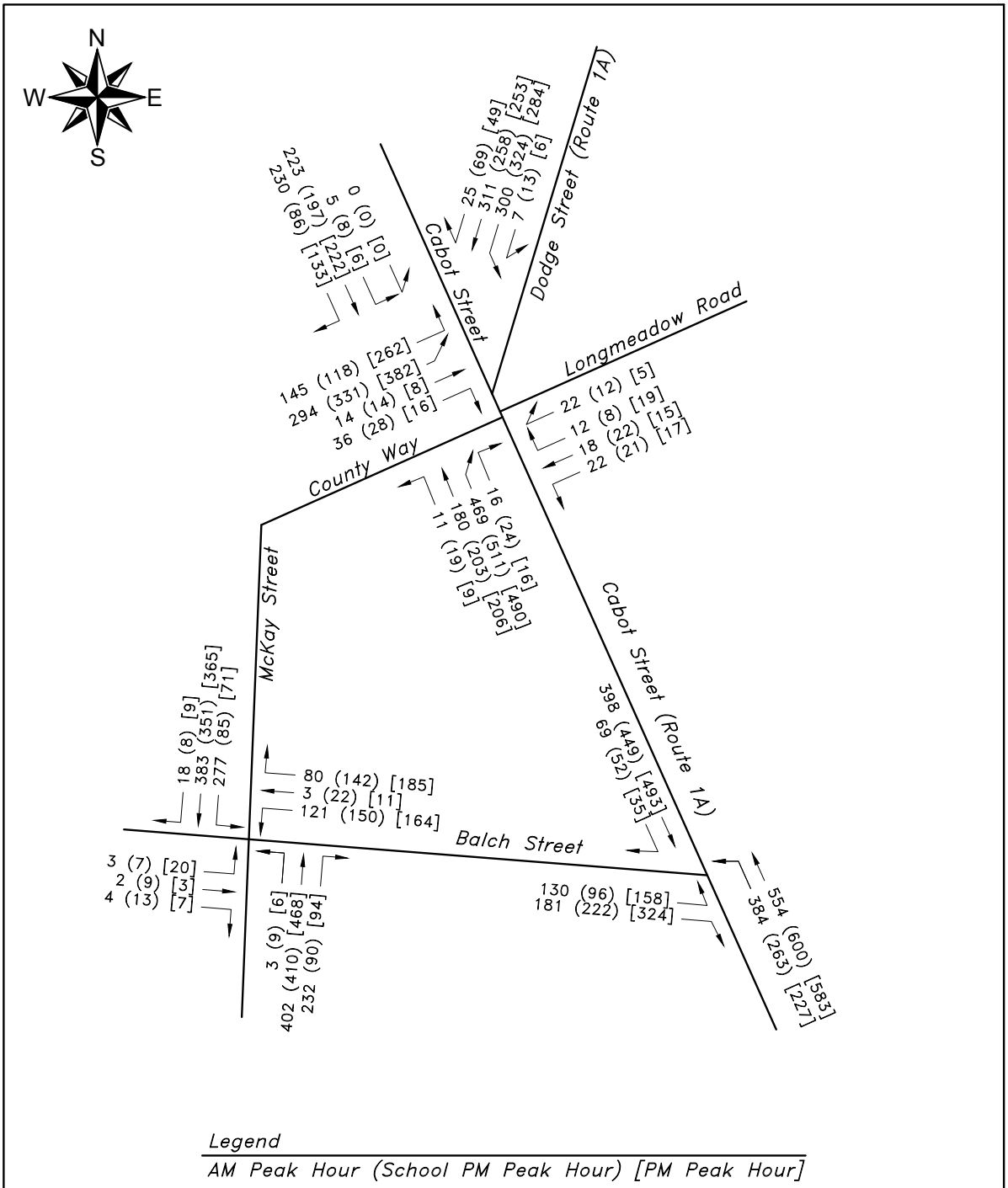

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Figure 5
Beverly Middle School
No-Build Traffic Volumes - Major Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS

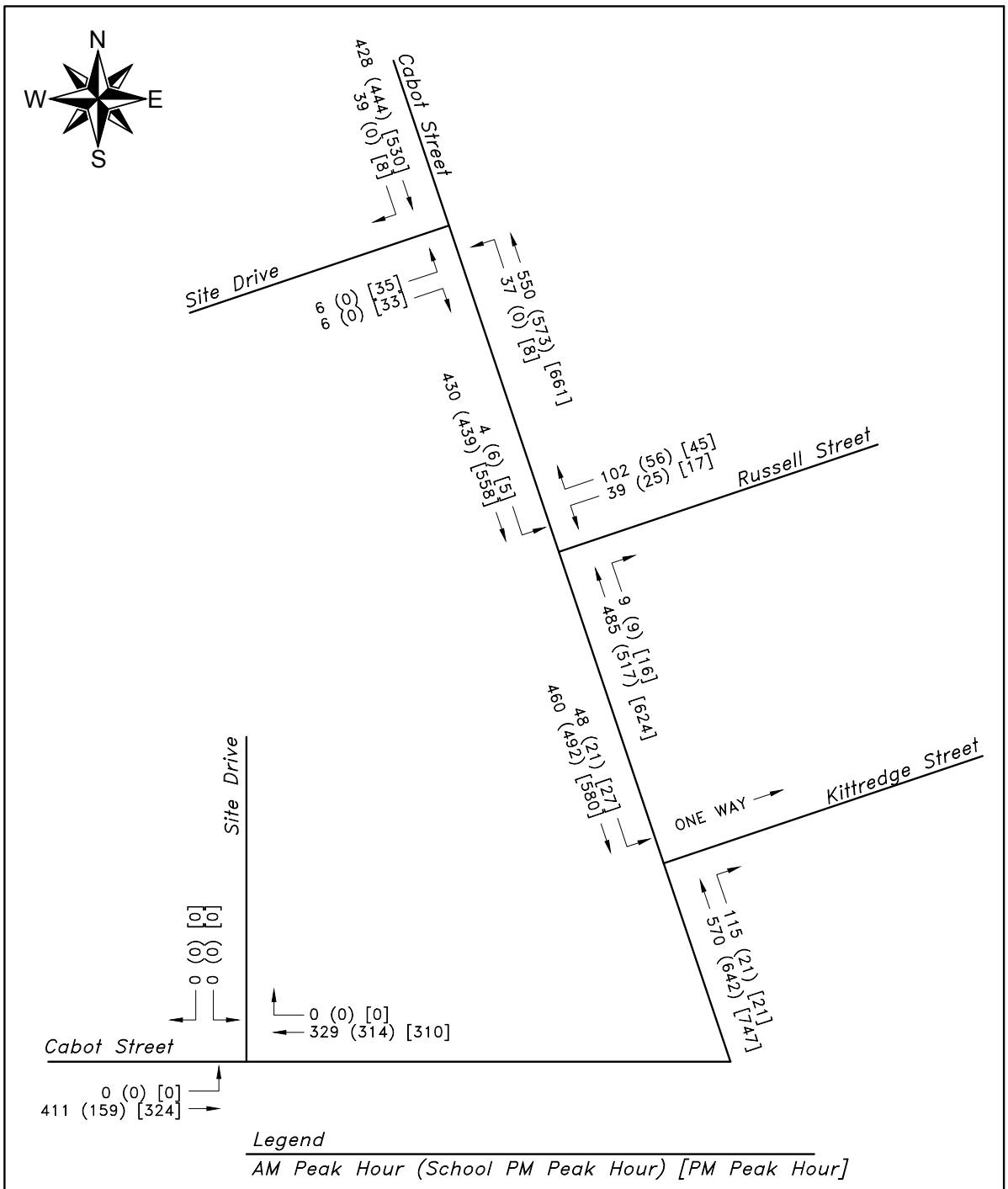

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Figure 6
Beverly Middle School
No-Build Traffic Volumes - Minor Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS

Build Conditions

The future 2019 build condition represents the future 2019 no-build condition plus traffic increases associated with the proposed expansion and relocation of the middle school.

Site Description
The proposed layout will maintain the loop currently located at the front of the building, with two driveways along Cabot Street. An additional driveway will be added on Balch Street to help circulation and distribution of traffic. It is intended that both buses and parents will be able to enter and exit to and from both Cabot Street and Balch Street. Two drop-off areas are provided on-site, one along the eastern side of the building, intended for bus drop-offs, and one along the southeastern side of the building, intended for parent drop-offs. The parking lot in the northwestern corner of the site is for the City's relocated school bus storage facility. Though designation has not been specified for the other parking areas, they are sufficient to accommodate the anticipated needs of a large event at either the auditorium or sports fields.

The excess of on-site parking spaces in conjunction with the drive aisle length will be adequate to accommodate queueing associated with student pick-up, particularly given the high turnover rate of the pick-up procedure. The proposed site will contain 271 parking spaces; 146 spaces will be for staff and day-to-day visitors and an additional 125 spaces will be provided for events. These additional spaces will be available on a daily basis for parents waiting to pick up their children. The drive aisle in its entirety, measured from the southern driveway on Cabot Street around the building to the northern driveway on Cabot Street, is approximately 2,000 feet. This length could accommodate up to 80 vehicles.

Trip Generation
The number of new trips expected at the proposed site was estimated using a combination of data obtained from the school's transportation department and the industry standard Institute of Transportation Engineers (ITE) *Trip Generation, 9th Edition*.

The Beverly Middle School currently accommodates 917 students in grades six (6) through eight (8) and has a teaching staff of 80 personnel. Of that total, 416 students, approximately 45 percent, utilize the school's transportation, which consists of 16 buses and seven (7) handicap accessible vans. The remaining 501 students are a combination of walkers, bikers and pick-up/drop-off. The school's transportation department did not have any information pertaining to the distribution between these three (3) modes. A percentage of walkers/bikers was assumed to be 15 percent on a typical school day based on observations at the school and discussions with the crossing guards. A common carpool factor of 1.5 students per car was also applied.

Trip generation calculations for the existing Memorial Building were completed utilizing Land Use Code 710, General Office Building. Because the busiest times for such use are the weekday morning and afternoon commuter peak hours, trip generation was completed for the a.m. peak and p.m. commuter peak hour.

The proposed school is intended to accommodate grades five (5) through (8), with a capacity of 1,400 students and a teaching staff of 110 personnel. It was assumed that the proposed site will have the same distribution percentages of students taking the bus, walking and carpooling as the existing school.

Table 6: Trip Generation Summary

		AM Peak Hour	PM School Peak Hour	PM Commuter Peak Hour
Existing Memorial Building	Entering	74	-	14
	Exiting	10	-	66
	Total	*84*	-	*80*
Proposed Middle School	Entering	515	370	-
	Exiting	370	515	-
	Total	*885*	*885*	-

Complete trip generation calculations are provided in Appendix E.

Trip Distribution
Trip distribution was completed for the proposed middle school by adding the proposed traffic volumes into the existing traffic stream based on ATR and MTMC count data collected for the roadways and intersections in the vicinity of each site. Trip distribution calculations resulted in the following:

- 2/3 of all traffic will enter and exit on Cabot Street
- 1/3 of all traffic will enter and exit on Balch Street
- 51.5% of the Cabot Street traffic would travel to and from the north
- 48.5% of the Cabot Street traffic would travel to and from the south
- 2/3 of the Balch Street traffic would travel to and from the west
- 1/3 of the Balch Street traffic would travel to and from the east

Though the existing traffic volumes on Balch Street differ from the 2:1 ratio noted, this distribution percent was made to minimize duplication or backtracking of movements between Balch Street and Cabot Street. Complete trip distribution calculations are provided in Appendix E. The site generated traffic volumes are shown in Figures 7 and 8.

The future 2019 build traffic volumes are shown in Figures 9 and 10.

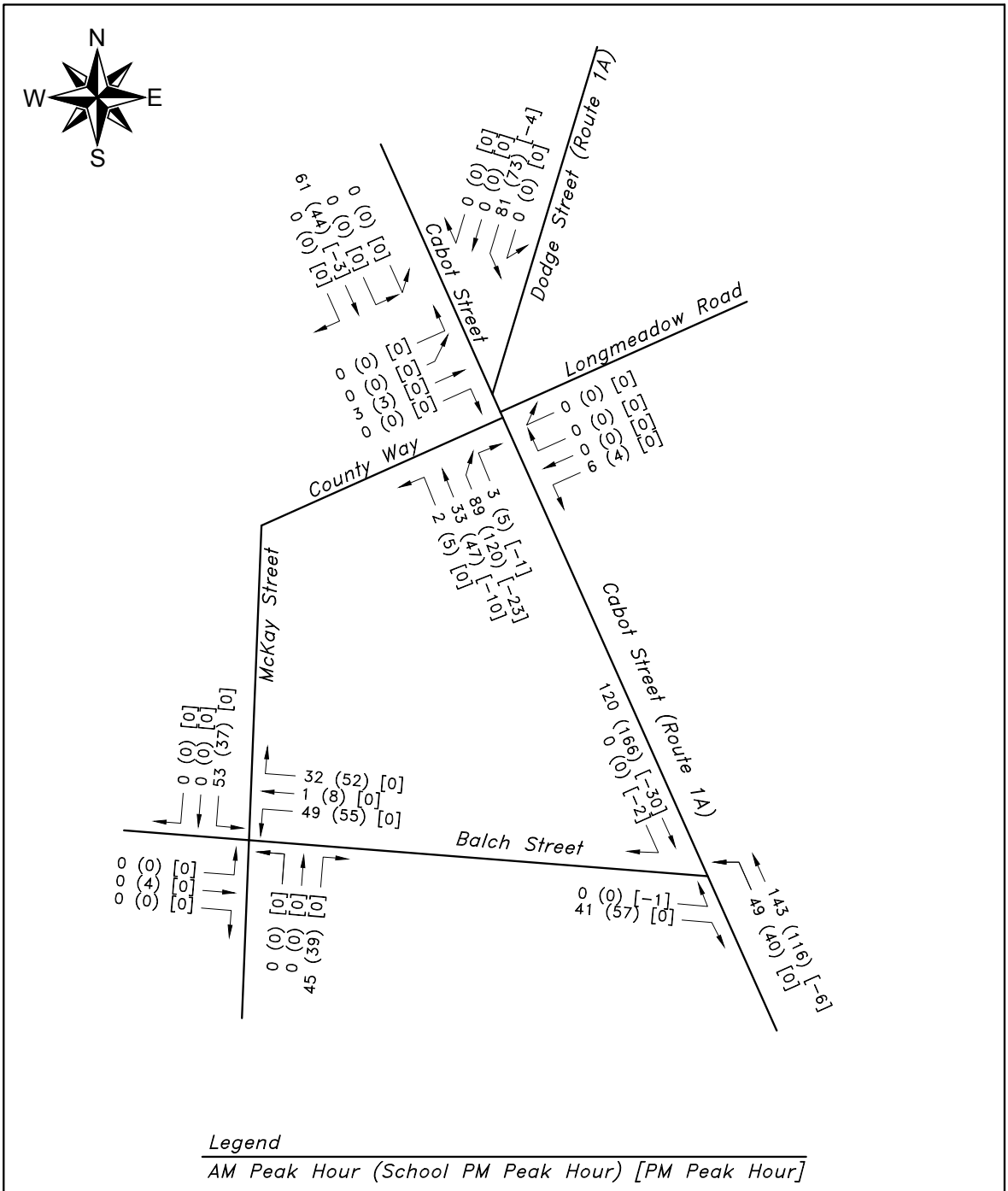

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Figure 7
Beverly Middle School
Site Generated Traffic Volumes - Major Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS

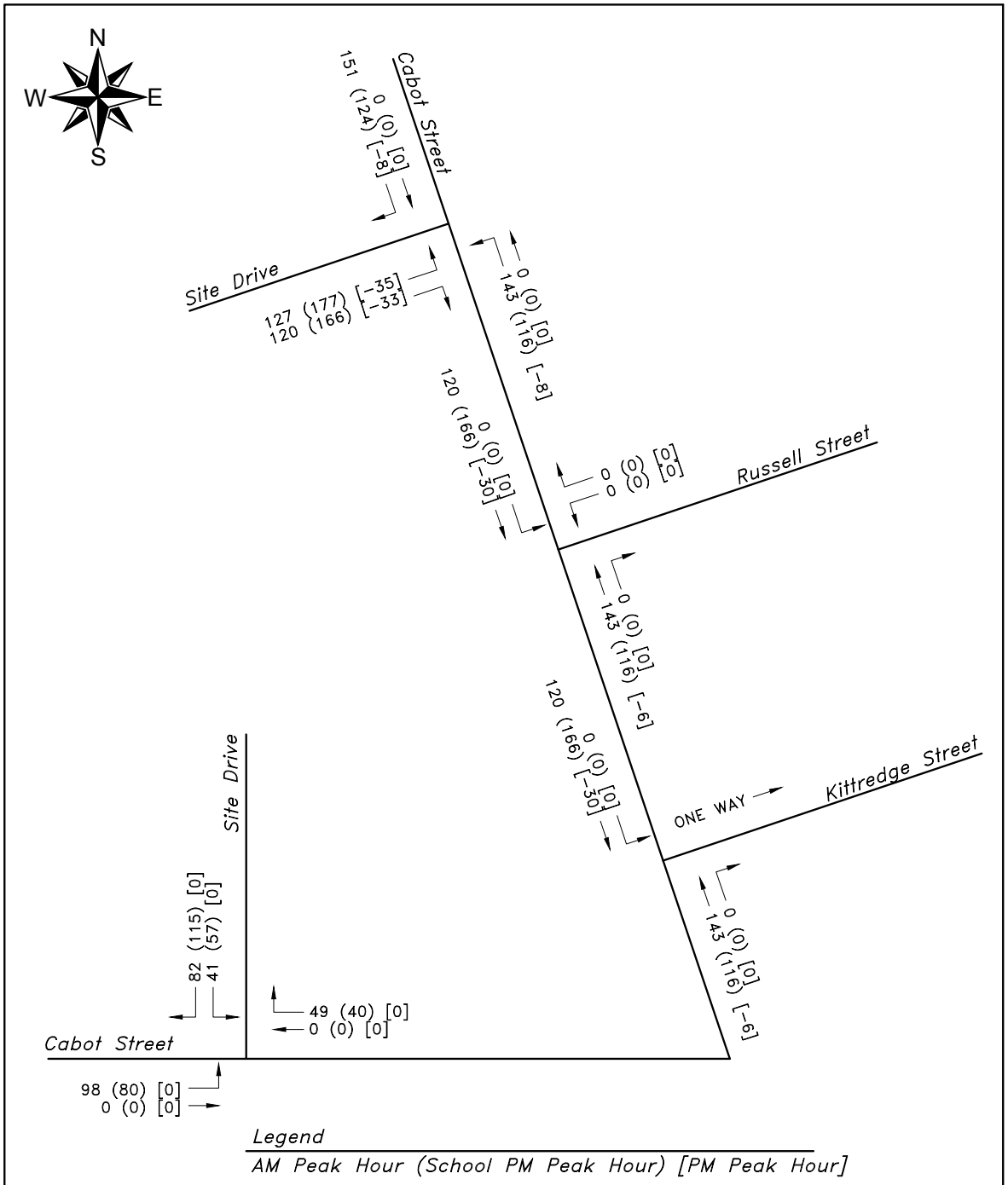

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Figure 8
Beverly Middle School
Site Generated Traffic Volumes - Minor Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS

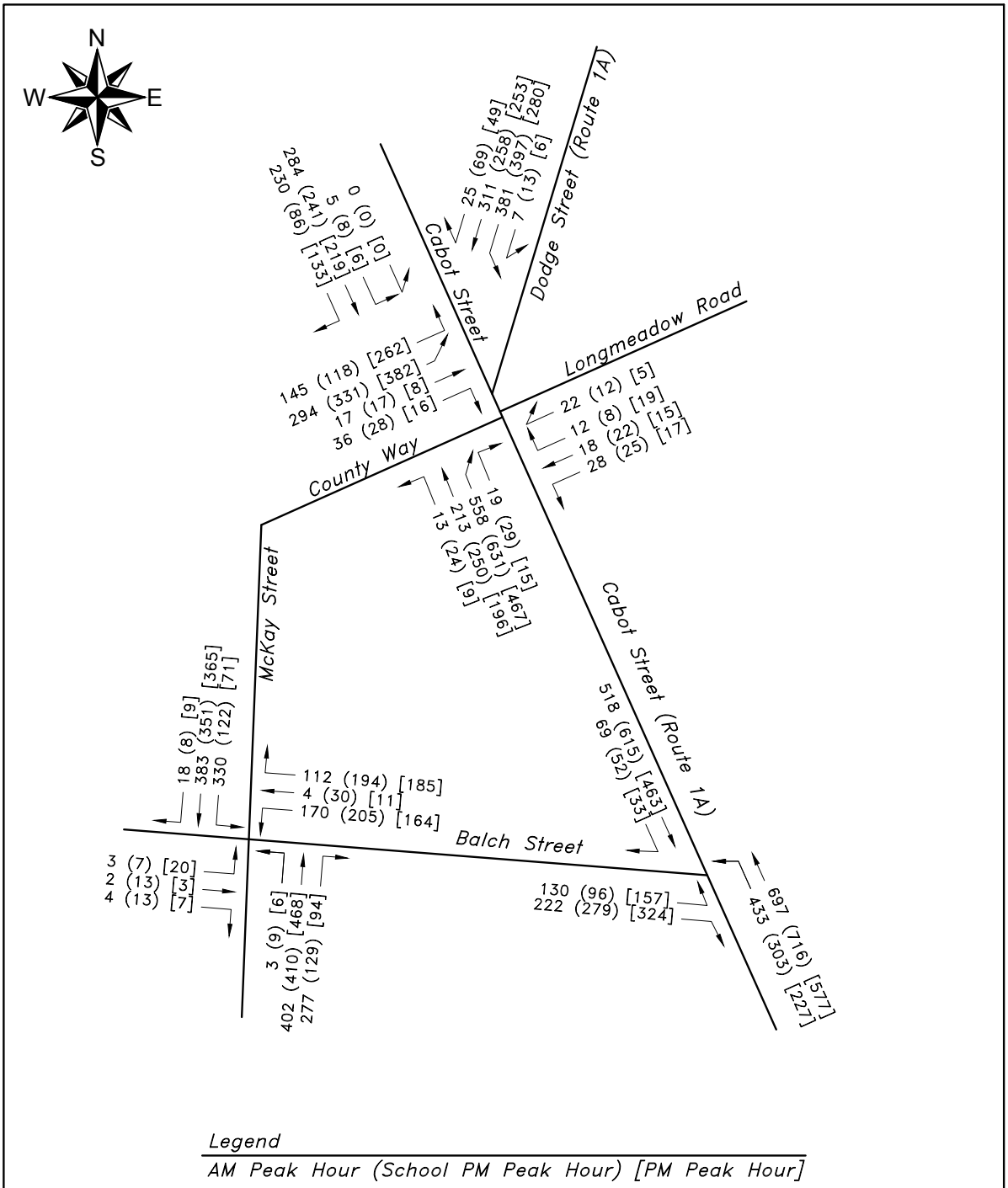

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Figure 9
Beverly Middle School
Build Traffic Volumes - Major Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS

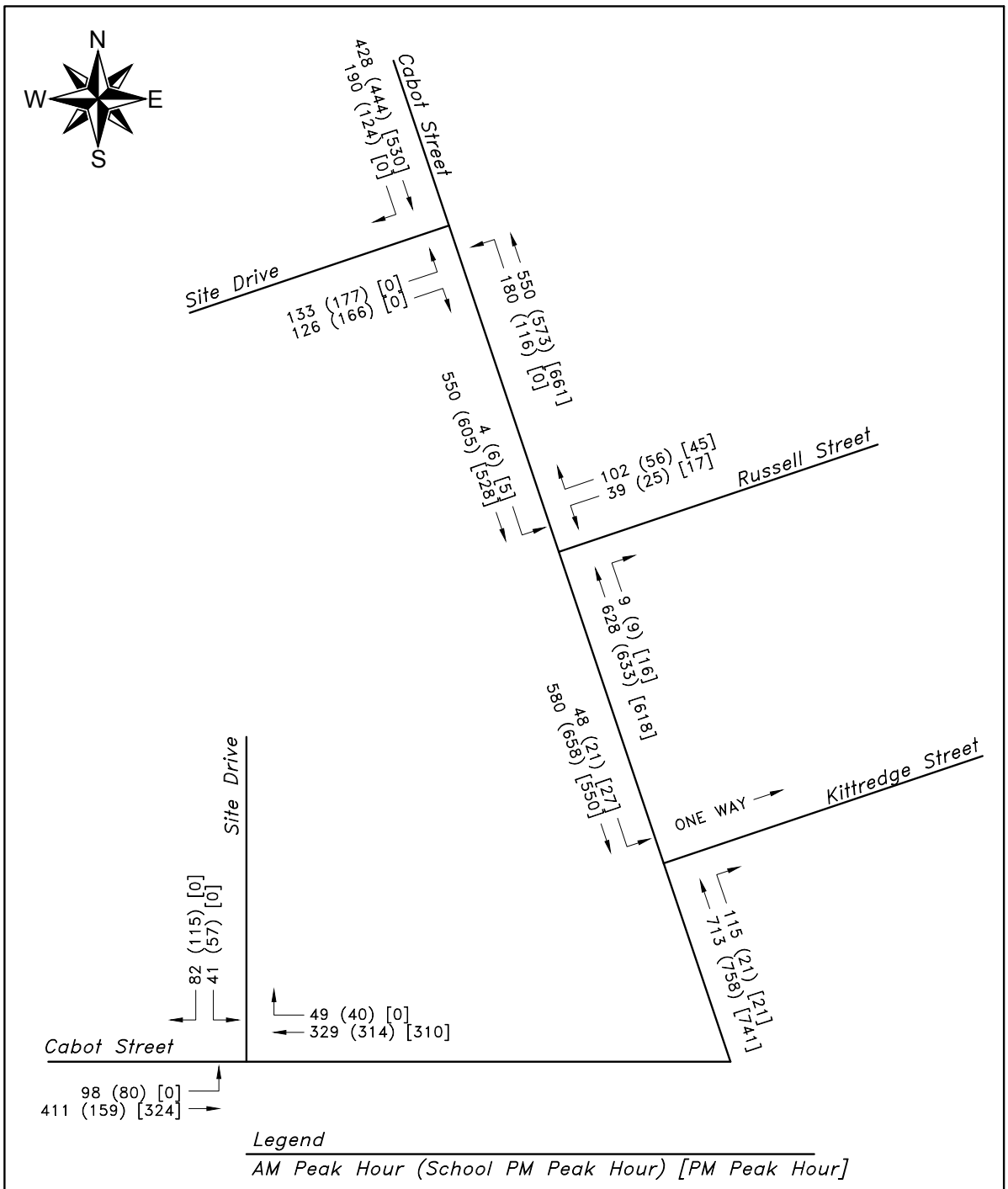

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Figure 10
Beverly Middle School
Build Traffic Volumes - Minor Intersections
Weekday AM, School, & PM Peak
BEVERLY, MASSACHUSETTS

Capacity Analysis – Existing, Future No-Build, and Future Build Conditions

Capacity analysis was completed for all study intersections for existing, future 2019 no-build, and future 2019 build conditions during each the a.m., p.m. school and p.m. commuter peak periods. Capacity analysis characterizes intersections based on their level of service (LOS). LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of service measures such as speed, travel times, traffic interruptions, etc. Six LOS are defined for signalized and unsignalized intersections, from A to F, with A representing the best operating conditions and F representing the worst operating conditions. The LOS criteria for signalized and unsignalized intersections are provided in Table 7 below. Tables 8 through 13 provide the capacity analysis results for all intersections. The complete traffic capacity analysis is provided in Appendix F.

Table 7: LOS Criteria for Intersections

	Signalized Intersection	**Unsignalized Intersection**
LOS	Delay Time (sec/veh)	Delay Time (sec/veh)
A	≤ 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

Cabot Street and County Way/Dodge Street/Longmeadow Road
The signalized intersection of Cabot Street (Route 1A) with County Way/Dodge Street (Route 1A)/Longmeadow Road currently operates at LOS F with over 150 seconds of delay per vehicle. Under future build conditions, no change in LOS is expected, with slight increases in delay for the future no-build and delays for the future build to exceed 200 seconds per vehicle.

Cabot Street and Balch Street
The signalized intersection of Cabot Street (Route 1A) with Balch Street currently operates at LOS C with less than 28 seconds of delay per vehicle. Under future build conditions, the LOS is expected to drop from C to E during the a.m. peak hour and from B to C during the p.m. school peak hour, with increases in delay around 10 seconds per vehicle in the p.m. school peak and nearing 40 seconds per vehicle in the a.m. peak.

McKay Street and Balch Street
The unsignalized intersection of McKay Street with Balch Street currently operates at primarily LOS A in the northbound and southbound directions and primarily LOS F in the eastbound and westbound directions. Under future build conditions, no change in LOS is expected but delays and queues could worsen. Increases in both are shown in the modeling, but Synchro tends to exaggerate deterioration of intersections operating over capacity.

Cabot Street and Russell Street
The unsignalized intersection of Cabot Street and Russell Street currently operates at LOS A in the northbound and southbound directions and LOS C in the westbound direction. Under future build conditions, LOS is maintained in the northbound and southbound directions and LOS for the westbound direction drops slightly with increase in delay of less than 10 seconds per vehicle in the p.m. school peak and less than 20 seconds per vehicle in the a.m. peak.

Cabot Street and Kittredge Street
The unsignalized intersection of Cabot Street and Kittredge Street currently performs at LOS A for the northbound and southbound directions. As Kittredge Street is one-way eastbound it does not have a LOS. The future build conditions will not affect the LOS along Cabot Street.

Site Driveways
The unsignalized driveways along Cabot Street currently operate at LOS A for the northbound and southbound directions and LOS C for the eastbound direction. Under the future build conditions, the eastbound LOS would be reduced to LOS E and F during the a.m. peak and p.m. school peak respectively. It should be noted that delays would not exceed 55 seconds per vehicle, which is assigned a LOS F for unsignalized intersections but would only be deemed a LOS D at a signalized intersection.

The unsignalized driveway along Balch Street does not exist under current conditions. Under the future build conditions, this driveway will operate at LOS C with delays of less than 20 seconds per vehicle.

Overall, the expansion and relocation of the Beverly Middle School is expected to have minimal impact on intersections that operate well today, but would negatively impact the intersections that are already over capacity. Additionally, it should be noted that the impacts associated with the build condition are a conservative assessment. Due to lack of origin-destination data that would be needed to determine the percentage, no volume deductions were made to account for trips already in the roadway network.

Table 8: A.M. Peak Hour LOS Table

		Weekday AM Peak Hour (7:30 – 8:30)					
		Existing 2014		Future (2019) No-Build		Future (2019) Build	
		LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)	LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)	LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)
Cabot Street (Route 1A) & Dodge Street (Route 1A)/County Way/Longmeadow Road							
Northbound	Left-Thru	F (112.7)	161	F (139.8)	415	F (>200)	572
	Right	C (21.7)	196	C (22.2)	501	C (27.7)	717
	Approach	D (47.3)		E (55.4)		F (169.0)	
Southbound	Left-Thru	E (76.4)	405	F (84.1)	434	F (116.5)	556
	Right	B (11.2)	83	B (11.2)	84	B (13.8)	102
	Approach	D (43.5)		D (47.5)		E (70.6)	
Eastbound	Left	F (>200)	410	F (>200)	422	F (>200)	422
	Thru-Right	F (145.9)	646	F (156.8)	668	F (160.8)	359
	Approach	F (>200)		F (>200)		F (>200)	
Westbound	Left-Thru	F (>200)	1154	F (>200)	1197	F (>200)	1398
	Right	A (0.1)	0	A (.01)	0	A (0.1)	0
	Approach	F (>200)		F (>200)		F (>200)	
South-West	Approach	B (10.2)	20	B (11.1)	24	B (13.1)	13.1
Intersection		F (163.3)		F (176.2)		F (>200)	
Cabot Street (Route 1A) & Balch Street							
Northbound	Left	D (37.1)	193	D (48.4)	286	F (180)	504
	Thru	B (11.9)	239	B (12.2)	241	B (13.7)	323
	Approach	C (22.2)		C (27.0)		E (77.4)	
Southbound	Approach	C (27.1)	334	C (28.6)	341	C (38.3)	462
Eastbound	Approach	D (42.2)	255	D (42.7)	286	E (60.7)	362
Intersection		C (27.6)		C (30.6)		E (63.3)	
McKay Street & Balch Street							
Northbound	Approach	N/C	-	N/C	-	N/C	-
Southbound	Approach	A (4.8)	32	A (4.9)	34	B(13.4)	48
Eastbound	Approach	F (59.5)	6	F (81)	14	F(166.7)	24
Westbound	Approach	F (>200)	460	F (>200)	498	F(>200)	788
Cabot Street & Russell Street							
Northbound	Approach	N/C	-	N/C	-	N/C	-
Southbound	Approach	A(0.1)	0	A(0.1)	0	A(0.1)	0
Westbound	Approach	C(22)	46	C(23.5)	52	E(42.0)	88
Cabot Street & Kittredge Street							
Northbound	Approach	N/C	-	N/C	-	N/C	-
Southbound	Approach	A(0.9)	4	A(0.9)	4	A(0.8)	4
Westbound	Approach	N/A	-	N/A	-	N/A	-
Cabot Street & Site Driveway							
Northbound	Approach	A(0.5)	2	A(0.5)	2	A(1.3)	6
Southbound	Approach	N/C	-	N/C	-	N/C	-
Eastbound	Approach	C(16.8)	2	C(17.4)	2	E(44.7)	74
Balch Street & Site Driveway							
Southbound	Approach	N/A	-	N/A	-	C(19.1)	30
Westbound	Approach	N/A	-	N/A	-	N/C	-
Eastbound	Approach	N/A	-	N/A	-	A(1.6)	6

N/C – No Conflict
~ Extensive queue expected

Table 9: P.M. School Peak Hour LOS Table

		Weekday PM School Peak Hour (2:00 – 3:00)					
		Existing 2014		Future (2019) No-Build		Future (2019) Build	
		LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)	LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)	LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)
Cabot Street (Route 1A) & Dodge Street (Route 1A)/County Way/Longmeadow Road							
Northbound	Left-Thru	F (192.0)	455	F (>200)	480	F (>200)	668
	Right	C (24.8)	499	C (25.3)	520	C (31.1)	733
	Approach	E (73.8)		F (87.8)		F (>200)	
Southbound	Left-Thru	F (108.0)	396	F (129.5)	423	F (>200)	589
	Right	B (11.4)	43	B (12.2)	47	B (12.2)	47
	Approach	E (79.4)		F (98.4)		F (>200)	
Eastbound	Left	F (670.1)	339	F (>200)	346	F (>200)	346
	Thru-Right	F (134.4)	682	F (145.4)	711	F (148.2)	717
	Approach	F (>200)		F (>200)		F (>200)	
Westbound	Left-Thru	F (>200)	1110	F (258.4)	1149	F (>200)	1330
	Right	A (2.6)	16	A (2.8)	18	A(2.8)	18
	Approach	F (>200)		F (>200)		F (>200)	
South-West	Approach	A (5.0)	9	A (5.5)	13	A (7.0)	18
Intersection		F (154.8)		F (169.7)		F (>200)	
Cabot Street (Route 1A) & Balch Street							
Northbound	Left	B (10.8)	118	B (11.8)	122	D (40.4)	181
	Thru	A (9.5)	310	B (10.0)	321	B (11.5)	334
	Approach	A (9.9)		B (10.6)		C (20.1)	
Southbound	Approach	B (18.3)	368	B (18.5)	361	C (26.0)	477
Eastbound	Approach	D (39.7)	223	D (39.9)	233	D(47.4)	497
Intersection		B (18.1)		B (18.5)		C (27.1)	
McKay Street & Balch Street							
Northbound	Approach	A (0.1)	0	A (0.1)	0	A (8.1)	0
Southbound	Approach	A (1.7)	6	A (1.7)	6	A (9.2)	1
Eastbound	Approach	C (23.4)	12	D (26.0)	16	E (39.1)	26
Westbound	Approach	F (184)	322	F (>200)	368	F (>200)	748
Cabot Street & Russell Street							
Northbound	Approach	N/C	-	N/C	-	N/C	-
Southbound	Approach	A(0.1)	0	A(0.1)	0	A(0.1)	0
Westbound	Approach	C(17.7)	20	C(18.4)	22	D(26.0)	34
Cabot Street & Kittredge Street							
Northbound	Approach	N/C	-	N/C	-	N/C	-
Southbound	Approach	A(0.4)	2	A(0.4)	2	A(0.3)	2
Westbound	Approach	N/A	-	N/A	-	N/A	-
Cabot Street & Site Driveway							
Northbound	Approach	A(0)	0	A(0)	0	A(0.8)	4
Southbound	Approach	N/C	-	N/C	-	N/C	-
Eastbound	Approach	N/A	-	N/A	-	F(53.5)	108
Balch Street & Site Driveway							
Southbound	Approach	N/A	-	N/A	-	C(15.8)	32
Westbound	Approach	N/A	-	N/A	-	N/C	-
Eastbound	Approach	N/A	-	N/A	-	A(2.8)	4

N/C – No Conflict
~ Extensive queue expected

Table 10: P.M. Commuter Peak Hour LOS Table

		Weekday PM Commuter Peak Hour (4:30 – 5:30)					
		Existing 2014		Future (2019) No-Build		Future (2019) Build	
		LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)	LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)	LOS (Delay, sec/veh)	95th Percentile Queue Length (feet)
Cabot Street (Route 1A) & Dodge Street (Route 1A)/County Way/Longmeadow Road							
Northbound	Left-Thru	F (104.8)	394	F (130.1)	424	F (115.3)	397
	Right	C (23.8)	459	C (24.2)	476	C (23.4)	445
	Approach	D (47.8)		E (55.7)		D (50.8)	
Southbound	Left-Thru	F (86.1)	400	F (101.1)	432	F (91.1)	414
	Right	B (12.2)	64	B (12.3)	64	B (12.3)	64
	Approach	E (58.8)		E (68.5)		E (61.9)	
Eastbound	Left	F (>200)	648	F (>200)	666	F (>200)	666
	Thru-Right	F (160.1)	750	F (174.7)	777	F (174.7)	777
	Approach	F (>200)		F (>200)		F (>200)	
Westbound	Left-Thru	F (185.9)	991	F (>200)	1033	F (>200)	1021
	Right	A (0.2)	0	A (0.2)	0	A (0.2)	0
	Approach	F (170.7)		F (190.8)		F (184.8)	
South-West	Approach	A (3.1)	1	A (4.1)	6	A(4.1)	6
Intersection		F (>200)		F (>200)		F (>200)	
Cabot Street (Route 1A) & Balch Street							
Northbound	Left	C (28.7)	109	C (34.8)	138	C (31.6)	119
	Thru	B (16.0)	244	B (16.2)	246	B (17.3)	259
	Approach	B (19.6)		C (21.4)		C (21.3)	
Southbound	Approach	C (32.4)	362	C (33.6)	368	C (33.7)	352
Eastbound	Approach	C (34.1)	499	D (35.6)	527	C (33.0)	504
Intersection		C (27.3)		C (28.9)		C (28.1)	
McKay Street & Balch Street							
Northbound	Approach	A (0.1)	0	A (0.1)	0	A (8.2)	0
Southbound	Approach	A (1.4)	6	A (1.4)	6	A (0.3)	6
Eastbound	Approach	F (51.1)	24	F (59.0)	32	F (59.0)	32
Westbound	Approach	F (>200)	456	F (>200)	215	F (>200)	512
Cabot Street & Russell Street							
Northbound	Approach	N/C	-	N/C	-	N/C	-
Southbound	Approach	A(0.1)	0	A(0.1)	0	A (0.1)	0
Westbound	Approach	C(19.3)	16	C(20.2)	18	C (19.7)	16
Cabot Street & Kittredge Street							
Northbound	Approach	N/C	-	N/C	-	N/C	-
Southbound	Approach	A(0.4)	2	A(0.4)	2	A(9.5)	2
Westbound	Approach	N/A	-	N/A	-	N/A	-
Cabot Street & Site Driveway							
Northbound	Approach	A(0.1)	0	A(0.1)	0	N/C	-
Southbound	Approach	N/C	-	N/C	-	N/C	-
Eastbound	Approach	C(23.3)	22	C(24.7)	24	N/A	-
Balch Street & Site Driveway							
Southbound	Approach	N/A	-	N/A	-	N/A	-
Westbound	Approach	N/A	-	N/A	-	N/C	-
Eastbound	Approach	N/A	-	N/A	-	N/C	-

N/C – No Conflict
~ Extensive queue expected

Warrants

Due to concerns expressed by the City and the Mayor, the intersections of Cabot Street with Russell Street and McKay Street with Balch Street were assessed to determine suitability for signal installation. These intersections were assessed using warrant analyses as outlined by the Manual on Uniform Traffic Control Devices (MUTCD). The warrants considered included Warrant 1, Eight-Hour Vehicular Volume, which requires at least eight (8) hour of a given day to exceed given limits; Warrant 2, Four-Hour Vehicular Volume, which requires at least four (4) hours of a given day exceed given limits; Warrant 3, Peak Hour, which requires at least one (1) peak hour exceed given limits; and warrant criteria for an all-way stop, which requires at least eight (8) hour of a given day to exceed given limits.

At the intersection of Cabot Street and Russell Street, the volumes met Warrant 1 for only one (1) hour under Condition A and only five (5) hour under Condition B; met Warrant 2 for only one (1) hour; and did not meet Warrant 3 for any interval. This intersection does not meet any of the volume based warrants under existing conditions, and will not change under proposed conditions, as volumes are expected to increase along Cabot Street only and not along the Russell Street approach. Furthermore, as the intersection of Cabot Street with Russell Street serves as egress from the high school, and the intersection of Cabot Street with Kittredge Street serves as entrance to the high school, there would be no traffic benefit to closing or prohibiting traffic along either street. Both intersections perform at acceptable LOS under existing conditions and are not worsened by the build condition.

At the intersection of McKay Street and Balch Street, the volumes met Warrant 1 for 11 hours under Condition A and all 12 hours reviewed under Condition B; met Warrant 2 for all hours reviewed; and met Warrant 3 for both peak hours. This intersection meets all of the volume based warrants under existing conditions, and will still meet under proposed conditions, as volumes are expected to be added from the expansion of the proposed site. Due to the high volume of both westbound and southbound left-turn movements, this intersection was also assessed for the justification of an all-way stop. Using the MUTCD criteria, the intersection is warranted for 10 of the 12 hours reviewed.

The complete warrant analysis can be found in Appendix G.

Mitigation

There are two intersections within the study area that operate at poor LOS, Cabot Street (Route 1A/Route 97) at Dodge Street (Route 1A)/County Way/Longmeadow Road and McKay Street at Balch Street. Mitigation measures were assessed at these two intersections to help alleviate existing and future congestion.

At the intersection of Cabot Street (Route 1A/Route 97) at Dodge Street (Route 1A)/County Way/Longmeadow Road there are buildings and parking lots abutting the back of sidewalk along each leg of the intersection. This makes right-of-way acquisition for the addition of designated turn lanes challenging. Therefore, timing adjustments alone were considered. Modifications in timing to allow greater passage from the primary approaches, Route 1A and Route 97, would reduce delay significantly. Specifically, during the p.m. school peak, which experiences the worst LOS under both existing and build conditions, the delay would be reduced by up to 90 seconds per vehicle, bringing it within 30 seconds of the no-build scenario. It should be noted

that both of these values are likely exaggerated, as Synchro tends to inflate delay once LOS F is surpassed.

At the intersection of McKay Street and Balch Street there is also limited road width to accommodate designated turn lanes. Widening in this area may be possible, but would yield minimal relief to westbound and southbound left-turn movements that face heavy opposing movements. The installation of either a signal or an all-way stop is warranted to mitigate congestion that exists at this intersection today. The installation of a signal would decrease overall delay and would balance delay for westbound and southbound left-turn movements. However, preliminary Synchro analysis shows the same benefits may be obtained from invoking an all-way stop at the intersection.

Conclusions

The crash data received from MassDOT and the City for the study area indicated a considerable number of crashes at the intersection of Cabot Street (Route 1A) with County Way/Dodge Street (Route 1A)/Longmeadow Road. This intersection was also identified as an HSIP cluster location for vehicles. However, the intersection was within the average crash rate for the state. There were also a considerable number of crashes along Cabot Street. Considering this is a long segment of roadway with several intersecting streets, the average number of crashes per mile or per intersection is reasonable. The increase in both vehicular and pedestrian volumes associated with the expansion of the middle school may result in some increase in incidents. It is expected that any increase in incidents would be proportional to the increase in volume and would not change the rate of incidents compared to the state and district averages.

The available stopping sight distances from the proposed driveways exceed the AASHTO requirements for the posted speed limits and the selected design speeds.

The intersections of Cabot Street (Route 1A/Route 97) with County Way/Dodge Street (Route 1A)/Longmeadow Road and McKay Street with Balch Street, which are already over capacity, are expected to get worse. Signal timing adjustments, optimized to accommodate the school destined movements, would provide some relief at the former, while conversion to an all-way stop or installation of a signal is warranted.

Recommendations

Restripe the eastbound approach to the intersection of Cabot Street (Route 1A) and County Way/Dodge Street (Route 1A)/Longmeadow Road to indicate a left-turn lane and a through/right-turn lane to minimize confusion and potentially avoid some of the incidents at this location.

Enhance control at the intersection of McKay Street and Balch Street to an all-way stop prior to the implementation of this project. Monitor the intersection for improvement and install a signal if necessary, as warranted under existing conditions. This mitigation should not be considered the responsibility of this project.

The following recommendations are made for the expanded and relocated middle school:

- Optimize the signal timing at the intersection of Cabot Street and County Way/Dodge Street/Longmeadow Road for the school destined movements during the peak hours.

- Consider removing the right-turn-on-red restrictions from the intersection of Cabot Street and Balch Street.
- Provide a crossing guard at the intersection of Cabot Street and Balch Street.
- Add school zone speed limit signs to Cabot Street in both directions approaching the site.

Appendix A

Traffic Counts

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: Cabot Street (Route 1A)
W: Balch Street
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493E
Site Code : 04493
Start Date : 10/8/2014
Page No : 1

Groups Printed- Cars & Peds - Trucks & Bikes

	Cabot Street (Route 1A) From North			Cabot Street (Route 1A) From South			Balch Street From West			
Start Time	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	Int. Total
07:00 AM	10	76	0	71	17	0	16	7	0	197
07:15 AM	6	95	0	81	44	0	22	10	1	259
07:30 AM	10	73	0	166	54	0	21	28	0	352
07:45 AM	15	78	0	165	98	0	47	50	0	453
Total	41	322	0	483	213	0	106	95	1	1261
08:00 AM	19	99	0	156	94	1	54	46	2	471
08:15 AM	16	117	0	107	100	0	33	11	1	385
08:30 AM	17	94	0	112	82	0	42	19	0	366
08:45 AM	17	87	0	102	83	1	39	15	0	344
Total	69	397	0	477	359	2	168	91	3	1566
Grand Total	110	719	0	960	572	2	274	186	4	2827
Apprch %	13.3	86.7	0	62.6	37.3	0.1	59.1	40.1	0.9	
Total %	3.9	25.4	0	34	20.2	0.1	9.7	6.6	0.1	
Cars & Peds	110	704	0	944	566	2	271	186	1	2784
% Cars & Peds	100	97.9	0	98.3	99	100	98.9	100	25	98.5
Trucks & Bikes	0	15	0	16	6	0	3	0	3	43
% Trucks & Bikes	0	2.1	0	1.7	1	0	1.1	0	75	1.5

	Cabot Street (Route 1A) From North				Cabot Street (Route 1A) From South				Balch Street From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	15	78	0	93	**165**	98	0	**263**	47	**50**	0	97	453
08:00 AM	**19**	99	0	118	156	94	**1**	251	**54**	46	**2**	**102**	**471**
08:15 AM	16	**117**	0	**133**	107	**100**	0	207	33	11	1	45	385
08:30 AM	17	94	0	111	112	82	0	194	42	19	0	61	366
Total Volume	67	388	0	455	540	374	1	915	176	126	3	305	1675
% App. Total	14.7	85.3	0		59	40.9	0.1		57.7	41.3	1		
PHF	.882	.829	.000	.855	.818	.935	.250	.870	.815	.630	.375	.748	.889
Cars & Peds	67	381	0	448	530	370	1	901	174	126	1	301	1650
% Cars & Peds	100	98.2	0	98.5	98.1	98.9	100	98.5	98.9	100	33.3	98.7	98.5
Trucks & Bikes	0	7	0	7	10	4	0	14	2	0	2	4	25
% Trucks & Bikes	0	1.8	0	1.5	1.9	1.1	0	1.5	1.1	0	66.7	1.3	1.5

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Client: Pare/A. Archer

File Name : 04493E
Site Code : 04493
Start Date : 10/8/2014
Page No : 1

Groups Printed- Trucks & Bikes

	Cabot Street (Route 1A) From North			Cabot Street (Route 1A) From South			Balch Street From West			
Start Time	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	Int. Total
07:00 AM	0	3	0	2	0	0	0	0	0	5
07:15 AM	0	2	0	3	1	0	0	0	1	7
07:30 AM	0	1	0	0	1	0	1	0	0	3
07:45 AM	0	1	0	3	0	0	0	0	0	4
Total	0	7	0	8	2	0	1	0	1	19
08:00 AM	0	3	0	2	3	0	1	0	1	10
08:15 AM	0	1	0	3	1	0	0	0	1	6
08:30 AM	0	2	0	2	0	0	1	0	0	5
08:45 AM	0	2	0	1	0	0	0	0	0	3
Total	0	8	0	8	4	0	2	0	2	24
Grand Total	0	15	0	16	6	0	3	0	3	43
Apprch %	0	100	0	72.7	27.3	0	50	0	50	
Total %	0	34.9	0	37.2	14	0	7	0	7	

	Cabot Street (Route 1A) From North				Cabot Street (Route 1A) From South				Balch Street From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	0	1	0	1	**3**	0	0	3	0	0	0	0	4
08:00 AM	0	**3**	0	**3**	2	**3**	0	**5**	**1**	0	**1**	**2**	**10**
08:15 AM	0	1	0	1	3	1	0	4	0	0	1	1	6
08:30 AM	0	2	0	2	2	0	0	2	1	0	0	1	5
Total Volume	0	7	0	7	10	4	0	14	2	0	2	4	25
% App. Total	0	100	0		71.4	28.6	0		50	0	50		
PHF	.000	.583	.000	.583	.833	.333	.000	.700	.500	.000	.500	.500	.625

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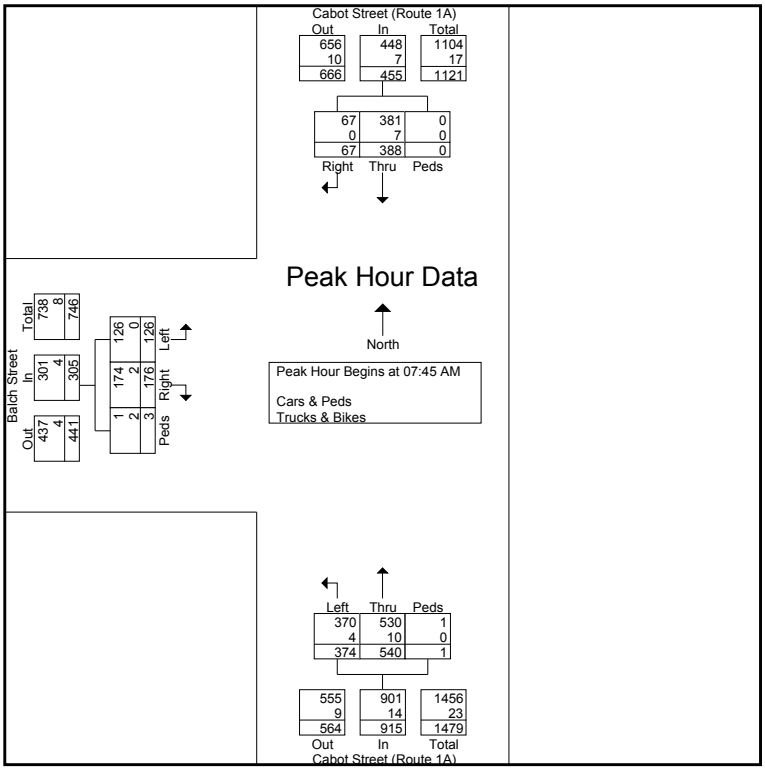
	Cabot Street (Route 1A) From North				Cabot Street (Route 1A) From South				Balch Street From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	15	78	0	93	**165**	98	0	**263**	47	**50**	0	97	453
08:00 AM	**19**	99	0	118	156	94	**1**	251	**54**	46	**2**	**102**	**471**
08:15 AM	16	**117**	0	**133**	107	**100**	0	207	33	11	1	45	385
08:30 AM	17	94	0	111	112	82	0	194	42	19	0	61	366
Total Volume	67	388	0	455	540	374	1	915	176	126	3	305	1675
% App. Total	14.7	85.3	0		59	40.9	0.1		57.7	41.3	1		
PHF	.882	.829	.000	.855	.818	.935	.250	.870	.815	.630	.375	.748	.889
Cars & Peds	67	381	0	448	530	370	1	901	174	126	1	301	1650
% Cars & Peds	100	98.2	0	98.5	98.1	98.9	100	98.5	98.9	100	33.3	98.7	98.5
Trucks & Bikes	0	7	0	7	10	4	0	14	2	0	2	4	25
% Trucks & Bikes	0	1.8	0	1.5	1.9	1.1	0	1.5	1.1	0	66.7	1.3	1.5



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File Name : 04493EE
Site Code : 04493
Start Date : 10/8/2014
Page No : 1

Groups Printed- Cars & Peds - Trucks & Bikes

	Cabot Street (Route 1A) From North			Cabot Street (Route 1A) From South			Balch Street From West			
Start Time	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	Int. Total
02:00 PM	10	80	0	150	52	0	48	34	0	374
02:15 PM	6	91	0	139	61	0	46	22	1	366
02:30 PM	13	112	0	136	45	0	53	26	0	385
02:45 PM	6	88	0	105	73	0	77	25	0	374
Total	35	371	0	530	231	0	224	107	1	1499
03:00 PM	10	121	0	151	73	0	62	27	0	444
03:15 PM	17	97	0	128	76	0	49	22	2	391
03:30 PM	9	105	0	176	60	0	54	31	1	436
03:45 PM	14	114	0	130	47	0	51	13	1	370
Total	50	437	0	585	256	0	216	93	4	1641
04:00 PM	11	101	0	125	49	0	60	25	1	372
04:15 PM	10	126	0	92	63	0	59	20	0	370
04:30 PM	13	117	0	139	63	1	82	36	4	455
04:45 PM	6	109	0	160	49	0	70	35	0	429
Total	40	453	0	516	224	1	271	116	5	1626
05:00 PM	5	141	0	137	58	0	90	38	0	469
05:15 PM	10	113	0	132	51	0	74	45	1	426
05:30 PM	9	100	0	122	33	0	88	33	1	386
05:45 PM	6	109	0	94	30	0	58	28	0	325
Total	30	463	0	485	172	0	310	144	2	1606
Grand Total	155	1724	0	2116	883	1	1021	460	12	6372
Apprch %	8.2	91.8	0	70.5	29.4	0	68.4	30.8	0.8	
Total %	2.4	27.1	0	33.2	13.9	0	16	7.2	0.2	
Cars & Peds	155	1718	0	2110	880	1	1019	460	9	6352
% Cars & Peds	100	99.7	0	99.7	99.7	100	99.8	100	75	99.7
Trucks & Bikes	0	6	0	6	3	0	2	0	3	20
% Trucks & Bikes	0	0.3	0	0.3	0.3	0	0.2	0	25	0.3

	Cabot Street (Route 1A) From North				Cabot Street (Route 1A) From South				Balch Street From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	**13**	117	0	130	139	**63**	**1**	203	82	36	**4**	122	455
04:45 PM	6	109	0	115	**160**	49	0	**209**	70	35	0	105	429
05:00 PM	5	**141**	0	**146**	137	58	0	195	**90**	38	0	**128**	**469**
05:15 PM	10	113	0	123	132	51	0	183	74	**45**	1	120	426
Total Volume	34	480	0	514	568	221	1	790	316	154	5	475	1779
% App. Total	6.6	93.4	0		71.9	28	0.1		66.5	32.4	1.1		
PHF	.654	.851	.000	.880	.888	.877	.250	.945	.878	.856	.313	.928	.948
Cars & Peds	34	478	0	512	566	221	1	788	316	154	4	474	1774
% Cars & Peds	100	99.6	0	99.6	99.6	100	100	99.7	100	100	80.0	99.8	99.7
Trucks & Bikes	0	2	0	2	2	0	0	2	0	0	1	1	5
% Trucks & Bikes	0	0.4	0	0.4	0.4	0	0	0.3	0	0	20.0	0.2	0.3

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Groups Printed- Trucks & Bikes

	Cabot Street (Route 1A) From North			Cabot Street (Route 1A) From South			Balch Street From West			
Start Time	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	Int. Total
02:00 PM	0	0	0	2	0	0	0	0	0	2
02:15 PM	0	1	0	0	0	0	1	0	1	3
02:30 PM	0	0	0	0	2	0	0	0	0	2
02:45 PM	0	0	0	0	0	0	1	0	0	1
Total	0	1	0	2	2	0	2	0	1	8
03:00 PM	0	1	0	1	1	0	0	0	0	3
03:15 PM	0	0	0	1	0	0	0	0	0	1
03:30 PM	0	1	0	0	0	0	0	0	1	2
03:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	2	0	2	1	0	0	0	1	6
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	2	0	1	0	0	0	0	0	3
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	2	0	1	0	0	0	0	0	3
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	1	0	0	0	0	1	2
05:30 PM	0	1	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	1	0	0	0	0	1	3
Grand Total	0	6	0	6	3	0	2	0	3	20
Apprch %	0	100	0	66.7	33.3	0	40	0	60	
Total %	0	30	0	30	15	0	10	0	15	

	Cabot Street (Route 1A) From North				Cabot Street (Route 1A) From South				Balch Street From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:15 PM													
02:15 PM	0	**1**	0	**1**	0	0	0	0	**1**	0	**1**	**2**	**3**
02:30 PM	0	0	0	0	0	**2**	0	**2**	0	0	0	0	2
02:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	1
03:00 PM	0	1	0	1	**1**	1	0	2	0	0	0	0	3
Total Volume	0	2	0	2	1	3	0	4	2	0	1	3	9
% App. Total	0	100	0		25	75	0		66.7	0	33.3		
PHF	.000	.500	.000	.500	.250	.375	.000	.500	.500	.000	.250	.375	.750

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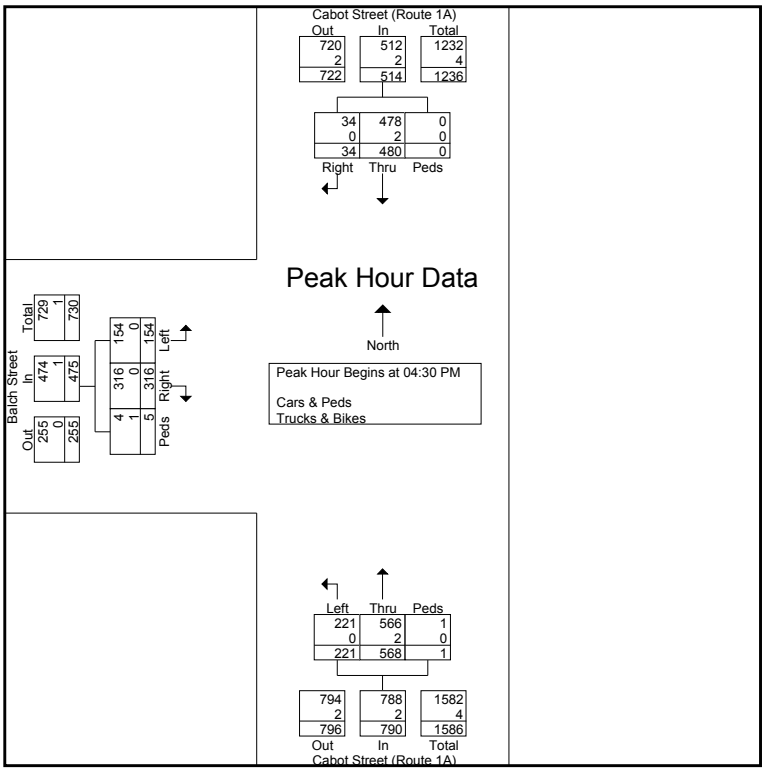
	Cabot Street (Route 1A) From North				Cabot Street (Route 1A) From South				Balch Street From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	**13**	117	0	130	139	**63**	**1**	203	82	36	**4**	122	455
04:45 PM	6	109	0	115	**160**	49	0	**209**	70	35	0	105	429
05:00 PM	5	**141**	0	**146**	137	58	0	195	**90**	38	0	**128**	**469**
05:15 PM	10	113	0	123	132	51	0	183	74	**45**	1	120	426
Total Volume	34	480	0	514	568	221	1	790	316	154	5	475	1779
% App. Total	6.6	93.4	0		71.9	28	0.1		66.5	32.4	1.1		
PHF	.654	.851	.000	.880	.888	.877	.250	.945	.878	.856	.313	.928	.948
Cars & Peds	34	478	0	512	566	221	1	788	316	154	4	474	1774
% Cars & Peds	100	99.6	0	99.6	99.6	100	100	99.7	100	100	80.0	99.8	99.7
Trucks & Bikes	0	2	0	2	2	0	0	2	0	0	1	1	5
% Trucks & Bikes	0	0.4	0	0.4	0.4	0	0	0.3	0	0	20.0	0.2	0.3



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N,S/SE: Cabot Street/Longmeadow Road
E/W: Dodge Street/County Way
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493F
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Cars & Peds - Trucks & Bikes

	Cabot Street (Route 97) From North					Dodge Street (Route 1A) From East					Longmeadow Road From Southeast					Cabot Street (Route 1A) From South					County Way From West					
Start Time	Right	Thru	Bear Left	Left	Peds	Right	Thru	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Peds	Right	Bear Right	Thru	Left	Peds	Int. Total
07:00 AM	46	36	2	0	0	6	72	48	1	0	2	3	6	2	1	2	55	34	0	0	4	4	50	21	1	396
07:15 AM	56	54	4	0	0	12	97	75	1	0	4	1	3	5	0	1	67	35	1	1	7	1	58	16	0	499
07:30 AM	62	57	2	0	0	5	79	85	3	0	7	3	4	4	0	3	107	54	2	0	8	1	77	33	0	596
07:45 AM	55	58	0	0	3	6	74	71	1	3	7	1	8	8	1	1	145	44	3	0	12	4	81	48	0	634
Total	219	205	8	0	3	29	322	279	6	3	20	8	21	19	2	7	374	167	6	1	31	10	266	118	1	2125
08:00 AM	55	53	1	0	1	10	75	80	0	1	4	5	1	4	0	4	105	45	3	0	13	4	59	32	1	556
08:15 AM	52	49	1	0	2	3	75	56	2	2	3	2	4	5	0	7	100	32	2	0	2	4	69	28	0	500
08:30 AM	65	69	0	0	1	6	93	75	4	1	4	3	2	4	5	3	70	27	3	0	8	1	66	27	0	537
08:45 AM	53	52	3	1	1	3	80	65	1	1	3	4	4	11	3	4	80	31	1	0	3	6	54	33	0	497
Total	225	223	5	1	5	22	323	276	7	5	14	14	11	24	8	18	355	135	9	0	26	15	248	120	1	2090
Grand Total	444	428	13	1	8	51	645	555	13	8	34	22	32	43	10	25	729	302	15	1	57	25	514	238	2	4215
Apprch %	49.7	47.9	1.5	0.1	0.9	4	50.7	43.6	1	0.6	24.1	15.6	22.7	30.5	7.1	2.3	68	28.2	1.4	0.1	6.8	3	61.5	28.5	0.2	
Total %	10.5	10.2	0.3	0	0.2	1.2	15.3	13.2	0.3	0.2	0.8	0.5	0.8	1	0.2	0.6	17.3	7.2	0.4	0	1.4	0.6	12.2	5.6	0	
Cars & Peds	443	422	13	1	8	49	640	545	13	8	34	22	32	43	9	25	721	296	15	0	57	25	495	237	0	4153
% Cars & Peds	99.8	98.6	100	100	100	96.1	99.2	98.2	100	100	100	100	100	100	90	100	98.9	98	100	0	100	100	96.3	99.6	0	98.5
Trucks & Bikes	1	6	0	0	0	2	5	10	0	0	0	0	0	0	1	0	8	6	0	1	0	0	19	1	2	62
% Trucks & Bikes																										

	Cabot Street (Route 97) From North						Dodge Street (Route 1A) From East						Longmeadow Road From Southeast						Cabot Street (Route 1A) From South						County Way From West						
Start Time	Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 07:30 AM																															
07:30 AM	**62**	57	**2**	0	0	**121**	5	**79**	**85**	**3**	0	**172**	**7**	3	4	4	0	18	3	107	**54**	2	0	166	8	1	77	33	0	119	596
07:45 AM	55	**58**	0	0	**3**	116	6	74	71	1	**3**	155	7	1	**8**	**8**	**1**	**25**	1	**145**	44	**3**	0	**193**	12	**4**	**81**	**48**	0	**145**	**634**
08:00 AM	55	53	1	0	1	110	**10**	75	80	0	1	166	4	**5**	1	4	0	14	4	105	45	3	0	157	**13**	4	59	32	**1**	109	556
08:15 AM	52	49	1	0	2	104	3	75	56	2	2	138	3	2	4	5	0	14	**7**	100	32	2	0	141	2	4	69	28	0	103	500
Total Volume	224	217	4	0	6	451	24	303	292	6	6	631	21	11	17	21	1	71	15	457	175	10	0	657	35	13	286	141	1	476	2286
% App. Total	49.7	48.1	0.9	0	1.3		3.8	48	46.3	1	1		29.6	15.5	23.9	29.6	1.4		2.3	69.6	26.6	1.5	0		7.4	2.7	60.1	29.6	0.2		
PHF	.903	.935	.500	.000	.500	.932	.600	.959	.859	.500	.500	.917	.750	.550	.531	.656	.250	.710	.536	.788	.810	.833	.000	.851	.673	.813	.883	.734	.250	.821	.901
Cars & Peds	224	212	4	0	6	446	22	298	284	6	6	616	21	11	17	21	1	71	15	451	171	10	0	647	35	13	272	140	0	460	2240
% Cars & Peds	100	97.7	100	0	100	98.9	91.7	98.3	97.3	100	100	97.6	100	100	100	100	100	100	100	98.7	97.7	100	0	98.5	100	100	95.1	99.3	0	96.6	98.0
Trucks & Bikes	0	5	0	0	0	5	2	5	8	0	0	15	0	0	0	0	0	0	0	6	4	0	0	10	0	0	14	1	1	16	46
% Trucks & Bikes	0	2.3	0	0	0	1.1	8.3	1.7	2.7	0	0	2.4	0	0	0	0	0	0	0	1.3	2.3	0	0	1.5	0	0	4.9	0.7	100	3.4	2.0

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N,S/SE: Cabot Street/Longmeadow Road
E/W: Dodge Street/County Way
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493F
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Trucks & Bikes

	Cabot Street (Route 97) From North					Dodge Street (Route 1A) From East					Longmeadow Road From Southeast					Cabot Street (Route 1A) From South					County Way From West					
Start Time	Right	Thru	Bear Left	Left	Peds	Right	Thru	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Peds	Right	Bear Right	Thru	Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2
07:15 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	0	0	1	0	0	6
07:30 AM	0	3	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	7
07:45 AM	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3	3	0	0	0	0	4	0	0	14
Total	1	4	0	0	0	1	2	3	0	0	0	0	0	0	1	0	4	5	0	1	0	0	6	0	1	29
08:00 AM	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	3	0	0	0	0	0	7	1	1	17
08:15 AM	0	1	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	8
08:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
08:45 AM	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	6
Total	0	2	0	0	0	1	3	7	0	0	0	0	0	0	0	0	4	1	0	0	0	0	13	1	1	33
Grand Total	1	6	0	0	0	2	5	10	0	0	0	0	0	0	1	0	8	6	0	1	0	0	19	1	2	62
Apprch %	14.3	85.7	0	0	0	11.8	29.4	58.8	0	0	0	0	0	0	100	0	53.3	40	0	6.7	0	0	86.4	4.5	9.1	
Total %	1.6	9.7	0	0	0	3.2	8.1	16.1	0	0	0	0	0	0	1.6	0	12.9	9.7	0	1.6	0	0	30.6	1.6	3.2	

	Cabot Street (Route 97) From North						Dodge Street (Route 1A) From East						Longmeadow Road From Southeast						Cabot Street (Route 1A) From South						County Way From West						
Start Time	Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 07:30 AM																															
07:30 AM	0	**3**	0	0	0	**3**	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	7
07:45 AM	0	1	0	0	0	1	**1**	1	1	0	0	3	0	0	0	0	0	0	0	**3**	**3**	0	0	**6**	0	0	4	0	0	4	14
08:00 AM	0	0	0	0	0	0	1	0	**4**	0	0	**5**	0	0	0	0	0	0	0	3	0	0	0	3	0	0	**7**	**1**	**1**	**9**	**17**
08:15 AM	0	1	0	0	0	1	0	**3**	1	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	0	0	2	8
Total Volume	0	5	0	0	0	5	2	5	8	0	0	15	0	0	0	0	0	0	0	6	4	0	0	10	0	0	14	1	1	16	46
% App. Total	0	100	0	0	0		13.3	33.3	53.3	0	0		0	0	0	0	0		0	60	40	0	0		0	0	87.5	6.2	6.2		
PHF	.000	.417	.000	.000	.000	.417	.500	.417	.500	.000	.000	.750	.000	.000	.000	.000	.000	.000	.000	.500	.333	.000	.000	.417	.000	.000	.500	.250	.250	.444	.676

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N,S/SE: Cabot Street/Longmeadow Road
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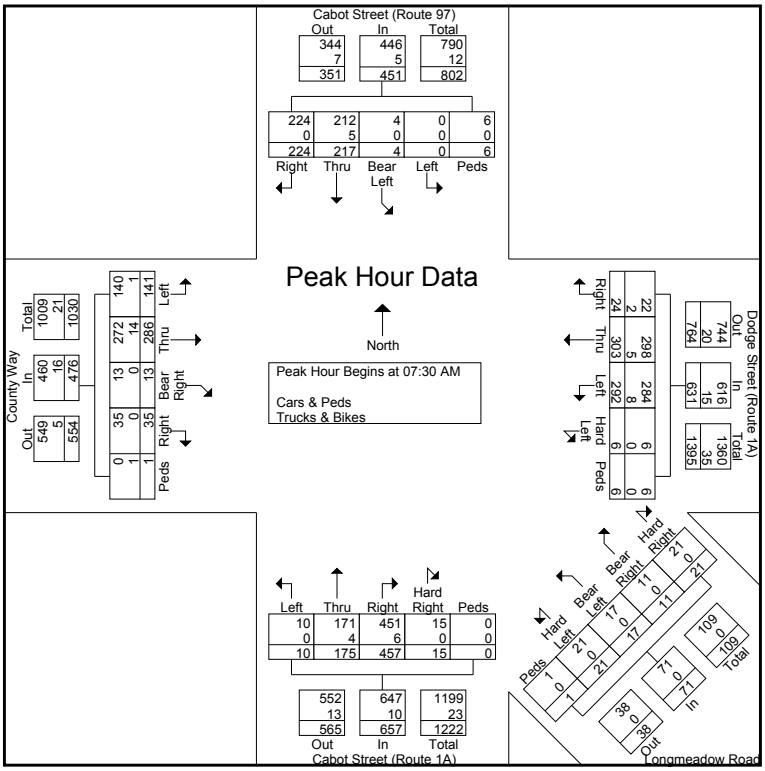
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493F
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

	Cabot Street (Route 97) From North						Dodge Street (Route 1A) From East						Longmeadow Road From Southeast						Cabot Street (Route 1A) From South						County Way From West						
Start Time	Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 07:30 AM																															
07:30 AM	**62**	57	**2**	0	0	**121**	5	**79**	**85**	**3**	0	**172**	**7**	3	4	4	0	18	3	107	**54**	2	0	166	8	1	77	33	0	119	596
07:45 AM	55	**58**	0	0	**3**	116	6	74	71	1	**3**	155	7	1	**8**	**8**	**1**	**25**	1	**145**	44	**3**	0	**193**	12	**4**	**81**	**48**	0	**145**	**634**
08:00 AM	55	53	1	0	1	110	**10**	75	80	0	1	166	4	**5**	1	4	0	14	4	105	45	3	0	157	**13**	4	59	32	**1**	109	556
08:15 AM	52	49	1	0	2	104	3	75	56	2	2	138	3	2	4	5	0	14	**7**	100	32	2	0	141	2	4	69	28	0	103	500
Total Volume	224	217	4	0	6	451	24	303	292	6	6	631	21	11	17	21	1	71	15	457	175	10	0	657	35	13	286	141	1	476	2286
% App. Total	49.7	48.1	0.9	0	1.3		3.8	48	46.3	1	1		29.6	15.5	23.9	29.6	1.4		2.3	69.6	26.6	1.5	0		7.4	2.7	60.1	29.6	0.2		
PHF	.903	.935	.500	.000	.500	.932	.600	.959	.859	.500	.500	.917	.750	.550	.531	.656	.250	.710	.536	.788	.810	.833	.000	.851	.673	.813	.883	.734	.250	.821	.901
Cars & Peds	224	212	4	0	6	446	22	298	284	6	6	616	21	11	17	21	1	71	15	451	171	10	0	647	35	13	272	140	0	460	2240
% Cars & Peds	100	97.7	100	0	100	98.9	91.7	98.3	97.3	100	100	97.6	100	100	100	100	100	100	100	98.7	97.7	100	0	98.5	100	100	95.1	99.3	0	96.6	98.0
Trucks & Bikes	0	5	0	0	0	5	2	5	8	0	0	15	0	0	0	0	0	0	0	6	4	0	0	10	0	0	14	1	1	16	46
% Trucks & Bikes	0	2.3	0	0	0	1.1	8.3	1.7	2.7	0	0	2.4	0	0	0	0	0	0	0	1.3	2.3	0	0	1.5	0	0	4.9	0.7	100	3.4	2.0



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File Name : 04493FF
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Cars & Peds - Trucks & Bikes

	Cabot Street (Route 97) From North					Dodge Street (Route 1A) From East					Longmeadow Road From Southeast					Cabot Street (Route 1A) From South					County Way From West					
Start Time	Right	Thru	Bear Left	Left	Peds	Right	Thru	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Peds	Right	Bear Right	Thru	Left	Peds	Int. Total
02:00 PM	13	43	1	0	0	10	58	72	2	0	1	2	3	3	0	1	94	42	2	0	5	2	71	24	0	449
02:15 PM	16	50	0	2	0	8	65	81	2	0	5	3	5	6	1	2	97	47	1	1	9	1	68	28	1	499
02:30 PM	24	54	2	0	1	18	57	77	3	1	0	2	3	5	2	0	132	51	6	0	4	1	80	23	1	547
02:45 PM	27	58	0	0	0	11	66	80	2	0	3	1	6	5	0	6	113	51	5	0	6	1	65	27	0	533
Total	80	205	3	2	1	47	246	310	9	1	9	8	17	19	3	9	436	191	14	1	24	5	284	102	2	2028
03:00 PM	21	53	2	0	2	23	62	86	4	2	2	0	7	4	4	4	137	42	4	0	4	4	76	27	0	570
03:15 PM	16	46	3	0	0	16	75	69	3	0	5	3	4	7	1	6	132	44	6	0	5	2	89	32	0	564
03:30 PM	20	39	0	0	3	10	57	72	4	0	4	2	3	6	5	8	120	52	5	0	9	3	77	28	2	529
03:45 PM	26	54	2	0	0	18	57	89	1	0	0	2	7	3	2	5	109	60	3	0	9	4	80	28	2	561
Total	83	192	7	0	5	67	251	316	12	2	11	7	21	20	12	23	498	198	18	0	27	13	322	115	4	2224
04:00 PM	17	40	2	0	0	12	49	84	5	0	2	4	5	4	1	2	144	46	4	0	3	4	92	53	0	573
04:15 PM	25	63	1	0	2	13	47	92	1	2	0	0	3	5	2	0	105	56	2	0	9	0	94	46	0	568
04:30 PM	20	60	2	0	1	14	63	64	6	1	5	2	3	1	0	1	117	54	3	0	8	5	103	66	2	601
04:45 PM	19	43	2	0	0	9	49	64	4	0	3	2	5	3	1	3	110	42	4	0	4	3	87	55	0	512
Total	81	206	7	0	3	48	208	304	16	3	10	8	16	13	4	6	476	198	13	0	24	12	376	220	2	2254
05:00 PM	26	63	1	0	0	9	58	67	1	0	2	8	3	2	0	5	114	53	3	0	4	4	89	64	0	576
05:15 PM	31	55	1	1	0	12	52	72	0	0	1	5	4	4	4	4	124	49	2	0	6	1	89	59	0	576
05:30 PM	39	51	2	1	0	15	72	67	3	0	0	2	4	7	0	3	122	53	1	0	2	0	101	69	0	614
05:45 PM	33	47	1	0	0	11	64	71	1	0	1	3	3	3	1	3	117	45	2	0	3	2	93	63	0	567
Total	129	216	5	2	0	47	246	277	5	0	4	18	14	16	5	15	477	200	8	0	15	7	372	255	0	2333
Grand Total	373	819	22	4	9	209	951	1207	42	6	34	41	68	68	24	53	1887	787	53	1	90	37	1354	692	8	8839
Apprch %	30.4	66.7	1.8	0.3	0.7	8.7	39.4	50	1.7	0.2	14.5	17.4	28.9	28.9	10.2	1.9	67.9	28.3	1.9	0	4.1	1.7	62.1	31.7	0.4	
Total %	4.2	9.3	0.2	0	0.1	2.4	10.8	13.7	0.5	0.1	0.4	0.5	0.8	0.8	0.3	0.6	21.3	8.9	0.6	0	1	0.4	15.3	7.8	0.1	
Cars & Peds	370	812	21	4	9	209	948	1194	42	6	33	41	67	67	20	53	1861	782	52	0	90	37	1343	689	7	8757
% Cars & Peds	99.2	99.1	95.5	100	100	100	99.7	98.9	100	100	97.1	100	98.5	98.5	83.3	100	98.6	99.4	98.1	0	100	100	99.2	99.6	87.5	99.1
Trucks & Bikes	3	7	1	0	0	0	3	13	0	0	1	0	1	1	4	0	26	5	1	1	0	0	11	3	1	82
% Trucks & Bikes																										

	Cabot Street (Route 97) From North						Dodge Street (Route 1A) From East						Longmeadow Road From Southeast						Cabot Street (Route 1A) From South						County Way From West						
Start Time	Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 05:00 PM																															
05:00 PM	26	**63**	1	0	0	90	9	58	67	1	0	135	**2**	**8**	3	2	0	15	**5**	114	**53**	**3**	0	175	4	**4**	89	64	0	161	576
05:15 PM	31	55	1	**1**	0	88	12	52	**72**	0	0	136	1	5	**4**	4	**4**	**18**	4	**124**	49	2	0	**179**	**6**	1	89	59	0	155	576
05:30 PM	**39**	51	**2**	1	0	**93**	**15**	**72**	67	**3**	0	**157**	0	2	4	**7**	0	13	3	122	53	1	0	179	2	0	**101**	**69**	0	**172**	**614**
05:45 PM	33	47	1	0	0	81	11	64	71	1	0	147	1	3	3	3	1	11	3	117	45	2	0	167	3	2	93	63	0	161	567
Total Volume	129	216	5	2	0	352	47	246	277	5	0	575	4	18	14	16	5	57	15	477	200	8	0	700	15	7	372	255	0	649	2333
% App. Total	36.6	61.4	1.4	0.6	0		8.2	42.8	48.2	0.9	0		7	31.6	24.6	28.1	8.8		2.1	68.1	28.6	1.1	0		2.3	1.1	57.3	39.3	0		
PHF	.827	.857	.625	.500	.000	.946	.783	.854	.962	.417	.000	.916	.500	.563	.875	.571	.313	.792	.750	.962	.943	.667	.000	.978	.625	.438	.921	.924	.000	.943	.950
Cars & Peds	126	215	5	2	0	348	47	245	275	5	0	572	4	18	14	16	4	56	15	473	199	8	0	695	15	7	369	254	0	645	2316
% Cars & Peds	97.7	99.5	100	100	0	98.9	100	99.6	99.3	100	0	99.5	100	100	100	100	80.0	98.2	100	99.2	99.5	100	0	99.3	100	100	99.2	99.6	0	99.4	99.3
Trucks & Bikes	3	1	0	0	0	4	0	1	2	0	0	3	0	0	0	0	1	1	0	4	1	0	0	5	0	0	3	1	0	4	17
% Trucks & Bikes	2.3	0.5	0	0	0	1.1	0	0.4	0.7	0	0	0.5	0	0	0	0	20.0	1.8	0	0.8	0.5	0	0	0.7	0	0	0.8	0.4	0	0.6	0.7

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N,S/SE: Cabot Street/Longmeadow Road
E/W: Dodge Street/County Way
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493FF
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Trucks & Bikes

	Cabot Street (Route 97) From North					Dodge Street (Route 1A) From East					Longmeadow Road From Southeast					Cabot Street (Route 1A) From South					County Way From West					
Start Time	Right	Thru	Bear Left	Left	Peds	Right	Thru	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Peds	Right	Bear Right	Thru	Left	Peds	Int. Total
02:00 PM	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	5
02:15 PM	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	0	7
02:30 PM	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	3	0	0	0	0	0	2	0	0	8
02:45 PM	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	2	1	0	0	0	1	5	0	0	0	0	1	0	1	0	6	1	0	1	0	0	4	0	0	23
03:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	1	0	8
03:15 PM	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	6
03:30 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	6
03:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	1	0	1	6
Total	0	2	0	0	0	0	1	3	0	0	1	0	0	0	2	0	10	2	0	0	0	0	2	2	1	26
04:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	5
04:15 PM	0	2	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	5
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	3
04:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	3
Total	0	2	0	0	0	0	0	3	0	0	0	0	0	1	0	0	6	1	1	0	0	0	2	0	0	16
05:00 PM	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	6
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	3
05:30 PM	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
05:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	1	0	5
Total	3	1	0	0	0	0	1	2	0	0	0	0	0	0	1	0	4	1	0	0	0	0	3	1	0	17
Grand Total	3	7	1	0	0	0	3	13	0	0	1	0	1	1	4	0	26	5	1	1	0	0	11	3	1	82
Apprch %	27.3	63.6	9.1	0	0	0	18.8	81.2	0	0	14.3	0	14.3	14.3	57.1	0	78.8	15.2	3	3	0	0	73.3	20	6.7	
Total %	3.7	8.5	1.2	0	0	0	3.7	15.9	0	0	1.2	0	1.2	1.2	4.9	0	31.7	6.1	1.2	1.2	0	0	13.4	3.7	1.2	

	Cabot Street (Route 97) From North						Dodge Street (Route 1A) From East						Longmeadow Road From Southeast						Cabot Street (Route 1A) From South						County Way From West						
Start Time	Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 02:15 PM																															
02:15 PM	0	**1**	0	0	0	**1**	0	**1**	1	0	0	**2**	0	0	0	0	0	0	0	1	**1**	0	**1**	3	0	0	1	0	0	1	7
02:30 PM	0	0	**1**	0	0	1	0	0	1	0	0	1	0	0	0	0	**1**	**1**	0	3	0	0	0	3	0	0	**2**	0	0	**2**	**8**
02:45 PM	0	0	0	0	0	0	0	0	**2**	0	0	2	0	0	**1**	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
03:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	**6**	0	0	0	**6**	0	0	0	**1**	0	1	8
Total Volume	0	1	1	0	0	2	0	1	5	0	0	6	0	0	1	0	1	2	0	10	1	0	1	12	0	0	3	1	0	4	26
% App. Total	0	50	50	0	0		0	16.7	83.3	0	0		0	0	50	0	50		0	83.3	8.3	0	8.3		0	0	75	25	0		
PHF	.000	.250	.250	.000	.000	.500	.000	.250	.625	.000	.000	.750	.000	.000	.250	.000	.250	.500	.000	.417	.250	.000	.250	.500	.000	.000	.375	.250	.000	.500	.813

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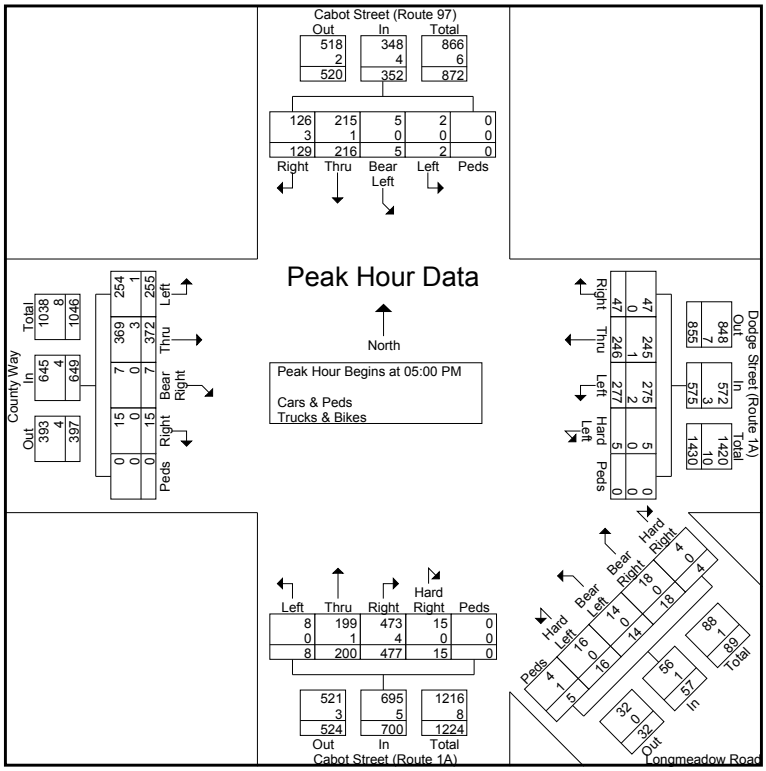
N,S/SE: Cabot Street/Longmeadow Road
E/W: Dodge Street/County Way
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493FF
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

	Cabot Street (Route 97) From North						Dodge Street (Route 1A) From East						Longmeadow Road From Southeast						Cabot Street (Route 1A) From South						County Way From West						
Start Time	Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 05:00 PM																															
05:00 PM	26	**63**	1	0	0	90	9	58	67	1	0	135	**2**	**8**	3	2	0	15	**5**	114	**53**	**3**	0	175	4	**4**	89	64	0	161	576
05:15 PM	31	55	1	**1**	0	88	12	52	**72**	0	0	136	1	5	**4**	4	**4**	**18**	4	**124**	49	2	0	**179**	**6**	1	89	59	0	155	576
05:30 PM	**39**	51	**2**	1	0	**93**	**15**	**72**	67	**3**	0	**157**	0	2	4	**7**	0	13	3	122	53	1	0	179	2	0	**101**	**69**	0	**172**	**614**
05:45 PM	33	47	1	0	0	81	11	64	71	1	0	147	1	3	3	3	1	11	3	117	45	2	0	167	3	2	93	63	0	161	567
Total Volume	129	216	5	2	0	352	47	246	277	5	0	575	4	18	14	16	5	57	15	477	200	8	0	700	15	7	372	255	0	649	2333
% App. Total	36.6	61.4	1.4	0.6	0		8.2	42.8	48.2	0.9	0		7	31.6	24.6	28.1	8.8		2.1	68.1	28.6	1.1	0		2.3	1.1	57.3	39.3	0		
PHF	.827	.857	.625	.500	.000	.946	.783	.854	.962	.417	.000	.916	.500	.563	.875	.571	.313	.792	.750	.962	.943	.667	.000	.978	.625	.438	.921	.924	.000	.943	.950
Cars & Peds	126	215	5	2	0	348	47	245	275	5	0	572	4	18	14	16	4	56	15	473	199	8	0	695	15	7	369	254	0	645	2316
% Cars & Peds	97.7	99.5	100	100	0	98.9	100	99.6	99.3	100	0	99.5	100	100	100	100	80.0	98.2	100	99.2	99.5	100	0	99.3	100	100	99.2	99.6	0	99.4	99.3
Trucks & Bikes	3	1	0	0	0	4	0	1	2	0	0	3	0	0	0	0	1	1	0	4	1	0	0	5	0	0	3	1	0	4	17
% Trucks & Bikes	2.3	0.5	0	0	0	1.1	0	0.4	0.7	0	0	0.5	0	0	0	0	20.0	1.8	0	0.8	0.5	0	0	0.7	0	0	0.8	0.4	0	0.6	0.7



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N/S: McKay Street
E/W: Balch Street/Golf Club
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493G
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Cars & Peds - Trucks & Bikes

	McKay Street From North				Balch Street From East				McKay Street From South				Country Club Driveway From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	2	90	42	0	7	0	10	0	21	53	0	0	0	0	0	0	225
07:15 AM	3	92	65	0	9	0	15	1	44	72	1	0	0	0	0	0	302
07:30 AM	1	112	53	0	10	0	25	0	42	95	0	0	0	0	0	0	338
07:45 AM	6	88	67	0	25	1	33	0	82	116	2	0	1	1	0	0	422
Total	12	382	227	0	51	1	83	1	189	336	3	0	1	1	0	0	1287
08:00 AM	6	91	59	0	23	1	19	1	67	115	0	0	0	0	0	0	382
08:15 AM	2	88	76	0	12	0	28	3	45	86	0	0	1	0	1	0	342
08:30 AM	3	106	68	2	18	0	38	0	32	75	0	0	1	0	1	0	344
08:45 AM	2	82	66	1	18	1	18	1	40	81	4	1	2	0	1	0	318
Total	13	367	269	3	71	2	103	5	184	357	4	1	4	0	3	0	1386
Grand Total	25	749	496	3	122	3	186	6	373	693	7	1	5	1	3	0	2673
Apprch %	2	58.8	39	0.2	38.5	0.9	58.7	1.9	34.7	64.5	0.7	0.1	55.6	11.1	33.3	0	
Total %	0.9	28	18.6	0.1	4.6	0.1	7	0.2	14	25.9	0.3	0	0.2	0	0.1	0	
Cars & Peds	25	745	494	3	118	3	185	6	371	681	7	1	5	1	3	0	2648
% Cars & Peds	100	99.5	99.6	100	96.7	100	99.5	100	99.5	98.3	100	100	100	100	100	0	99.1
Trucks & Bikes	0	4	2	0	4	0	1	0	2	12	0	0	0	0	0	0	25
% Trucks & Bikes	0	0.5	0.4	0	3.3	0	0.5	0	0.5	1.7	0	0	0	0	0	0	0.9

	McKay Street From North					Balch Street From East					McKay Street From South					Country Club Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**6**	88	67	0	161	**25**	**1**	33	0	**59**	**82**	**116**	**2**	0	**200**	**1**	**1**	0	0	**2**	**422**
08:00 AM	6	91	59	0	156	23	1	19	1	44	67	115	0	0	182	0	0	0	0	0	382
08:15 AM	2	88	**76**	0	166	12	0	28	**3**	43	45	86	0	0	131	1	0	**1**	0	2	342
08:30 AM	3	**106**	68	**2**	**179**	18	0	**38**	0	56	32	75	0	0	107	1	0	1	0	2	344
Total Volume	17	373	270	2	662	78	2	118	4	202	226	392	2	0	620	3	1	2	0	6	1490
% App. Total	2.6	56.3	40.8	0.3		38.6	1	58.4	2		36.5	63.2	0.3	0		50	16.7	33.3	0		
PHF	.708	.880	.888	.250	.925	.780	.500	.776	.333	.856	.689	.845	.250	.000	.775	.750	.250	.500	.000	.750	.883
Cars & Peds	17	371	269	2	659	76	2	117	4	199	225	384	2	0	611	3	1	2	0	6	1475
% Cars & Peds	100	99.5	99.6	100	99.5	97.4	100	99.2	100	98.5	99.6	98.0	100	0	98.5	100	100	100	0	100	99.0
Trucks & Bikes	0	2	1	0	3	2	0	1	0	3	1	8	0	0	9	0	0	0	0	0	15
% Trucks & Bikes	0	0.5	0.4	0	0.5	2.6	0	0.8	0	1.5	0.4	2.0	0	0	1.5	0	0	0	0	0	1.0

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File Name : 04493G
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Trucks & Bikes

	McKay Street From North				Balch Street From East				McKay Street From South				Country Club Driveway From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	4
07:30 AM	0	1	0	0	0	0	0	0	1	2	0	0	0	0	0	0	4
07:45 AM	0	0	0	0	1	0	0	0	1	2	0	0	0	0	0	0	4
Total	0	2	1	0	2	0	0	0	2	5	0	0	0	0	0	0	12
08:00 AM	0	1	0	0	1	0	1	0	0	4	0	0	0	0	0	0	7
08:15 AM	0	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0	4
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2
Total	0	2	1	0	2	0	1	0	0	7	0	0	0	0	0	0	13
Grand Total	0	4	2	0	4	0	1	0	2	12	0	0	0	0	0	0	25
Apprch %	0	66.7	33.3	0	80	0	20	0	14.3	85.7	0	0	0	0	0	0	
Total %	0	16	8	0	16	0	4	0	8	48	0	0	0	0	0	0	

	McKay Street From North					Balch Street From East					McKay Street From South					Country Club Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	**1**	**1**	0	**2**	**1**	0	0	0	1	0	1	0	0	1	0	0	0	0	0	4
07:30 AM	0	1	0	0	1	0	0	0	0	0	**1**	2	0	0	3	0	0	0	0	0	4
07:45 AM	0	0	0	0	0	1	0	0	0	1	1	2	0	0	3	0	0	0	0	0	4
08:00 AM	0	1	0	0	1	1	0	**1**	0	**2**	0	**4**	0	0	**4**	0	0	0	0	0	**7**
Total Volume	0	3	1	0	4	3	0	1	0	4	2	9	0	0	11	0	0	0	0	0	19
% App. Total	0	75	25	0		75	0	25	0		18.2	81.8	0	0		0	0	0	0		
PHF	.000	.750	.250	.000	.500	.750	.000	.250	.000	.500	.500	.563	.000	.000	.688	.000	.000	.000	.000	.000	.679

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File Name : 04493G
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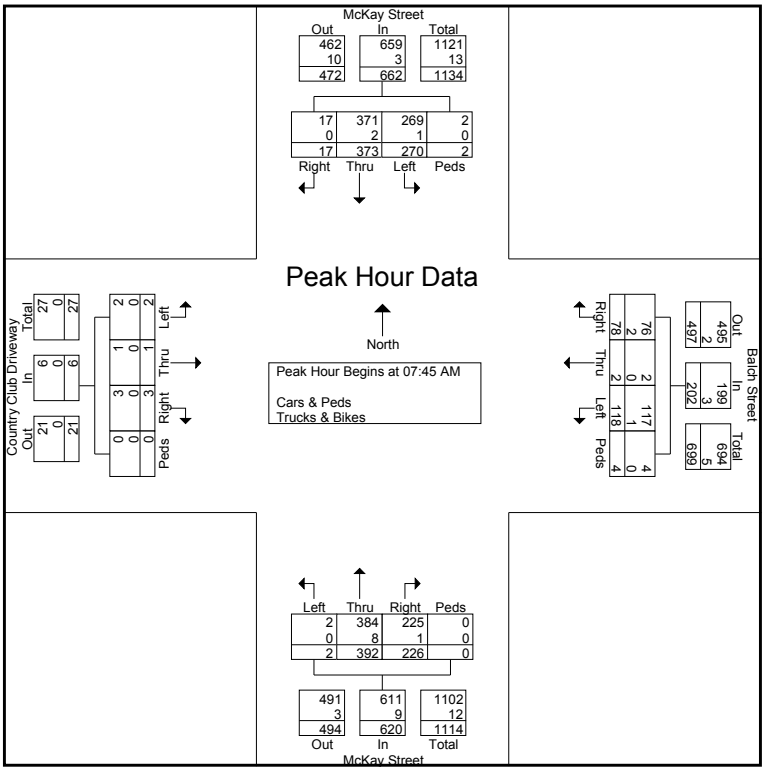
Page No : 1

	McKay Street From North					Balch Street From East					McKay Street From South					Country Club Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**6**	88	67	0	161	**25**	**1**	33	0	**59**	**82**	**116**	**2**	0	**200**	**1**	**1**	0	0	**2**	**422**
08:00 AM	6	91	59	0	156	23	1	19	1	44	67	115	0	0	182	0	0	0	0	0	382
08:15 AM	2	88	**76**	0	166	12	0	28	**3**	43	45	86	0	0	131	1	0	**1**	0	2	342
08:30 AM	3	**106**	68	**2**	**179**	18	0	**38**	0	56	32	75	0	0	107	1	0	1	0	2	344
Total Volume	17	373	270	2	662	78	2	118	4	202	226	392	2	0	620	3	1	2	0	6	1490
% App. Total	2.6	56.3	40.8	0.3		38.6	1	58.4	2		36.5	63.2	0.3	0		50	16.7	33.3	0		
PHF	.708	.880	.888	.250	.925	.780	.500	.776	.333	.856	.689	.845	.250	.000	.775	.750	.250	.500	.000	.750	.883
Cars & Peds	17	371	269	2	659	76	2	117	4	199	225	384	2	0	611	3	1	2	0	6	1475
% Cars & Peds	100	99.5	99.6	100	99.5	97.4	100	99.2	100	98.5	99.6	98.0	100	0	98.5	100	100	100	0	100	99.0
Trucks & Bikes	0	2	1	0	3	2	0	1	0	3	1	8	0	0	9	0	0	0	0	0	15
% Trucks & Bikes	0	0.5	0.4	0	0.5	2.6	0	0.8	0	1.5	0.4	2.0	0	0	1.5	0	0	0	0	0	1.0



Transportation Data Corporation
Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: McKay Street
E/W: Balch Street/Golf Club
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493GG
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Cars & Peds - Trucks & Bikes

	McKay Street From North				Balch Street From East				McKay Street From South				Country Club Driveway From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
02:00 PM	2	73	27	0	44	1	29	0	34	77	5	0	5	0	0	0	297
02:15 PM	1	78	16	0	28	2	17	0	38	104	0	0	1	3	3	0	291
02:30 PM	3	77	22	0	27	3	35	0	26	82	3	0	1	0	1	1	281
02:45 PM	1	80	25	1	25	4	40	3	24	69	0	2	4	0	3	0	281
Total	7	308	90	1	124	10	121	3	122	332	8	2	11	3	7	1	1150
03:00 PM	2	72	21	0	35	1	37	1	25	104	4	1	5	3	2	0	313
03:15 PM	1	88	24	0	33	11	35	1	22	95	2	0	2	1	0	0	315
03:30 PM	3	88	21	1	39	8	35	3	16	109	1	0	3	1	2	0	330
03:45 PM	1	94	16	0	31	1	39	0	24	91	1	0	2	3	2	0	305
Total	7	342	82	1	138	21	146	5	87	399	8	1	12	8	6	0	1263
04:00 PM	0	82	12	1	53	3	41	1	34	110	2	0	2	1	4	0	346
04:15 PM	0	97	8	1	45	1	35	0	17	113	2	1	2	1	0	1	324
04:30 PM	4	80	22	0	41	3	47	0	15	122	1	1	1	0	9	0	346
04:45 PM	4	97	27	0	41	3	36	2	25	111	0	5	1	0	6	2	360
Total	8	356	69	2	180	10	159	3	91	456	5	7	6	2	19	3	1376
05:00 PM	6	96	23	1	46	1	40	1	19	103	0	1	2	1	6	0	346
05:15 PM	3	82	18	0	46	0	28	1	16	97	2	0	0	1	2	0	296
05:30 PM	1	95	23	0	51	0	45	2	22	104	0	0	5	3	9	1	361
05:45 PM	8	94	13	0	46	3	32	2	27	83	2	0	8	4	13	0	335
Total	18	367	77	1	189	4	145	6	84	387	4	1	15	9	30	1	1338
Grand Total	40	1373	318	5	631	45	571	17	384	1574	25	11	44	22	62	5	5127
Apprch %	2.3	79.1	18.3	0.3	49.9	3.6	45.2	1.3	19.3	78.9	1.3	0.6	33.1	16.5	46.6	3.8	
Total %	0.8	26.8	6.2	0.1	12.3	0.9	11.1	0.3	7.5	30.7	0.5	0.2	0.9	0.4	1.2	0.1	
Cars & Peds	39	1367	315	5	624	45	567	17	383	1570	25	11	44	22	61	5	5100
% Cars & Peds	97.5	99.6	99.1	100	98.9	100	99.3	100	99.7	99.7	100	100	100	100	98.4	100	99.5
Trucks & Bikes	1	6	3	0	7	0	4	0	1	4	0	0	0	0	1	0	27
% Trucks & Bikes	2.5	0.4	0.9	0	1.1	0	0.7	0	0.3	0.3	0	0	0	0	1.6	0	0.5

	McKay Street From North					Balch Street From East					McKay Street From South					Country Club Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	82	12	**1**	95	**53**	**3**	41	1	**98**	**34**	110	**2**	0	**146**	**2**	**1**	4	0	7	346
04:15 PM	0	**97**	8	1	106	45	1	35	0	81	17	113	2	1	133	2	1	0	1	4	324
04:30 PM	**4**	80	22	0	106	41	3	**47**	0	91	15	**122**	1	1	139	1	0	**9**	0	**10**	346
04:45 PM	4	97	**27**	0	**128**	41	3	36	**2**	82	25	111	0	**5**	141	1	0	6	**2**	9	**360**
Total Volume	8	356	69	2	435	180	10	159	3	352	91	456	5	7	559	6	2	19	3	30	1376
% App. Total	1.8	81.8	15.9	0.5		51.1	2.8	45.2	0.9		16.3	81.6	0.9	1.3		20	6.7	63.3	10		
PHF	.500	.918	.639	.500	.850	.849	.833	.846	.375	.898	.669	.934	.625	.350	.957	.750	.500	.528	.375	.750	.956
Cars & Peds	8	356	69	2	435	179	10	158	3	350	91	456	5	7	559	6	2	19	3	30	1374
% Cars & Peds	100	100	100	100	100	99.4	100	99.4	100	99.4	100	100	100	100	100	100	100	100	100	100	99.9
Trucks & Bikes	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2
% Trucks & Bikes	0	0	0	0	0	0.6	0	0.6	0	0.6	0	0	0	0	0	0	0	0	0	0	0.1

Transportation Data Corporation

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N/S: McKay Street
E/W: Balch Street/Golf Club
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493GG
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

Groups Printed- Trucks & Bikes

	McKay Street From North				Balch Street From East				McKay Street From South				Country Club Driveway From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
02:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:15 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
02:30 PM	0	0	1	0	1	0	3	0	0	2	0	0	0	0	0	0	7
02:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	1	0	2	0	3	0	0	3	0	0	0	0	0	0	11
03:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:15 PM	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	3
03:30 PM	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	3
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	1	0	2	0	0	0	1	1	0	0	0	0	0	0	7
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
05:00 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3
Total	0	3	1	0	2	0	0	0	0	0	0	0	0	0	1	0	7
Grand Total	1	6	3	0	7	0	4	0	1	4	0	0	0	0	1	0	27
Apprch %	10	60	30	0	63.6	0	36.4	0	20	80	0	0	0	0	100	0	
Total %	3.7	22.2	11.1	0	25.9	0	14.8	0	3.7	14.8	0	0	0	0	3.7	0	

	McKay Street From North					Balch Street From East					McKay Street From South					Country Club Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	0	0	**1**	0	**1**	**1**	0	**3**	0	**4**	0	**2**	0	0	**2**	0	0	0	0	0	**7**
02:45 PM	0	**1**	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00 PM	**1**	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:15 PM	0	1	0	0	1	1	0	0	0	1	**1**	0	0	0	1	0	0	0	0	0	3
Total Volume	1	2	1	0	4	2	0	3	0	5	1	2	0	0	3	0	0	0	0	0	12
% App. Total	25	50	25	0		40	0	60	0		33.3	66.7	0	0		0	0	0	0		
PHF	.250	.500	.250	.000	1.000	.500	.000	.250	.000	.313	.250	.250	.000	.000	.375	.000	.000	.000	.000	.000	.429

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N/S: McKay Street
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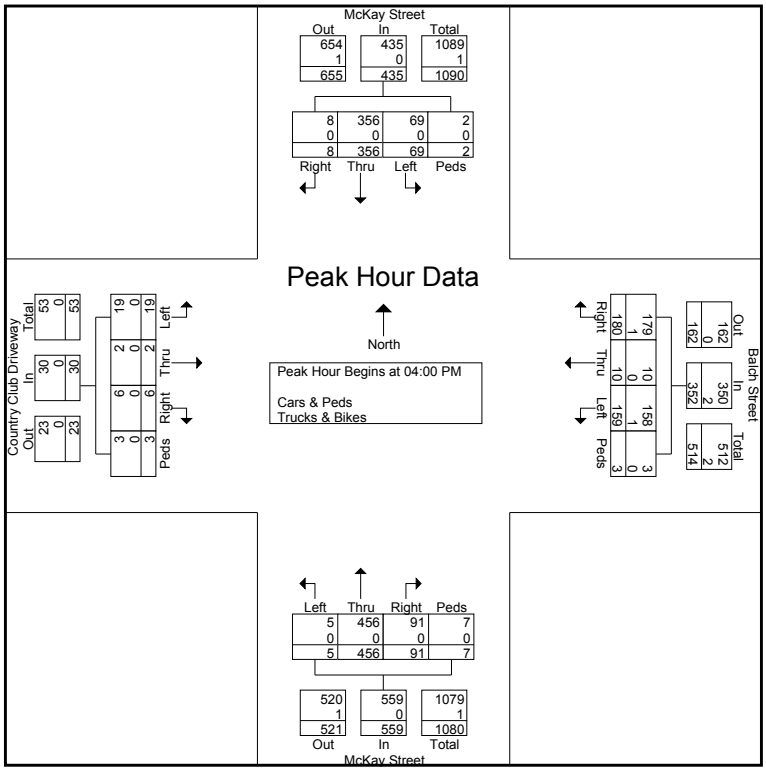
City, State: Beverly, MA
Client: Pare/A. Archer

File Name : 04493GG
Site Code : 04493
Start Date : 10/9/2014
Page No : 1

	McKay Street From North					Balch Street From East					McKay Street From South					Country Club Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	82	12	**1**	95	**53**	**3**	41	1	**98**	**34**	110	**2**	0	**146**	**2**	**1**	4	0	7	346
04:15 PM	0	**97**	8	1	106	45	1	35	0	81	17	113	2	1	133	2	1	0	1	4	324
04:30 PM	**4**	80	22	0	106	41	3	**47**	0	91	15	**122**	1	1	139	1	0	**9**	0	**10**	346
04:45 PM	4	97	**27**	0	**128**	41	3	36	**2**	82	25	111	0	**5**	141	1	0	6	**2**	9	**360**
Total Volume	8	356	69	2	435	180	10	159	3	352	91	456	5	7	559	6	2	19	3	30	1376
% App. Total	1.8	81.8	15.9	0.5		51.1	2.8	45.2	0.9		16.3	81.6	0.9	1.3		20	6.7	63.3	10		
PHF	.500	.918	.639	.500	.850	.849	.833	.846	.375	.898	.669	.934	.625	.350	.957	.750	.500	.528	.375	.750	.956
Cars & Peds	8	356	69	2	435	179	10	158	3	350	91	456	5	7	559	6	2	19	3	30	1374
% Cars & Peds	100	100	100	100	100	99.4	100	99.4	100	99.4	100	100	100	100	100	100	100	100	100	100	99.9
Trucks & Bikes	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2
% Trucks & Bikes	0	0	0	0	0	0.6	0	0.6	0	0.6	0	0	0	0	0	0	0	0	0	0	0.1



Pare Corporation

8 Blackstone Valley Place
Lincoln, RI 02865
www.parecorp.com

Roadway: Cabot Street
PARE Project No: 14225.00
Recorded By: CG
Weather: Sunny, Dry, Warm

File Name : cabot and russell am pm
Site Code : 00000000
Start Date : 6/3/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	CABOT From North					RUSSELL From East					CABOT From South					RUSSELL From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	79	1	0	80	7	1	5	1	14	0	77	0	0	77	0	0	0	0	0	171
07:15 AM	0	98	0	0	98	10	1	3	0	14	1	94	0	0	95	0	0	0	1	1	208
07:30 AM	0	98	2	0	100	24	0	8	3	35	1	127	0	0	128	0	0	0	1	1	264
07:45 AM	0	84	1	0	85	33	2	6	5	46	5	140	0	0	145	0	0	0	0	0	276
Total	0	359	4	0	363	74	4	22	9	109	7	438	0	0	445	0	0	0	2	2	919
08:00 AM	0	114	0	0	114	30	0	16	5	51	0	106	0	0	106	0	0	0	0	0	271
08:15 AM	0	123	0	0	123	12	1	8	5	26	2	100	0	0	102	0	0	0	0	0	251
08:30 AM	0	86	0	0	86	8	0	5	2	15	1	93	0	0	94	0	0	0	0	0	195
08:45 AM	0	92	0	1	93	7	1	4	4	16	0	106	0	0	106	0	0	0	0	0	215
Total	0	415	0	1	416	57	2	33	16	108	3	405	0	0	408	0	0	0	0	0	932
*** BREAK ***																					
02:00 PM	0	114	1	0	115	12	0	2	2	16	0	127	0	0	127	0	0	0	0	0	258
02:15 PM	0	105	0	0	105	13	0	6	1	20	1	143	0	0	144	0	0	0	0	0	269
02:30 PM	0	119	0	0	119	38	0	17	3	58	1	121	0	0	122	0	0	0	0	0	299
02:45 PM	0	118	2	0	120	42	0	21	5	68	0	153	0	0	153	0	0	0	0	0	341
Total	0	456	3	0	459	105	0	46	11	162	2	544	0	0	546	0	0	0	0	0	1167
03:00 PM	0	109	0	0	109	21	0	3	7	31	1	132	0	0	133	0	0	0	0	0	273
03:15 PM	0	125	1	0	126	11	0	12	10	33	1	121	0	0	122	0	0	0	0	0	281
03:30 PM	0	84	2	0	86	11	0	6	5	22	6	131	0	0	137	0	0	0	0	0	245
03:45 PM	0	110	2	0	112	11	0	3	6	20	0	120	0	0	120	0	0	0	0	0	252
Total	0	428	5	0	433	54	0	24	28	106	8	504	0	0	512	0	0	0	0	0	1051
04:00 PM	0	122	0	0	122	15	0	6	7	28	1	117	0	0	118	1	0	0	0	1	269
04:15 PM	0	110	1	0	111	14	0	7	3	24	4	112	0	0	116	0	0	0	0	0	251
04:30 PM	0	111	0	0	111	12	0	11	3	26	1	114	0	0	115	0	0	0	0	0	252
04:45 PM	0	119	0	0	119	13	0	5	2	20	7	163	0	0	170	0	0	0	0	0	309
Total	0	462	1	0	463	54	0	29	15	98	13	506	0	0	519	1	0	0	0	1	1081
05:00 PM	0	145	2	0	147	10	1	3	7	21	3	159	0	0	162	0	0	0	0	0	330
05:15 PM	0	140	2	0	142	10	0	6	1	17	1	144	0	0	145	0	0	0	0	0	304
05:30 PM	0	140	0	0	140	10	0	2	11	23	4	142	0	0	146	0	0	0	0	0	309
05:45 PM	0	121	1	0	122	9	1	2	7	19	1	165	0	0	166	0	0	0	0	0	307
Total	0	546	5	0	551	39	2	13	26	80	9	610	0	0	619	0	0	0	0	0	1250
Grand Total	0	2666	18	1	2685	383	8	167	105	663	42	3007	0	0	3049	1	0	0	2	3	6400
Apprch %	0	99.3	0.7	0		57.8	1.2	25.2	15.8		1.4	98.6	0	0		33.3	0	0	66.7		
Total %	0	41.7	0.3	0	42	6	0.1	2.6	1.6	10.4	0.7	47	0	0	47.6	0	0	0	0	0	

Pare Corporation

8 Blackstone Valley Place
Lincoln, RI 02865
www.parecorp.com

Roadway: Cabot Street
PARE Project No: 14225.00
Recorded By: CG
Weather: Sunny, Dry, Warm

File Name : cabot and russell am pm
Site Code : 00000000
Start Date : 6/3/2015
Page No : 2

Groups Printed- Cars - Heavy Vehicles

	CABOT From North					RUSSELL From East					CABOT From South					RUSSELL From West					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Cars	0	2608	16	1	2625	380	0	164	104	648	40	2938	0	0	2978	1	0	0	2	3	6254
% Cars	0	97.8	88.9	100	97.8	99.2	0	98.2	99	97.7	95.2	97.7	0	0	97.7	100	0	0	100	100	97.7
Heavy Vehicles	0	58	2	0	60	3	8	3	1	15	2	69	0	0	71	0	0	0	0	0	146
% Heavy Vehicles	0	2.2	11.1	0	2.2	0.8	100	1.8	1	2.3	4.8	2.3	0	0	2.3	0	0	0	0	0	2.3

Pare Corporation

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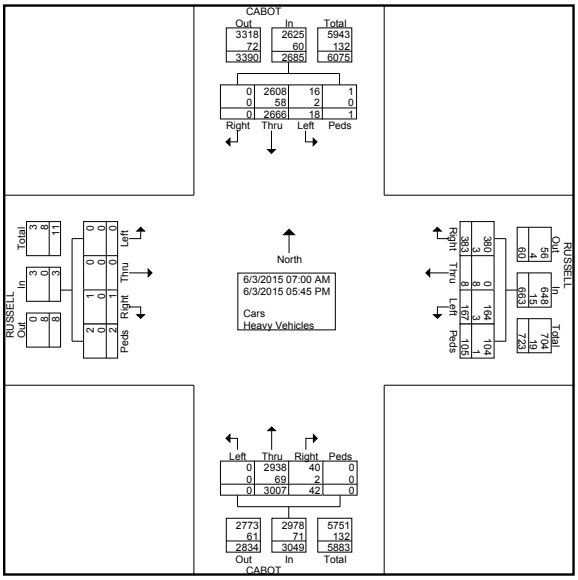
Roadway: Cabot Street
PARE Project No: 14225.00
Recorded By: CG
Weather: Sunny, Dry, Warm

File Name : cabot and russell am pm
Site Code : 00000000
Start Date : 6/3/2015
Page No : 3


CABOT
Out In Total
3318 2625 5943
72 60 132
3390 2685 6075
0 2608 16 1
0 58 2 0
0 2666 18 1
Right Thru Left Peds
RUSSELL
Out In Total
9 5 14
8 0 8
17 5 22
2 0 2
0 1 1
2 1 3
0 0 0
0 0 0
0 0 0

Pare Corporation

8 Blackstone Valley Place
Lincoln, RI 02865
www.parecorp.com

Roadway: Cabot Street
PARE Project No: 14225.00
Recorded By: CG
Weather: Sunny, Dry, Warm

File Name : cabot and russell am pm
Site Code : 00000000
Start Date : 6/3/2015
Page No : 4

	CABOT From North					RUSSELL From East					CABOT From South					RUSSELL From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	98	**2**	0	100	24	0	8	3	35	1	127	0	0	128	0	0	0	**1**	**1**	264
07:45 AM	0	84	1	0	85	**33**	**2**	6	**5**	46	**5**	**140**	0	0	**145**	0	0	0	0	0	**276**
08:00 AM	0	114	0	0	114	30	0	**16**	5	**51**	0	106	0	0	106	0	0	0	0	0	271
08:15 AM	0	**123**	0	0	**123**	12	1	8	5	26	2	100	0	0	102	0	0	0	0	0	251
Total Volume	0	419	3	0	422	99	3	38	18	158	8	473	0	0	481	0	0	0	1	1	1062
% App. Total	0	99.3	0.7	0		62.7	1.9	24.1	11.4		1.7	98.3	0	0		0	0	0	100		
PHF	.000	.852	.375	.000	.858	.750	.375	.594	.900	.775	.400	.845	.000	.000	.829	.000	.000	.000	.250	.250	.962
Cars	0	405	3	0	408	99	0	37	18	154	7	463	0	0	470	0	0	0	1	1	1033
% Cars	0	96.7	100	0	96.7	100	0	97.4	100	97.5	87.5	97.9	0	0	97.7	0	0	0	100	100	97.3
Heavy Vehicles	0	14	0	0	14	0	3	1	0	4	1	10	0	0	11	0	0	0	0	0	29
% Heavy Vehicles	0	3.3	0	0	3.3	0	100	2.6	0	2.5	12.5	2.1	0	0	2.3	0	0	0	0	0	2.7
Peak Hour Analysis From 03:00 PM to 03:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:00 PM																					
03:00 PM	0	109	0	0	109	**21**	0	3	7	31	1	**132**	0	0	133	0	0	0	0	0	273
03:15 PM	0	**125**	1	0	**126**	11	0	**12**	**10**	**33**	1	121	0	0	122	0	0	0	0	0	**281**
03:30 PM	0	84	**2**	0	86	11	0	6	5	22	**6**	131	0	0	**137**	0	0	0	0	0	245
03:45 PM	0	110	2	0	112	11	0	3	6	20	0	120	0	0	120	0	0	0	0	0	252
Total Volume	0	428	5	0	433	54	0	24	28	106	8	504	0	0	512	0	0	0	0	0	1051
% App. Total	0	98.8	1.2	0		50.9	0	22.6	26.4		1.6	98.4	0	0		0	0	0	0		
PHF	.000	.856	.625	.000	.859	.643	.000	.500	.700	.803	.333	.955	.000	.000	.934	.000	.000	.000	.000	.000	.935
Cars	0	419	5	0	424	54	0	24	27	105	8	492	0	0	500	0	0	0	0	0	1029
% Cars	0	97.9	100	0	97.9	100	0	100	96.4	99.1	100	97.6	0	0	97.7	0	0	0	0	0	97.9
Heavy Vehicles	0	9	0	0	9	0	0	0	1	1	0	12	0	0	12	0	0	0	0	0	22
% Heavy Vehicles	0	2.1	0	0	2.1	0	0	0	3.6	0.9	0	2.4	0	0	2.3	0	0	0	0	0	2.1

Pare Corporation

8 Blackstone Valley Place
Lincoln, RI 02865
www.parecorp.com

Roadway: Cabot Street
PARE Project No: 14225.00
Recorded By: CG
Weather: Sunny, Dry, Warm

File Name : cabot and russell am pm
Site Code : 00000000
Start Date : 6/3/2015
Page No : 5

	CABOT From North					RUSSELL From East					CABOT From South					RUSSELL From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	119	0	0	119	**13**	0	5	2	20	**7**	**163**	0	0	**170**	0	0	0	0	0	309
05:00 PM	0	**145**	**2**	0	**147**	10	**1**	3	7	21	3	159	0	0	162	0	0	0	0	0	**330**
05:15 PM	0	140	2	0	142	10	0	**6**	1	17	1	144	0	0	145	0	0	0	0	0	304
05:30 PM	0	140	0	0	140	10	0	2	**11**	**23**	4	142	0	0	146	0	0	0	0	0	309
Total Volume	0	544	4	0	548	43	1	16	21	81	15	608	0	0	623	0	0	0	0	0	1252
% App. Total	0	99.3	0.7	0		53.1	1.2	19.8	25.9		2.4	97.6	0	0		0	0	0	0		
PHF	.000	.938	.500	.000	.932	.827	.250	.667	.477	.880	.536	.933	.000	.000	.916	.000	.000	.000	.000	.000	.948
Cars	0	535	3	0	538	42	0	16	21	79	14	602	0	0	616	0	0	0	0	0	1233
% Cars	0	98.3	75.0	0	98.2	97.7	0	100	100	97.5	93.3	99.0	0	0	98.9	0	0	0	0	0	98.5
Heavy Vehicles	0	9	1	0	10	1	1	0	0	2	1	6	0	0	7	0	0	0	0	0	19
% Heavy Vehicles	0	1.7	25.0	0	1.8	2.3	100	0	0	2.5	6.7	1.0	0	0	1.1	0	0	0	0	0	1.5

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Roadway: Cabot Street
PARE Project No: 14225.00
Recorded By: CR
Weather: Sunny, Dry, Warm

File Name : cabot and kittredge am
Site Code : 00000000
Start Date : 6/3/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	CABOT From North					KITTREDGE From East					CABOT From South					KITTREDGE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	89	2	0	91	0	0	0	0	0	5	95	0	0	100	0	0	0	1	1	192
07:15 AM	0	95	8	0	103	1	0	0	0	1	15	111	0	0	126	0	0	0	1	1	231
07:30 AM	0	96	9	0	105	0	0	0	2	2	14	169	0	1	184	0	0	0	1	1	292
07:45 AM	0	95	10	0	105	0	0	0	1	1	40	136	0	0	176	0	0	0	1	1	283
Total	0	375	29	0	404	1	0	0	3	4	74	511	0	1	586	0	0	0	4	4	998
08:00 AM	0	125	24	0	149	0	0	0	2	2	47	135	0	1	183	0	0	0	0	0	334
08:15 AM	0	132	3	0	135	0	0	0	1	1	11	115	0	0	126	0	0	0	0	0	262
08:30 AM	0	97	0	0	97	0	0	0	0	0	4	112	0	0	116	0	0	0	0	0	213
08:45 AM	0	92	0	0	92	0	0	0	0	0	4	106	0	1	111	0	0	0	0	0	203
Total	0	446	27	0	473	0	0	0	3	3	66	468	0	2	536	0	0	0	0	0	1012
Grand Total	0	821	56	0	877	1	0	0	6	7	140	979	0	3	1122	0	0	0	4	4	2010
Apprch %	0	93.6	6.4	0		14.3	0	0	85.7		12.5	87.3	0	0.3		0	0	0	100		
Total %	0	40.8	2.8	0	43.6	0	0	0	0.3	0.3	7	48.7	0	0.1	55.8	0	0	0	0.2	0.2	
Cars	0	802	56	0	858	1	0	0	6	7	140	956	0	3	1099	0	0	0	4	4	1968
% Cars	0	97.7	100	0	97.8	100	0	0	100	100	100	97.7	0	100	98	0	0	0	100	100	97.9
Heavy Vehicles	0	19	0	0	19	0	0	0	0	0	0	23	0	0	23	0	0	0	0	0	42
% Heavy Vehicles	0	2.3	0	0	2.2	0	0	0	0	0	0	2.3	0	0	2	0	0	0	0	0	2.1

Pare Corporation

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Roadway: Cabot Street
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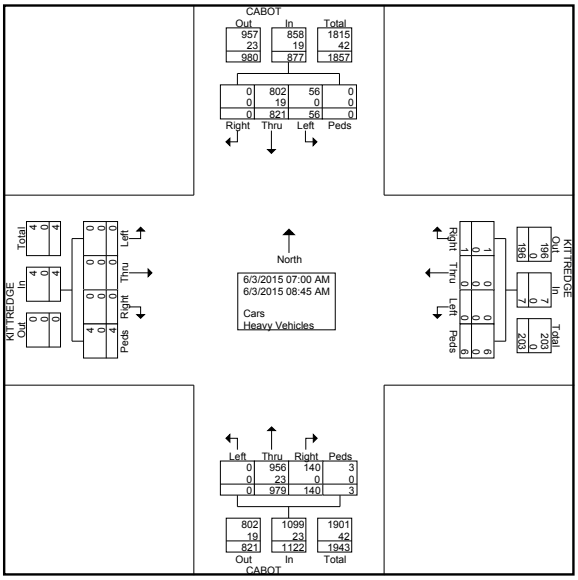
File Name : cabot and kittredge am
Site Code : 00000000
Start Date : 6/3/2015
Page No : 2



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	CABOT From North					KITTREDGE From East					CABOT From South					KITTREDGE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	96	9	0	105	0	0	0	**2**	**2**	14	**169**	0	**1**	**184**	0	0	0	**1**	**1**	292
07:45 AM	0	95	10	0	105	0	0	0	1	1	40	136	0	0	176	0	0	0	1	1	283
08:00 AM	0	125	**24**	0	**149**	0	0	0	2	2	**47**	135	0	1	183	0	0	0	0	0	**334**
08:15 AM	0	**132**	3	0	135	0	0	0	1	1	11	115	0	0	126	0	0	0	0	0	262
Total Volume	0	448	46	0	494	0	0	0	6	6	112	555	0	2	669	0	0	0	2	2	1171
% App. Total	0	90.7	9.3	0		0	0	0	100		16.7	83	0	0.3		0	0	0	100		
PHF	.000	.848	.479	.000	.829	.000	.000	.000	.750	.750	.596	.821	.000	.500	.909	.000	.000	.000	.500	.500	.876
Cars	0	434	46	0	480	0	0	0	6	6	112	545	0	2	659	0	0	0	2	2	1147
% Cars	0	96.9	100	0	97.2	0	0	0	100	100	100	98.2	0	100	98.5	0	0	0	100	100	98.0
Heavy Vehicles	0	14	0	0	14	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	24
% Heavy Vehicles	0	3.1	0	0	2.8	0	0	0	0	0	0	1.8	0	0	1.5	0	0	0	0	0	2.0

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File Name : cabot and kittredge pm
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Start Date : 6/3/2015
Page No : 1

Groups Printed- Cars - Trucks

	CABOT From North					KITTREDGE From East					CABOT From South					KITTREDGE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	0	114	3	0	117	0	0	0	0	0	8	136	0	0	144	0	0	0	0	0	261
02:15 PM	0	117	8	0	125	0	0	0	0	0	12	141	0	0	153	0	0	0	0	0	278
02:30 PM	0	122	14	0	136	0	0	0	1	1	21	150	0	4	175	0	0	0	0	0	312
02:45 PM	0	131	5	0	136	0	0	0	3	3	13	149	0	0	162	0	0	0	0	0	301
Total	0	484	30	0	514	0	0	0	4	4	54	576	0	4	634	0	0	0	0	0	1152
03:00 PM	0	113	3	0	116	0	0	0	2	2	4	157	0	0	161	0	0	0	0	0	279
03:15 PM	0	139	6	0	145	0	0	0	2	2	5	145	0	0	150	0	0	0	2	2	299
03:30 PM	0	114	7	0	121	0	0	0	5	5	6	170	0	0	176	0	0	0	1	1	303
03:45 PM	0	113	4	0	117	0	0	0	1	1	5	154	0	0	159	0	0	0	1	1	278
Total	0	479	20	0	499	0	0	0	10	10	20	626	0	0	646	0	0	0	4	4	1159
04:00 PM	0	147	4	0	151	0	0	0	1	1	11	161	0	1	173	0	0	0	0	0	325
04:15 PM	0	127	6	0	133	0	0	0	1	1	5	166	0	0	171	0	0	0	0	0	305
04:30 PM	0	134	4	0	138	0	0	0	2	2	6	168	0	0	174	0	0	0	1	1	315
04:45 PM	0	120	5	0	125	0	0	0	1	1	4	190	0	0	194	0	0	0	1	1	321
Total	0	528	19	0	547	0	0	0	5	5	26	685	0	1	712	0	0	0	2	2	1266
05:00 PM	0	151	7	0	158	0	0	0	7	7	2	183	0	0	185	0	0	0	1	1	351
05:15 PM	0	162	8	0	170	0	0	0	0	0	6	189	0	0	195	0	0	0	2	2	367
05:30 PM	0	132	6	0	138	0	0	0	3	3	8	166	0	0	174	0	0	0	6	6	321
05:45 PM	0	122	5	0	127	0	0	0	1	1	6	161	0	0	167	0	0	0	6	6	301
Total	0	567	26	0	593	0	0	0	11	11	22	699	0	0	721	0	0	0	15	15	1340
Grand Total	0	2058	95	0	2153	0	0	0	30	30	122	2586	0	5	2713	0	0	0	21	21	4917
Apprch %	0	95.6	4.4	0		0	0	0	100		4.5	95.3	0	0.2		0	0	0	100		
Total %	0	41.9	1.9	0	43.8	0	0	0	0.6	0.6	2.5	52.6	0	0.1	55.2	0	0	0	0.4	0.4	
Cars	0	2019	95	0	2114	0	0	0	30	30	122	2540	0	5	2667	0	0	0	21	21	4832
% Cars	0	98.1	100	0	98.2	0	0	0	100	100	100	98.2	0	100	98.3	0	0	0	100	100	98.3
Trucks	0	39	0	0	39	0	0	0	0	0	0	46	0	0	46	0	0	0	0	0	85
% Trucks	0	1.9	0	0	1.8	0	0	0	0	0	0	1.8	0	0	1.7	0	0	0	0	0	1.7

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File Name : cabot and kittredge pm
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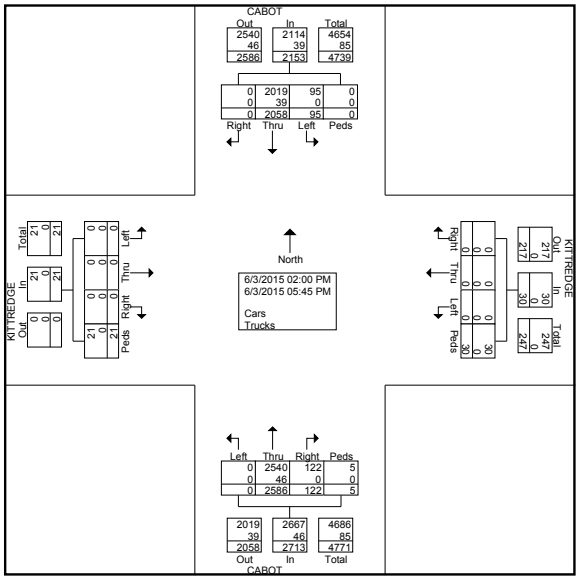

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	CABOT From North					KITTREDGE From East					CABOT From South					KITTREDGE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 03:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:00 PM																					
03:00 PM	0	113	3	0	116	0	0	0	2	2	4	157	0	0	161	0	0	0	0	0	279
03:15 PM	0	**139**	6	0	**145**	0	0	0	2	2	5	145	0	0	150	0	0	0	**2**	**2**	299
03:30 PM	0	114	**7**	0	121	0	0	0	**5**	**5**	**6**	**170**	0	0	**176**	0	0	0	1	1	**303**
03:45 PM	0	113	4	0	117	0	0	0	1	1	5	154	0	0	159	0	0	0	1	1	278
Total Volume	0	479	20	0	499	0	0	0	10	10	20	626	0	0	646	0	0	0	4	4	1159
% App. Total	0	96	4	0		0	0	0	100		3.1	96.9	0	0		0	0	0	100		
PHF	.000	.862	.714	.000	.860	.000	.000	.000	.500	.500	.833	.921	.000	.000	.918	.000	.000	.000	.500	.500	.956
Cars	0	470	20	0	490	0	0	0	10	10	20	614	0	0	634	0	0	0	4	4	1138
% Cars	0	98.1	100	0	98.2	0	0	0	100	100	100	98.1	0	0	98.1	0	0	0	100	100	98.2
Trucks	0	9	0	0	9	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	21
% Trucks	0	1.9	0	0	1.8	0	0	0	0	0	0	1.9	0	0	1.9	0	0	0	0	0	1.8
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	120	5	0	125	0	0	0	1	1	4	**190**	0	0	194	0	0	0	1	1	321
05:00 PM	0	151	7	0	158	0	0	0	**7**	**7**	2	183	0	0	185	0	0	0	1	1	351
05:15 PM	0	**162**	**8**	0	**170**	0	0	0	0	0	6	189	0	0	**195**	0	0	0	2	2	**367**
05:30 PM	0	132	6	0	138	0	0	0	3	3	**8**	166	0	0	174	0	0	0	**6**	**6**	321
Total Volume	0	565	26	0	591	0	0	0	11	11	20	728	0	0	748	0	0	0	10	10	1360
% App. Total	0	95.6	4.4	0		0	0	0	100		2.7	97.3	0	0		0	0	0	100		
PHF	.000	.872	.813	.000	.869	.000	.000	.000	.393	.393	.625	.958	.000	.000	.959	.000	.000	.000	.417	.417	.926
Cars	0	556	26	0	582	0	0	0	11	11	20	722	0	0	742	0	0	0	10	10	1345
% Cars	0	98.4	100	0	98.5	0	0	0	100	100	100	99.2	0	0	99.2	0	0	0	100	100	98.9
Trucks	0	9	0	0	9	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	15
% Trucks	0	1.6	0	0	1.5	0	0	0	0	0	0	0.8	0	0	0.8	0	0	0	0	0	1.1

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

Cabot Street (Route 1A)
north of Crosby Avenue
City, State: Beverly, MA
Client: McM/A. Archer

04493BVOLUME
Site Code: 04493

Start	08-Oct-14	SB		Hour Totals		NB		Hour Totals		Combined Totals	
Time	Wed	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		11	109			8	109				
12:15		3	116			3	112				
12:30		6	119			7	114				
12:45		4	103	24	447	4	108	22	443	46	890
01:00		4	101			6	125				
01:15		4	114			3	118				
01:30		5	94			1	89				
01:45		0	125	13	434	6	123	16	455	29	889
02:00		2	76			1	161				
02:15		0	111			3	151				
02:30		3	127			2	157				
02:45		2	108	7	422	0	138	6	607	13	1029
03:00		1	130			3	172				
03:15		4	114			5	153				
03:30		3	120			7	181				
03:45		3	122	11	486	10	144	25	650	36	1136
04:00		1	118			7	146				
04:15		6	144			4	111				
04:30		9	131			4	163				
04:45		5	128	21	521	5	144	20	564	41	1085
05:00		9	147			21	121				
05:15		17	124			21	137				
05:30		26	121			26	136				
05:45		39	122	91	514	41	123	109	517	200	1031
06:00		33	115			52	153				
06:15		46	113			54	115				
06:30		59	112			61	113				
06:45		108	111	246	451	62	103	229	484	475	935
07:00		79	100			61	111				
07:15		107	75			93	68				
07:30		80	71			184	76				
07:45		123	72	389	318	162	74	500	329	889	647
08:00		133	70			146	69				
08:15		151	69			108	46				
08:30		130	56			133	39				
08:45		112	57	526	252	106	45	493	199	1019	451
09:00		102	79			105	49				
09:15		100	44			92	40				
09:30		95	48			87	35				
09:45		97	51	394	222	126	32	410	156	804	378
10:00		106	40			93	28				
10:15		99	42			98	18				
10:30		90	28			93	24				
10:45		130	19	425	129	100	15	384	85	809	214
11:00		91	27			106	23				
11:15		102	20			88	23				
11:30		84	8			119	19				
11:45		106	13	383	68	118	11	431	76	814	144
Total		2530	4264			2645	4565			5175	8829
Percent		37.2%	62.8%			36.7%	63.3%			37.0%	63.0%
Combined Total		6794				7210				14004	

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

Cabot Street (Route 1A)
north of Crosby Avenue
City, State: Beverly, MA
Client: McM/A. Archer

04493BVOLUME
Site Code: 04493

Start Time	09-Oct-14 Thu	SB Morning	SB Afternoon	Hour Totals Morning	Hour Totals Afternoon	NB Morning	NB Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		10	110			12	121				
12:15		9	102			3	113				
12:30		5	99			6	105				
12:45		4	114	28	425	3	109	24	448	52	873
01:00		4	112			2	132				
01:15		1	124			3	127				
01:30		1	91			6	110				
01:45		0	101	6	428	4	115	15	484	21	912
02:00		0	97			1	116				
02:15		3	143			0	144				
02:30		1	126			5	154				
02:45		2	106	6	472	4	136	10	550	16	1022
03:00		1	143			8	130				
03:15		3	125			2	155				
03:30		1	118			7	150				
03:45		4	121	9	507	4	168	21	603	30	1110
04:00		6	146			1	156				
04:15		4	115			7	142				
04:30		5	127			6	166				
04:45		4	105	19	493	14	134	28	598	47	1091
05:00		12	130			17	113				
05:15		19	157			21	135				
05:30		18	126			28	162				
05:45		28	151	77	564	43	128	109	538	186	1102
06:00		29	121			48	145				
06:15		50	108			55	109				
06:30		68	115			57	108				
06:45		81	119	228	463	58	139	218	501	446	964
07:00		73	88			78	71				
07:15		104	88			106	81				
07:30		99	73			162	80				
07:45		125	62	401	311	164	62	510	294	911	605
08:00		135	65			141	72				
08:15		139	55			123	48				
08:30		135	56			107	34				
08:45		128	51	537	227	96	54	467	208	1004	435
09:00		94	42			98	65				
09:15		94	41			99	31				
09:30		90	37			93	44				
09:45		105	39	383	159	101	29	391	169	774	328
10:00		97	40			89	25				
10:15		102	27			92	25				
10:30		97	23			101	21				
10:45		114	21	410	111	99	19	381	90	791	201
11:00		105	21			110	17				
11:15		95	18			94	16				
11:30		92	12			108	17				
11:45		100	14	392	65	116	8	428	58	820	123
Total		2496	4225			2602	4541			5098	8766
Percent		37.1%	62.9%			36.4%	63.6%			36.8%	63.2%
Combined Total		6721				7143				13864	
Total		5026	8489			5247	9106			10273	17595
Percent		37.2%	62.8%			36.6%	63.4%			36.9%	63.1%
Combined Total		13515				14353				27868	
ADT		ADT 13,934		AADT 13,934							

Appendix B

Crash Data and Crash Rate Calculations

Beverly Middle School
Crash Data Summary
January 2010 - December 2013

Crash Number	City/Town Name	Crash Date	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Directions	Weather Condition	Road Surface Condition	Ambient Light	Intersection/Roadway
2587860	BEVERLY	4/17/10	2	0	0	Angle	NB/EB	Rain/Rain	Wet	Daylight	CABOT ST / DODGE ST
2589060	BEVERLY	3/30/10	2	0	0	Angle	NB/NB	Rain/Rain	Wet	Daylight	CABOT ST / DODGE ST
2592442	BEVERLY	5/1/10	2	1	0	Angle	NB/SB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2652601	BEVERLY	10/21/10	2	0	0	Angle	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2722386	BEVERLY	5/10/11	2	0	0	Angle	WB/NB	Cloudy/Cloudy	Dry	Daylight	CABOT ST / DODGE ST
2754954	BEVERLY	8/26/11	2	0	0	Angle	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2757249	BEVERLY	9/2/11	2	0	0	Angle	SB/NB	Clear/Clear	Dry	Dark - Lighted	CABOT ST / DODGE ST
2758847	BEVERLY	7/8/11	3	0	0	Angle	UNK/UNK/UNK	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2768443	BEVERLY	9/23/11	2	0	0	Angle	UNK/UNK	Cloudy/Cloudy	Dry	Daylight	CABOT ST / DODGE ST
2874527	BEVERLY	1/20/12	2	0	0	Angle	NB/SB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
3067635	BEVERLY	5/4/12	2	1	0	Angle	WB/NB	Cloudy/Rain	Wet	Daylight	CABOT ST / DODGE ST
3267499	BEVERLY	9/29/12	2	0	0	Angle	NB/SB	Cloudy/Cloudy	Dry	Daylight	CABOT ST / DODGE ST
3366613	BEVERLY	2/22/13	2	0	0	Angle	SB/EB	Cloudy/Cloudy	Wet	Daylight	CABOT ST / DODGE ST
2645001	BEVERLY	9/28/10	2	0	0	Head-on	SB/EB	Cloudy/Rain	Wet	Daylight	CABOT ST / DODGE ST
2563643	BEVERLY	1/15/10	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2566337	BEVERLY	1/14/10	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2581080	BEVERLY	2/17/10	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Dark - Lighted	CABOT ST / DODGE ST
2629551	BEVERLY	8/5/10	2	1	0	Rear-end	SB/SB	Cloudy/Cloudy	Dry	Daylight	CABOT ST / DODGE ST
2682364	BEVERLY	1/6/11	3	0	0	Rear-end	SB/SB/SB	Clear/Clear	Dry	Dark - Lighted	CABOT ST / DODGE ST
2748318	BEVERLY	8/2/11	2	0	0	Rear-end	NB/NB	Rain/Rain	Wet	Daylight	CABOT ST / DODGE ST
2754957	BEVERLY	8/28/11	2	0	0	Rear-end	SB/SB	Rain/Cloudy	Wet	Daylight	CABOT ST / DODGE ST
3067638	BEVERLY	5/5/12	2	0	0	Rear-end	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
3286681	BEVERLY	10/13/12	2	0	0	Rear-end	EB/EB	Cloudy/Cloudy	Dry	Daylight	CABOT ST / DODGE ST
3298530	BEVERLY	12/5/12	3	2	0	Rear-end	NB/NB/NB	Cloudy/Cloudy	Dry	Daylight	CABOT ST / DODGE ST
3664704	BEVERLY	12/1/13	2	0	0	Rear-end	SB/SB	Cloudy/Cloudy	Wet	Dark - Lighted	CABOT ST / DODGE ST
3548838	BEVERLY	8/5/13	2	0	0	Sideswipe - OD	NB/SB	Clear/Clear	Dry	Dark - Lighted	CABOT ST / DODGE ST
3182445	BEVERLY	7/15/12	2	0	0	Sideswipe - SD	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2594041	BEVERLY	4/13/10	1	0	0	Single vehicle crash	UNK	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
2735566	BEVERLY	6/24/11	1	1	0	Single vehicle crash	NB	Rain/Rain	Wet	Dark - Lighted	CABOT ST / DODGE ST
2836631	BEVERLY	12/23/11	2	0	0	Single vehicle crash	SB/EB	Cloudy/Rain	Wet	Daylight	CABOT ST / DODGE ST
3138840	BEVERLY	5/3/12	2	0	0	Single vehicle crash	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST / DODGE ST
3350459	BEVERLY	1/21/13	2	0	0	Single vehicle crash	SB/SB	Cloudy/Cloudy	Dry	Dark - Lighted	CABOT ST / DODGE ST
			32	6	0						
2589231	BEVERLY	4/23/10	2	0	0	Angle	NB/SB	Cloudy/Cloudy	Dry	Daylight	CABOT ST / BALCH ST
2607400	BEVERLY	5/17/10	2	0	0	Angle	WB/EB	Clear/Clear	Dry	Daylight	CABOT ST / BALCH ST
2733861	BEVERLY	6/20/11	2	1	0	Angle	NB/EB	Clear/Clear	Dry	Daylight	CABOT ST / BALCH ST
3028908	BEVERLY	4/12/12	2	1	0	Angle	NB/EB	Cloudy/Cloudy	Dry	Dusk	CABOT ST / BALCH ST
3323440	BEVERLY	12/28/12	2	0	0	Angle	WB/NB	Clear/Clear	Dry	Daylight	CABOT ST / BALCH ST
2648911	BEVERLY	10/7/10	4	1	0	Rear-end	SB/SB/SB/SB	Clear/Clear	Dry	Dark - Lighted	CABOT ST / BALCH ST
2751350	BEVERLY	8/11/11	2	0	0	Rear-end	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST / BALCH ST
2957754	BEVERLY	3/13/12	2	1	0	Rear-end	UNK/UNK	Clear/Clear	Dry	Dark - Lighted	CABOT ST / BALCH ST
3248534	BEVERLY	9/4/12	2	0	0	Rear-end	UNK/SB	Rain/Rain	Wet	Daylight	CABOT ST / BALCH ST
3576648	BEVERLY	8/31/13	2	0	0	Rear-end	NB/NB	Cloudy/Cloudy	Wet	Daylight	CABOT ST / BALCH ST
3028909	BEVERLY	4/13/12	2	1	0	Reported but invalid	EB/EB	Clear/Clear	Dry	Daylight	CABOT ST / BALCH ST
2920567	BEVERLY	2/23/12	1	0	0	Single vehicle crash	NB/SB	Clear/Clear	Dry	Dark - Lighted	CABOT ST / BALCH ST
			12	5	0						
3350468	BEVERLY	2/3/13	1	0	0	Single vehicle crash	NB	Clear/Clear	Dry	Dark - Lighted	CABOT ST / RUSSELL ST
			1	0	0						
2677173	BEVERLY	12/30/10	2	0	0	Angle	NB/EWB	Clear/Clear	Wet	Dark - Lighted	MCKAY ST / BALCH ST
2681942	BEVERLY	1/18/11	2	0	0	Angle	WB/WB	Snow/Snow	Snow	Daylight	MCKAY ST / BALCH ST
2733305	BEVERLY	6/19/11	2	0	0	Angle	SB/WB	Clear/Clear	Dry	Dark - Lighted	MCKAY ST / BALCH ST
3287171	BEVERLY	11/5/12	2	0	0	Angle	UNK/UNK	Cloudy/Cloudy	Dry	Daylight	MCKAY ST / BALCH ST
3157233	BEVERLY	6/28/12	2	1	0	Rear-end	EB/EB	Clear/Clear	Dry	Daylight	MCKAY ST / BALCH ST
3591549	BEVERLY	9/20/13	2	0	0	Rear-end	WB/WB	Clear/Clear	Dry	Daylight	MCKAY ST / BALCH ST
3138841	BEVERLY	6/11/12	1	0	0	Single vehicle crash	EB	Clear/Clear	Dry	Dark - Lighted	MCKAY ST / BALCH ST
			7	1	0						
3292333	BEVERLY	11/16/12	2	0	0	Angle	SB/UNK	Clear/Clear	Dry	Daylight	BALCH ST
3403835	BEVERLY	4/24/13	1	1	0	Angle	NB	Clear/Clear	Dry	Dusk	BALCH ST
3267497	BEVERLY	9/28/12	2	1	0	Rear-end	UNK/UNK	Rain/Cloudy	Wet	Daylight	BALCH ST
2701635	BEVERLY	2/28/11	2	0	0	Sideswipe - OD	UNK/UNK	Sleet	Ice	Daylight	BALCH ST
2786670	BEVERLY	10/14/11	2	0	0	Sideswipe - SD	EB/EB	Rain/Rain	Wet	Daylight	BALCH ST
			5	2	0						

Beverly Middle School
Crash Data Summary
January 2010 - December 2013

Crash Number	City/Town Name	Crash Date	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Directions	Weather Condition	Road Surface Condition	Ambient Light	Intersection/Roadway
2587740	BEVERLY	3/23/10	2	2	0	Angle	WB/NB	Rain	Wet	Dark - Lighted	CABOT ST
2600062	BEVERLY	4/9/10	2	0	0	Angle	NB/NB	Cloudy/Rain	Wet	Daylight	CABOT ST
2617160	BEVERLY	6/7/10	2	0	0	Angle	WB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2626179	BEVERLY	8/8/10	2	1	0	Angle	WB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2627965	BEVERLY	8/11/10	2	0	0	Angle	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST
2628942	BEVERLY	8/13/10	2	1	0	Angle	WB/EB	Clear/Clear	Dry	Daylight	CABOT ST
2643845	BEVERLY	9/22/10	2	0	0	Angle	NB/UNK	Clear/Clear	Dry	Daylight	CABOT ST
2653412	BEVERLY	10/22/10	2	0	0	Angle	SB/NB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
2655258	BEVERLY	10/28/10	2	0	0	Angle	EB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2670730	BEVERLY	12/10/10	2	0	0	Angle	EB/WB	Clear/Clear	Dry	Daylight	CABOT ST
2677171	BEVERLY	12/29/10	2	0	0	Angle	EB/SB	Clear/Clear	Wet	Daylight	CABOT ST
2689095	BEVERLY	2/4/11	2	0	0	Angle	NB/UNK	Clear/Clear	Slush	Daylight	CABOT ST
2720322	BEVERLY	4/28/11	2	0	0	Angle	UNK/UNK	Cloudy/Clear	Dry	Daylight	CABOT ST
2724117	BEVERLY	5/17/11	2	0	0	Angle	SB/WB	Cloudy/Rain	Wet	Daylight	CABOT ST
2724910	BEVERLY	5/20/11	1	1	0	Angle	EB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
2731222	BEVERLY	6/7/11	2	0	0	Angle	WB/EB	Clear/Clear	Dry	Daylight	CABOT ST
2749486	BEVERLY	8/4/11	2	0	0	Angle	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST
2939652	BEVERLY	2/29/12	2	0	0	Angle	NB/NB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
3279857	BEVERLY	10/17/12	2	1	0	Angle	SB/NB	Clear/Clear	Dry	Dark - Lighted	CABOT ST
3358632	BEVERLY	2/19/13	2	2	0	Angle	WB/NB	Cloudy/Cloudy	Wet	Daylight	CABOT ST
3654638	BEVERLY	11/7/13	2	2	0	Angle	EB/SB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
3655898	BEVERLY	11/12/13	2	0	0	Angle	SB/WB	Clear/Clear	Dry	Dark - Lighted	CABOT ST
2646750	BEVERLY	10/3/10	3	0	0	Head-on	SB/NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2715256	BEVERLY	4/10/11	2	0	0	Head-on	NB/SB	Clear/Clear	Dry	Dark - Lighted	CABOT ST
2786672	BEVERLY	10/24/11	2	3	0	Head-on	SB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2566019	BEVERLY	1/9/10	2	0	0	Rear-end	WB/UNK	Clear/Clear	Dry	Daylight	CABOT ST
2566320	BEVERLY	1/24/10	3	0	0	Rear-end	SB/SB/SB	Cloudy	Dry	Daylight	CABOT ST
2589061	BEVERLY	3/30/10	2	0	0	Rear-end	SB/SB	Rain/Cloudy	Wet	Daylight	CABOT ST
2606472	BEVERLY	6/8/10	3	0	0	Rear-end	SB/SB/SB	Clear/Clear	Dry	Daylight	CABOT ST
2611157	BEVERLY	6/21/10	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2634354	BEVERLY	8/27/10	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2638605	BEVERLY	9/9/10	2	1	0	Rear-end	NB/NB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
2639275	BEVERLY	9/10/10	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2642493	BEVERLY	9/19/10	2	1	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2700764	BEVERLY	3/8/11	2	0	0	Rear-end	SB/UNK	Clear/Clear	Dry	Daylight	CABOT ST
2707078	BEVERLY	3/11/11	2	0	0	Rear-end	SB/UNK	Cloudy/Rain	Wet	Daylight	CABOT ST
2711143	BEVERLY	4/1/11	2	3	0	Rear-end	WB/WB	Cloudy/Cloudy	Slush	Daylight	CABOT ST
2719036	BEVERLY	4/27/11	3	0	0	Rear-end	NB/NB/NB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
2723186	BEVERLY	5/13/11	2	0	0	Rear-end	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST
2740386	BEVERLY	7/12/11	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2763459	BEVERLY	9/17/11	2	1	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2766052	BEVERLY	9/21/11	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2786671	BEVERLY	10/24/11	3	0	0	Rear-end	NB/NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2793961	BEVERLY	11/11/11	2	1	0	Rear-end	SB/SB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
2909740	BEVERLY	2/14/12	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2912639	BEVERLY	2/10/12	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
2949054	BEVERLY	3/7/12	3	3	0	Rear-end	WB/WB/NB	Clear/Clear	Dry	Daylight	CABOT ST
3115419	BEVERLY	5/29/12	2	0	0	Rear-end	SB/SB	Cloudy/Other	Dry	Daylight	CABOT ST
3120182	BEVERLY	6/5/12	2	0	0	Rear-end	NB/NB	Cloudy/Cloudy	Wet	Daylight	CABOT ST
3295707	BEVERLY	11/27/12	2	0	0	Rear-end	NB/NB	Rain/Rain	Wet	Dark - Lighted	CABOT ST
3352528	BEVERLY	2/10/13	3	0	0	Rear-end	SB/SB/SB	Clear/Clear	Wet	Daylight	CABOT ST
3356068	BEVERLY	2/15/13	2	1	0	Rear-end	EB/EB	Clear/Clear	Dry	Daylight	CABOT ST
3434051	BEVERLY	6/2/13	2	0	0	Rear-end	UNK/UNK	Clear/Clear	Dry	Dark - Lighted	CABOT ST
3510617	BEVERLY	7/11/13	2	1	0	Rear-end	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST
3640938	BEVERLY	10/26/13	2	0	0	Rear-end	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
3654737	BEVERLY	11/7/13	2	0	0	Rear-end	SB/SB	Clear/Clear	Wet	Daylight	CABOT ST
2670161	BEVERLY	12/10/10	2	0	0	Sideswipe - OD	WB/EB	Cloudy/Cloudy	Ice	Daylight	CABOT ST
2752976	BEVERLY	8/19/11	2	0	0	Sideswipe - OD	NB/SB	Clear/Clear	Dry	Daylight	CABOT ST
3161432	BEVERLY	7/3/12	2	1	0	Sideswipe - OD	NB/WB	Clear/Clear	Dry	Daylight	CABOT ST
2687044	BEVERLY	2/6/11	1	0	0	Sideswipe - SD	NB	Clear/Clear	Wet	Daylight	CABOT ST
2693832	BEVERLY	2/18/11	2	0	0	Sideswipe - SD	SB/UNK	Clear/Clear	Dry	Daylight	CABOT ST
2730468	BEVERLY	6/8/11	2	0	0	Sideswipe - SD	SB/SB	Clear/Clear	Dry	Daylight	CABOT ST
2731223	BEVERLY	6/10/11	3	0	0	Sideswipe - SD	SB/SB/SB	Clear/Clear	Dry	Daylight	CABOT ST
2776857	BEVERLY	9/29/11	2	0	0	Sideswipe - SD	NB/NB	Clear/Clear	Dry	Daylight	CABOT ST
3323441	BEVERLY	12/29/12	2	0	0	Sideswipe - SD	UNK/UNK	Snow/Snow	Wet	Daylight	CABOT ST
3471438	BEVERLY	6/7/13	2	0	0	Sideswipe - SD	NB/NB	Rain/Cloudy	Wet	Daylight	CABOT ST
2598752	BEVERLY	5/13/10	1	1	0	Single vehicle crash	EB	Clear/Clear	Dry	Daylight	CABOT ST
2614657	BEVERLY	6/30/10	1	0	0	Single vehicle crash	NB	Clear/Clear	Dry	Dusk	CABOT ST
2642487	BEVERLY	9/15/10	1	1	0	Single vehicle crash	WB	Cloudy/Cloudy	Dry	Daylight	CABOT ST
2699330	BEVERLY	3/3/11	1	0	0	Single vehicle crash	NB	Clear/Clear	Dry	Daylight	CABOT ST
2704998	BEVERLY	2/28/11	1	0	0	Single vehicle crash	EB	Cloudy/Cloudy	Ice	Daylight	CABOT ST
2724427	BEVERLY	5/16/11	1	0	0	Single vehicle crash	UNK	Cloudy/Rain	Wet	Daylight	CABOT ST
2763456	BEVERLY	9/14/11	1	2	0	Single vehicle crash	SB	Clear/Clear	Dry	Daylight	CABOT ST
2763569	BEVERLY	9/18/11	1	0	0	Single vehicle crash	SB	Clear/Clear	Dry	Dark - Lighted	CABOT ST
2781677	BEVERLY	10/7/11	2	0	0	Single vehicle crash	UNK/UNK	Clear/Clear	Dry	Daylight	CABOT ST
2980031	BEVERLY	3/21/12	2	0	0	Single vehicle crash	UNK/UNK	Clear/Clear	Dry	Daylight	CABOT ST
2998633	BEVERLY	3/29/12	1	1	0	Single vehicle crash	SB	Rain/Cloudy	Wet	Daylight	CABOT ST
3067735	BEVERLY	5/5/12	1	1	0	Single vehicle crash	SB	Cloudy/Rain	Wet	Dark - Lighted	CABOT ST
3307950	BEVERLY	10/3/12	1	1	0	Single vehicle crash	WB	Rain/Rain	Wet	Dark - Lighted	CABOT ST
3344247	BEVERLY	12/20/12	1	1	0	Single vehicle crash	NB	Rain/Rain	Wet	Dark - Lighted	CABOT ST
3385704	BEVERLY	4/4/13	1	1	0	Single vehicle crash	NB	Clear/Clear	Dry	Dark - Lighted	CABOT ST
			81	35	0						

PAGE ____ OF ____

PARE CORPORATION

PROJECT Beverly Middle School TIA PROJECT NO. 14225.00
SUBJECT Crash Rates
COMPUTATIONS BY AA DATE 7/1/15
CHECK BY ____ DATE ____

From Cabot ATR → peak hour = school dismissal

$$K = \frac{(1136 + 1110)}{2} \div 13934 = 8\%$$

@ Cabot / Dodge

School Peak = 2224 ent veh / .08 = 27,800 daily

27,800 × 365 = 10.15 mil ent veh / year

$\frac{32 \text{ incidents}}{4\text{yr}}$ = 8 incidents/yr $\frac{8}{10.15}$ = .79 crash / mil ent veh

@ Cabot / Russell

School Peak = 1028 ent veh / .08 = 12,800 daily

12,800 × 365 = 4.67 mil ent veh / year

$\frac{1 \text{ incident}}{4\text{yr}}$ = .25 incidents/yr $\frac{.25}{4.67}$ = .05 crash / mil ent veh

@ Cabot / Balch

School Peak = 1641 ent veh / .08 = 20,500 daily

20,500 × 365 = 7.48 mil ent veh/yr

$\frac{12 \text{ incidents}}{4 \text{ years}}$ = 3 incidents/yr $\frac{3}{7.48}$ = .40 crash / mil ent veh

@ McKay / Balch

School Peak = 1263 ent veh / .08 = 15,800 daily

15,800 × 365 = 5.77 mil ent veh/yr

$\frac{7 \text{ incidents}}{4 \text{ years}}$ = 1.75 incidents/yr $\frac{1.75}{5.77}$ = .30 crash / mil ent veh

Appendix C

Speed Study Data

Pare Corporation

8 Blackstone Valley Place
Lincoln, RI 02865
www.parecorp.com

Roadway: Cabot Street
Time: 1:20 PM
Weather: Sunny, Dry
Taken By: AA

File Name : Cabot Street Speed Study
Site Code : 14225023
Start Date : 10/6/2014
Page No : 1

#	Northbound	Southbound
1	35	31
2	38	37
3	36	38
4	32	34
5	30	38
6	29	34
7	28	39
8	33	35
9	34	34
10	34	36
11	28	31
12	36	33
13	32	35
14	34	39
15	33	34
16	32	33
17	30	34
18	29	32
19	29	33
20	30	28
21	33	31
22	31	33
23	30	31
24	31	31
25	36	33
26	30	36
27	29	30
28	27	33
29	35	32
30	33	33
31	34	
32	31	
33	34	
34	32	
35	34	
36	32	
37	32	
38	29	
39	31	
40	30	
41	28	
42	31	
43	30	
44	32	
45	29	
46	27	
47	33	
48	30	
49	31	
50	35	
51	32	
52	29	
53	28	
54	25	
55	27	
56	30	
57	32	
58	32	
59	28	
60	27	

Pare Corporation

8 Blackstone Valley Place
Lincoln, RI 02865
www.parecorp.com

File Name : Cabot Street Speed Study
Site Code : 14225023
Start Date : 10/6/2014
Page No : 2

#	Northbound	Southbound
61	27	
62	28	
63	26	
64	28	
65	25	
66	31	
67	19	
68	29	
69	28	
70	34	
71	29	
72	31	
73		

Class	Vehicle Count	85 Percentile	10 MPH Pace Speed	Number in Pace	Percent in Pace	Number of Vehicles Over 30 MPH	Percent of Vehicles Over 30 MPH	Average Speed	True Median (50th Percentile)
Northbound	72	34	27 - 36	67	93	37	51	31	31
Southbound	30	37	29 - 38	27	90	28	93	34	33
Summary	102	35	27 - 36	92	90	65	64	32	32

Appendix D

Beverly Census Data

CensusViewer

HOME COMPARE VERSIONS F.A.Q. IMAGES BLOG CONTACT SUBSCRIBE LOG IN

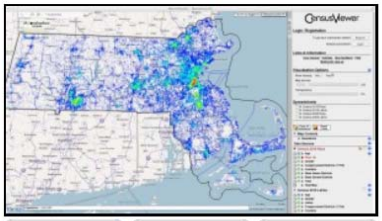
All States > Massachusetts > Cities > Beverly, Massachusetts

View Cart

Beverly, Massachusetts Population:
Census 2010 and 2000 Interactive Map, Demographics, Statistics, Quick Facts

Compare population statistics about Beverly, MA by race, age, gender, Latino/Hispanic origin etc. CensusViewer delivers detailed demographics and population statistics from the 2010 Census, 2000 Census, American Community Survey (ACS), registered voter files, commercial data sources and more.

Experience breakthrough technology for census data discovery, population analysis and visualization over Bing Maps. Visually "fly over" a state, viewing in great detail the census blocks, census tracts, cities, counties and various political districts in your selection or "zoom down" to the street level to get demographic statistics and information about the population in an individual census block or census tract.



Buy CSV $9.95 Free Version Compare Versions

Click on any map link to see our blazing-fast data visualization over Bing Maps in action. Read more about the unprecedented demographic insight and analytical power of CensusViewer interactive maps.

CensusViewer maps, data and statistics pages for all states, counties and cities.

Beverly, Massachusetts - Overview	2010 Census		2000 Census		2000-2010 Change	
	Counts	Percentages	Counts	Percentages	Change	Percentages
Total Population	39,502	100.00%	39,862	100.00%	-360	-0.90%

Appendix E

Trip Generation and Distribution

PARE CORPORATION

PAGE 1 OF

PROJECT Beverly Middle School PROJECT NO. 14225.02
SUBJECT Trip Generation
COMPUTATIONS BY AA DATE 10/15/14
CHECK BY DATE

Current : @ Briscoe Middle School

grades 6-8 = 917 students, 416 take bus, 501 drop-off/bike/walk
16 buses 7 vans = 23 trips
80 teachers = 80 trips
Based on counts - assume 15% walk/bike ⇒ 917x.15 = 138
501 - 138 = 363 drop-off/pick-up
assume carpool rate = 1.5 students/veh ⇒ 363/1.5 = 242 trips

Existing = 345 trips

Proposed : Expanded Middle School - Moved to Memorial Site

515 proposed trips - 84 exist AM = 431 new trips AM
515 new School and - 80 new PM

Proposed - Memorial Site

AM entering = 370 + 35 + 110 = 515 - 74 = 441
exiting = 370 - 10 = 360

School entering = 370
exiting = 370 + 35 + 110 = 515

PM entering = - 14
exiting = - 66

Proposed : Expanded Middle School - Moved to Memorial Site

515 proposed trips - 84 exist AM = 431 new trips AM
515 new School and - 80 new PM

PARE CORPORATION

PAGE ____ OF ____

PROJECT Beverly Middle School TIA PROJECT NO. 14225.02
SUBJECT Trip Distribution
COMPUTATIONS BY AA DATE 6/10/15
CHECK BY ____ DATE ____

From Trip Gen Comps :

	AM Peak	School Peak	PM Peak
Volume Entering Site :	441	370	-14
Volume Exiting Site :	360	575	-66

From ADT Cabot St ~ 14,000 veh/day Balch St ~ 7,000 veh/day (K=9%)

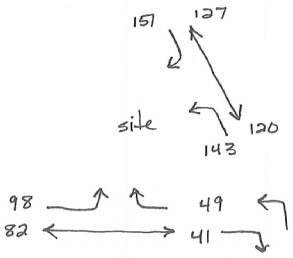
AM Peak => 147 enter Balch 294 enter Cabot
123 exit Balch 247 exit Cabot

PM Peak => 120 enter Balch 240 enter Cabot
172 exit Balch 343 exit Cabot

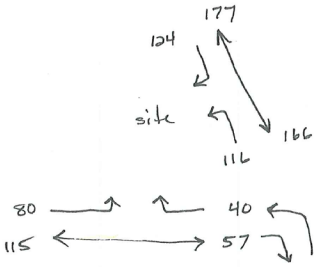
From Cabot ATR – 51.5% NB 48.5% SB

From Balch MTMC's – AM: 40% WB 60% EB
PM School: 50% WB 50% EB
} large % EB to Cabot/Balch seems unlikely w/ two driveways on Cabot
↳ adjust to 2/3 WB 1/3 EB

AM Peak



PM School Peak



For Cabot Street driveways, 1/2 volume per driveway assumed for analysis
For Balch Street driveway, throughs = average of adjacent intersections

PARE CORPORATION

PAGE ____ OF ____

PROJECT Beverly Middle School PROJECT NO. 14225.02

SUBJECT Trip Distribution - Revised

COMPUTATIONS BY AA DATE 6/10/15

CHECK BY ____ DATE ____

@ Cabot / Dodge

AM: 127~~143~~ to N × 10, 175, 457, 15 } % 657 = 2 NB-LT, 33 NB-T, 89 NB-RT, 3 NB-SRT

657

151 from N × 217, 13, 292, 21 } % 543 = 61 SB-T, 3 EB-RT, 81 WB-LT, 6 SWB-LT

543

School: 177 to N × 18, 198, 498, 23 } % 737 = 5 NB-LT, 47 NB-T, 180 NB-RT, 5 NB-SRT

737

124 from N × 192, 13, 316, 20 } % 541 = 44 SB-T, ~~8~~ 3 EB-RT, ~~22~~ 73 WB-LT, 4 SWB-LT

541

@ McKay / Balch

AM: 82 to W × 118, 2, 78 } % 198 = 49 WB-LT, 1 WB-T, 32 WB-RT

198

98 from W × 226, 1, 270 } % 497 = 45 NB-RT, 0 EB-T, 53 SB-LT

497

School: 115 to W × 146, 21, 138 } % 305 = 55 WB-LT, 8 WB-T, 52 WB-RT

305

80 from W × 87, 8, 82 } % 177 = 39 NB-RT, 4 EB-T, 37 SB-LT

177

PARE CORPORATION

PAGE _____ OF _____

PROJECT _____ PROJECT NO. _____

SUBJECT _____

COMPUTATIONS BY _____ DATE _____

CHECK BY _____ DATE _____

@ Cabot / Balch

AM: 41 EB-RT
49 NB-LT
120 SB-T
143 NB-T

School: 57 EB-RT
40 NB-LT
166 SB-T
116 NB-T

Beverly Middle School
Beverly, MA
Trip Generation Calculations
PARE Project No. 14225.02
October 16, 2014

PARE CORPORATION

Existing Memorial Building
Land Use Code 710 General Office Building
Average Vehicle Trip Ends vs. 1000 Sq. Feet Gross Floor Area
Existing: 54,000 SF GFA

54 1000 SF

On a: Weekday, AM Peak Hour

Average Rate:		1.56 * 54	84
Fitted Curve Equation:		N/A	-
Trips Entering	88% * 84		74
Trips Exiting	12% * 84		10
			84 Trips

On a: Weekday, PM Peak Hour

Average Rate:		1.49 * 54	80
Fitted Curve Equation:		N/A	-
Trips Entering	17% * 80		14
Trips Exiting	83% * 80		66
			80 Trips

Proposed Apartments - 131 McKay Street
Land Use Code 220 Apartment Building
Average Vehicle Trip Ends vs. Dwelling Units
Proposed: 32 Units

32 Units

On a: Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 AM

Average Rate:		0.51 * 32	16
Fitted Curve Equation:		N/A	-
Trips Entering	20% * 16		3
Trips Exiting	80% * 16		13
			16 Trips

On a: Weekday, AM Peak Hour of the Generator

Average Rate:		0.55 * 32	18
Fitted Curve Equation:		N/A	-
Trips Entering	29% * 18		5
Trips Exiting	71% * 18		13
			18 Trips

On a: Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 PM

Average Rate:		0.62 * 32	20
Fitted Curve Equation:		N/A	-

Page 1 of 2
Computations by: AA
Checked by:

Beverly Middle School
Beverly, MA
Trip Generation Calculations
PARE Project No. 14225.02
October 16, 2014

Trips Entering	65% * 20	13	
Trips Exiting	35% * 20	7	
		20	**Trips**

On a: Weekday, PM Peak Hour of the Generator

Average Rate:	0.67 * 32	21	
Fitted Curve Equation:	N/A	-	
Trips Entering	61% * 21	13	
Trips Exiting	39% * 21	8	
		21	**Trips**

Page 2 of 2
Computations by: AA
Checked by:

Beverly Middle School
Beverly, MA
Future 2019 No-Build Traffic Volumes
Pare Project No. 14225.02
June 30, 2015

2014-2019
NO-BUILD TRAFFIC VOLUMES
Future No-Build Growth Factor = 0.5%

AM Peak Hour
7:00 - 8:00 AM

Cabot Street (Route 1A/Route 97) & County Way/Dodge Street (Route 1A)

	2014 Existing	2019 No-Build
NB-LT	10	11
NB-T	175	180
NB-RT	457	469
NB-SRT	15	16
SB-SLT	0	0
SB - LT	4	5
SB - T	217	223
SB - RT	224	230
EB - LT	141	145
EB - T	286	294
EB - RT	13	14
EB-SRT	35	36
WB-SLT	6	7
WB - LT	292	300
WB - T	303	311
WB - RT	24	25
SWB-LT	21	22
SWB-T	17	18
SWB-RT	11	12
SWB-SRT	21	22

Cabot Street (Route 1A) & Balch Street

	2014 Existing	2019 No-Build
NB-LT	374	384
NB-T	540	554
SB - T	388	398
SB - RT	67	69
EB - LT	126	130
EB - RT	176	181

Cabot Street (Route 1A) & Russell Street

	2014 Existing	2019 No-Build
NB-T	473	485
NB-RT	8	9
SB - LT	3	4
SB - T	419	430
WB - LT	38	39
WB - RT	99	102

Cabot Street (Route 1A) & Kittredge Street

	2014 Existing	2019 No-Build
NB-T	555	570
NB-R	112	115
SB-LT	46	48
SB-T	448	460
WB	0	0

Cabot Street (Route 1A) & Site Driveway

	2014 Existing	2019 No-Build
NB-LT	36	37
NB-T	536	550
SB - T	417	428
SB - RT	38	39
EB - LT	5	6
EB - RT	5	6

PM School Peak Hour
3:00 - 4:00 PM

Cabot Street (Route 1A/Route 97) & County Way/Dodge Street (Route 1A)

	2014 Existing	2019 No-Build
NB-LT	18	19
NB-T	198	203
NB-RT	498	511
NB-SRT	23	24
SB-SLT	0	0
SB - LT	7	8
SB - T	192	197
SB - RT	83	86
EB - LT	115	118
EB - T	322	331
EB - RT	13	14
EB-SRT	27	28
WB-SLT	12	13
WB - LT	316	324
WB - T	251	258
WB - RT	67	69
SWB-LT	20	21
SWB-T	21	22
SWB-RT	7	8
SWB-SRT	11	12

Cabot Street (Route 1A) & Balch Street

	2014 Existing	2019 No-Build
NB-LT	256	263
NB-T	585	600
SB - T	437	449
SB - RT	50	52
EB - LT	93	96
EB - RT	216	222

Cabot Street (Route 1A) & Russell Street

	2014 Existing	2019 No-Build
NB-T	504	517
NB-RT	8	9
SB - LT	5	6
SB - T	428	439
WB - LT	24	25
WB - RT	54	56

Cabot Street (Route 1A) & Kittredge Street

	2014 Existing	2019 No-Build
NB-T	626	642
NB-R	20	21
SB-LT	20	21
SB-T	479	492
WB	0	0

Cabot Street (Route 1A) & Site Driveway

	2014 Existing	2019 No-Build
NB-LT	0	0
NB-T	558	573
SB - T	433	444
SB - RT	0	0
EB - LT	0	0
EB - RT	0	0

PM Commuter Peak Hour
4:30 - 5:30 PM

Cabot Street (Route 1A/Route 97) & County Way/Dodge Street (Route 1A)

	2014 Existing	2019 No-Build
NB-LT	8	9
NB-T	200	206
NB-RT	477	490
NB-SRT	15	16
SB-SLT	0	0
SB - LT	5	6
SB - T	216	222
SB - RT	129	133
EB - LT	255	262
EB - T	372	382
EB - RT	7	8
EB-SRT	15	16
WB-SLT	5	6
WB - LT	277	284
WB - T	246	253
WB - RT	47	49
SWB-LT	16	17
SWB-T	14	15
SWB-RT	18	19
SWB-SRT	4	5

Cabot Street (Route 1A) & Balch Street

	2014 Existing	2019 No-Build
NB-LT	221	227
NB-T	568	583
SB - T	480	493
SB - RT	34	35
EB - LT	154	158
EB - RT	316	324

Cabot Street (Route 1A) & Russell Street

	2014 Existing	2019 No-Build
NB-T	608	624
NB-RT	15	16
SB - LT	4	5
SB - T	544	558
WB - LT	16	17
WB - RT	43	45

Cabot Street (Route 1A) & Kittredge Street

	2014 Existing	2019 No-Build
NB-T	728	747
NB-R	20	21
SB-LT	26	27
SB-T	565	580
WB	0	0

Cabot Street (Route 1A) & Site Driveway

	2014 Existing	2019 No-Build
NB-LT	7	8
NB-T	644	661
SB - T	516	530
SB - RT	7	8
EB - LT	34	35
EB - RT	32	33

Computation by: AA
Checked by:

Beverly Middle School
Beverly, MA
Future 2019 No-Build Traffic Volumes
Pare Project No. 14225.02
June 30, 2015

2014-2019
NO-BUILD TRAFFIC VOLUMES
Future No-Build Growth Factor = 0.5%

AM Peak Hour
7:00 - 8:00 AM

Balch Street & Site Driveway

	2014 Existing	2019 No-Build
SB - LT	0	0
SB - RT	0	0
EB - LT	0	0
EB - T	400	411
WB - T	320	329
WB - RT	0	0

McKay Street & Balch Street

	2014 Existing	2019 No-Build
NB-LT	2	3
NB-T	392	402
NB-RT	226	232
SB - LT	270	277
SB - T	373	383
SB - RT	17	18
EB - LT	2	3
EB - T	1	2
EB - RT	3	4
WB - LT	118	121
WB - T	2	3
WB - RT	78	80

PM School Peak Hour
3:00 - 4:00 PM

Balch Street & Site Driveway

	2014 Existing	2019 No-Build
SB - LT	0	0
SB - RT	0	0
EB - LT	0	0
EB - T	155	159
WB - T	306	314
WB - RT	0	0

McKay Street & Balch Street

	2014 Existing	2019 No-Build
NB-LT	8	9
NB-T	399	410
NB-RT	87	90
SB - LT	82	85
SB - T	342	351
SB - RT	7	8
EB - LT	6	7
EB - T	8	9
EB - RT	12	13
WB - LT	146	150
WB - T	21	22
WB - RT	138	142

PM Commuter Peak Hour
4:30 - 5:30 PM

Balch Street & Site Driveway

	2014 Existing	2019 No-Build
SB - LT	0	0
SB - RT	0	0
EB - LT	0	0
EB - T	316	324
WB - T	302	310
WB - RT	0	0

McKay Street & Balch Street

	2014 Existing	2019 No-Build
NB-LT	5	6
NB-T	456	468
NB-RT	91	94
SB - LT	69	71
SB - T	356	365
SB - RT	8	9
EB - LT	19	20
EB - T	2	3
EB - RT	6	7
WB - LT	159	164
WB - T	10	11
WB - RT	180	185

Computation by: AA
Checked by:

Beverly Middle School
Beverly, MA
Future 2019 Build Traffic Volumes
Pare Project No. 14225.02
June 30, 2015

2014-2019
BUILD TRAFFIC VOLUMES
Future Build = Future No-Build + Site Generated

AM Peak Hour
7:00 - 8:00 AM

Cabot Street (Route 1A/Route 97) & County Way/Dodge Street (Route 1A)

	Site Gen	2019 Build
NB-LT	2	13
NB-T	33	213
NB-RT	89	558
NB-SRT	3	19
SB-SLT	0	0
SB - LT	0	5
SB - T	61	284
SB - RT	0	230
EB - LT	0	145
EB - T	0	294
EB - RT	3	17
EB-SRT	0	36
WB-SLT	0	7
WB - LT	81	381
WB - T	0	311
WB - RT	0	25
SWB-LT	6	28
SWB-T	0	18
SWB-RT	0	12
SWB-SRT	0	22

Cabot Street (Route 1A) & Balch Street

	Site Gen	2019 Build
NB-LT	49	433
NB-T	143	697
SB - T	120	518
SB - RT	0	69
EB - LT	0	130
EB - RT	41	222

Cabot Street (Route 1A) & Russell Street

	Site Gen	2019 Build
NB-T	143	628
NB-RT	0	9
SB - LT	0	4
SB - T	120	550
WB - LT	0	39
WB - RT	0	102

Cabot Street (Route 1A) & Kittredge Street

	Site Gen	2019 Build
NB-T	143	713
NB-R	0	115
SB-LT	0	48
SB-T	120	580
WB	0	0

Cabot Street (Route 1A) & Site Driveway

	Site Gen	2019 Build
NB-LT	143	180
NB-T	0	550
SB - T	0	428
SB - RT	151	190
EB - LT	127	133
EB - RT	120	126

PM School Peak Hour
3:00 - 4:00 PM

Cabot Street (Route 1A/Route 97) & County Way/Dodge Street (Route 1A)

	Site Gen	2019 Build
NB-LT	5	24
NB-T	47	250
NB-RT	120	631
NB-SRT	5	29
SB-SLT	0	0
SB - LT	0	8
SB - T	44	241
SB - RT	0	86
EB - LT	0	118
EB - T	0	331
EB - RT	3	17
EB-SRT	0	28
WB-SLT	0	13
WB - LT	73	397
WB - T	0	258
WB - RT	0	69
SWB-LT	4	25
SWB-T	0	22
SWB-RT	0	8
SWB-SRT	0	12

Cabot Street (Route 1A) & Balch Street

	Site Gen	2019 Build
NB-LT	40	303
NB-T	116	716
SB - T	166	615
SB - RT	0	52
EB - LT	0	96
EB - RT	57	279

Cabot Street (Route 1A) & Russell Street

	Site Gen	2019 Build
NB-T	116	633
NB-RT	0	9
SB - LT	0	6
SB - T	166	605
WB - LT	0	25
WB - RT	0	56

Cabot Street (Route 1A) & Kittredge Street

	Site Gen	2019 Build
NB-T	116	758
NB-R	0	21
SB-LT	0	21
SB-T	166	658
WB	0	0

Cabot Street (Route 1A) & Site Driveway

	Site Gen	2019 Build
NB-LT	116	116
NB-T	0	573
SB - T	0	444
SB - RT	124	124
EB - LT	177	177
EB - RT	166	166

PM Commuter Peak Hour
4:30 - 5:30 PM

Cabot Street (Route 1A/Route 97) & County Way/Dodge Street (Route 1A)

	Site Gen	2019 Build
NB-LT	0	9
NB-T	-10	196
NB-RT	-23	467
NB-SRT	-1	15
SB-SLT	0	0
SB - LT	0	6
SB - T	-3	219
SB - RT	0	133
EB - LT	0	262
EB - T	0	382
EB - RT	0	8
EB-SRT	0	16
WB-SLT	0	6
WB - LT	-4	280
WB - T	0	253
WB - RT	0	49
SWB-LT	0	17
SWB-T	0	15
SWB-RT	0	19
SWB-SRT	0	5

Cabot Street (Route 1A) & Balch Street

	Site Gen	2019 Build
NB-LT	0	227
NB-T	-6	577
SB - T	-30	463
SB - RT	-2	33
EB - LT	-1	157
EB - RT	0	324

Cabot Street (Route 1A) & Russell Street

	Site Gen	2019 Build
NB-T	-6	618
NB-RT	0	16
SB - LT	0	5
SB - T	-30	528
WB - LT	0	17
WB - RT	0	45

Cabot Street (Route 1A) & Kittredge Street

	Site Gen	2019 Build
NB-T	-6	741
NB-R	0	21
SB-LT	0	27
SB-T	-30	550
WB	0	0

Cabot Street (Route 1A) & Site Driveway

	Site Gen	2019 Build
NB-LT	-8	0
NB-T	0	661
SB - T	0	530
SB - RT	-8	0
EB - LT	-35	0
EB - RT	-33	0

Computation by: AA
Checked by:

Beverly Middle School
Beverly, MA
Future 2019 Build Traffic Volumes
Pare Project No. 14225.02
June 30, 2015

2014-2019
BUILD TRAFFIC VOLUMES
Future Build = Future No-Build + Site Generated

AM Peak Hour
7:00 - 8:00 AM

Balch Street & Site Driveway

	Site Gen	2019 Build
SB - LT	41	41
SB - RT	82	82
EB - LT	98	98
EB - T	0	411
WB - T	0	329
WB - RT	49	49

McKay Street & Balch Street

	Site Gen	2019 Build
NB-LT	0	3
NB-T	0	402
NB-RT	45	277
SB - LT	53	330
SB - T	0	383
SB - RT	0	18
EB - LT	0	3
EB - T	0	2
EB - RT	0	4
WB - LT	49	170
WB - T	1	4
WB - RT	32	112

PM School Peak Hour
3:00 - 4:00 PM

Balch Street & Site Driveway

	Site Gen	2019 Build
SB - LT	57	57
SB - RT	115	115
EB - LT	80	80
EB - T	0	159
WB - T	0	314
WB - RT	40	40

McKay Street & Balch Street

	Site Gen	2019 Build
NB-LT	0	9
NB-T	0	410
NB-RT	39	129
SB - LT	37	122
SB - T	0	351
SB - RT	0	8
EB - LT	0	7
EB - T	4	13
EB - RT	0	13
WB - LT	55	205
WB - T	8	30
WB - RT	52	194

PM Commuter Peak Hour
4:30 - 5:30 PM

Balch Street & Site Driveway

	Site Gen	2019 Build
SB - LT	0	0
SB - RT	0	0
EB - LT	0	0
EB - T	0	324
WB - T	0	310
WB - RT	0	0

McKay Street & Balch Street

	Site Gen	2019 Build
NB-LT	0	6
NB-T	0	468
NB-RT	0	94
SB - LT	0	71
SB - T	0	365
SB - RT	0	9
EB - LT	0	20
EB - T	0	3
EB - RT	0	7
WB - LT	0	164
WB - T	0	11
WB - RT	0	185

Computation by: AA
Checked by:

Appendix F

Traffic Capacity Analysis

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
Existing AM Peak Hour

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	38	99	473	8	3	419
Conflicting Peds, #/hr	0	0	0	18	18	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	83	83	86	86
Heavy Vehicles, %	3	0	2	13	0	3
Mvmt Flow	49	127	570	10	3	487

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1069	593	0	0	580	0
Stage 1	575	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Critical Hdwy	6.43	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	244	509	-	-	1004	-
Stage 1	561	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	239	500	-	-	987	-
Mov Cap-2 Maneuver	239	-	-	-	-	-
Stage 1	561	-	-	-	-	-
Stage 2	598	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	384	987	-
HCM Lane V/C Ratio	-	-	0.457	0.004	-
HCM Control Delay (s)	-	-	22	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.3	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
Existing AM Peak Hour

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	555	112	45	448
Conflicting Peds, #/hr	0	0	0	6	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	83	83
Heavy Vehicles, %	0	0	2	0	0	3
Mvmt Flow	0	0	610	123	54	540

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1319	677	0	0	733	0
Stage 1	671	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	175	456	-	-	881	-
Stage 1	512	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	159	453	-	-	876	-
Mov Cap-2 Maneuver	159	-	-	-	-	-
Stage 1	512	-	-	-	-	-
Stage 2	475	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	876	-
HCM Lane V/C Ratio	-	-	-	0.062	-
HCM Control Delay (s)	-	-	0	9.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.2	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
Existing AM Peak Hour

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	5	36	536	417	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	2	3	0
Mvmt Flow	5	5	39	583	453	41

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1135	474	495	0	-	0
Stage 1	474	-	-	-	-	-
Stage 2	661	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	226	595	1079	-	-	-
Stage 1	630	-	-	-	-	-
Stage 2	517	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	214	595	1079	-	-	-
Mov Cap-2 Maneuver	214	-	-	-	-	-
Stage 1	630	-	-	-	-	-
Stage 2	490	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.8	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1079	-	315	-	-
HCM Lane V/C Ratio	0.036	-	0.035	-	-
HCM Control Delay (s)	8.5	0	16.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Existing AM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	141	287	13	35	6	292	303	24	10	175	457	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978						0.850			0.850	
Flt Protected	0.950						0.976			0.997		
Satd. Flow (prot)	1787	1779	0	0	0	0	1810	1495	0	1859	1600	0
Flt Permitted	0.157						0.647			0.753		
Satd. Flow (perm)	295	1779	0	0	0	0	1200	1495	0	1404	1600	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		3						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	1%	5%	5%	0%	0%	3%	2%	8%	0%	2%	1%	0%
Adj. Flow (vph)	172	350	16	43	7	317	329	26	12	206	538	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	172	409	0	0	0	0	653	26	0	218	556	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.20	0.20					0.39	0.39		0.16	0.61	
v/c Ratio	3.02	1.17					1.39	0.04		0.99	0.57	
Control Delay	962.3	145.9					218.8	0.1		112.7	21.7	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	962.3	145.9					218.8	0.1		112.7	21.7	

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Existing AM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	4	217	224	21	17	11	21	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.939			
Flt Protected		0.999			0.973			
Satd. Flow (prot)	0	1861	1615	0	1736	0	0	
Flt Permitted		0.993			0.973			
Satd. Flow (perm)	0	1850	1615	0	1736	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			241		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.93	0.93	0.93	0.71	0.71	0.71	0.71	
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	4	233	241	30	24	15	30	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	237	241	0	99	0	0	
Turn Type	Perm	NA	Perm	D.Pm	Prot			
Protected Phases		1			3!			2
Permitted Phases	1		1	3				
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								13
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.16	0.16		0.20			
v/c Ratio		0.82	0.53		0.23			
Control Delay		76.4	11.2		10.2			
Queue Delay		0.0	0.0		0.0			
Total Delay		76.4	11.2		10.2			

Lanes, Volumes, Timings — Beverly Middle School

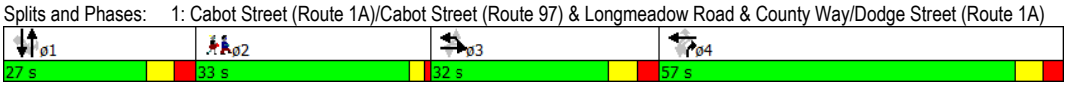
1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Existing AM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		387.6					210.4			47.3		
Approach LOS		F					F			D		
90th %ile Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
90th %ile Term Code	Max	Max			Max	Max	Max	Max	Max	Max	Max	
70th %ile Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
70th %ile Term Code	Max	Max			Max	Max	Max	Max	Max	Max	Max	
50th %ile Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
50th %ile Term Code	Max	Max			Max	Max	Max	Max	Max	Max	Max	
30th %ile Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
30th %ile Term Code	Max	Max			Max	Max	Max	Max	Max	Max	Max	
10th %ile Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
10th %ile Term Code	Max	Max			Max	Max	Max	Max	Max	Max	Max	
Queue Length 50th (ft)	~218	~335					~614	0		161	196	
Queue Length 95th (ft)	#410	#646					#1154	0		#386	483	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	57	351					471	650		220	968	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	3.02	1.17					1.39	0.04		0.99	0.57	

Intersection Summary

Area Type: Other
Cycle Length: 149
Actuated Cycle Length: 129.2
Natural Cycle: 115
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 3.02
Intersection Signal Delay: 163.3 — Intersection LOS: F
Intersection Capacity Utilization 114.7% — ICU Level of Service H
Analysis Period (min) 15
90th %ile Actuated Cycle: 149
70th %ile Actuated Cycle: 149
50th %ile Actuated Cycle: 116
30th %ile Actuated Cycle: 116
10th %ile Actuated Cycle: 116
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Existing AM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		E	B		B			
Approach Delay		43.5			10.2			
Approach LOS		D			B			
90th %ile Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
90th %ile Term Code	Max	Max	Max	Max	Max			Ped
70th %ile Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
70th %ile Term Code	Max	Max	Max	Max	Max			Ped
50th %ile Green (s)	20.0	20.0	20.0	25.0	25.0			0.0
50th %ile Term Code	Max	Max	Max	Max	Max			Skip
30th %ile Green (s)	20.0	20.0	20.0	25.0	25.0			0.0
30th %ile Term Code	Max	Max	Max	Max	Max			Skip
10th %ile Green (s)	20.0	20.0	20.0	25.0	25.0			0.0
10th %ile Term Code	Max	Max	Max	Max	Max			Skip
Queue Length 50th (ft)		170	0		0			
Queue Length 95th (ft)		#405	83		20			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		290	456		423			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		0.82	0.53		0.23			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Existing AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	127	177	374	540	388	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00	
Frt	0.921				0.980	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1683	0	1787	1863	1825	0
Flt Permitted	0.980		0.236			
Satd. Flow (perm)	1683	0	444	1863	1825	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	64				12	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)		1	1			1
Peak Hour Factor	0.75	0.75	0.87	0.87	0.86	0.86
Heavy Vehicles (%)	0%	1%	1%	2%	2%	0%
Adj. Flow (vph)	169	236	430	621	451	78
Shared Lane Traffic (%)						
Lane Group Flow (vph)	405	0	430	621	529	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		21.5	74.0	52.5	
Total Split (%)	26.0%		21.5%	74.0%	52.5%	
Maximum Green (s)	21.5		16.0	69.5	48.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	1				1	
Act Effct Green (s)	27.2		62.8	63.8	43.7	
Actuated g/C Ratio	0.27		0.63	0.64	0.44	
v/c Ratio	0.80		0.91	0.52	0.66	
Control Delay	42.2		37.1	11.9	27.1	

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

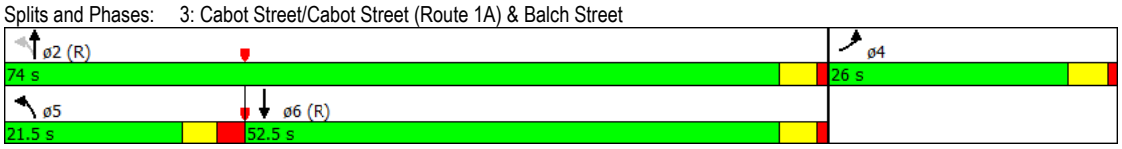
Beverly Middle School
Existing AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	42.2		37.1	11.9	27.1	
LOS	D		D	B	C	
Approach Delay	42.2			22.2	27.1	
Approach LOS	D			C	C	
90th %ile Green (s)	24.1		16.0	66.9	45.4	
90th %ile Term Code	Max		Max	Coord	Coord	
70th %ile Green (s)	30.3		16.0	60.7	39.2	
70th %ile Term Code	Max		Max	Coord	Coord	
50th %ile Green (s)	29.5		16.7	61.5	39.3	
50th %ile Term Code	Gap		Gap	Coord	Coord	
30th %ile Green (s)	27.9		13.8	63.1	43.8	
30th %ile Term Code	Gap		Gap	Coord	Coord	
10th %ile Green (s)	24.4		10.2	66.6	50.9	
10th %ile Term Code	Gap		Gap	Coord	Coord	
Queue Length 50th (ft)	198		132	211	276	
Queue Length 95th (ft)	255		#193	239	334	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	505		495	1294	892	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.80		0.87	0.48	0.59	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 27.6 Intersection LOS: C
Intersection Capacity Utilization 75.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street



HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Existing AM Peak Hour

Intersection	
Int Delay, s/veh	138.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	1	3	118	2	78	2	392	226
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	86	86	86	78	78	78
Heavy Vehicles, %	0	0	0	1	0	3	0	2	0
Mvmt Flow	3	1	4	137	2	91	3	503	290

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1694	1792	416	1651	1657	653	421	0	0
Stage 1	993	993	-	655	655	-	-	-	-
Stage 2	701	799	-	996	1002	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.23	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.327	2.2	-	-
Pot Cap-1 Maneuver	74	82	641	~ 79	99	466	1149	-	-
Stage 1	298	326	-	457	466	-	-	-	-
Stage 2	433	401	-	296	323	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	37	44	638	~ 49	54	464	1145	-	-
Mov Cap-2 Maneuver	37	44	-	~ 49	54	-	-	-	-
Stage 1	296	177	-	454	463	-	-	-	-
Stage 2	344	398	-	159	176	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	59.5	$ 1031.5	0
HCM LOS	F	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1145	-	-	74	76	833	-	-
HCM Lane V/C Ratio	0.002	-	-	0.108	3.029	0.349	-	-
HCM Control Delay (s)	8.2	0	-	59.5	$ 1031.5	11.6	0	-
HCM Lane LOS	A	A	-	F	F	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	23	1.6	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Existing AM Peak Hour

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	270	373	17
Conflicting Peds, #/hr	4	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	93	93	93
Heavy Vehicles, %	0	1	0
Mvmt Flow	290	401	18

Major/Minor	Major2		
Conflicting Flow All	794	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	836	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	833	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	4.8
HCM LOS	

Minor Lane/Major Mvmt

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
No-Build AM Peak Hour

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	39	102	485	9	4	430
Conflicting Peds, #/hr	0	0	0	18	18	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	83	83	86	86
Heavy Vehicles, %	3	0	2	13	0	3
Mvmt Flow	50	131	584	11	5	500

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1099	608	0	0	595	0
Stage 1	590	-	-	-	-	-
Stage 2	509	-	-	-	-	-
Critical Hdwy	6.43	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	234	499	-	-	991	-
Stage 1	552	-	-	-	-	-
Stage 2	602	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	228	490	-	-	974	-
Mov Cap-2 Maneuver	228	-	-	-	-	-
Stage 1	552	-	-	-	-	-
Stage 2	588	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.5	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	372	974	-
HCM Lane V/C Ratio	-	-	0.486	0.005	-
HCM Control Delay (s)	-	-	23.5	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.6	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
No-Build AM Peak Hour

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	570	115	48	460
Conflicting Peds, #/hr	0	0	0	6	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	83	83
Heavy Vehicles, %	0	0	2	0	0	3
Mvmt Flow	0	0	626	126	58	554

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1360	696	0	0	753	0
Stage 1	690	-	-	-	-	-
Stage 2	670	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	165	445	-	-	866	-
Stage 1	502	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	148	442	-	-	861	-
Mov Cap-2 Maneuver	148	-	-	-	-	-
Stage 1	502	-	-	-	-	-
Stage 2	460	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	861	-
HCM Lane V/C Ratio	-	-	-	0.067	-
HCM Control Delay (s)	-	-	0	9.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.2	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
No-Build AM Peak Hour

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	6	6	37	550	428	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	2	3	0
Mvmt Flow	7	7	40	598	465	42

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1164	486	508	0	-	0
Stage 1	486	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	217	585	1067	-	-	-
Stage 1	623	-	-	-	-	-
Stage 2	508	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	205	585	1067	-	-	-
Mov Cap-2 Maneuver	205	-	-	-	-	-
Stage 1	623	-	-	-	-	-
Stage 2	480	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.4	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1067	-	304	-	-
HCM Lane V/C Ratio	0.038	-	0.043	-	-
HCM Control Delay (s)	8.5	0	17.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — No Build AM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	145	294	14	36	7	300	311	25	11	180	469	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978						0.850			0.850	
Flt Protected	0.950						0.976			0.997		
Satd. Flow (prot)	1787	1779	0	0	0	0	1810	1495	0	1859	1600	0
Flt Permitted	0.157						0.642			0.705		
Satd. Flow (perm)	295	1779	0	0	0	0	1190	1495	0	1315	1600	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		3						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	1%	5%	5%	0%	0%	3%	2%	8%	0%	2%	1%	0%
Adj. Flow (vph)	177	359	17	44	8	326	338	27	13	212	552	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	177	420	0	0	0	0	672	27	0	225	571	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.20	0.20					0.39	0.39		0.16	0.61	
v/c Ratio	3.11	1.20					1.44	0.04		1.09	0.59	
Control Delay	1000.4	156.8					241.0	0.1		139.8	22.2	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	1000.4	156.8					241.0	0.1		139.8	22.2	

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Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — No-Build AM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	5	223	230	22	18	12	22	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.938			
Flt Protected		0.999			0.974			
Satd. Flow (prot)	0	1862	1615	0	1736	0	0	
Flt Permitted		0.958			0.974			
Satd. Flow (perm)	0	1785	1615	0	1736	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			247		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.93	0.93	0.93	0.71	0.71	0.71	0.71	
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	5	240	247	31	25	17	31	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	245	247	0	104	0	0	
Turn Type	Perm	NA	Perm	D.Pm	Prot			
Protected Phases		1			3!			2
Permitted Phases	1		1	3				
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								13
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.16	0.16		0.20			
v/c Ratio		0.88	0.54		0.25			
Control Delay		84.1	11.2		11.1			
Queue Delay		0.0	0.0		0.0			
Total Delay		84.1	11.2		11.1			

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — No-Build AM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		406.9					231.7			55.4		
Approach LOS		F					F			E		
Queue Length 50th (ft)	~226	~353					~647	0		170	204	
Queue Length 95th (ft)	#422	#668					#1197	0		#415	501	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	57	351					467	650		206	968	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	3.11	1.20					1.44	0.04		1.09	0.59	

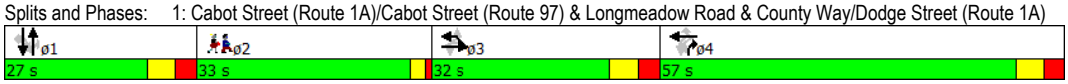
Intersection Summary	
Area Type:	Other
Cycle Length: 149	
Actuated Cycle Length: 129.2	
Natural Cycle: 115	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 3.11	
Intersection Signal Delay: 176.2	Intersection LOS: F
Intersection Capacity Utilization 117.2%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

No-Build AM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		F	B		B			
Approach Delay		47.5			11.1			
Approach LOS		D			B			
Queue Length 50th (ft)		178	0		1			
Queue Length 95th (ft)		#434	84		24			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		280	461		423			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		0.88	0.54		0.25			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
No-Build AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	130	181	384	554	398	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00	
Frt	0.921				0.980	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1683	0	1787	1863	1825	0
Flt Permitted	0.980		0.214			
Satd. Flow (perm)	1683	0	403	1863	1825	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	64				12	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)		1	1			1
Peak Hour Factor	0.75	0.75	0.87	0.87	0.86	0.86
Heavy Vehicles (%)	0%	1%	1%	2%	2%	0%
Adj. Flow (vph)	173	241	441	637	463	80
Shared Lane Traffic (%)						
Lane Group Flow (vph)	414	0	441	637	543	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		21.5	74.0	52.5	
Total Split (%)	26.0%		21.5%	74.0%	52.5%	
Maximum Green (s)	21.5		16.0	69.5	48.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	1				1	
Act Effct Green (s)	27.7		62.3	63.3	42.6	
Actuated g/C Ratio	0.28		0.62	0.63	0.43	
v/c Ratio	0.81		0.96	0.54	0.69	
Control Delay	42.7		48.4	12.2	28.6	

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
No-Build AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	42.7		48.4	12.2	28.6	
LOS	D		D	B	C	
Approach Delay	42.7			27.0	28.6	
Approach LOS	D			C	C	
Queue Length 50th (ft)	202		154	224	297	
Queue Length 95th (ft)	#286		#286	241	341	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	512		477	1294	882	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.81		0.92	0.49	0.62	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 30.6 Intersection LOS: C
Intersection Capacity Utilization 76.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
No-Build AM Peak Hour

Intersection	
Int Delay, s/veh	170.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	3	2	4	121	3	80	3	402	232
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	86	86	86	78	78	78
Heavy Vehicles, %	0	0	0	1	0	3	0	2	0
Mvmt Flow	4	3	5	141	3	93	4	515	297

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1741	1842	428	1697	1703	670	433	0	0
Stage 1	1019	1019	-	674	674	-	-	-	-
Stage 2	722	823	-	1023	1029	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.23	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.327	2.2	-	-
Pot Cap-1 Maneuver	69	76	631	~ 74	93	455	1137	-	-
Stage 1	288	317	-	446	457	-	-	-	-
Stage 2	421	391	-	286	314	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	32	39	628	~ 43	48	453	1133	-	-
Mov Cap-2 Maneuver	32	39	-	~ 43	48	-	-	-	-
Stage 1	286	165	-	442	453	-	-	-	-
Stage 2	329	388	-	145	163	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	81	$ 1272.5	0
HCM LOS	F	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1133	-	-	59	67	818	-	-
HCM Lane V/C Ratio	0.003	-	-	0.203	3.54	0.364	-	-
HCM Control Delay (s)	8.2	0	-	81	$ 1272.5	11.9	0	-
HCM Lane LOS	A	A	-	F	F	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	24.9	1.7	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
No-Build AM Peak Hour

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	277	383	18
Conflicting Peds, #/hr	4	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	93	93	93
Heavy Vehicles, %	0	1	0
Mvmt Flow	298	412	19

Major/Minor	Major2		
Conflicting Flow All	815	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	821	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	818	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	4.9
HCM LOS	

Minor Lane/Major Mvmt

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
Build AM Peak Hour

Intersection	
Int Delay, s/veh	4.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	39	102	628	9	4	550
Conflicting Peds, #/hr	0	0	0	18	18	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	83	83	86	86
Heavy Vehicles, %	3	0	2	13	0	3
Mvmt Flow	50	131	757	11	5	640

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1411	780	0	0	767	0
Stage 1	762	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Critical Hdwy	6.43	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	152	399	-	-	856	-
Stage 1	459	-	-	-	-	-
Stage 2	518	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	148	392	-	-	841	-
Mov Cap-2 Maneuver	148	-	-	-	-	-
Stage 1	459	-	-	-	-	-
Stage 2	505	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	42	0	0.1
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	269	841	-
HCM Lane V/C Ratio	-	-	0.672	0.006	-
HCM Control Delay (s)	-	-	42	9.3	0
HCM Lane LOS	-	-	E	A	A
HCM 95th %tile Q(veh)	-	-	4.4	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
Build AM Peak Hour

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	713	115	48	580
Conflicting Peds, #/hr	0	0	0	6	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	83	83
Heavy Vehicles, %	0	0	2	0	0	3
Mvmt Flow	0	0	784	126	58	699

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1661	853	0	0	910	0
Stage 1	847	-	-	-	-	-
Stage 2	814	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	108	362	-	-	757	-
Stage 1	424	-	-	-	-	-
Stage 2	439	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	94	360	-	-	753	-
Mov Cap-2 Maneuver	94	-	-	-	-	-
Stage 1	424	-	-	-	-	-
Stage 2	381	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	753	-
HCM Lane V/C Ratio	-	-	-	0.077	-
HCM Control Delay (s)	-	-	0	10.2	0
HCM Lane LOS	-	-	A	B	A
HCM 95th %tile Q(veh)	-	-	-	0.2	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
Build AM Peak Hour

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	67	63	90	550	428	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	9	9	8	2	3	8
Mvmt Flow	73	68	98	598	465	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1310	517	568	0	-	0
Stage 1	517	-	-	-	-	-
Stage 2	793	-	-	-	-	-
Critical Hdwy	6.49	6.29	4.18	-	-	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.381	2.272	-	-	-
Pot Cap-1 Maneuver	170	545	975	-	-	-
Stage 1	585	-	-	-	-	-
Stage 2	434	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	145	545	975	-	-	-
Mov Cap-2 Maneuver	145	-	-	-	-	-
Stage 1	585	-	-	-	-	-
Stage 2	369	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	44.7	1.3	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	975	-	225	-	-
HCM Lane V/C Ratio	0.1	-	0.628	-	-
HCM Control Delay (s)	9.1	0	44.7	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.3	-	3.7	-	-

HCM 2010 TWSC
11: Balch Street & Site Driveway

Beverly Middle School TIA
Build AM Peak Hour

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	98	411	329	49	41	82
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	2	2	8	9	9
Mvmt Flow	107	447	358	53	45	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	411	0	-	0	1044	384
Stage 1	-	-	-	-	384	-
Stage 2	-	-	-	-	660	-
Critical Hdwy	4.18	-	-	-	6.49	6.29
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.272	-	-	-	3.581	3.381
Pot Cap-1 Maneuver	1116	-	-	-	246	648
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	501	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1116	-	-	-	215	648
Mov Cap-2 Maneuver	-	-	-	-	215	-
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	437	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	19.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1116	-	-	-	388
HCM Lane V/C Ratio	0.095	-	-	-	0.345
HCM Control Delay (s)	8.6	0	-	-	19.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	1.5

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Build No Build Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	145	294	17	36	7	381	311	25	13	213	558	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977						0.850			0.850	
Flt Protected	0.950						0.973			0.997		
Satd. Flow (prot)	1787	1777	0	0	0	0	1803	1495	0	1859	1600	0
Flt Permitted	0.157						0.614			0.433		
Satd. Flow (perm)	295	1777	0	0	0	0	1138	1495	0	807	1600	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		3						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	1%	5%	5%	0%	0%	3%	2%	8%	0%	2%	1%	0%
Adj. Flow (vph)	177	359	21	44	8	414	338	27	15	251	656	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	177	424	0	0	0	0	760	27	0	266	714	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.20	0.20					0.39	0.39		0.16	0.61	
v/c Ratio	3.11	1.21					1.70	0.04		2.09	0.74	
Control Delay	1000.4	160.8					353.4	0.1		548.4	27.7	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	1000.4	160.8					353.4	0.1		548.4	27.7	

6/30/2015 — Synchro 8 Report
CR — Page 1

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Build Alt 1 Hour

Lane Group	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations							
Volume (vph)	284	230	28	18	12	22	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		230		0	0		
Storage Lanes		1		1	0		
Taper Length (ft)				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850		0.942			
Flt Protected				0.972			
Satd. Flow (prot)	1863	1615	0	1740	0	0	
Flt Permitted				0.972			
Satd. Flow (perm)	1863	1615	0	1740	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)		231		103			
Link Speed (mph)	30			30			
Link Distance (ft)	1239			491			
Travel Time (s)	28.2			11.2			
Peak Hour Factor	0.93	0.93	0.71	0.71	0.71	0.71	
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	305	247	39	25	17	31	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	305	247	0	112	0	0	
Turn Type	NA	Perm	D.Pm	Prot			
Protected Phases	1			3!			2
Permitted Phases		1	3				
Detector Phase	1	1	3	3			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)	0.0	0.0		0.0			
Total Lost Time (s)	7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None			None
Walk Time (s)							5.0
Flash Dont Walk (s)							25.0
Pedestrian Calls (#/hr)							13
Act Effct Green (s)	20.3	20.3		25.4			
Actuated g/C Ratio	0.16	0.16		0.20			
v/c Ratio	1.04	0.55		0.26			
Control Delay	116.5	13.8		13.1			
Queue Delay	0.0	0.0		0.0			
Total Delay	116.5	13.8		13.1			

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Build With Bond

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		408.1					341.3			169.0		
Approach LOS		F					F			F		
Queue Length 50th (ft)	~226	~359					~801	0		~306	296	
Queue Length 95th (ft)	#422	#675					#1398	0		#572	717	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	57	351					446	650		127	968	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	3.11	1.21					1.70	0.04		2.09	0.74	

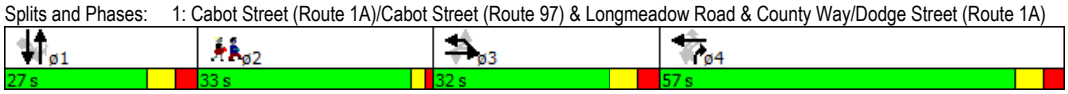
Intersection Summary	
Area Type:	Other
Cycle Length: 149	
Actuated Cycle Length: 129.2	
Natural Cycle: 125	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 3.11	
Intersection Signal Delay: 237.4	Intersection LOS: F
Intersection Capacity Utilization 132.4%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Build Alt 1 Hdr

Lane Group	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS	F	B		B			
Approach Delay	70.6			13.1			
Approach LOS	E			B			
Queue Length 50th (ft)	228	10		5			
Queue Length 95th (ft)	#556	102		32			
Internal Link Dist (ft)	1159			411			
Turn Bay Length (ft)		230					
Base Capacity (vph)	293	448		424			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	1.04	0.55		0.26			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Build AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	130	222	433	697	518	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				0.98	
Frt	0.915				0.984	
Flt Protected	0.982		0.950			
Satd. Flow (prot)	1673	0	1787	1863	1803	0
Flt Permitted	0.982		0.108			
Satd. Flow (perm)	1673	0	203	1863	1803	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	78				9	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)		1				54
Peak Hour Factor	0.75	0.75	0.87	0.87	0.86	0.86
Heavy Vehicles (%)	0%	1%	1%	2%	2%	0%
Adj. Flow (vph)	173	296	498	801	602	80
Shared Lane Traffic (%)						
Lane Group Flow (vph)	469	0	498	801	682	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		21.5	74.0	52.5	
Total Split (%)	26.0%		21.5%	74.0%	52.5%	
Maximum Green (s)	21.5		16.0	69.5	48.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	1				54	
Act Effct Green (s)	26.4		63.6	64.6	43.1	
Actuated g/C Ratio	0.26		0.64	0.65	0.43	
v/c Ratio	0.94		1.30	0.67	0.87	
Control Delay	60.7		180.0	13.7	38.3	

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

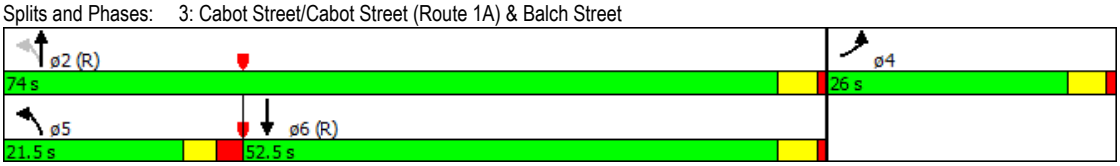
Beverly Middle School
Build AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	60.7		180.0	13.7	38.3	
LOS	E		F	B	D	
Approach Delay	60.7			77.4	38.3	
Approach LOS	E			E	D	
Queue Length 50th (ft)	~258		~340	269	368	
Queue Length 95th (ft)	#362		#504	323	462	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	499		382	1294	870	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.94		1.30	0.62	0.78	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 63.3 Intersection LOS: E
Intersection Capacity Utilization 88.9% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street



HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Build AM Peak Hour

Intersection	
Int Delay, s/veh	536.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	3	2	4	170	4	112	3	402	277	330	383	18
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	4	4	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	86	86	86	78	78	78	93	93	93
Heavy Vehicles, %	0	0	0	1	0	3	0	2	0	0	1	0
Mvmt Flow	4	3	5	198	5	130	4	515	355	355	412	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1903	2013	428	1840	1846	699	433	0	0	873	0	0
Stage 1	1133	1133	-	703	703	-	-	-	-	-	-	-
Stage 2	770	880	-	1137	1143	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.23	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.327	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	53	59	631	~ 58	76	438	1137	-	-	781	-	-
Stage 1	249	280	-	430	443	-	-	-	-	-	-	-
Stage 2	396	368	-	246	277	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	17	23	628	~ 27	30	436	1133	-	-	778	-	-
Mov Cap-2 Maneuver	17	23	-	~ 27	30	-	-	-	-	-	-	-
Stage 1	247	111	-	426	439	-	-	-	-	-	-	-
Stage 2	272	365	-	~ 94	110	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	166.7	$ 3212.3	0	6.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1133	-	-	33	43	778	-	-
HCM Lane V/C Ratio	0.003	-	-	0.364	7.734	0.456	-	-
HCM Control Delay (s)	8.2	0	-	166.3	$ 3212.3	13.4	0	-
HCM Lane LOS	A	A	-	F	F	B	A	-
HCM 95th %tile Q(veh)	0	-	-	1.2	39.4	2.4	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
Existing PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	16	43	608	15	4	544
Conflicting Peds, #/hr	0	0	0	21	21	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	92	92	93	93
Heavy Vehicles, %	0	2	1	7	24	2
Mvmt Flow	18	49	661	16	4	585

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1263	690	0	0	677	0
Stage 1	669	-	-	-	-	-
Stage 2	594	-	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.34	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.416	-
Pot Cap-1 Maneuver	189	445	-	-	820	-
Stage 1	513	-	-	-	-	-
Stage 2	555	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	184	436	-	-	804	-
Mov Cap-2 Maneuver	184	-	-	-	-	-
Stage 1	513	-	-	-	-	-
Stage 2	540	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.3	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	318	804	-
HCM Lane V/C Ratio	-	-	0.211	0.005	-
HCM Control Delay (s)	-	-	19.3	9.5	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
Existing PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	728	20	26	565
Conflicting Peds, #/hr	0	0	0	11	11	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	96	96	87	87
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	0	0	758	21	30	649

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1478	780	0	0	779	0
Stage 1	769	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	140	399	-	-	847	-
Stage 1	461	-	-	-	-	-
Stage 2	491	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	131	395	-	-	838	-
Mov Cap-2 Maneuver	131	-	-	-	-	-
Stage 1	461	-	-	-	-	-
Stage 2	459	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	838	-
HCM Lane V/C Ratio	-	-	-	0.036	-
HCM Control Delay (s)	-	-	0	9.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
Existing PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	34	32	7	644	516	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	37	35	8	700	561	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1280	565	568	0	-	0
Stage 1	565	-	-	-	-	-
Stage 2	715	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	185	528	1014	-	-	-
Stage 1	573	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	183	528	1014	-	-	-
Mov Cap-2 Maneuver	183	-	-	-	-	-
Stage 1	573	-	-	-	-	-
Stage 2	482	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.3	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1014	-	268	-	-
HCM Lane V/C Ratio	0.008	-	0.268	-	-
HCM Control Delay (s)	8.6	0	23.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	1.1	-	-

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road/County Way/Dodge Street (F — Existing Conditions AM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	255	372	7	15	5	277	246	47	8	200	477	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992						0.850			0.850	
Flt Protected	0.950						0.974			0.998		
Satd. Flow (prot)	1805	1867	0	0	0	0	1841	1615	0	1878	1599	0
Flt Permitted	0.157						0.625			0.802		
Satd. Flow (perm)	298	1867	0	0	0	0	1181	1615	0	1509	1599	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		1						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	271	396	7	16	5	301	267	51	8	204	487	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	271	419	0	0	0	0	573	51	0	212	502	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.19	0.19					0.37	0.37		0.15	0.58	
v/c Ratio	4.84	1.20					1.30	0.08		0.94	0.55	
Control Delay	1795.2	160.1					185.9	0.2		104.8	23.8	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	1795.2	160.1					185.9	0.2		104.8	23.8	

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Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Existing Conditions PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	5	216	129	16	14	18	4	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.943			
Flt Protected		0.999			0.972			
Satd. Flow (prot)	0	1880	1583	0	1730	0	0	
Flt Permitted		0.963			0.972			
Satd. Flow (perm)	0	1812	1583	0	1730	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			136		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.95	0.95	0.95	0.79	0.79	0.79	0.79	
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%	9%	
Adj. Flow (vph)	5	227	136	20	18	23	5	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	232	136	0	66	0	0	
Turn Type	Perm	NA	Perm	D.Pm	Prot			
Protected Phases		1			3!			2
Permitted Phases	1		1	3				
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								23
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.15	0.15		0.19			
v/c Ratio		0.86	0.39		0.16			
Control Delay		86.1	12.2		3.1			
Queue Delay		0.0	0.0		0.0			
Total Delay		86.1	12.2		3.1			

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Existing Commuter PM Peak Hour

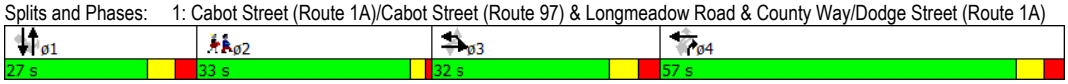
Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		802.3					170.7			47.8		
Approach LOS		F					F			D		
Queue Length 50th (ft)	~496	~530					~755	0		~223	336	
Queue Length 95th (ft)	#648	#750					#991	0		#394	459	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	56	350					441	668		225	920	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	4.84	1.20					1.30	0.08		0.94	0.55	

Intersection Summary

Area Type: Other
Cycle Length: 149
Actuated Cycle Length: 135.8
Natural Cycle: 105
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 4.84
Intersection Signal Delay: 290.9 — Intersection LOS: F
Intersection Capacity Utilization 114.9% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Existing Commuter PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		F	B		A			
Approach Delay		58.8			3.1			
Approach LOS		E			A			
Queue Length 50th (ft)		227	0		0			
Queue Length 95th (ft)		#400	64		1			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		271	352		406			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		0.86	0.39		0.16			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Existing Commuter PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	154	316	221	568	480	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00	
Frt	0.909				0.991	
Flt Protected	0.984		0.950			
Satd. Flow (prot)	1699	0	1805	1900	1879	0
Flt Permitted	0.984		0.156			
Satd. Flow (perm)	1699	0	296	1900	1879	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	94				5	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)			4			4
Peak Hour Factor	0.93	0.93	0.95	0.95	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	166	340	233	598	545	39
Shared Lane Traffic (%)						
Lane Group Flow (vph)	506	0	233	598	584	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		16.5	74.0	57.5	
Total Split (%)	26.0%		16.5%	74.0%	57.5%	
Maximum Green (s)	21.5		11.0	69.5	53.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	0				4	
Act Effct Green (s)	35.5		54.5	55.5	40.3	
Actuated g/C Ratio	0.36		0.54	0.56	0.40	
v/c Ratio	0.76		0.76	0.57	0.77	
Control Delay	34.1		28.7	16.0	32.4	

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Existing Commuter PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	34.1		28.7	16.0	32.4	
LOS	C		C	B	C	
Approach Delay	34.1			19.6	32.4	
Approach LOS	C			B	C	
Queue Length 50th (ft)	230		75	238	321	
Queue Length 95th (ft)	#499		109	244	362	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	664		327	1320	998	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.76		0.71	0.45	0.59	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 27.3	Intersection LOS: C
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Existing Commuter PM Peak Hour

Intersection	
Int Delay, s/veh	75.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	19	2	6	159	10	180	5	456	91
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	90	90	90	96	96	96
Heavy Vehicles, %	0	0	0	1	0	1	0	0	0
Mvmt Flow	25	3	8	177	11	200	5	475	95

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1226	1168	430	1126	1126	528	429	0	0
Stage 1	587	587	-	534	534	-	-	-	-
Stage 2	639	581	-	592	592	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.21	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.309	2.2	-	-
Pot Cap-1 Maneuver	157	195	629	183	207	552	1141	-	-
Stage 1	499	500	-	532	528	-	-	-	-
Stage 2	468	503	-	494	497	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	87	173	626	~ 162	183	549	1136	-	-
Mov Cap-2 Maneuver	87	173	-	~ 162	183	-	-	-	-
Stage 1	495	447	-	528	524	-	-	-	-
Stage 2	288	499	-	432	444	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	51.1	286.5	0.1
HCM LOS	F	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1136	-	-	113	256	1008	-	-
HCM Lane V/C Ratio	0.005	-	-	0.319	1.515	0.081	-	-
HCM Control Delay (s)	8.2	0	-	51.1	286.5	8.9	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.2	22.8	0.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Existing Commuter PM Peak Hour

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	69	356	8
Conflicting Peds, #/hr	5	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	85	85	85
Heavy Vehicles, %	0	0	0
Mvmt Flow	81	419	9

Major/Minor	Major2		
Conflicting Flow All	571	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1012	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1008	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	1.4
HCM LOS	

Minor Lane/Major Mvmt

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
No-Build PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	17	45	624	16	5	558
Conflicting Peds, #/hr	0	0	0	21	21	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	92	92	93	93
Heavy Vehicles, %	0	2	1	7	24	2
Mvmt Flow	19	51	678	17	5	600

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1298	708	0	0	696	0
Stage 1	687	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.34	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.416	-
Pot Cap-1 Maneuver	180	435	-	-	806	-
Stage 1	503	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	175	426	-	-	790	-
Mov Cap-2 Maneuver	175	-	-	-	-	-
Stage 1	503	-	-	-	-	-
Stage 2	530	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.2	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	306	790	-
HCM Lane V/C Ratio	-	-	0.23	0.007	-
HCM Control Delay (s)	-	-	20.2	9.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.9	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
No-Build PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	747	21	27	580
Conflicting Peds, #/hr	0	0	0	11	11	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	96	96	87	87
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	0	0	778	22	31	667

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1518	800	0	0	800	0
Stage 1	789	-	-	-	-	-
Stage 2	729	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	132	388	-	-	832	-
Stage 1	451	-	-	-	-	-
Stage 2	481	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	123	384	-	-	823	-
Mov Cap-2 Maneuver	123	-	-	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	447	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	823	-
HCM Lane V/C Ratio	-	-	-	0.038	-
HCM Control Delay (s)	-	-	0	9.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
No-Build PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	35	33	8	661	530	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	38	36	9	718	576	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1316	580	585	0	-	0
Stage 1	580	-	-	-	-	-
Stage 2	736	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	176	518	1000	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	477	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	173	518	1000	-	-	-
Mov Cap-2 Maneuver	173	-	-	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	470	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.7	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1000	-	256	-	-
HCM Lane V/C Ratio	0.009	-	0.289	-	-
HCM Control Delay (s)	8.6	0	24.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — New Bldg Commuter PM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	262	382	8	16	6	284	253	49	9	206	490	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991						0.850			0.850	
Flt Protected	0.950						0.974			0.998		
Satd. Flow (prot)	1805	1865	0	0	0	0	1841	1615	0	1878	1600	0
Flt Permitted	0.157						0.619			0.747		
Satd. Flow (perm)	298	1865	0	0	0	0	1170	1615	0	1406	1600	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		1						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	279	406	9	17	7	309	275	53	9	210	500	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	432	0	0	0	0	591	53	0	219	516	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.19	0.19					0.37	0.37		0.15	0.58	
v/c Ratio	4.98	1.24					1.35	0.08		1.04	0.56	
Control Delay	1859.4	174.7					207.9	0.2		130.1	24.2	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	1859.4	174.7					207.9	0.2		130.1	24.2	

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — No Bldg Commuter PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	6	222	133	17	15	19	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.943			
Flt Protected		0.999			0.972			
Satd. Flow (prot)	0	1880	1583	0	1728	0	0	
Flt Permitted		0.907			0.972			
Satd. Flow (perm)	0	1707	1583	0	1728	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			140		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.95	0.95	0.95	0.79	0.79	0.79	0.79	
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%	9%	
Adj. Flow (vph)	6	234	140	22	19	24	6	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	240	140	0	71	0	0	
Turn Type	Perm	NA	Perm	D.Pm	Prot			
Protected Phases		1			3!			2
Permitted Phases	1		1	3				
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								23
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.15	0.15		0.19			
v/c Ratio		0.94	0.39		0.17			
Control Delay		101.2	12.3		4.1			
Queue Delay		0.0	0.0		0.0			
Total Delay		101.2	12.3		4.1			

Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		835.8					190.8			55.7		
Approach LOS		F					F			E		
Queue Length 50th (ft)	~512	~557					~795	0		~251	349	
Queue Length 95th (ft)	#666	#777					#1033	0		#424	476	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	56	349					437	668		210	920	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	4.98	1.24					1.35	0.08		1.04	0.56	

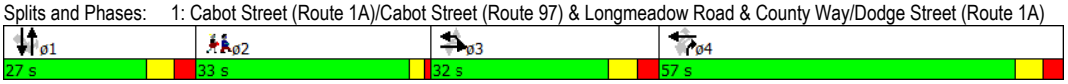
Intersection Summary	
Area Type:	Other
Cycle Length: 149	
Actuated Cycle Length: 135.8	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 4.98	
Intersection Signal Delay: 308.7	Intersection LOS: F
Intersection Capacity Utilization 117.6%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — No Bld Commter PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		F	B		A			
Approach Delay		68.5			4.1			
Approach LOS		E			A			
Queue Length 50th (ft)		~253	0		0			
Queue Length 95th (ft)		#432	64		6			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		255	355		406			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		0.94	0.39		0.17			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
No-Build Commuter PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	158	324	227	583	493	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00	
Frt	0.909				0.991	
Flt Protected	0.984		0.950			
Satd. Flow (prot)	1699	0	1805	1900	1879	0
Flt Permitted	0.984		0.141			
Satd. Flow (perm)	1699	0	268	1900	1879	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	94				5	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)			4			4
Peak Hour Factor	0.93	0.93	0.95	0.95	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	170	348	239	614	560	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	518	0	239	614	600	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		16.5	74.0	57.5	
Total Split (%)	26.0%		16.5%	74.0%	57.5%	
Maximum Green (s)	21.5		11.0	69.5	53.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	0				4	
Act Effct Green (s)	35.5		54.5	55.5	40.2	
Actuated g/C Ratio	0.36		0.54	0.56	0.40	
v/c Ratio	0.78		0.80	0.58	0.79	
Control Delay	35.6		34.8	16.2	33.6	

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
No-Build Commuter PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	35.6		34.8	16.2	33.6	
LOS	D		C	B	C	
Approach Delay	35.6			21.4	33.6	
Approach LOS	D			C	C	
Queue Length 50th (ft)	243		75	242	329	
Queue Length 95th (ft)	#527		#138	246	368	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	663		315	1320	998	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.78		0.76	0.47	0.60	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 28.9	Intersection LOS: C
Intersection Capacity Utilization 81.4%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
No-Build Commuter PM Peak Hour

Intersection	
Int Delay, s/veh	91.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	20	3	7	164	11	185	6	468	94
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	90	90	90	96	96	96
Heavy Vehicles, %	0	0	0	1	0	1	0	0	0
Mvmt Flow	27	4	9	182	12	206	6	488	98

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1262	1202	441	1159	1158	542	441	0	0
Stage 1	603	603	-	550	550	-	-	-	-
Stage 2	659	599	-	609	608	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.21	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.309	2.2	-	-
Pot Cap-1 Maneuver	148	186	621	~ 174	198	542	1130	-	-
Stage 1	489	492	-	521	519	-	-	-	-
Stage 2	456	494	-	484	489	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	78	164	618	~ 152	174	539	1125	-	-
Mov Cap-2 Maneuver	78	164	-	~ 152	174	-	-	-	-
Stage 1	485	437	-	516	514	-	-	-	-
Stage 2	272	490	-	418	434	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	59	$ 347.5	0.1
HCM LOS	F	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1125	-	-	105	242	995	-	-
HCM Lane V/C Ratio	0.006	-	-	0.381	1.653	0.084	-	-
HCM Control Delay (s)	8.2	0	-	59	$ 347.5	8.9	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.6	25.6	0.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
No-Build Commuter PM Peak Hour

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	71	365	9
Conflicting Peds, #/hr	5	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	85	85	85
Heavy Vehicles, %	0	0	0
Mvmt Flow	84	429	11

Major/Minor	Major2		
Conflicting Flow All	586	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	999	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	995	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	1.4
HCM LOS	

Minor Lane/Major Mvmt

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
Build PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	17	45	618	16	5	528
Conflicting Peds, #/hr	0	0	0	21	21	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	92	92	93	93
Heavy Vehicles, %	0	2	1	7	24	2
Mvmt Flow	19	51	672	17	5	568

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1258	701	0	0	689	0
Stage 1	680	-	-	-	-	-
Stage 2	578	-	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.34	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.416	-
Pot Cap-1 Maneuver	190	439	-	-	811	-
Stage 1	507	-	-	-	-	-
Stage 2	565	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	185	430	-	-	795	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	507	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.7	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	315	795	-
HCM Lane V/C Ratio	-	-	0.224	0.007	-
HCM Control Delay (s)	-	-	19.7	9.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
Build PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	741	21	27	550
Conflicting Peds, #/hr	0	0	0	11	11	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	96	96	87	87
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	0	0	772	22	31	632

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1477	794	0	0	794	0
Stage 1	783	-	-	-	-	-
Stage 2	694	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	140	391	-	-	836	-
Stage 1	454	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	130	387	-	-	827	-
Mov Cap-2 Maneuver	130	-	-	-	-	-
Stage 1	454	-	-	-	-	-
Stage 2	465	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	827	-
HCM Lane V/C Ratio	-	-	-	0.038	-
HCM Control Delay (s)	-	-	0	9.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
Build PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	0	661	530	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	0	0	0	718	576	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1294	576	576	0	-	0
Stage 1	576	-	-	-	-	-
Stage 2	718	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	181	521	1007	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	487	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	181	521	1007	-	-	-
Mov Cap-2 Maneuver	181	-	-	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	487	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1007	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

HCM 2010 TWSC
11:

Beverly Middle School TIA
Build PM Commuter Peak Hour

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	324	310	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	0	352	337	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	337	0	-	0	689	337
Stage 1	-	-	-	-	337	-
Stage 2	-	-	-	-	352	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1234	-	-	-	415	710
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	716	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1234	-	-	-	415	710
Mov Cap-2 Maneuver	-	-	-	-	415	-
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	716	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1234	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Bldg Commuter PM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	262	382	8	16	6	280	253	49	9	196	467	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991						0.850			0.850	
Flt Protected	0.950						0.974			0.998		
Satd. Flow (prot)	1805	1865	0	0	0	0	1841	1615	0	1878	1599	0
Flt Permitted	0.157						0.621			0.759		
Satd. Flow (perm)	298	1865	0	0	0	0	1174	1615	0	1428	1599	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		1						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	279	406	9	17	7	304	275	53	9	200	477	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	432	0	0	0	0	586	53	0	209	492	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.19	0.19					0.37	0.37		0.15	0.58	
v/c Ratio	4.98	1.24					1.34	0.08		0.98	0.53	
Control Delay	1859.4	174.7					201.4	0.2		115.3	23.4	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	1859.4	174.7					201.4	0.2		115.3	23.4	

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	6	219	133	17	15	19	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.943			
Flt Protected		0.999			0.972			
Satd. Flow (prot)	0	1880	1583	0	1728	0	0	
Flt Permitted		0.947			0.972			
Satd. Flow (perm)	0	1782	1583	0	1728	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			140		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.95	0.95	0.95	0.79	0.79	0.79	0.79	
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%	9%	
Adj. Flow (vph)	6	231	140	22	19	24	6	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	237	140	0	71	0	0	
Turn Type	Perm	NA	Perm	D.Pm	Prot			
Protected Phases		1			3!			2
Permitted Phases	1		1	3				
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								23
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.15	0.15		0.19			
v/c Ratio		0.89	0.39		0.17			
Control Delay		91.2	12.3		4.1			
Queue Delay		0.0	0.0		0.0			
Total Delay		91.2	12.3		4.1			

Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

B&D Comprehensive PM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		835.8					184.8			50.8		
Approach LOS		F					F			D		
Queue Length 50th (ft)	~512	~557					~784	0		~228	326	
Queue Length 95th (ft)	#666	#777					#1021	0		#397	445	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	56	349					438	668		213	920	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	4.98	1.24					1.34	0.08		0.98	0.53	

Intersection Summary

Area Type: Other

Cycle Length: 149

Actuated Cycle Length: 135.8

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 4.98

Intersection Signal Delay: 308.8 Intersection LOS: F

Intersection Capacity Utilization 115.7% ICU Level of Service H

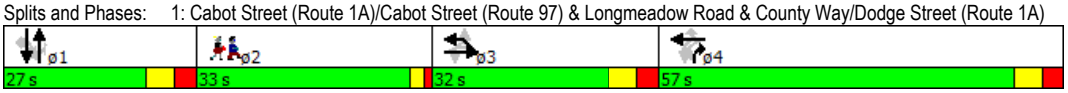
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — BSC Committee Mtg Feb Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		F	B		A			
Approach Delay		61.9			4.1			
Approach LOS		E			A			
Queue Length 50th (ft)		233	0		0			
Queue Length 95th (ft)		#414	64		6			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		266	355		406			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		0.89	0.39		0.17			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Build Commuter PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	157	324	227	577	463	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00	
Frt	0.909				0.991	
Flt Protected	0.984		0.950			
Satd. Flow (prot)	1699	0	1805	1900	1879	0
Flt Permitted	0.984		0.155			
Satd. Flow (perm)	1699	0	294	1900	1879	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	94				6	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)			4			4
Peak Hour Factor	0.93	0.93	0.95	0.95	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	169	348	239	607	526	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	517	0	239	607	564	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		16.5	74.0	57.5	
Total Split (%)	26.0%		16.5%	74.0%	57.5%	
Maximum Green (s)	21.5		11.0	69.5	53.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	0				4	
Act Effct Green (s)	37.0		53.0	54.0	38.6	
Actuated g/C Ratio	0.37		0.53	0.54	0.39	
v/c Ratio	0.75		0.78	0.59	0.77	
Control Delay	33.0		31.6	17.3	33.7	

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

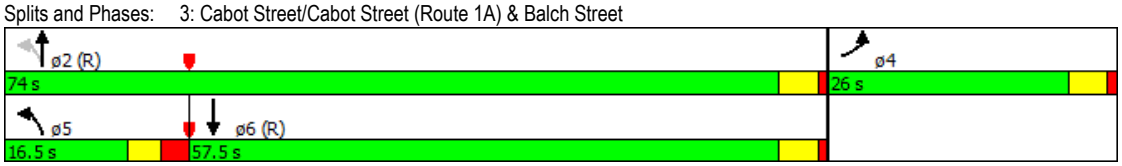
Beverly Middle School
Build Commuter PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	33.0		31.6	17.3	33.7	
LOS	C		C	B	C	
Approach Delay	33.0			21.3	33.7	
Approach LOS	C			C	C	
Queue Length 50th (ft)	235		79	248	311	
Queue Length 95th (ft)	#504		119	259	352	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	687		322	1320	998	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.75		0.74	0.46	0.57	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 28.1	Intersection LOS: C
Intersection Capacity Utilization 79.7%	ICU Level of Service D
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street



HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Build Commuter PM Peak Hour

Intersection	
Int Delay, s/veh	91.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	3	7	164	11	185	6	468	94	71	365	9
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	5	5	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	90	90	90	96	96	96	85	85	85
Heavy Vehicles, %	0	0	0	1	0	1	0	0	0	0	0	0
Mvmt Flow	27	4	9	182	12	206	6	488	98	84	429	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1262	1202	441	1159	1158	542	441	0	0	586	0	0
Stage 1	603	603	-	550	550	-	-	-	-	-	-	-
Stage 2	659	599	-	609	608	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.21	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.309	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	148	186	621	~ 174	198	542	1130	-	-	999	-	-
Stage 1	489	492	-	521	519	-	-	-	-	-	-	-
Stage 2	456	494	-	484	489	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	78	164	618	~ 152	174	539	1125	-	-	995	-	-
Mov Cap-2 Maneuver	78	164	-	~ 152	174	-	-	-	-	-	-	-
Stage 1	485	437	-	516	514	-	-	-	-	-	-	-
Stage 2	272	490	-	418	434	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	59	$ 347.5	0.1	1.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1125	-	-	105	242	995	-	-
HCM Lane V/C Ratio	0.006	-	-	0.381	1.653	0.084	-	-
HCM Control Delay (s)	8.2	0	-	59	$ 347.5	8.9	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.6	25.6	0.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
Existing PM School Peak Hour

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	24	54	504	8	5	428
Conflicting Peds, #/hr	0	0	0	28	28	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	80	80	93	93	86	86
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	30	68	542	9	6	498

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1055	574	0	0	551	0
Stage 1	546	-	-	-	-	-
Stage 2	509	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	252	522	-	-	1029	-
Stage 1	584	-	-	-	-	-
Stage 2	608	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	243	508	-	-	1002	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	584	-	-	-	-	-
Stage 2	587	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.7	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	380	1002	-
HCM Lane V/C Ratio	-	-	0.257	0.006	-
HCM Control Delay (s)	-	-	17.7	8.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
Existing PM School Peak Hour

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	626	20	20	479
Conflicting Peds, #/hr	0	0	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	86	86
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	0	0	680	22	23	557

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1294	701	0	0	702	0
Stage 1	691	-	-	-	-	-
Stage 2	603	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	181	442	-	-	905	-
Stage 1	501	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	173	438	-	-	896	-
Mov Cap-2 Maneuver	173	-	-	-	-	-
Stage 1	501	-	-	-	-	-
Stage 2	525	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	896	-
HCM Lane V/C Ratio	-	-	-	0.026	-
HCM Control Delay (s)	-	-	0	9.1	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
Existing PM School Peak Hour

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	0	558	433	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	0	0	0	607	471	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	471	471	0	-	0
Stage 1	471	-	-	-	-	-
Stage 2	607	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	244	597	1101	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	244	597	1101	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	548	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1101	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Existing School PM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	115	322	13	27	12	316	251	67	18	198	498	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.983						0.850			0.850	
Flt Protected	0.950						0.972			0.996		
Satd. Flow (prot)	1770	1851	0	0	0	0	1837	1615	0	1875	1585	0
Flt Permitted	0.157						0.625			0.633		
Satd. Flow (perm)	292	1851	0	0	0	0	1181	1615	0	1192	1585	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		2						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	1%	0%	0%	0%	1%	0%	0%	0%	1%	2%	0%
Adj. Flow (vph)	124	346	14	29	13	343	273	73	18	202	508	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	389	0	0	0	0	629	73	0	220	531	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.19	0.19					0.37	0.37		0.15	0.58	
v/c Ratio	2.30	1.12					1.43	0.11		1.24	0.58	
Control Delay	670.1	134.4					237.5	2.6		192.0	24.8	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	670.1	134.4					237.5	2.6		192.0	24.8	

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road/County Way/Dodge Street (F — Existing School PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	7	192	83	20	21	7	11	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.959			
Flt Protected		0.998			0.966			
Satd. Flow (prot)	0	1878	1615	0	1731	0	0	
Flt Permitted		0.852			0.966			
Satd. Flow (perm)	0	1603	1615	0	1731	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			103		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.86	0.86	0.86	0.78	0.78	0.78	0.78	
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	9%	
Adj. Flow (vph)	8	223	97	26	27	9	14	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	231	97	0	76	0	0	
Turn Type	Perm	NA	Perm	D.Pm	Prot			
Protected Phases		1			3!			2
Permitted Phases	1		1	3				
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								23
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.15	0.15		0.19			
v/c Ratio		0.97	0.30		0.19			
Control Delay		108.0	11.4		5.0			
Queue Delay		0.0	0.0		0.0			
Total Delay		108.0	11.4		5.0			

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Existing School PM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		263.9					213.1			73.8		
Approach LOS		F					F			E		
Queue Length 50th (ft)	~201	~470					~868	0		~282	366	
Queue Length 95th (ft)	#339	#682					#1110	16		#455	499	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	54	347					441	668		178	912	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	2.30	1.12					1.43	0.11		1.24	0.58	

Intersection Summary

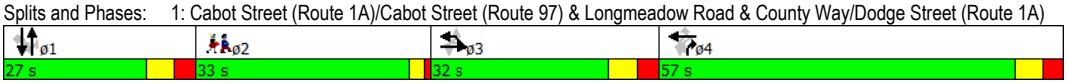
Area Type: Other
Cycle Length: 149
Actuated Cycle Length: 135.8
Natural Cycle: 145
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.30
Intersection Signal Delay: 154.8 — Intersection LOS: F
Intersection Capacity Utilization 116.8% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road/County Way/Dodge Street (F — Existing School PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		F	B		A			
Approach Delay		79.4			5.0			
Approach LOS		E			A			
Queue Length 50th (ft)		~249	0		0			
Queue Length 95th (ft)		#396	43		9			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		239	328		407			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		0.97	0.30		0.19			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Existing School PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	93	216	256	585	437	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00	
Frt	0.906				0.986	
Flt Protected	0.985		0.950			
Satd. Flow (prot)	1696	0	1805	1900	1868	0
Flt Permitted	0.985		0.317			
Satd. Flow (perm)	1696	0	602	1900	1868	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	106				9	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)			4			4
Peak Hour Factor	0.87	0.87	0.89	0.89	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	107	248	288	657	470	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	355	0	288	657	524	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		16.5	74.0	57.5	
Total Split (%)	26.0%		16.5%	74.0%	57.5%	
Maximum Green (s)	21.5		11.0	69.5	53.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	0				4	
Act Effct Green (s)	21.1		68.9	69.9	54.8	
Actuated g/C Ratio	0.21		0.69	0.70	0.55	
v/c Ratio	0.80		0.54	0.50	0.51	
Control Delay	39.7		10.8	9.5	18.3	

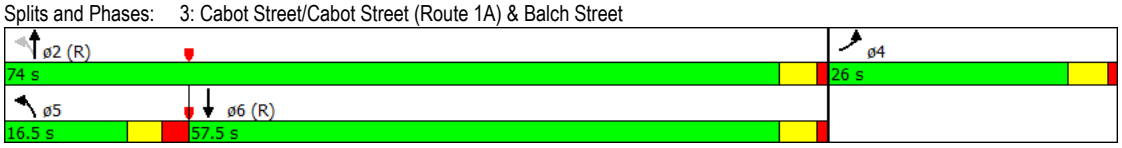
Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Existing School PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	39.7		10.8	9.5	18.3	
LOS	D		B	A	B	
Approach Delay	39.7			9.9	18.3	
Approach LOS	D			A	B	
Queue Length 50th (ft)	153		61	171	195	
Queue Length 95th (ft)	223		118	310	368	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	480		555	1367	1079	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.74		0.52	0.48	0.49	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 18.1	Intersection LOS: B
Intersection Capacity Utilization 70.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street



HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Existing School PM Peak Hour

Intersection	
Int Delay, s/veh	45.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	6	8	12	146	21	138	8	399	87
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	0	0	1	0	0	1
Mvmt Flow	9	12	18	157	23	148	9	429	94

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1116	1078	370	1047	1035	482	368	0	0
Stage 1	537	537	-	494	494	-	-	-	-
Stage 2	579	541	-	553	541	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.21	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.309	2.2	-	-
Pot Cap-1 Maneuver	187	220	680	208	234	586	1202	-	-
Stage 1	532	526	-	561	550	-	-	-	-
Stage 2	504	524	-	521	524	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	116	195	677	175	207	583	1197	-	-
Mov Cap-2 Maneuver	116	195	-	175	207	-	-	-	-
Stage 1	526	471	-	554	543	-	-	-	-
Stage 2	355	518	-	440	469	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	23.4	184	0.1
HCM LOS	C	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1197	-	-	235	260	1044	-	-
HCM Lane V/C Ratio	0.007	-	-	0.17	1.261	0.083	-	-
HCM Control Delay (s)	8	0	-	23.4	184	8.8	0	-
HCM Lane LOS	A	A	-	C	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	16.1	0.3	-	-

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Existing School PM Peak Hour

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	82	342	7
Conflicting Peds, #/hr	5	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	1	0	14
Mvmt Flow	86	360	7

Major/Minor	Major2		
Conflicting Flow All	524	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.11	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.209	-	-
Pot Cap-1 Maneuver	1048	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1044	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	1.7
HCM LOS	

Minor Lane/Major Mvmt

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
No-Build PM School Peak Hour

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	25	56	517	9	6	439
Conflicting Peds, #/hr	0	0	0	28	28	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	80	80	93	93	86	86
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	31	70	556	10	7	510

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1085	589	0	0	566	0
Stage 1	561	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	242	512	-	-	1016	-
Stage 1	575	-	-	-	-	-
Stage 2	598	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	233	498	-	-	989	-
Mov Cap-2 Maneuver	233	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	576	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.4	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	369	989	-
HCM Lane V/C Ratio	-	-	0.274	0.007	-
HCM Control Delay (s)	-	-	18.4	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.1	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
No-Build PM School Peak Hour

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	642	21	21	492
Conflicting Peds, #/hr	0	0	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	86	86
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	0	0	698	23	24	572

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1330	719	0	0	721	0
Stage 1	709	-	-	-	-	-
Stage 2	621	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	172	432	-	-	890	-
Stage 1	491	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	164	428	-	-	882	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	491	-	-	-	-	-
Stage 2	513	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	882	-
HCM Lane V/C Ratio	-	-	-	0.028	-
HCM Control Delay (s)	-	-	0	9.2	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
No-Build PM School Peak Hour

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	0	573	444	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	0	0	0	623	483	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1106	483	483	0	-	0
Stage 1	483	-	-	-	-	-
Stage 2	623	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	235	588	1090	-	-	-
Stage 1	625	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	235	588	1090	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	625	-	-	-	-	-
Stage 2	539	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1090	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	118	331	14	28	13	324	258	69	19	203	511	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.983						0.850			0.850	
Flt Protected	0.950						0.972			0.996		
Satd. Flow (prot)	1770	1851	0	0	0	0	1837	1615	0	1875	1585	0
Flt Permitted	0.157						0.620			0.592		
Satd. Flow (perm)	292	1851	0	0	0	0	1172	1615	0	1115	1585	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		2						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	1%	0%	0%	0%	1%	0%	0%	0%	1%	2%	0%
Adj. Flow (vph)	127	356	15	30	14	352	280	75	19	207	521	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	127	401	0	0	0	0	646	75	0	226	545	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	4!	
Permitted Phases	3				4!	4		4	1		1	
Detector Phase	3	3			4	4	4	4	1	1	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0	17.0	
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0	57.0	
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%	38.3%	
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None			None	None	None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.19	0.19					0.37	0.37		0.15	0.58	
v/c Ratio	2.35	1.16					1.47	0.11		1.36	0.60	
Control Delay	694.0	145.4					258.4	2.8		238.5	25.3	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	694.0	145.4					258.4	2.8		238.5	25.3	

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Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

N&BHI School MA PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	8	197	86	21	22	8	12	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.958			
Flt Protected		0.998			0.967			
Satd. Flow (prot)	0	1878	1615	0	1731	0	0	
Flt Permitted		0.806			0.967			
Satd. Flow (perm)	0	1517	1615	0	1731	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			103		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.86	0.86	0.86	0.78	0.78	0.78	0.78	
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	9%	
Adj. Flow (vph)	9	229	100	27	28	10	15	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	238	100	0	80	0	0	
Turn Type	Perm	NA	Perm	D.Pm	Prot			
Protected Phases		1			3!			2
Permitted Phases	1		1	3				
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								23
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.15	0.15		0.19			
v/c Ratio		1.05	0.30		0.20			
Control Delay		129.5	12.2		5.5			
Queue Delay		0.0	0.0		0.0			
Total Delay		129.5	12.2		5.5			

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		277.3					231.8			87.8		
Approach LOS		F					F			F		
Queue Length 50th (ft)	~207	~494					~905	0		~305	381	
Queue Length 95th (ft)	#346	#711					#1149	18		#480	520	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	54	347					438	668		166	912	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	2.35	1.16					1.47	0.11		1.36	0.60	

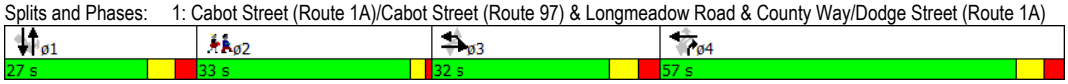
Intersection Summary	
Area Type:	Other
Cycle Length: 149	
Actuated Cycle Length: 135.8	
Natural Cycle: 135	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 2.35	
Intersection Signal Delay: 169.7	Intersection LOS: F
Intersection Capacity Utilization 119.5%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

N:\Bldg\School\MA\Bev\Hur

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		F	B		A			
Approach Delay		94.8			5.5			
Approach LOS		F			A			
Queue Length 50th (ft)		~274	0		0			
Queue Length 95th (ft)		#423	47		13			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		226	328		407			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		1.05	0.30		0.20			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
No-Build School PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	96	222	263	600	449	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00	
Frt	0.906				0.986	
Flt Protected	0.985		0.950			
Satd. Flow (prot)	1696	0	1805	1900	1867	0
Flt Permitted	0.985		0.305			
Satd. Flow (perm)	1696	0	580	1900	1867	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	106				9	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)			4			4
Peak Hour Factor	0.87	0.87	0.89	0.89	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	110	255	296	674	483	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	365	0	296	674	539	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		16.5	74.0	57.5	
Total Split (%)	26.0%		16.5%	74.0%	57.5%	
Maximum Green (s)	21.5		11.0	69.5	53.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	0				4	
Act Effct Green (s)	21.7		68.3	69.3	54.5	
Actuated g/C Ratio	0.22		0.68	0.69	0.54	
v/c Ratio	0.81		0.58	0.51	0.53	
Control Delay	39.9		11.8	10.0	18.5	

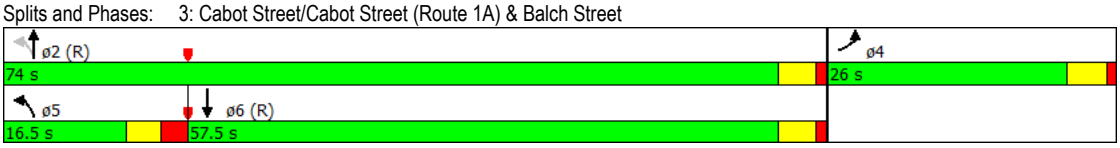
Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
No-Build School PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	39.9		11.8	10.0	18.5	
LOS	D		B	B	B	
Approach Delay	39.9			10.6	18.5	
Approach LOS	D			B	B	
Queue Length 50th (ft)	159		65	184	210	
Queue Length 95th (ft)	233		122	321	361	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	485		533	1361	1066	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.75		0.56	0.50	0.51	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 18.5	Intersection LOS: B
Intersection Capacity Utilization 72.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street



HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
No-Build School PM Peak Hour

Intersection	
Int Delay, s/veh	57.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	7	9	13	150	22	142	9	410	90
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	0	0	1	0	0	1
Mvmt Flow	11	14	20	161	24	153	10	441	97

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1152	1112	380	1081	1068	495	379	0	0
Stage 1	554	554	-	510	510	-	-	-	-
Stage 2	598	558	-	571	558	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.21	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.309	2.2	-	-
Pot Cap-1 Maneuver	176	211	671	197	223	577	1191	-	-
Stage 1	520	517	-	550	541	-	-	-	-
Stage 2	492	515	-	509	515	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	106	185	668	163	196	574	1186	-	-
Mov Cap-2 Maneuver	106	185	-	163	196	-	-	-	-
Stage 1	513	460	-	543	534	-	-	-	-
Stage 2	340	508	-	425	458	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	26	232.6	0.1
HCM LOS	D	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1186	-	-	216	245	1030	-	-
HCM Lane V/C Ratio	0.008	-	-	0.207	1.378	0.087	-	-
HCM Control Delay (s)	8.1	0	-	26	232.6	8.8	0	-
HCM Lane LOS	A	A	-	D	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.8	18.4	0.3	-	-

HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
No-Build School PM Peak Hour

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	85	351	8
Conflicting Peds, #/hr	5	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	1	0	14
Mvmt Flow	89	369	8

Major/Minor	Major2		
Conflicting Flow All	539	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.11	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.209	-	-
Pot Cap-1 Maneuver	1034	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1030	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	1.7
HCM LOS	

Minor Lane/Major Mvmt

HCM 2010 TWSC
3: Cabot Street & Russell Street

Beverly Middle School TIA
Build PM School Peak Hour

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	25	56	633	9	6	605
Conflicting Peds, #/hr	0	0	0	28	28	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	80	80	93	93	86	86
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	31	70	681	10	7	703

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1402	713	0	0	690	0
Stage 1	685	-	-	-	-	-
Stage 2	717	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	156	435	-	-	914	-
Stage 1	504	-	-	-	-	-
Stage 2	487	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	150	423	-	-	890	-
Mov Cap-2 Maneuver	150	-	-	-	-	-
Stage 1	504	-	-	-	-	-
Stage 2	468	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26	0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	271	890	-
HCM Lane V/C Ratio	-	-	0.374	0.008	-
HCM Control Delay (s)	-	-	26	9.1	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0	-

HCM 2010 TWSC
5: Cabot Street & Kittredge Street

Beverly Middle School TIA
Build PM School Peak Hour

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	758	21	21	658
Conflicting Peds, #/hr	0	0	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	86	86
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	0	0	824	23	24	765

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1649	845	0	0	847	0
Stage 1	835	-	-	-	-	-
Stage 2	814	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	110	366	-	-	799	-
Stage 1	429	-	-	-	-	-
Stage 2	439	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	103	363	-	-	791	-
Mov Cap-2 Maneuver	103	-	-	-	-	-
Stage 1	429	-	-	-	-	-
Stage 2	412	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	791	-
HCM Lane V/C Ratio	-	-	-	0.031	-
HCM Control Delay (s)	-	-	0	9.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

HCM 2010 TWSC
7: Cabot Street & Site Driveway

Beverly Middle School TIA
Build PM School Peak Hour

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	89	83	58	573	444	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	9	2	2	9
Mvmt Flow	97	90	63	623	483	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1265	516	550	0	-	0
Stage 1	516	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Critical Hdwy	6.48	6.28	4.19	-	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.281	-	-	-
Pot Cap-1 Maneuver	182	547	985	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	164	547	985	-	-	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	412	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	53.5	0.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	985	-	248	-	-
HCM Lane V/C Ratio	0.064	-	0.754	-	-
HCM Control Delay (s)	8.9	0	53.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	5.4	-	-

HCM 2010 TWSC
11:

Beverly Middle School TIA
Build PM School Peak Hour

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	80	159	314	40	57	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	9	2	2	9	8	8
Mvmt Flow	87	173	341	43	62	125

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	385	0	-	0	710	363
Stage 1	-	-	-	-	363	-
Stage 2	-	-	-	-	347	-
Critical Hdwy	4.19	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.281	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1136	-	-	-	391	669
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	702	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1136	-	-	-	358	669
Mov Cap-2 Maneuver	-	-	-	-	358	-
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	642	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1136	-	-	-	519
HCM Lane V/C Ratio	0.077	-	-	-	0.36
HCM Control Delay (s)	8.4	0	-	-	15.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	1.6

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	118	331	17	28	13	397	258	69	24	250	631	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982						0.850			0.850	
Flt Protected	0.950						0.970			0.996		
Satd. Flow (prot)	1770	1850	0	0	0	0	1832	1615	0	1875	1585	0
Flt Permitted	0.157						0.599			0.328		
Satd. Flow (perm)	292	1850	0	0	0	0	1131	1615	0	618	1585	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		2						103				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	1%	0%	0%	0%	1%	0%	0%	0%	1%	2%	0%
Adj. Flow (vph)	127	356	18	30	14	432	280	75	24	255	644	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	127	404	0	0	0	0	726	75	0	279	674	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	1 4!	
Permitted Phases	3				4!	4		4	1			
Detector Phase	3	3			4	4	4	4	1	1	1 4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0		
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0		
Total Split (s)	32.0	32.0			57.0	57.0	57.0	57.0	27.0	27.0		
Total Split (%)	21.5%	21.5%			38.3%	38.3%	38.3%	38.3%	18.1%	18.1%		
Maximum Green (s)	25.0	25.0			50.0	50.0	50.0	50.0	20.0	20.0		
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0		
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0		
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0		
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0		
Recall Mode	None	None			None	None	None	None	None	None		
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.4	25.4					50.8	50.8		20.3	78.2	
Actuated g/C Ratio	0.19	0.19					0.37	0.37		0.15	0.58	
v/c Ratio	2.35	1.16					1.72	0.11		3.03	0.74	
Control Delay	694.0	148.2					362.4	2.8		968.4	31.1	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	694.0	148.2					362.4	2.8		968.4	31.1	

6/30/2015 — Synchro 8 Report
TT — Page 1

Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Bill Schoonmaker PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	8	241	86	25	22	8	12	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.960			
Flt Protected		0.998			0.966			
Satd. Flow (prot)	0	1878	1615	0	1734	0	0	
Flt Permitted		0.584			0.966			
Satd. Flow (perm)	0	1099	1615	0	1734	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			103		103			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.86	0.86	0.86	0.78	0.78	0.78	0.78	
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	9%	
Adj. Flow (vph)	9	280	100	32	28	10	15	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	289	100	0	85	0	0	
Turn Type	Perm	NA	Perm	D.Pm	D.Pm			
Protected Phases		1						2
Permitted Phases	1		1	3	3!			
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	27.0	27.0	27.0	32.0	32.0			33.0
Total Split (%)	18.1%	18.1%	18.1%	21.5%	21.5%			22%
Maximum Green (s)	20.0	20.0	20.0	25.0	25.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								23
Act Effct Green (s)		20.3	20.3		25.4			
Actuated g/C Ratio		0.15	0.15		0.19			
v/c Ratio		1.76	0.30		0.21			
Control Delay		400.7	12.2		7.0			
Queue Delay		0.0	0.0		0.0			
Total Delay		400.7	12.2		7.0			

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		278.8					328.7			305.5		
Approach LOS		F					F			F		
Queue Length 50th (ft)	~207	~500					~1080	0		~479	538	
Queue Length 95th (ft)	#346	#717					#1330	18		#668	733	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	54	347					422	668		92	912	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	2.35	1.16					1.72	0.11		3.03	0.74	

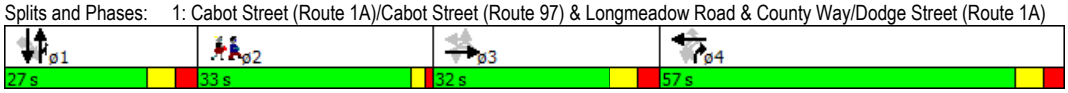
Intersection Summary	
Area Type:	Other
Cycle Length: 149	
Actuated Cycle Length: 135.8	
Natural Cycle: 145	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 3.03	
Intersection Signal Delay: 297.2	Intersection LOS: F
Intersection Capacity Utilization 133.7%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings

Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Bldg School PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		F	B		A			
Approach Delay		300.8			7.0			
Approach LOS		F			A			
Queue Length 50th (ft)		~434	0		0			
Queue Length 95th (ft)		#589	47		18			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		164	328		407			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		1.76	0.30		0.21			

Intersection Summary

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

Beverly Middle School
Build School PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	96	279	303	716	615	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	110			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99	
Frt	0.899				0.989	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1686	0	1805	1900	1855	0
Flt Permitted	0.987		0.160			
Satd. Flow (perm)	1686	0	304	1900	1855	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	134				6	
Link Speed (mph)	30			30	30	
Link Distance (ft)	2781			751	4236	
Travel Time (s)	63.2			17.1	96.3	
Confl. Peds. (#/hr)			4			57
Peak Hour Factor	0.87	0.87	0.89	0.89	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	110	321	340	804	661	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	431	0	340	804	717	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases			2			
Detector Phase	4		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	7.0	7.0	
Minimum Split (s)	11.5		11.0	11.5	11.5	
Total Split (s)	26.0		16.5	74.0	57.5	
Total Split (%)	26.0%		16.5%	74.0%	57.5%	
Maximum Green (s)	21.5		11.0	69.5	53.0	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	1.0		2.5	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		5.5	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		1.0	3.0	3.0	
Recall Mode	None		None	C-Min	C-Min	
Walk Time (s)	7.0				7.0	
Flash Dont Walk (s)	14.0				12.0	
Pedestrian Calls (#/hr)	0				57	
Act Effct Green (s)	22.7		67.3	68.3	51.0	
Actuated g/C Ratio	0.23		0.67	0.68	0.51	
v/c Ratio	0.89		0.89	0.62	0.76	
Control Delay	47.4		40.4	11.5	26.0	

Lanes, Volumes, Timings
3: Cabot Street/Cabot Street (Route 1A) & Balch Street

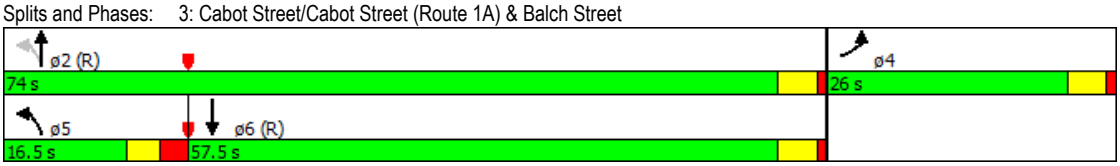
Beverly Middle School
Build School PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	47.4		40.4	11.5	26.0	
LOS	D		D	B	C	
Approach Delay	47.4			20.1	26.0	
Approach LOS	D			C	C	
Queue Length 50th (ft)	178		105	291	397	
Queue Length 95th (ft)	#355		#181	334	477	
Internal Link Dist (ft)	2701			671	4156	
Turn Bay Length (ft)			110			
Base Capacity (vph)	497		384	1334	1002	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.87		0.89	0.60	0.72	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 27.1 Intersection LOS: C
Intersection Capacity Utilization 87.2% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Cabot Street/Cabot Street (Route 1A) & Balch Street



HCM 2010 TWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Build School PM Peak Hour

Intersection	
Int Delay, s/veh	187.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	13	13	205	30	194	9	410	129	122	351	8
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	5	5	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	93	93	93	93	93	93	95	95	95
Heavy Vehicles, %	0	0	0	0	0	1	0	0	1	1	0	14
Mvmt Flow	11	20	20	220	32	209	10	441	139	128	369	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1283	1232	380	1183	1167	516	379	0	0	581	0	0
Stage 1	632	632	-	531	531	-	-	-	-	-	-	-
Stage 2	651	600	-	652	636	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.21	4.1	-	-	4.11	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.309	2.2	-	-	2.209	-	-
Pot Cap-1 Maneuver	143	179	671	~ 168	195	561	1191	-	-	998	-	-
Stage 1	472	477	-	536	529	-	-	-	-	-	-	-
Stage 2	461	493	-	460	475	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	66	148	668	~ 126	161	558	1186	-	-	994	-	-
Mov Cap-2 Maneuver	66	148	-	~ 126	161	-	-	-	-	-	-	-
Stage 1	465	399	-	529	522	-	-	-	-	-	-	-
Stage 2	266	486	-	353	397	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	39.1	$ 646.5	0.1	2.3
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1186	-	-	155	199	994	-	-
HCM Lane V/C Ratio	0.008	-	-	0.328	2.318	0.129	-	-
HCM Control Delay (s)	8.1	0	-	39.1	$ 646.5	9.2	0	-
HCM Lane LOS	A	A	-	E	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	37.4	0.4	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Bldg Schematic PM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	118	331	17	28	13	397	258	69	24	250	631	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0			0		0	0		250	
Storage Lanes	1		0			0		1	0		1	
Taper Length (ft)	25					25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982						0.850			0.850	
Flt Protected	0.950						0.970			0.996		
Satd. Flow (prot)	1770	1850	0	0	0	0	1832	1615	0	1875	1585	0
Flt Permitted	0.172						0.599			0.671		
Satd. Flow (perm)	320	1850	0	0	0	0	1131	1615	0	1263	1585	0
Right Turn on Red				Yes				Yes				No
Satd. Flow (RTOR)		2						102				
Link Speed (mph)		30					30			30		
Link Distance (ft)		643					882			4236		
Travel Time (s)		14.6					20.0			96.3		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	1%	0%	0%	0%	1%	0%	0%	0%	1%	2%	0%
Adj. Flow (vph)	127	356	18	30	14	432	280	75	24	255	644	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	127	404	0	0	0	0	726	75	0	279	674	0
Turn Type	Perm	NA			Perm	Perm	NA	Perm	Perm	NA	custom	
Protected Phases		3!					4			1	1 4!	
Permitted Phases	3				4!	4		4	1			
Detector Phase	3	3			4	4	4	4	1	1	1 4	
Switch Phase												
Minimum Initial (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0	10.0		
Minimum Split (s)	17.0	17.0			17.0	17.0	17.0	17.0	17.0	17.0		
Total Split (s)	30.0	30.0			52.0	52.0	52.0	52.0	35.0	35.0		
Total Split (%)	20.0%	20.0%			34.7%	34.7%	34.7%	34.7%	23.3%	23.3%		
Maximum Green (s)	23.0	23.0			45.0	45.0	45.0	45.0	28.0	28.0		
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0		
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0		
Total Lost Time (s)	7.0	7.0					7.0	7.0		7.0		
Lead/Lag	Lead	Lead			Lag	Lag	Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0		
Recall Mode	None	None			None	None	None	None	None	None		
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	23.3	23.3					45.7	45.7		28.4	81.2	
Actuated g/C Ratio	0.17	0.17					0.33	0.33		0.21	0.59	
v/c Ratio	2.35	1.27					1.93	0.12		1.06	0.72	
Control Delay	682.6	190.4					452.4	3.2		125.6	28.8	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	
Total Delay	682.6	190.4					452.4	3.2		125.6	28.8	

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Full Schematic PM Peak Hour

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
Lane Configurations								
Volume (vph)	8	241	86	25	22	8	12	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		230		0	0		
Storage Lanes	0		1		1	0		
Taper Length (ft)	25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.960			
Flt Protected		0.998			0.966			
Satd. Flow (prot)	0	1878	1615	0	1734	0	0	
Flt Permitted		0.924			0.966			
Satd. Flow (perm)	0	1739	1615	0	1734	0	0	
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			102		102			
Link Speed (mph)		30			30			
Link Distance (ft)		1239			491			
Travel Time (s)		28.2			11.2			
Peak Hour Factor	0.86	0.86	0.86	0.78	0.78	0.78	0.78	
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	9%	
Adj. Flow (vph)	9	280	100	32	28	10	15	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	289	100	0	85	0	0	
Turn Type	Perm	NA	Perm	D.Pm	D.Pm			
Protected Phases		1						2
Permitted Phases	1		1	3	3!			
Detector Phase	1	1	1	3	3			
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0			1.0
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0			33.0
Total Split (s)	35.0	35.0	35.0	30.0	30.0			33.0
Total Split (%)	23.3%	23.3%	23.3%	20.0%	20.0%			22%
Maximum Green (s)	28.0	28.0	28.0	23.0	23.0			30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0			2.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0			1.0
Lost Time Adjust (s)		0.0	0.0		0.0			
Total Lost Time (s)		7.0	7.0		7.0			
Lead/Lag	Lead	Lead	Lead	Lead	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0
Recall Mode	None	None	None	None	None			None
Walk Time (s)								5.0
Flash Dont Walk (s)								25.0
Pedestrian Calls (#/hr)								23
Act Effct Green (s)		28.4	28.4		23.3			
Actuated g/C Ratio		0.21	0.21		0.17			
v/c Ratio		0.80	0.24		0.22			
Control Delay		71.1	10.3		7.7			
Queue Delay		0.0	0.0		0.0			
Total Delay		71.1	10.3		7.7			

7/1/2015 — Synchro 8 Report
TT — Page 2

Lanes, Volumes, Timings — Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F — Build School PM Peak Hour

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
LOS	F	F					F	A		F	C	
Approach Delay		308.1					410.4			57.1		
Approach LOS		F					F			E		
Queue Length 50th (ft)	~208	~532					~1129	0		~327	521	
Queue Length 95th (ft)	#348	#747					#1378	20		#518	709	
Internal Link Dist (ft)		563					802			4156		
Turn Bay Length (ft)											250	
Base Capacity (vph)	54	317					377	606		262	940	
Starvation Cap Reductn	0	0					0	0		0	0	
Spillback Cap Reductn	0	0					0	0		0	0	
Storage Cap Reductn	0	0					0	0		0	0	
Reduced v/c Ratio	2.35	1.27					1.93	0.12		1.06	0.72	

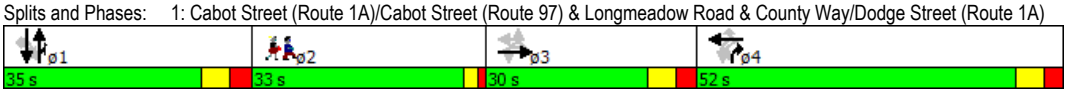
Intersection Summary	
Area Type:	Other
Cycle Length: 150	
Actuated Cycle Length: 136.8	
Natural Cycle: 145	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 2.35	
Intersection Signal Delay: 206.2	Intersection LOS: F
Intersection Capacity Utilization 133.7%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (Route 1A)



Lanes, Volumes, Timings Beverly Middle School

1: Cabot Street (Route 1A)/Cabot Street (Route 97) & Longmeadow Road & County Way/Dodge Street (F

Lane Group	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	ø2
LOS		E	B		A			
Approach Delay		55.5			7.7			
Approach LOS		E			A			
Queue Length 50th (ft)		279	0		0			
Queue Length 95th (ft)		#413	45		19			
Internal Link Dist (ft)		1159			411			
Turn Bay Length (ft)			230					
Base Capacity (vph)		361	416		380			
Starvation Cap Reductn		0	0		0			
Spillback Cap Reductn		0	0		0			
Storage Cap Reductn		0	0		0			
Reduced v/c Ratio		0.80	0.24		0.22			

Intersection Summary

Lanes, Volumes, Timings
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Adjusted AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	2	4	170	4	112	3	402	277	330	383	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			0.99			1.00	
Frt		0.944			0.947			0.945			0.997	
Flt Protected		0.984			0.971						0.978	
Satd. Flow (prot)	0	1765	0	0	1700	0	0	1758	0	0	1843	0
Flt Permitted		0.926			0.811			0.998			0.478	
Satd. Flow (perm)	0	1660	0	0	1419	0	0	1755	0	0	900	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			28			98			4	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		568			2781			1173			2048	
Travel Time (s)		12.9			63.2			26.7			46.5	
Confl. Peds. (#/hr)	2					2			4	4		
Peak Hour Factor	0.75	0.75	0.75	0.86	0.86	0.86	0.78	0.78	0.78	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	1%	0%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	4	3	5	198	5	130	4	515	355	355	412	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	0	333	0	0	874	0	0	786	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	21.0	21.0		21.0	21.0		79.0	79.0		79.0	79.0	
Total Split (%)	21.0%	21.0%		21.0%	21.0%		79.0%	79.0%		79.0%	79.0%	
Maximum Green (s)	17.0	17.0		17.0	17.0		75.0	75.0		75.0	75.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.0			4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		17.0			17.0			75.0			75.0	
Actuated g/C Ratio		0.17			0.17			0.75			0.75	
v/c Ratio		0.04			1.26			0.65			1.16	
Control Delay		27.8			147.4			8.1			105.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		27.8			147.4			8.1			105.9	
LOS		C			F			A			F	
Approach Delay		27.8			147.4			8.1			105.9	
Approach LOS		C			F			A			F	
Queue Length 50th (ft)		4			~255			196			~600	
Queue Length 95th (ft)		16			m#182			214			#389	
Internal Link Dist (ft)		488			2701			1093			1968	
Turn Bay Length (ft)												
Base Capacity (vph)		286			264			1340			676	
Starvation Cap Reductn		0			0			0			0	

Lanes, Volumes, Timings
2: McKay Street & Golf Course Driveway/Balch Street

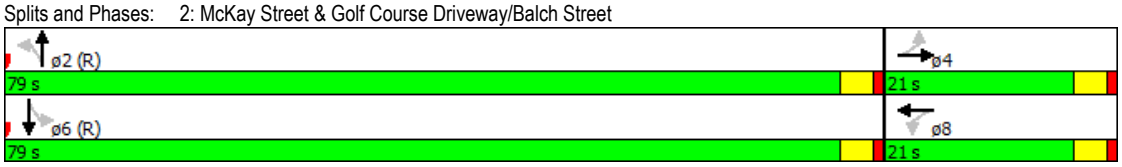
Beverly Middle School
Adjusted AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.04			1.26			0.65			1.16	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Pretimed
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 69.7 Intersection LOS: E
Intersection Capacity Utilization 111.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: McKay Street & Golf Course Driveway/Balch Street



HCM 2010 AWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Adjusted AM Peak Hour

Intersection	
Intersection Delay, s/veh	54.9
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	3	2	4	0	170	4	112	0	3	402	277
Peak Hour Factor	0.92	0.75	0.75	0.75	0.92	0.86	0.86	0.86	0.92	0.78	0.78	0.78
Heavy Vehicles, %	2	0	0	0	2	1	0	3	2	0	2	0
Mvmt Flow	0	4	3	5	0	198	5	130	0	4	515	355
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	11.7	21.7	61
HCM LOS	B	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	59%	45%
Vol Thru, %	59%	22%	1%	52%
Vol Right, %	41%	44%	39%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	682	9	286	731
LT Vol	3	3	170	330
Through Vol	402	2	4	383
RT Vol	277	4	112	18
Lane Flow Rate	874	12	333	786
Geometry Grp	1	1	1	1
Degree of Util (X)	1	0.028	0.643	1
Departure Headway (Hd)	6.009	8.469	6.958	6.327
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	612	425	522	582
Service Time	4.009	6.469	4.971	4.327
HCM Lane V/C Ratio	1.428	0.028	0.638	1.351
HCM Control Delay	61	11.7	21.7	62.7
HCM Lane LOS	F	B	C	F
HCM 95th-tile Q	15	0.1	4.5	14.6

HCM 2010 AWSC
2: McKay Street & Golf Course Driveway/Balch Street

Beverly Middle School
Adjusted AM Peak Hour

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	330	383	18
Peak Hour Factor	0.92	0.93	0.93	0.93
Heavy Vehicles, %	2	0	1	0
Mvmt Flow	0	355	412	19
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	62.7
HCM LOS	F

Lane

Appendix G

Warrant Analysis

PARE Project No. 14225.02 - Beverly Middle School TIA
Warrant Analysis -Cabot Street at Russell Street

Warrant 1: Eight Hour Vehicular Volume

		Major Street Volume (Both Approaches)	Minor Street Volume (One Direction Only)
Time		Cabot Street	Russell Street
7:00 AM	8:00 AM	808	100
8:00 AM	9:00 AM	823	92
9:00 AM	10:00 AM	745	58
10:00 AM	11:00 AM	751	58
11:00 AM	12:00 PM	755	59
12:00 PM	1:00 PM	826	64
1:00 PM	2:00 PM	825	64
2:00 PM	3:00 PM	1005	151
3:00 PM	4:00 PM	945	78
4:00 PM	5:00 PM	982	83
5:00 PM	6:00 PM	1170	54
6:00 PM	7:00 PM	868	67

100% Threshold Met (500 VPH Major, 150 VPH Minor)
80% Threshold Met (400 VPH Major, 120 VPH Minor)

Counts completed Wednesday, June 3, 2015

PARE Project No. 14225.02 - Beverly Middle School TIA
Warrant Analysis -Cabot Street at Russell Street

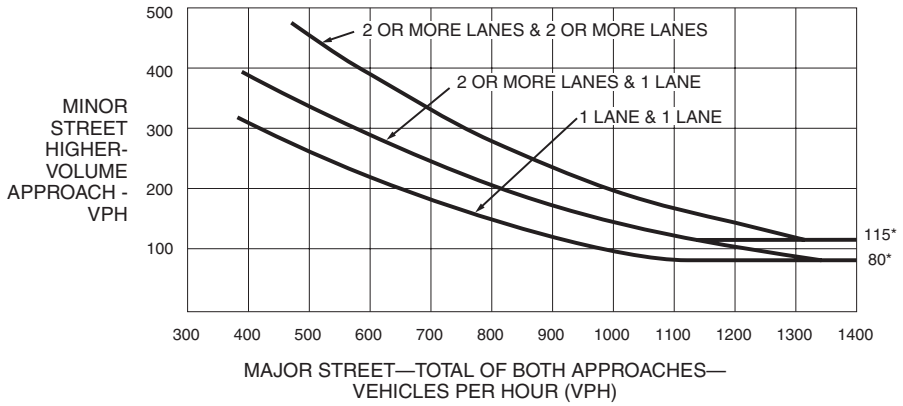
Warrant 1: Eight Hour Vehicular Volume

		Major Street Volume (Both Approaches)	Minor Street Volume (One Direction Only)
Time		Cabot Street	Russell Street
7:00 AM	8:00 AM	808	100
8:00 AM	9:00 AM	823	92
9:00 AM	10:00 AM	745	58
10:00 AM	11:00 AM	751	58
11:00 AM	12:00 PM	755	59
12:00 PM	1:00 PM	826	64
1:00 PM	2:00 PM	825	64
2:00 PM	3:00 PM	1005	151
3:00 PM	4:00 PM	945	78
4:00 PM	5:00 PM	982	83
5:00 PM	6:00 PM	1170	54
6:00 PM	7:00 PM	868	67

100% Threshold Met (750 VPH Major, 75 VPH Minor)
80% Threshold Met (600 VPH Major, 60 VPH Minor)

Counts completed Wednesday, June 3, 2015

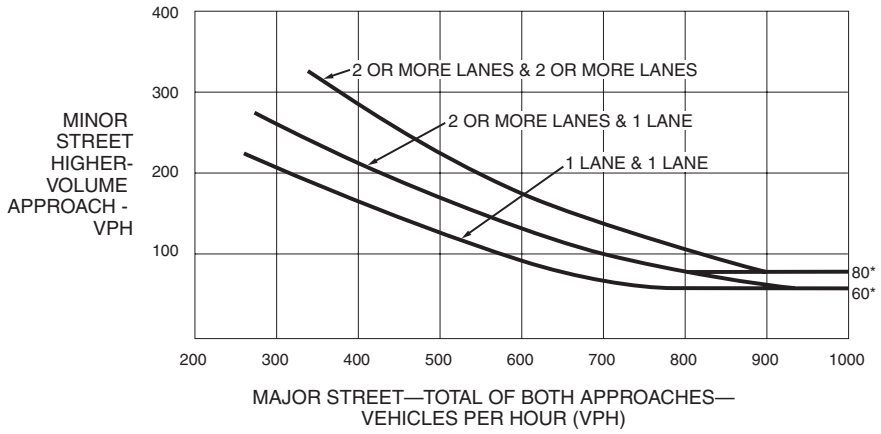
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

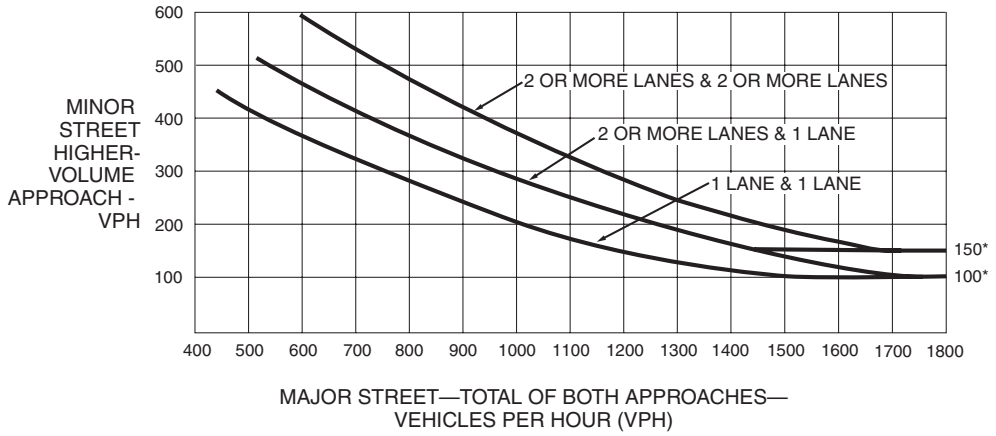
Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

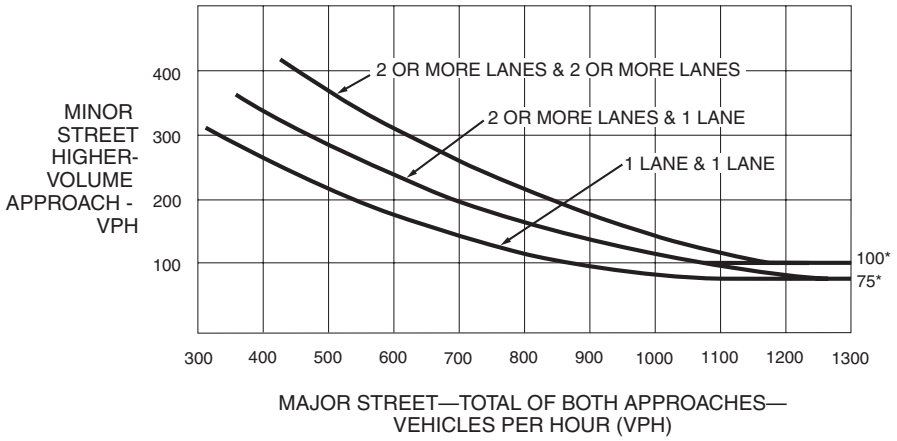
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

PARE Project No. 14225.02 - Beverly Middle School TIA
Warrant Analysis -McKay Street at Balch Street

Warrant 1: Eight Hour Vehicular Volume

		Major Street Volume (Both Approaches)	Minor Street Volume (One Direction Only)
Time		McKay Street	Balch Street
7:00 AM	8:00 AM	1149	135
8:00 AM	9:00 AM	1194	176
9:00 AM	10:00 AM	792	200
10:00 AM	11:00 AM	798	201
11:00 AM	12:00 PM	802	202
12:00 PM	1:00 PM	876	221
1:00 PM	2:00 PM	876	221
2:00 PM	3:00 PM	857	255
3:00 PM	4:00 PM	925	305
4:00 PM	5:00 PM	985	349
5:00 PM	6:00 PM	937	338
6:00 PM	7:00 PM	925	235

100% Threshold Met (500 VPH Major, 150 VPH Minor)
80% Threshold Met (400 VPH Major, 120 VPH Minor)

Counts completed Tuesday, October 9, 2014

PARE Project No. 14225.02 - Beverly Middle School TIA
Warrant Analysis -McKay Street at Balch Street

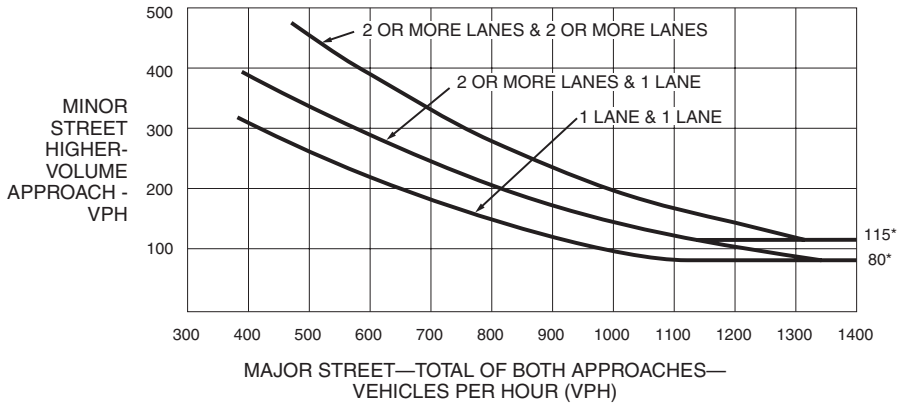
Warrant 1: Eight Hour Vehicular Volume

		Major Street Volume (Both Approaches)	Minor Street Volume (One Direction Only)
Time		McKay Street	Balch Street
7:00 AM	8:00 AM	1149	135
8:00 AM	9:00 AM	1194	176
9:00 AM	10:00 AM	792	200
10:00 AM	11:00 AM	798	201
11:00 AM	12:00 PM	802	202
12:00 PM	1:00 PM	876	221
1:00 PM	2:00 PM	876	221
2:00 PM	3:00 PM	857	255
3:00 PM	4:00 PM	925	305
4:00 PM	5:00 PM	985	349
5:00 PM	6:00 PM	937	338
6:00 PM	7:00 PM	925	235

100% Threshold Met (750 VPH Major, 75 VPH Minor)
80% Threshold Met (600 VPH Major, 60 VPH Minor)

Counts completed Tuesday, October 9, 2014

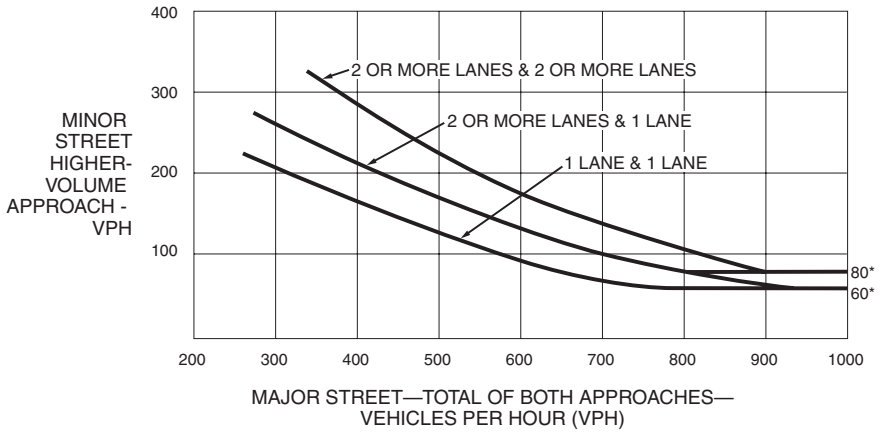
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

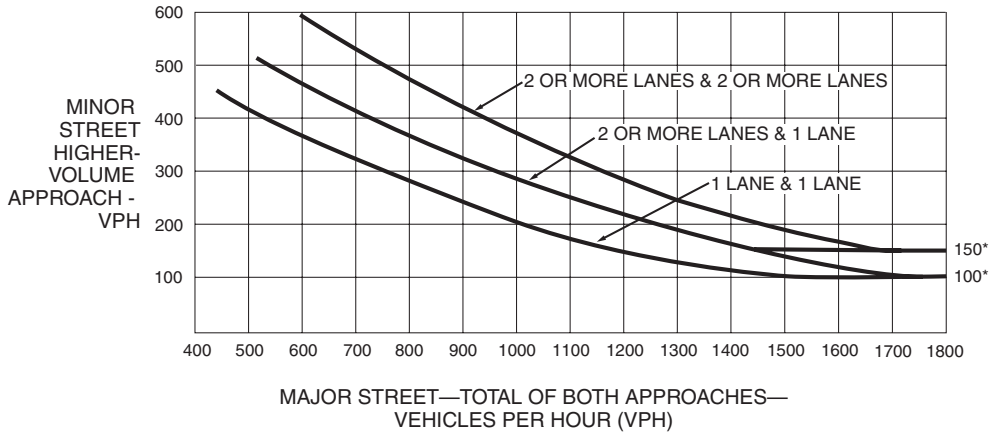
Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

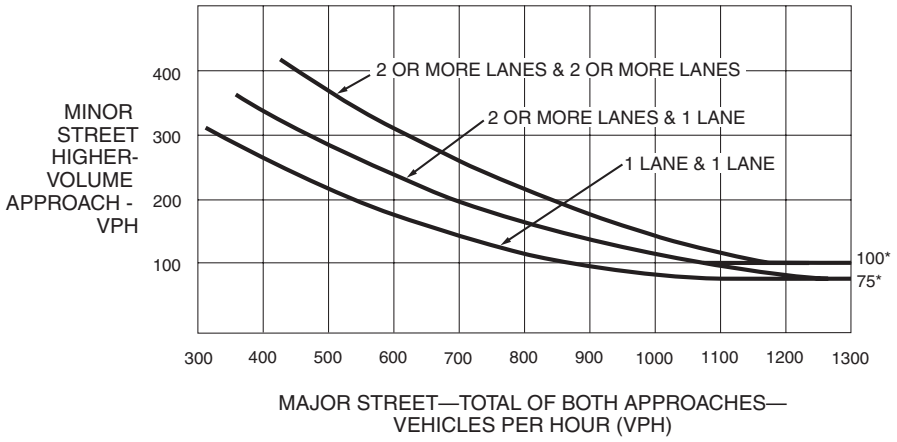
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

PARE Project No. 14225.02 - Beverly Middle School TIA
Warrant Analysis -McKay Street at Balch Street

Warrant: All-Way Stop

		Major Street Volume (Both Approaches)	Minor Street Volume (Both Approaches)
Time		McKay Street	Balch Street
7:00 AM	8:00 AM	1149	138
8:00 AM	9:00 AM	1194	188
9:00 AM	10:00 AM	792	221
10:00 AM	11:00 AM	798	222
11:00 AM	12:00 PM	802	223
12:00 PM	1:00 PM	876	244
1:00 PM	2:00 PM	876	244
2:00 PM	3:00 PM	857	280
3:00 PM	4:00 PM	925	336
4:00 PM	5:00 PM	985	382
5:00 PM	6:00 PM	937	399
6:00 PM	7:00 PM	925	257

Threshold Met (300 VPH Major, 200 VPH Minor)

Counts completed Tuesday, October 9, 2014

PARE Project No. 14225.02 - Beverly Middle School TIA
Volume Projections by Percent Distribution

Cabot Street - from ATR

Time	Veh	%	1%	Recorded
7am	889	6.35	140.04	889
8am	1019	7.28	140.04	1019
9am	804	5.74		804
10am	809	5.78		809
11am	814	5.81		814
12pm	890	6.36		890
1pm	889	6.35		889
2pm	1029	7.35	140.04	1029
3pm	1136	8.11	140.04	1136
4pm	1085	7.75	140.04	1085
5pm	1031	7.36	140.04	1031
6pm	935	6.68		935
Day Total:	14004	AVG: 140.04		

Balch Street - for Warrant 1

Time	Veh	%	1%	Estimated
7am	135	6.35	21.26	
8am	176	7.28	24.18	
9am		5.74		200
10am		5.78		201
11am		5.81		202
12pm		6.36		221
1pm		6.35		221
2pm	255	7.35	34.69	
3pm	305	8.11	37.61	
4pm	349	7.75	45.03	
5pm	338	7.36	45.92	
6pm		6.68		232
		AVG: 34.78		

Cabot Street - for Warrant 1

Time	Veh	%	1%	Estimated
7am	808	6.35	127.24	
8am	823	7.28	113.05	
9am		5.74		745
10am		5.78		751
11am		5.81		755
12pm		6.36		826
1pm		6.35		825
2pm	1005	7.35	136.73	
3pm	945	8.11	116.52	
4pm	982	7.75	126.71	
5pm	1170	7.36	158.97	
6pm		6.68		868
		AVG: 129.87		

Russell Street - for Warrant 1

Time	Veh	%	1%	Estimated
7am	100	6.35	*	
8am	92	7.28	12.64	
9am		5.74		58
10am		5.78		58
11am		5.81		59
12pm		6.36		64
1pm		6.35		64
2pm	151	7.35	*	
3pm	78	8.11	9.62	
4pm	83	7.75	10.71	
5pm	54	7.36	7.34	
6pm		6.68		67
		AVG: 10.08		

PARE Project No. 14225.02 - Beverly Middle School TIA
Volume Projections by Percent Distribution

Balch Street - for All-Way Warrant

Time	Veh	%	1%	Estimated
7am	138	6.35	21.73	
8am	188	7.28	25.82	
9am		5.74		221
10am		5.78		222
11am		5.81		223
12pm		6.36		244
1pm		6.35		244
2pm	280	7.35	38.10	
3pm	336	8.11	41.43	
4pm	382	7.75	49.29	
5pm	399	7.36	54.21	
6pm		6.68		257
		AVG:	38.43	

Environmental and Existing Building Assessment

Environmental and Existing Building Assessment

Universal Environmental Consultants has performed a comprehensive environmental assessment of the existing Memorial School building located at 502 Cabot Street. The scope of work includes inspections of accessible Asbestos Containing Materials (ACM), collection of bulk samples suspected to contain asbestos, and determination of types of ACM found. Eighty-two (82) bulk samples were collected from materials suspected of containing asbestos. Samples which were found to contain asbestos included ceiling plaster at various locations throughout the school, brown cement floor in boys and girls locker rooms and auditorium, boiler room duct insulation, black/grey/tan mastic for vinyl floor tile in various locations of the building, glue daub at ceiling tiles, soft glazing caulking at interior windows, interior and exterior soft black caulking at exterior windows, and hard joint insulation in crawlspace. The following materials were also assumed to contain asbestos based upon the age of the building and experience with similar building types: Soft ceiling plaster, glazing caulking, tank and duct insulation, pipe and hardjoint insulation, mastic under gymnasium hardwood flooring, glue holding blackboards, sewer pipes, building flashing, and damproofing on foundation walls.

Currently $1,735,000.00 is being identified in the 100% Schematic Design Cost Estimate for the abatement and removal of hazardous materials in the existing Memorial School. $122,300.00 is being carried in the total project budget for inspection, design, construction monitoring, and air sampling associated with the remediation and removal of the hazardous materials.

The Environmental & Existing Building Assessment performed by Universal Environmental Consultants, which was previously provided in the Beverly Public Schools Feasibility Study submittal dated November 25, 2014, is also included herein for reference.

REPORT
FOR
HAZARDOUS MATERIALS DETERMINATION
SURVEY
AT THE
MEMORIAL BUILDING
BEVERLY, MASSACHUSETTS

PROJECT NO: 214 291.00

Survey Dates:
September 25-30, 2014

SURVEY CONDUCTED BY:

UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 BREWSTER ROAD
FRAMINGHAM, MA 01702

1.0 INTRODUCTION:

UEC has been providing comprehensive asbestos services since 2001 and has completed projects throughout New England. We have completed projects for a variety of clients including commercial, industrial, municipal, and public and private schools. We maintain appropriate asbestos licenses and staff with a minimum of twenty years of experience.

As part of the proposed renovation and demolition project, UEC was contracted by Ai3 Architects LLC to conduct the following services at the Memorial Building, Beverly, MA:

- Asbestos Containing Materials (ACM) Inspection and Testing;
- Lead Based Paint (LBP) Assessment;
- Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures Assessment;

It appears that the building consists of one construction date. There is a crawl space underneath the entire building.

Information included in this report was based on the AHERA Management Plan and on a determination inspection and testing performed by UEC. It is required that once a detailed scope of work is identified for a renovation or a demolition project, a comprehensive Environmental Protection Agency (EPA) NESHAP inspection including asbestos testing for all suspect materials and testing for other hazardous materials including Polychlorinated Biphenyls (PCB's) should be performed, which would provide a more accurate hazardous materials abatement scope.

Additional PCB's testing and abatement plans for EPA review are required to be performed should PCB's was found in the caulking.

The scope of work included the inspection of accessible ACM, collection of bulk samples from materials suspected to contain asbestos, determination of types of ACM found and cost estimates for remediation. Bulk samples analyses for asbestos were performed using the standard Polarized Light Microscopy (PLM) in accordance with EPA standard.

Bulk samples were collected by a Massachusetts licensed asbestos inspector Mr. Leonard J. Busa (AI-0030673) and analyzed by a Massachusetts licensed laboratory Asbestos Identification Laboratory, Woburn, MA.

Refer to samples results.

2.0 FINDINGS:

The regulations for asbestos inspection are based on representative sampling. It would be impractical and costly to sample all materials in all areas. Therefore, representative samples of each homogenous area were collected and analyzed or assumed.

All suspect materials were grouped into homogenous areas. By definition a homogenous area is one in which the materials are evenly mixed and similar in appearance and texture throughout. A homogeneous area shall be determined to contain asbestos based on findings that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent in accordance with EPA regulations.

All suspect materials that contain any amount of asbestos must be considered asbestos if it is scheduled to be removed per the Department of Environmental Protection (DEP) regulations.

Number of Samples Collected

Eighty two (82) bulk samples were collected from the following materials suspected of containing asbestos:

Type and Location of Material

1. Smooth ceiling plaster at rear stage
2. Smooth ceiling plaster at boy's locker room
3. Smooth ceiling plaster at hallway to gymnasium
4. Smooth ceiling plaster at room 219
5. Smooth ceiling plaster at boy's locker room
6. Wall plaster at first floor janitor closet
7. Soft ceiling plaster at second floor main corridor
8. Soft ceiling plaster at basement
9. Brown cement floor at boy's locker room
10. Brown cement floor at hallway to girl's locker room
11. Brown cement floor at auditorium
12. Glazing caulking for window in wood door at room 152
13. Glazing caulking for window in wood door at room 4
14. Glazing caulking for interior window at basement shop
15. Glue daub for wall tiles at room 33
16. Glue daub for ceiling tiles at basement closet by room 9
17. Glue daub for ceiling tiles at basement shop
18. Duct insulation at boiler room
19. Duct insulation at boiler room
20. Tank insulation at boiler room
21. New duct insulation for new small metal boiler at boiler room
22. Hard grey mud sealant at front of boiler 2 at boiler room
23. Hard grey mud sealant at front of boiler 1 at boiler room
24. Interior brick for incinerator at boiler room
25. Cementious material on top of incinerator at boiler room
26. Hard grey mud sealant at front/side of incinerator at boiler room
27. Mastic coating on ceiling at boiler room
28. Mastic coating on ceiling at boiler room
29. CMU/cement ceiling deck at boiler room
30. Adhesive on CMU/cement ceiling deck at boiler room
31. Grey 9" x 9" vinyl floor tile at rear of stage
32. Mastic for grey 9" x 9" vinyl floor tile at rear of stage
33. Mastic for black 9" x 9" vinyl floor tile at basement
34. Mastic for tan 9" x 9" vinyl floor tile at janitor closet by business office
35. Dark flex 12" x 12" vinyl floor tile at basement main corridor
36. Mastic for dark flex 12" x 12" vinyl floor tile at basement main corridor
37. Light flex 12" x 12" vinyl floor tile at main corridor by business office
38. Light mastic for light flex 12" x 12" vinyl floor tile at main corridor by business office
39. Crème 12" x 12" vinyl floor tile at rear stairwell by room 30
40. Mastic for crème 12" x 12" vinyl floor tile at rear stairwell by room 30
41. Crème 12" x 12" vinyl floor tile at second floor main corridor
42. Mastic for crème 12" x 12" vinyl floor tile at second floor main corridor
43. Red/orange 12" x 12" vinyl floor tile at cafeteria
44. Mastic for red/orange 12" x 12" vinyl floor tile at cafeteria
45. Dark orange/brown 12" x 12" vinyl floor tile at main corridor entrance
46. Mastic for dark orange/brown 12" x 12" vinyl floor tile at main corridor entrance
47. Chocolate/brown 12" x 12" vinyl floor tile at main corridor by police
48. Mastic for chocolate/brown 12" x 12" vinyl floor tile at main corridor by police

49. White/grey 12” x 12” vinyl floor tile at food service
50. Mastic for white/grey 12” x 12” vinyl floor tile at food service
51. Hard black vinyl baseboard at first floor conference room
52. Adhesive for hard black vinyl baseboard at first floor conference room
53. Brown linoleum covering on heating cabinet at room 164
54. Adhesive for brown linoleum covering on heating cabinet at room 164
55. Brown linoleum covering on heating cabinet at room 37
56. Adhesive for brown linoleum covering on heating cabinet at room 37
57. Smooth ceiling plaster at front of auditorium
58. Exterior framing caulking on new window
59. Exterior framing caulking on new window
60. Exterior framing caulking on new window
61. Exterior old framing caulking behind new caulking on new window
62. Exterior old framing putty on top of metal lentil over new window
63. Exterior residue old framing caulking on brick adjacent to new window
64. Exterior soft grey putty in new metal window framing system
65. Exterior soft grey putty in new metal window framing system
66. Exterior door framing caulking
67. Exterior unit vent grille caulking
68. Exterior door framing caulking
69. Exterior unit vent grille caulking
70. Smooth ceiling plaster at girl’s locker room
71. Flexible connector at penthouse
72. Grey plank deck at penthouse
73. Paper pipe insulation at crawl space
74. Hard joint insulation off paper pipe insulation at crawl space
75. Heating pipe insulation at crawl space
76. Black paper covering heating pipe insulation at crawl space
77. Black mastic on black paper covering heating pipe insulation at crawl space
78. Smooth ceiling plaster at stairwell by room 8
79. Top layer new white vinyl floor tile at room 36
80. Bottom layer under new white vinyl floor tile at room 36
81. Glazing caulking on interior window at basement shop
82. Black paint on metal interior of heating cabinet

Samples Results

Type and Location of Material	**Sample Result**
1. Smooth ceiling plaster at rear stage	No Asbestos Detected
2. Smooth ceiling plaster at boy’s locker room	No Asbestos Detected
3. Smooth ceiling plaster at hallway to gymnasium	No Asbestos Detected
4. Smooth ceiling plaster at room 219	No Asbestos Detected
5. Smooth ceiling plaster at boy’s locker room	No Asbestos Detected
6. Wall plaster at first floor janitor closet	No Asbestos Detected
7. Soft ceiling plaster at second floor main corridor	2% Asbestos
8. Soft ceiling plaster at basement	2% Asbestos
9. Brown cement floor at boy’s locker room	No Asbestos Detected
10. Brown cement floor at hallway to girl’s locker room	No Asbestos Detected
11. Brown cement floor at auditorium	No Asbestos Detected
12. Glazing caulking for window in wood door at room 152	2% Asbestos
13. Glazing caulking for window in wood door at room 4	No Asbestos Detected
14. Glazing caulking for interior window at basement shop	2% Asbestos
15. Glue daub for wall tiles at room 33	No Asbestos Detected

16. Glue daub for ceiling tiles at basement closet by room 9	No Asbestos Detected
17. Glue daub for ceiling tiles at basement shop	No Asbestos Detected
18. Duct insulation at boiler room	70% Asbestos
19. Duct insulation at boiler room	70% Asbestos
20. Tank insulation at boiler room	60% Asbestos
21. New duct insulation for new small metal boiler at boiler room	No Asbestos Detected
22. Hard grey mud sealant at front of boiler 2 at boiler room	No Asbestos Detected
23. Hard grey mud sealant at front of boiler 1 at boiler room	No Asbestos Detected
24. Interior brick for incinerator at boiler room	No Asbestos Detected
25. Cementious material on top of incinerator at boiler room	No Asbestos Detected
26. Hard grey mud sealant at front/side of incinerator at boiler room	No Asbestos Detected
27. Mastic coating on ceiling at boiler room	No Asbestos Detected
28. Mastic coating on ceiling at boiler room	No Asbestos Detected
29. CMU/cement ceiling deck at boiler room	No Asbestos Detected
30. Adhesive on CMU/cement ceiling deck at boiler room	No Asbestos Detected
31. Grey 9” x 9” vinyl floor tile at rear of stage	10% Asbestos
32. Mastic for grey 9” x 9” vinyl floor tile at rear of stage	No Asbestos Detected
33. Mastic for black 9” x 9” vinyl floor tile at basement	No Asbestos Detected
34. Mastic for tan 9” x 9” vinyl floor tile at janitor closet by business office	No Asbestos Detected
35. Dark flex 12” x 12” vinyl floor tile at basement main corridor	No Asbestos Detected
36. Mastic for dark flex 12” x 12” vinyl floor tile at basement main corridor	No Asbestos Detected
37. Light flex 12” x 12” vinyl floor tile at main corridor by business office	No Asbestos Detected
38. Mastic for flex 12” x 12” vinyl floor tile at main corridor by business office	No Asbestos Detected
39. Crème 12” x 12” vinyl floor tile at rear stairwell by room 30	No Asbestos Detected
40. Mastic for crème 12” x 12” vinyl floor tile at rear stairwell by room 30	No Asbestos Detected
41. Crème 12” x 12” vinyl floor tile at second floor main corridor	No Asbestos Detected
42. Mastic for crème 12” x 12” vinyl floor tile at second floor main corridor	No Asbestos Detected
43. Red/orange 12” x 12” vinyl floor tile at cafeteria	No Asbestos Detected
44. Mastic for red/orange 12” x 12” vinyl floor tile at cafeteria	5% Asbestos
45. Dark orange/brown 12” x 12” vinyl floor tile at main corridor entrance	No Asbestos Detected
46. Mastic for dark orange/brown 12” x 12” vinyl floor tile at main corridor entrance	5% Asbestos
47. Chocolate/brown 12” x 12” vinyl floor tile at main corridor by police	No Asbestos Detected
48. Mastic for chocolate/brown 12” x 12” vinyl floor tile at main corridor by police	5% Asbestos
49. White/grey 12” x 12” vinyl floor tile at food service	No Asbestos Detected
50. Mastic for white/grey 12” x 12” vinyl floor tile at food service	10% Asbestos
51. Hard black vinyl baseboard at first floor conference room	No Asbestos Detected
52. Adhesive for hard black vinyl baseboard at first floor conference room	No Asbestos Detected
53. Brown linoleum covering on heating cabinet at room 164	No Asbestos Detected
54. Adhesive for brown linoleum covering on heating cabinet at room 164	No Asbestos Detected
55. Brown linoleum covering on heating cabinet at room 37	No Asbestos Detected
56. Adhesive for brown linoleum covering on heating cabinet at room 37	No Asbestos Detected
57. Smooth ceiling plaster at front of auditorium	No Asbestos Detected
58. Exterior framing caulking on new window	No Asbestos Detected
59. Exterior framing caulking on new window	No Asbestos Detected
60. Exterior framing caulking on new window	No Asbestos Detected
61. Exterior old framing caulking behind new caulking on new window	No Asbestos Detected
62. Exterior old framing putty on top of metal lentil over new window	2% Asbestos
63. Exterior residue old framing caulking on brick adjacent to new window	2% Asbestos
64. Exterior soft grey putty in new metal window framing system	No Asbestos Detected
65. Exterior soft grey putty in new metal window framing system	No Asbestos Detected
66. Exterior door framing caulking	2% Asbestos
67. Exterior unit vent grille caulking	10% Asbestos
68. Exterior door framing caulking	10% Asbestos
69. Exterior unit vent grille caulking	10% Asbestos

70. Smooth ceiling plaster at girl's locker room	No Asbestos Detected
71. Flexible connector at penthouse	60% Asbestos
72. Grey plank deck at penthouse	No Asbestos Detected
73. Paper pipe insulation at crawl space	20% Asbestos
74. Hard joint insulation off paper pipe insulation at crawl space	70% Asbestos
75. Heating pipe insulation at crawl space	45% Asbestos
76. Black paper covering heating pipe insulation at crawl space	No Asbestos Detected
77. Black mastic on black paper covering heating pipe insulation at crawl space	No Asbestos Detected
78. Smooth ceiling plaster at stairwell by room 8	No Asbestos Detected
79. Top layer new white vinyl floor tile at room 36	No Asbestos Detected
80. Bottom layer under new white vinyl floor tile at room 36	2% Asbestos
81. Glazing caulking on interior window at basement shop	2% Asbestos
82. Black paint on metal interior of heating cabinet	No Asbestos Detected

3.0 OBSERVATION AND COST ESTIMATES:

OBSERVATIONS:

All ACM must be removed by a Massachusetts licensed asbestos abatement contractor under the supervision of a Massachusetts licensed project monitor prior to any renovation or demolition activities that might disturb the ACM.

1. Various types of vinyl floor tiles and mastic were found to contain asbestos. The ACM was found at various locations.
2. Soft ceiling plaster was found to contain asbestos. The ACM was found at main corridors.
3. Glazing caulking for window in wood door was found to contain asbestos. The ACM was found at throughout the building.
4. Glazing caulking for interior window was found to contain asbestos. The ACM was found at throughout the building.
5. Tank insulation was found to contain asbestos. The ACM was found in the boiler room.
6. Duct insulation was found to contain asbestos. The ACM was found in the boiler room and penthouses.
7. Pipe and hard joint insulation was found to contain asbestos. The ACM was found at throughout the school. The ACM was also found in the crawl spaces.
8. ACM debris was found intermixed with soil in the crawl spaces.
9. It appears that all exterior windows were replaced, however, old frames exist and old caulking was found to contain asbestos.
10. Exterior door framing caulking was found to contain asbestos.
11. Exterior unit vent grille framing caulking was found to contain asbestos.
12. Mastic under gymnasium hardwood floor was assumed to contain asbestos.
13. Flexible connector was found to contain asbestos. The ACM was found at various locations.
14. Glue holding blackboard was assumed to contain asbestos.
15. Insulation inside boilers was assumed to contain asbestos.
16. Insulation inside incinerator was assumed to contain asbestos.
17. Paper inside round light fixtures was assumed to contain asbestos.
18. Stage fire curtain was assumed to contain asbestos.
19. All remaining suspect materials were found not to contain asbestos.
20. Roofing material was assumed to contain asbestos. Roofing material does not have to be removed by a licensed asbestos contractor. However, the General Contractor must comply with OSHA regulation during demolition and with state regulations for proper disposal.
21. Underground sewer pipe was assumed to contain asbestos.

22. Damproofing on exterior and foundation walls was assumed to contain asbestos. The demolition contractor will have to segregate the ACM from non-ACM building surfaces for proper disposal in an EPA approved landfill that does not recycle.
23. Painted surfaces were assumed to be LBP. A school is not considered a regulated facility therefore the Massachusetts Lead Law does not apply. All LBP activities performed, including waste disposal, should be in accordance with applicable Federal, State, or local laws, ordinances, codes or regulations governing evaluation and hazard reduction. In the event of discrepancies, the most protective requirements prevail. These requirements can be found in OSHA 29 CFR 1926-Construction Industry Standards, 29 CFR 1926.62-Construction Industry Lead Standards, 29 CFR 1910.1200-Hazards Communication, 40 CFR 261-EPA Regulations. According to OSHA, any amount of LBP triggers compliance.
24. Visual inspection of various equipments such as light fixtures, thermostats, exit signs and switches was performed for the presence of PCB's and mercury. Ballasts in light fixtures were assumed not to contain PCB's since there were labels indicating "No PCB's". Tubes, thermostats, exit signs and switches were assumed to contain mercury. It would be very costly to test those equipments and dismantling would be required to access. Therefore, the above mentioned equipments should be disposed in an EPA approved landfill as part of the demolition project.
25. Caulking and building materials were assumed to contain PCB's. PCB's are manmade chemicals that were widely produced and distributed across the country from the 1950s to 1977 until the production of PCB's was banned by the EPA law which became effective in 1978. PCB's are a class of chemicals made up of more than 200 different compounds. PCB's are non-flammable, stable, and good insulators so they were widely used in a variety of products including: electrical transformers and capacitors, cable and wire coverings, sealants and caulking, and household products such as television sets and fluorescent light fixtures. Because of their chemical properties, PCB's are not very soluble in water and they do not break down easily in the environment. PCB's also do not readily evaporate into air but tend to remain as solids or thick liquids. Even though PCB's have not been produced or used in the country for more than 30 years, they are still present in the environment in the air, soil, and water and in our food. EPA requires that all construction waste including caulking be disposed as PCB's if PCB's level exceed 50 mg/kg (ppm). Should PCB's was found then EPA regulations must be implemented immediately. Therefore, no testing was performed during this survey, but will be performed prior to design development.

COST ESTIMATES:

The cost includes removal and disposal of all accessible ACM and an allowance for removal of inaccessible or hidden ACM that may be found during the demolition or renovation project.

Location	Material	Approximate Quantity	Cost Estimate ($)
Throughout the School	Flooring Materials and Mastic	60,000 SF	240,000.00
	Pipe and Hard Joint Insulation	1,500 LF	30,000.00
	Interior Windows/Doors	300 Total	30,000.00
	Hidden Pipe and Hard Joint Insulation	Unknown	50,000.00
	Ceiling/Walls Demolition to Access ACM	Unknown	25,000.00
	Blackboard and Glue	220 Total	22,000.00
	Light Fixtures Tubes	600 Total	24,000.00
	Hidden ACM and Miscellaneous HAZ MAT	Unknown	25,000.00
Main Corridors	Soft Ceiling Plaster	14,000 SF	140,000.00
Various Locations	Round Light Fixtures	20 Total	2,000.00
	Flexible Connectors	50 Total	5,000.00

Location	Material	Approximate Quantity	Cost Estimate ($)
Stage	Fire Curtain	1 Total	7,500.00
Boiler Room	Pipe and Hard Joint Insulation	800 LF	16,000.00
	Duct Insulation	900 SF	27,000.00
	Tank Insulation	300 SF	6,000.00
	Boilers	2 Total	16,000.00
	Incinerator	1 Total	5,000.00
Penthouses	Pipe and Hard Joint Insulation	100 LF	3,000.00
	Duct Insulation	1,000 SF	20,000.00
Crawl Space	Pipe and Hard Joint Insulation	6,200 LF	124,000.00
	Contaminated Soil	30,000 SF	60,000.00
Gymnasium	Flooring Materials	5,400 SF	32,400.00
Exterior of School	Window Wall Systems	650 Total	130,000.00
	Doors	33 Total	3,300.00
	Unit Vent Grills	160 Total	8,000.00
	Transite Sewer Pipes	Unknown [1]	50,000.00
	Thru-Wall Flashing	Unknown [1]	75,000.00
	Damproofing on Exterior/Foundation Walls	Unknown [1]	325,000.00
PCB's Remediation[2]			80,000.00
Estimated costs for ACM Inspection and Testing Services			10,000.00
Estimated costs for PCB's Testing and Abatement Plans Services[2]			35,000.00
Estimated costs for Design, Construction Monitoring and Air Sampling Services			108,800.00
		TOTAL:	***1,735,000.00***

[1]: Part of total demolition.
[2]: Should results exceed EPA limit.

4.0 DESCRIPTION OF SURVEY METHODS AND LABORATORY ANALYSES:

Asbestos samples were collected using a method that prevents fiber release. Homogeneous sample areas were determined by criteria outlined in EPA document 560/5-85-030a.

Bulk material samples were analyzed using PLM and dispersion staining techniques with EPA method 600/M4-82-020.

Inspected By:

_____
Leonard J. Busa
Asbestos Inspector

5.0 LIMITATIONS AND CONDITIONS:

This report has been completed based on visual and physical observations made and information available at the time of the site visits, as well as an interview with the Owner's representatives. This report is intended to be used as a summary of available information on existing conditions with conclusions based on a reasonable and knowledgeable review of evidence found in accordance with normally accepted industry standards, state and federal protocols, and within the scope and budget established by the client. Any additional data obtained by further review must be reviewed by UEC and the conclusions presented herein may be modified accordingly.

This report and attachments, prepared for the exclusive use of Owner for use in an environmental evaluation of the subject site, are an integral part of the inspections and opinions should not be formulated without reading the report in its entirety. No part of this report may be altered, used, copied or relied upon without prior written permission from UEC, except that this report may be conveyed in its entirety to parties associated with Owner for this subject study.

Asbestos Identification Laboratory
165 New Boston St., Ste 271
Woburn, MA 01801
781-932-9600
Web: www.asbestosidentificationlab.com
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Batch: 2095

NVLAP®
Lab Code: 200919-0

October 03, 2014

Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project Number:
Project Name: Memorial Bldg, Beverly, MA

Date Sampled: 2014-09-30
Work Received: 2014-09-30

Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

Dear Ammar Dieb,

Asbestos Identification Laboratory has completed the analysys of the samples from your office for the above referenced project
.

The information and analysis contained in this report have been generated using the EPA /600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials. Materials or products that contain more than 1% of any kind or combination of asbestos are considered an asbestos containing building material as determined by the EPA. This Polarized Light Microscope (PLM) technique may be performed either by visual estimation or point counting. Point counting provides a determination of the area percentage of asbestos in a sample. If the asbestos is estimated to be less than 10% by visual estimation of friable material, the determination may be repeated using the point counting technique. The results of the point counting supersede visual PLM results. Results in this report only relate to the items tested. This report may not be used by the customer to claim product endorsement by NVLAP or any other U.S. Government Agency.

Laboratory results represent the analysis of samples as submitted by the customer. Information regarding sample location, description, area, volume, etc., was provided by the customer. Asbestos Identification Laboratory is not responsible for sample collection activities or analytical method limitations. Unless notified in writing to return samples, Asbestos Identification Laboratory discards customer samples after 30 days. This report shall not be reproduced, except in full, without the written consent of Asbestos Identification Laboratory.

- NVLAP Lab Code: 200919-0
- Massachusetts Certification License: AA000208
- State of Connecticut, Department of Public Health Approved Environmental Laboratory Registration Number: PH-0142
- State of Maine, Department of Environmental Protection Asbestos Analytical Laboratory License Number: LB-0078(Bulk) LA-0087(Air)
- State of Rhode Island and Providence Plantations Department of Health Certification: AAL-121

Thank you Ammar Dieb for your business.

Michael Manning
Owner/Director

October 03, 2014

Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project Number:
Project Name: Memorial Bldg, Beverly, MA

Date Sampled: 2014-09-30
Work Received: 2014-09-30

Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
1 / 21644	Smooth Ceiling Plaster (SCP)	Rear of Storage- Police	multi	Non-Fibrous 100	None Detected
2 / 21645	SCP	Boy's Locker- Storage	multi	Cellulose < 1 Non-Fibrous 100	None Detected
3 / 21646	SCP	Hall to Gym	multi	Cellulose < 1 Non-Fibrous 100	None Detected
4 / 21647	SCP	Rm 219	multi	Cellulose < 1 Non-Fibrous 100	None Detected
5 / 21648	SCP	Boy's Lockers- Showers Soffit	multi	Cellulose < 1 Non-Fibrous 100	None Detected
6 / 21649	Wall Plaster	1st FL Jan CL	white	Non-Fibrous 100	None Detected
7 / 21650	Soft Suspect CP (CP-I)	2nd FL Main Corr	white	Cellulose 10 Non-Fibrous 88	Detected Chrysotile 2
8 / 21651	CP-I	Bsmt MC	white	Cellulose 10 Non-Fibrous 88	Detected Chrysotile 2
9 / 21652	Brown Cement Floor	Boy's Lockers	brown	Non-Fibrous 100	None Detected
10 / 21653	Brown Cement Floor	Hall to Girl's Lockers	brown	Non-Fibrous 100	None Detected
11 / 21654	Brown Cement Floor	Auditorium	brown	Non-Fibrous 100	None Detected
12 / 21655	Glazing for Window in Wood Door	Rm 152 (1st FL)	tan	Non-Fibrous 98	Detected Chrysotile 2
13 / 21656	GL for Win in Wood Door	Rm 4 (Bsmt)	multi	Non-Fibrous 100	None Detected
14 / 21657	GL for Interior Window	Bsmt- Shop (Tim)	tan	Non-Fibrous 98	Detected Chrysotile 2

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
15 / 21658	Glue Daub for Wall Tile	Rm 33	brown	Other < 1 Non-Fibrous 100	None Detected
16 / 21659	Glue Daub for Clg Tile	Bsmt Closet @ Rm-9	brown	Other < 1 Non-Fibrous 100	None Detected
17 / 21660	Glue Daub for Clg Tile	Bsmt- Shop (Tim)	brown	Other < 1 Non-Fibrous 100	None Detected
18 / 21661	Duct Insul	Boiler #2 Exh Fan, Boiler Rm	white	Non-Fibrous 30	**Detected** **Chrysotile 65** **Amosite 5**
19 / 21662	Duct Insul	@ AHV, Boiler Rm	white	Non-Fibrous 30	**Detected** **Chrysotile 65** **Amosite 5** **Crocidolite < 1**
20 / 21663	Tan Insul	Upper Boiler Rm, Boiler Rm	gray	Mineral Wool 20 Non-Fibrous 20	**Detected** **Chrysotile 60**
21 / 21664	New Duct Insul for New Small Metal Mills Boiler	Boiler Rm	multi	Mineral Wool 5 Cellulose 5 Synthetic 2 Non-Fibrous 88	None Detected
22 / 21665	Hard Grey Mud Sealant	Front of Boiler #2, Boiler Rm	brown	Non-Fibrous 100	None Detected
23 / 21666	Hard White Mud Sealant	Front of Boiler #1, Boiler Rm	white	Cellulose 20 Non-Fibrous 80	None Detected
24 / 21667	Interior Brick for Incinerator	Boiler Rm	brown	Non-Fibrous 100	None Detected
25 / 21668	Cementitious Top of Incinerator	Boiler Rm	gray	Non-Fibrous 100	None Detected
26 / 21669	Hard Grey Sealant @ Front Sides of Incinerator	Boiler Rm	gray	Non-Fibrous 100	None Detected
27 / 21670	Mastic Coating on Boiler Rm Clg	Boiler Rm	black	Non-Fibrous 100	None Detected
28 / 21671	Mastic Coating on Boiler Rm Clg	Boiler Rm	black	Non-Fibrous 100	None Detected
29 / 21672	CMU/Cement Deck on #28	Boiler Rm	gray	Non-Fibrous 100	None Detected
30 / 21673	Other Adhesive/Yellow Adhesive on #28	Boiler Rm	yellow	Non-Fibrous 100	None Detected
31 / 21674	9" Grey VT	Rear of Stage- Police	multi	Non-Fibrous 90	**Detected** **Chrysotile 10**

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
32 / 21675	BL Mastic #31	Rear of Stage- Police	black	Non-Fibrous 100	None Detected
33 / 21676	BL Mastic for 9" Black VT	Bsmt	black	Non-Fibrous 100	None Detected
34 / 21677	BL Mastic for 9" Tan VT	Jan CL by Business Office	black	Non-Fibrous 100	None Detected
35 / 21678	12" VT w/ Dark Flecks	Bsmt MC by Elect Rm	tan	Non-Fibrous 100	None Detected
36 / 21679	BL Mastic #35	Bsmt MC by Elect Rm	black	Cellulose 10 Non-Fibrous 90	None Detected
37 / 21680	12" VT w/ Light Flecks	MC by Business Office	tan	Non-Fibrous 100	None Detected
38 / 21681	Light Mastic? #37	MC by Business Office	multi	Non-Fibrous 100	None Detected
39 / 21682	12" VT Creme w/ Brown	Rear Stairwell by Rm 30	tan	Non-Fibrous 100	None Detected
40 / 21683	BL Mastic #39	Rear Stairwell by Rm 30	black	Cellulose 5 Non-Fibrous 95	None Detected
41 / 21684	12" Creme	2nd FL MC	tan	Non-Fibrous 100	None Detected
42 / 21685	M Present?	2nd FL MC	black	Cellulose 20 Non-Fibrous 80	None Detected
43 / 21686	12" Red Orange VT	Cafe	red	Non-Fibrous 100	None Detected
44 / 21687	BL Mastic #43	Cafe	black	Non-Fibrous 95	Detected Chrysotile 5
45 / 21688	12" Dark Orange-Brown	Main Lobby- Entrance	multi	Non-Fibrous 100	None Detected
46 / 21689	BL Mastic #45	Main Lobby- Entrance	black	Cellulose 2 Non-Fibrous 93	Detected Chrysotile 5
47 / 21690	12" Chocolate Brown	MC by Police- Detectives	brown	Non-Fibrous 100	None Detected
48 / 21691	BL Mastic #47	MC by Police- Detectives	black	Non-Fibrous 95	Detected Chrysotile 5
49 / 21692	12" White w/ Slight Grey	Food Services- Rm 154	white	Non-Fibrous 100	None Detected

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
50 / 21693	BL Mastic #49	Food Services- Rm 154	black	Non-Fibrous 90	Detected Chrysotile 10
51 / 21694	Hard Black Vinyl Base Board	1st FL Conference Rm #154	black	Non-Fibrous 100	None Detected
52 / 21695	Adhesive #51	1st FL Conference Rm #154	black	Non-Fibrous 100	None Detected
53 / 21696	Brown BL Lino on Htg Cabinet	Rm 164- 1st FL	brown	Cellulose 10 Non-Fibrous 90	None Detected
54 / 21697	Adh. #53	Rm 164- 1st FL	brown	Non-Fibrous 100	None Detected
55 / 21698	Brown BL Lino on Htg Cabinet	Rm 37 Bsmt	brown	Cellulose 15 Synthetic 5 Non-Fibrous 80	None Detected
56 / 21699	Adh. #55	Rm 37 Bsmt	brown	Non-Fibrous 100	None Detected
57 / 21700	CP- SCP?	Auditorium Clg- Front	multi	Non-Fibrous 100	None Detected
58 / 21701	New Win Fr	Side Dvwy to Cafe, Exterior	white	Non-Fibrous 100	None Detected
59 / 21702	New Win Fr	Bsmt- Shop Wing, Exterior	white	Non-Fibrous 100	None Detected
60 / 21703	New Win Fr	Front of Bldg, Exterior	white	Non-Fibrous 100	None Detected
61 / 21704	Old Win Fr? Behind New Metal Fr	Front of Bldg, Bsmt, Exterior	multi	Non-Fibrous 100	None Detected
62 / 21705	Old Putty? Fr Top of Metal Lentil over New Window	Side Driveway to Cafe, Exterior	multi	Non-Fibrous 98	Detected Chrysotile 2
63 / 21706	Residue Orig Fr? on Brick Beside New Win Fr	Exterior	multi	Non-Fibrous 98	Detected Chrysotile 2
64 / 21707	Soft Grey Putty in New Metal Win Fr System	Rear Police/Cafe, Exterior	white	Non-Fibrous 100	None Detected
65 / 21708	Soft Grey Putty in New Metal Win Fr System	Rear Police/Cafe, Exterior	white	Non-Fibrous 100	None Detected
66 / 21709	Door Fr Caulk (Old Door)	Side of School, Dvwy to Cage, Exterior	multi	Non-Fibrous 98	Detected Chrysotile 2
67 / 21710	Grille Caulk	Cafe/Outside Dining, Exterior	gray	Non-Fibrous 90	Detected Chrysotile 10

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
68 / 21711	Door Fr Caulk (Old Door)	Rear of Boy's Lockers, Exterior	white	Non-Fibrous 90	Detected Chrysotile 10
69 / 21712	Grille Caulk for Small Crsp Grille	Exterior	gray	Non-Fibrous 90	Detected Chrysotile 10
70 / 21713	SCP	Girl's Lockers- Showers Soffit	white	Non-Fibrous 100	None Detected
71 / 21714	Flex Conn	Penthouse- Girl's Lockers	multi	Cellulose 30 Non-Fibrous 10	Detected Chrysotile 60
72 / 21715	Grey Block Plan K Deck	Penthouse- Girl's Lockers	gray	Non-Fibrous 100	None Detected
73 / 21716	Domestic Line Paper Pipe Insulation	Crawl Space	multi	Cellulose 70 Non-Fibrous 10	Detected Chrysotile 20
74 / 21717	Elbow Insulation #73	Crawl Space	gray	Mineral Wool 10 Non-Fibrous 20	Detected Chrysotile 70
75 / 21718	Htg Pipe Insulation	Crawl Space	white	Non-Fibrous 55	Detected Chrysotile 15 Amosite 25 Crocidolite 5
76 / 21719	Black Paper Covering #75	Crawl Space	black	Cellulose 35 Non-Fibrous 65	None Detected
77 / 21720	Black Mastic on #76	Crawl Space	black	Non-Fibrous 100	None Detected
78 / 21721	SCP	Ground FL SW by C'rm #8	white	Non-Fibrous 100	None Detected
79 / 21722	Top Layer New VT White?	Rm 36	white	Non-Fibrous 100	None Detected
80 / 21723	Bottom Layer VT Tan	Rm 36	tan	Non-Fibrous 98	Detected Chrysotile 2
81 / 21724	Interior Window GL	Bsmt, Shops	tan	Non-Fibrous 98	Detected Chrysotile 2
82 / 21725	Black Paint on Metal Interior of Htg Cabinet	Main Lobby]	black	Non-Fibrous 100	None Detected

Friday 03 October
Analyzed by: Michael Hanny

End of Report
Batch: 2095

Page 5 of 5

1 of 4

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Beverly, MA Building Name Memorial Bldg

Sample	Result	Description of Material	Sample Location
1		smooth ceiling plaster (SCP)	rear of stage - Police
2		SCP	Boy's Locker - storage
3		SCP	hall to Gym
4		SCP	rm 219
5		SCP	Boy's Lockers - showers soffit
6		wall plaster	1st Fl dan cl
7		soffit suspect CP (CP-I)	2nd Fl main corr
8		CP-I	Bsmt mc
9		Brown cement floor	Boy's Lockers
10		Brown cement floor	hall to Girl's Lockers
11		Brown cement floor	auditorium
12		glazing for window in wood door	rm 152 (1st Fl)
13		gl for win in wood door	rm 4 (Bsmt)
14		gl for interior window	Bsmt - Shop (Tin)
15		glue daub for wall tile	rm 33
16		glue daub for clg tile	Bsmt closet c rm - 9
17		glue daub for clg tile	Bsmt - Shop (Tin)
18		Duct insul	Boiler #2 exh fan Boiler rm
19		Duct insul	c AHU
20		Tank insul	upper Boiler rm

Reported By: [signature] Date: 9/30/14 Due Date: 72-hr

Received By: [signature] Date: 9/30/14

2 of 4

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Beverly, MA Building Name Memorial Bldg

Boiler Rm

Sample	Result	Description of Material	Sample Location
21		new duct insul for new small metal Mills Boiler	
22		Hard grey mud sealant, Front of Boiler #2	
23		Hard white mud sealant, Front of Boiler #1	
24		interior brick for incinerator	
25		cementitious top of incinerator	
26		hard grey sealant on front & sides of incinerator	
27		mastic coating on Boiler rm clg	
28		mastic coating on Boiler rm clg	
29		cmu/cement deck on #28	
30		other adhesive/yellow adhesive on #28	
31		9" Grey VT	rear of stage - Police
32		BL mastic #31	" " " "
33		BL mastic for 9" Black VT	Bsmt
34		BL mastic for 9" Tan VT	JAN cl by Business office
35		12" VT w/Dark Flecks	Bsmt mc by Electrm
36		BL mastic #35	" " "
37		12" VT w/Light Flecks	mc by Business office
38		Light mastic? #37	" " "
39		12" VT creme w/Brown	rear stairwell by rm 30
40		BL mastic #39	" " " "

Reported By: Leonard Buse Date: 9/30/14 Due Date: 72hr

Received By: Date:

3.
4

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Beverly, Ma Building Name Memorial Bldg

Sample	Result	Description of Material	Sample Location
41		12" creme	2nd Fl. mc
42		@ present?	" "
43		12" red orange VT	CAFE
44		BL mastic #43	CAFE
45		12" Dark orange-Brown	main Lobby - entrance
46		BL mastic #45	" " "
47		12" chocolate Brown	mc by Police - Detectives
48		BL mastic #47	" " " "
49		12" white w/ slight grey	Food Services - rm 154
50		BL mastic #49	" " "
51		Hard Black vinyl base board	1st Fl. Conference rm #154
52		adhesive #51	" " "
53		Brown BL Lino on bty cabinet	rm 164 - 1st Fl.
54		adh. #53	" "
55		Brown BL Lino on bty cabinet	rm 37 bsmt
56		adh #55	" "
57		CP - SCP?	auditorium clg - Front
58		new winfr	side drway to CAFE EXTERIOR
59		new winfr	Bsmt - Shop Wing
60		new winfr	Front of Bldg

Reported By: [signature] Date: 9/30/14 Due Date: 72 hr

Received By: Date:

4 of 4

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Beverly, MA Building Name: Memorial Bldg

Sample	Result	Description of Material	Sample Location (EXTERIOR)
61		old winfr? behind new	metal fr front of Bldg, Bsmt
62		old putty? fr top of metal	lentil over new window - side driveway to cafe
63		residue orig fr? on Brick	beside new winfr " "
64		soft grey putty in new metal	win fr system rear Police/cafe
65		soft grey putty in new metal	win fr system rear Police/cafe
66		door fr caulk (old door)	side of school, drwy to cafe
67		Grille caulk	cafe/outside dining
68		door fr caulk (old door)	rear of Boy's Locker
69		grille caulk for small crsp	grille
70		SCP	Girl's Lockers - Showers soffit
71		Flex conn	Penthouse - Girl's Locker
72		Grey Block Plank deck	" " "
73		domestic line paper pipe	insulation crawlspace
74		Elbow insulation #73	
75		htg pipe insulation	
76		Black paper covering #75	
77		Black mastic on #76	
78		SCP	Ground Fl sw by rm #8
79		Top layer new VT white?	rm 36
80		Bottom layer VT Tan	rm 36

Reported By: [signature] Date: 9/30/14 Due Date: 72hr

Received By: _____ Date: _____

81 interior window gl _____ Bsmt, shops

82 Black paint on metal interior of htg cabinet — main lobby

Geotechnical and Geo-Environmental Analysis

Geotechnical and Geo-Environmental Analysis

A Phase 1 Geotechnical and Geo-Environmental Analysis was previously performed, and results were provided in the Beverly Public Schools Feasibility Study submittal dated November 25, 2014.

The Phase 2 Geotechnical and Geo-Environmental Analysis, provided by Lahlaf Geotechnical Consulting, Inc. (LGCI), is included herein.

LGCI
Lahlaf Geotechnical Consulting, Inc.

July 9, 2015

Mr. Troy L. Randall AIA, LEED AP BD+C
Ai3 Architects LLC
526 Boston Post Road
Wayland, MA 01778
phone: (508) 358-0790
fax: (508) 358-0791
E-mail: randall@ai3architects.com

Re: Geotechnical Report
Proposed Middle School
Beverly, Massachusetts
LGCI Project No. 1435

Dear Mr. Randall:

Lahlaf Geotechnical Consulting, Inc. (LGCI) is pleased to submit our geotechnical report for the proposed middle school in Beverly, Massachusetts. We are submitting our geotechnical report electronically.

The soil samples from our explorations are currently stored at LGCI for further analysis, if requested. The rock cores were left at the existing middle school. Unless notified otherwise, we will dispose of the soil samples after three months.

Thank you for choosing LGCI as your geotechnical engineer.

Very truly yours,

Lahlaf Geotechnical Consulting, Inc.

Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

cc. (via e-mail) Mr. Marc Gabriel / Pare Corporation

23 McGinness Way, Billerica, MA 01821 Tel: (978) 330-5912 Fax: (978) 330-5056 www.lgcinc.net

LGCI
Lahlaf Geotechnical Consulting, Inc.

GEOTECHNICAL REPORT
PROPOSED MIDDLE SCHOOL
BEVERLY, MASSACHUSETTS
LGCI Project No. 1435
July 9, 2015

Prepared for:

AI3 ARCHITECTS LLC
526 Boston Post Road
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GEOTECHNICAL REPORT
PROPOSED MIDDLE SCHOOL
BEVERLY, MASSACHUSETTS
LGCI Project No. 1435
July 9, 2015

Prepared for:

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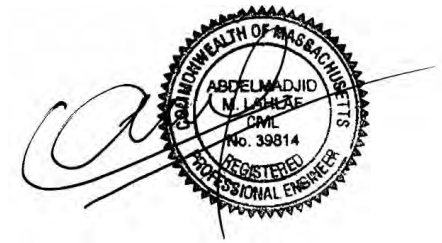

Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

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Geotechnical Engineering Report
Proposed Middle School
Beverly, Massachusetts
LGCI Project No. 1435

1. PROJECT INFORMATION

1.1 Project Authorization

This report presents the results of subsurface explorations and a geotechnical evaluation performed by Lahlaf Geotechnical Consulting, Inc. (LGCI) for the proposed middle school in Beverly, Massachusetts.

We performed our services in general accordance with our proposals Nos. 14062 and 15048 dated September 23, 2014 and April 28, 2015, respectively. Mr. Troy L. Randall of Ai3 Architects LLC (Ai3) authorized our preliminary services by signing our proposal No. 14062 on September 23, 2014. The services in our proposal 15048 were authorized by Mr. Randall in an e-mail dated May 20, 2015.

1.2 Purpose and Scope of Services

The purpose of this study was to obtain subsurface information at the site and to provide recommendations for foundation design and construction. LGCI performed the following services:

- Coordinated our field explorations with Pare Corporation (Pare), the project civil engineer, and with the City of Beverly personnel, staked our exploration locations in the field, and contacted Dig Safe Systems Inc. (Dig Safe).
- Engaged a drilling subcontractor to drill twenty one (21) borings and to install one (1) groundwater observation well.
- Provided a geotechnical field engineer at the site to coordinate and observe the borings and test pits, describe the soil samples, and prepare field logs.
- Provided a field engineer to observe test pits excavated by the City of Beverly personnel and equipment.
- Submitted soil samples for laboratory testing, including seven (7) Atterberg Limit tests, five (5) shear strength tests, four (4) consolidation tests, and one (1) grain-size analysis.
- Prepared this geotechnical report containing the results of our subsurface explorations and our recommendations for foundation design and construction.

Preliminary Geotechnical Engineering Report
Proposed Middle School
Beverly, Massachusetts
LGCI Project No. 1435

Please note that LGCI submitted a preliminary geotechnical report dated November 24, 2014. The present report supersedes our preliminary report.

As the project moves into the design phase, LGCI should be engaged to revise our recommendations if the proposed building location or proposed grades change.

LGCI did not perform environmental services for this project. LGCI did not perform an assessment to evaluate the presence or absence of hazardous or toxic materials above or below the ground surface at or around the site. Any statement about the color, odor, or the presence of suspicious materials included in our boring and test pit logs or report were made by LGCI for information only and to support our geotechnical services. No environmental recommendations and/or opinions are included in this report.

Our scope did not include preparing specifications, attending meetings, performing contract document reviews, or providing construction services. LGCI would be pleased to perform these services, when needed, under a separate agreement. Recommendations for stormwater management, erosion control, pavement design, and detailed cost or quantity estimates are not included in our scope of work.

1.3 Available Information about Site

1.3.1 Reviewed Documents

Our understanding of the existing conditions is based on our field observations, our discussions with Pare, our review of existing school specifications, an historical aerial view of the site, and the existing school record drawings. A list of the documents we reviewed is shown below:

- Aerial photographs of the site from 1995 (1995 Aerial View), downloaded from google.earth.com.
- Drawings titled: “Site Plan,” prepared by Leland and Larsen and dated September 18, 1951.
- Drawings S1, S2, and S10 titled: “Foundation Plan,” “Foundation and Ground Floor Plan,” and “Foundation Plans and Sections,” (Foundation Drawings) prepared by Leland and Larsen and dated June 16, 1952.
- Specification Section IV: “Concrete Pile Foundations and Test Boring Data” (Record Specifications).
- GIS plan with site topography (GIS Topographic Plan) downloaded from the City of Beverly website (www.mapgeo.com/beverlyma).

- GIS utility plan (Utility Plan) of the site provided to us by the City of Beverly.
- Plan titled: "Brimbal Avenue Interceptor, Cross Country - Balch Street to Cabot Street," (Interceptor Plan) prepared by CDM and dated November 1982.
- "Existing Conditions Survey, Memorial Building, 502 Cabot Street Beverly, Massachusetts," (Existing Conditions Survey) prepared by Welch Associates Land Surveyors, Inc. and dated June 12, 2015.

1.3.2 Site description and Background

The Beverly Middle School site is located near the intersection of Cabot Street and Balch Street in Beverly, Massachusetts as shown in Figure 1. The site is occupied by a three-story school building, a small parking lot accessible from Cabot Street, and athletic fields at the rear (the southern and western sides) of the existing building. The site is bordered by Cabot Street and Blaine Avenue on the eastern side, by Balch Street on the southern side, by the Beverly Housing Authority residential properties on the western side, and by wooded land (a wildlife sanctuary) on the northern side.

Eighteen (18) borings were performed within the existing building footprint in 1952. A summary of these borings is provided in Section 1.3.3.

We understand that the existing school was constructed in the early 1950s. The Foundation Drawings and the Record Specifications indicate that the existing building is pile-supported. Details about the existing piles are presented in Section 1.3.4. Based on the Existing Conditions Survey, the existing building has a ground floor with a finished floor elevation (FFE) of about 21.5 feet. The Foundation Drawings show a crawl space under a portion of the building at El. 23 feet.

The Existing Conditions Survey also indicates that the existing ground surface on the northern side of the site (just north and west of the northern driveway) ranges between El. 24 and El. 33 feet. The existing grade ranges between El. 28 and El. 31 feet in the front (eastern side) of the existing building, and between El. 20 and El. 25 feet in the athletic fields.

A review of the 1995 Aerial View, shown in Figure 2, indicates that the southern side of the site, just north of the Beverly Housing Authority residential properties, was a low lying area that has been filled in since then.

The Utility Plan and the Interceptor Plan show drain lines extending from the building to Balch Street in a North-South direction and under the athletic fields in an East-West direction, and a 21-inch sewer line running from Cabot Street to Balch Street along the

eastern side of the school property. Other utilities, including gas, water, and electric lines enter the building from the Cabot Street side and are shown in Existing Conditions Survey.

1.3.3 Previous Explorations

Subsurface data included in the Record Specifications indicate that eighteen (18) soil borings (borings Nos. 1 to 18) were advanced within the footprint of the existing building. The borings extended to depths ranging between 20 and 58 feet beneath the ground surface.

The previous borings indicate that subsurface conditions at the site consist mostly of a thin layer of sand (possibly fill) overlying soft to medium stiff clay extending to refusal or to a thin layer of sand and gravel which was encountered at depths of 48 to 58 feet from the original ground surface. The sand and gravel layer was 2 to 6.5 feet thick, contained boulders, and extended to refusal at depths of 54.5 to 58 feet beneath the ground surface. It is not known whether refusal was encountered on rock.

A summary of the 1952 borings is shown in Table 1. A plan showing the locations of these borings, and the previous borings logs are included in Appendix A.

1.3.4 Existing Pile Foundations

Based on the Record Specifications, the existing building is supported on cast-in-place, permanent shell concrete piles. The Record Specifications indicate that the shell is either the type that is bottom-driven using a mandrel or a casing with sufficient strength to withstand the pile driving energy. The existing piles were specified as tapered piles with a minimum tip diameter of 11 inches and a minimum butt diameter of 15 inches, or a constant diameter of 13 inches. The former is similar to a Raymond pile and the latter is a steel pipe pile.

Based on the Foundation Drawings, the existing piles were designed for an allowable bearing capacity of 45 tons per pile. The piles were driven to an average elevation of El. (-28.5) feet and had cutoff elevations ranging between El. 13.7 and 26.7 feet, i.e., had design lengths of 44.2 to 54.7 feet.

No as-built drawings of the existing piles are available; therefore, the actual pile lengths and sizes are not known. If this information is needed in the future, test pits could be performed in the crawl space to expose the piles to observe their sizes and condition. Special testing techniques would be needed to explore for the depth of the existing piles.

1.4 Project Description

Our understanding of the proposed construction is based on our discussions with Pare and on the following drawing:

- "Grading Plan," prepared by Pare for Ai3 and provided to us by Ai3 on June 16, 2015.

The project is in the schematic design phase and Ai3 is in the process of performing an evaluation of the site to establish where to build the proposed school with associated parking lots and driveways. Based on the Grading Plan, the currently proposed building will have a fan shape that will consist of a semi-circular core with three wings and will sit on a footprint of about 90,000 square feet. The proposed building will be located near the northeastern corner of the site near Cabot Street and will overlap with the footprint of the existing building, slated for demolition before the start of construction.

The proposed building will be two to four stories high and will have a lower level (below the Cabot Street grade) on the southern side over about one third of the proposed building footprint.

The proposed building will have an FFE at the first floor of 28 feet, i.e., at grade with the front (eastern side of the proposed building). This grade will generally require between 2 and 8 feet (with an average of about 7 feet) of fill. The lower level on the southern side of the proposed building will have an FFE of 21 feet and will require little fill and minor cuts to achieve the proposed grade.

Information about the proposed building loads was not available at the time of this report.

1.5 Elevation Datum

We understand that the elevations shown in the Site Plan are referenced to the Beverly City Base. The grades shown in the Grading Plan and in the Existing Conditions Survey are referenced to the National Vertical Datum of 1988 (NAVD 1988).

Based on a plan titled: "Relation of Datum Planes," prepared by MassDOT, the Beverly City Base is 6.34 feet lower than the National Vertical Datum of 1988 (NAVD 1988).

NAVD 1988 = Beverly City Base – 6.34 feet

2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed the following map: "Surficial Geologic Map of the Salem-Newburyport East-Wilmington-Rockport 16 Quadrangle Area in Northeast Massachusetts," prepared by Stone, B.D., Stone, J.R., and DiGiacomo-Cohen, M.L. for U.S. Geological Survey (Open-File Report 2006-1260-B, 2006). The map indicates that the natural surficial materials at the site consist of glaciomarine fine deposits that include very fine to fine sand, silt, and clay that occurs as well sorted, thin layers of alternating silt and clay (varved clay) or thicker layers of very fine sand and silt. These deposits are typical of glacial lakes.

The surficial geologic map shows on the southern side of the site, swamp deposits that consist of organic muck and peat that contain minor amounts of sand, silt, and clay. The map indicates that these deposits are generally less than 10 feet thick and generally overlie glacial deposits.

The surficial geologic map is shown in Figure 3.

2.2 Bedrock Geologic Map

LGCI reviewed the following map: "Bedrock Geology of the Salem quadrangle and Vicinity, Massachusetts," prepared by Toulmin, Priestley for U.S. Geological Survey (Bulletin 1163-A, 1964). The map indicates that the bedrock at the site consists of fine- to medium-grained, generally massive, dark-gray to green diorite and gabbro (Salem Gabbro-Diorite).

The bedrock geologic map is shown in Figure 4.

2.3 Subsurface Explorations

2.3.1 General

LGCI marked our test pit and boring locations in the field during the preliminary exploration in the presence of a representative of Pare and the Commissioner of Public Services and Engineering (Commissioner) of the City of Beverly. Our most recent borings were staked in the field in the presence of the Commissioner. LGCI notified Dig Safe and City staff cleared private utilities before and during our explorations.

During the explorations, LGCI provided a field engineer at the site full-time to observe the borings and the test pits, collect soil samples, and prepare field logs.

2.3.2 Test Pits

The City of Beverly provided a DEERE 410E rubber tire backhoe to excavate six (6) test pits (TP-1 to TP-6) at the site on October 14, 2014.

The test pits were advanced to depths ranging between 7.5 and 10.3 feet beneath the existing ground surface. The test pits were backfilled with the excavated materials. The backfill was placed and tamped with the excavator bucket. City personnel leveled the test pit areas, and loamed and seeded the surface. Appendix B contains LGCI's test pit logs, Table 2 contains the test pit summary, and Figures 5A and 5B show the test pit locations.

2.3.3 Soil Borings

As part of our preliminary explorations in 2014, LGCI engaged Technical Drill Service of Sterling, Massachusetts to advance six (6) soil borings (B-1 to B-6) in the existing athletic fields on the western and southern sides of the existing building and near the edge of the wooded area on the northern side of the existing building between October 6 and 10, 2014 using a CME 55 rubber-track mounted drill rig. The borings were advanced using 4-inch cased wash boring techniques. Since our preliminary explorations were completed, the proposed building layout and location have changed. LGCI engaged Northern Drill Service of Northborough, Massachusetts between June 3 and 12, 2015 to advance fifteen (15) soil borings (B-101 to B-115) within or near the currently proposed building footprint.

The borings extended to depths ranging between 40.6 and 77 feet beneath the ground surface. The drillers performed Standard Penetration Tests (SPT) and obtained split spoon samples with an automatic hammer semi-continuously or at five-foot intervals as noted on the boring logs in general accordance with ASTM D-1586 in borings B-1 to B-6, B-101, B-102, B-104, B-106, B-109, and B-112. The remainder of the borings were advanced as probes without SPT samples to the top of the sand and gravel layer underlying the clay to determine the depth to the bottom of the clay. Unless notified otherwise, we will dispose of the soil samples after three months. The rock cores were left at the site and can be viewed upon request to the building custodian.

Upon completion, the boreholes were backfilled with the soil cuttings. The drillers installed one groundwater observation well in boring B-3-OW. The well was screened to a depth of 20 feet. To reduce the potential for the screen sinking to the bottom of the borehole, the well was installed in a borehole located about 5 feet west of boring B-3.

Appendix C contains LGCI's boring logs and the groundwater observation well installation report, Table 3 shows the boring summary, and Figures 5A and 5B show the boring locations.

The ground surface elevations shown in the test pit and boring logs were interpolated from the Existing Conditions Survey and are approximate.

2.4 Subsurface Conditions

The subsurface description in this report is based on a limited number of borings and test pits and is intended to highlight the major soil strata encountered during our borings and test pits. The subsurface conditions are known only at the actual boring and test pit locations. Variations may occur and should be expected between boring and test pit locations. The boring and test pit logs represent conditions that we observed at the time of our explorations and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our boring and test pit logs are based on our interpretations and the actual transition may be gradual. Graphic soil symbols are for illustration only.

The soil strata encountered in our borings and test pits were as follows, starting from the ground surface.

Topsoil/Subsoil/Asphalt – A layer of organic soil (topsoil/subsoil) was encountered at the ground surface in all explorations. The thickness of this layer ranged between 0.8 feet and 2.8 feet. A thin layer of asphalt was encountered at the ground surface in borings advanced in paved areas.

Fill – Fill was encountered in all borings and test pits except TP-5, B-102, and B-111. The fill extended to depths ranging between about 1.3 and 10 feet beneath the ground surface. The fill was the thickest on the southern side of the site just north of the Beverly Housing Authority building and near the existing building's portion that has a basement.

The fill generally consisted of a heterogeneous mixture of silt, silty sand, clayey sand, and silty gravel. The fill contained organics, tree stumps, and cobbles and boulders up to 2.5 feet in size.

The standard penetration test (SPT) N-values in the fill ranged between 4 and 27 blows per foot (bpf), indicating mostly loose to medium dense fill. A few of the high SPT N-values may have been caused by obstructions in the fill and may not represent the true density of the fill.

Silty Clay – A layer of silty clay was encountered beneath the fill or topsoil in the borings and test pits. The top of this layer in a few borings consisted of clayey silt. The clay contained thin layers of fine sand spaced at a few to several inches apart. The clay extended to depths ranging between 33 and 64.8 feet beneath the ground surface. The bottom of the clay was the deepest (i.e., deeper than El. -30 feet) at borings B-1, B-3-OW, B-6, B-101, and B-102 to B-109, indicating that the depth to the bottom of the clay increases from the western and eastern sides toward the center of the proposed building footprint.

The clay had a desiccated crust in the top 5 to 15 feet. The SPT N-values ranged in the top 5 to 15 feet (crust) between 2 and 20 with most values between 7 and 14 bpf, indicating medium stiff

to stiff clay. Below the crust, the SPT N-values ranged between weight of hammer (WOH) and 9 bpf, with most values lower than 2 bpf, indicating very soft to soft clay.

Based on the SPT N-values, we believe that the clay crust is over-consolidated. Below the crust, the clay is slightly over-consolidated to normally consolidated. This observation is consistent with the results of the consolidations tests performed on undisturbed samples of clay from borings B-4 and B-101. We used the laboratory test data to estimate the over-consolidation ratio (OCR) using the Casagrande graphical method and the strain energy method to obtain the maximum past pressure. The results are shown in the table below.

The table also shows the estimated compression ratio, CC, and the recompression ratio, CR. The results indicate that the clay is moderately compressible. The test results also indicate an average coefficient of consolidation, C_v, of about 2.5×10^{-6} ft^2/sec.

		Depth (ft.)			Max. Past Pressure (tsf)						
Boring	Sample	Top		Bot.	Graphical Method	Strain Energy Method	Effective Stress (tsf)	OCR	CC	CR	Cv (ft2/sec.)
B-101	T1	6	-	8	2	2.5	0.37	6.8	0.09	0.01	7.0E-05
B-101	T2	21	-	23	2.8	2.3	0.79	2.9	0.14	0.02	4.0E-06
B-4	U3	33	-	35	2	1.6	1.19	1.3	0.11	0.02	2.5E-06
B-101	T3	41	-	43	1.1	1.6	1.44	1.1	0.1	0.02	1.0E-06

The natural moisture content in the clay ranged between 22 and 36 percent and the plasticity index ranged between 17 and 22 percent.

Unconsolidated undrained (UU) shear strength tests in the clay indicated undrained shear strength values of 612 to 1,086 psf as shown in Section 2.6.

Sand – A layer of sand and gravel was encountered beneath the clay in all borings except in boring B-1. This layer extended to the boring termination depths in borings B-2 to B-6, B-103, B-105, B-107, B-108, B-110, B-111, and B-113 to B-115. Boulders 2.5 feet and 3 feet in diameter were encountered in this layer and cored through in borings B-4 and B-104. The SPT N-values ranged in this layer between 17 and 79 bpf, indicating medium dense to very dense sand. The presence of boulders and angular gravel in the split spoon samples combined with the hard drilling through this layer suggest that the lower portion of this layer may be weathered rock.

Rock – Refusal was encountered at the bottom of the clay in boring B-1 at a depth of 53 feet, and at the bottom of the sand layer in borings B-2 and B-6 at depths of 40.6 and 61.8 feet beneath the ground surface, respectively. Refusal on possible rock was also encountered in borings B-101,

B-102, B-104, B-106, B-109, and B-112 at depths ranging between 47.5 and 74 feet beneath the ground surface.

To confirm and characterize the rock, the drillers cored the rock in borings B-1 and B-112. The rock consisted of hard, slightly weathered, moderately to extremely fractured, fine to medium grained, light gray Gabbro Diorite. The recovery values were 60 and 97, percent and the rock quality designation (RQD) values were 20 and 76 percent in borings B-1 and B-112, respectively.

2.5 Groundwater

Groundwater was observed during drilling in all borings, expect in the probe borings, and in test pits TP-3 and TP-4 at depths ranging between 1 and 14 feet beneath the ground surface.

One groundwater observation well was installed in boring B-3-OW. The well was screened between depths of 10 and 20 feet beneath the ground surface. The groundwater observation well installation report is included at the end of Appendix C. The groundwater levels measured in B-3-OW after installation on October 10, and again on October 14, 2014, were 6.3 feet and 6.4 feet beneath the ground surface, respectively. The groundwater level was monitored again on June 3 and 23, 2015 and was measured at 5.3 and 5.2 feet beneath the ground surface, respectively.

The reported levels may not represent the actual groundwater conditions, as additional time may be required for the groundwater levels to stabilize. The groundwater levels presented in this report only represent the conditions encountered at the time and locations of our explorations. Seasonal fluctuation should be anticipated.

2.6 Laboratory Test Data

LGCI submitted one (1) split spoon sample for grain-size analysis and seven (7) samples for Atterberg Limit tests. We also submitted undisturbed tube samples from the clay for five (5) unconsolidated undrained shear strength tests, and four (4) consolidation tests.

The laboratory data sheets are included in Appendix D and the results are summarized below.

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Beverly, Massachusetts
LGCI Project No. 1435

Boring /Test Pit No.	Sample Depth (ft)	Soil Layer	Percent Gravel	Percent Sand	Percent Fines	Undrained Shear Strength (psf)	Nat. Moisture Content/ Liquid Limit (%)	Plasticity Index (%)
TP-4	4 – 5	Fill	25.6	44.2	30.2	-	-	-
B-4	12 – 14	Clay	-	-	-	932	41	22
B-4	16 – 18	Clay	-	-	-	819	34	17
B-4	33 – 35	Clay	-	-	-	-	31	14
B-101	6 – 8	Clay	-	-	-	670	-	-
B-101	21 – 23	Clay	-	-	-	1086	-	-
B-101	41 – 43	Clay	-	-	-	612	-	-
B-101	10 – 12	Clay	-	-	-	-	29/37	20
B-101	29 – 31	Clay	-	-	-	-	35/43	22
B-101	49 – 51	Clay	-	-	-	-	35/25	17
b-101	54 -5 6	Clay	-	-	-		36/40	21

3. EVALUATION AND RECOMMENDATIONS

3.1 Foundation Recommendations

Based on the results of our explorations, the existing fill and the underlying clay layer are not suitable to support shallow foundations. The proposed building should be supported on deep foundations bearing in the sand layer beneath the clay or on the rock (Pile Option), or on shallow footings bearing on ground improved using rigid concrete inclusions (Ground Improvement Option).

In this section we discuss the advantages and limitations related to each of the options listed above.

The Pile Option offers the advantage of familiarity. Piles are designed by the project team and generally, barring significant unforeseen conditions, their cost can be estimated reasonably well during the design development phase of the project. In addition, many pile driving contractors are locally available; thus, offering the benefit of competitive proposals during the bid stage of the project. The disadvantage of piles is their cost, and the cost of the required structural slab and pile caps.

The Ground Improvement Option's main advantage is the possibility to use conventional spread and wall footings and a slab-on-grade after improving the ground. The cost savings realized by not installing a structural slab and pile caps may be significant. Several ground improvement techniques are available for subsurface profiles that contain clay, including aggregate piers and rigid inclusions. Due to the deep extent of the clay (up to about 65 feet beneath the ground surface), aggregate piers are not feasible. Ground improvement by means of rigid inclusions is technically feasible at the site and is a viable option to support the proposed building. However, this ground improvement technique is fairly new in New England, and although specialty contractors we spoke with indicated that several project have been completed in the last few years in the Boston area using rigid inclusions, this technique has not been widely used and is still not generally considered common practice. The implication of the lack of familiarity associated with this option is the difficulty of preparing cost estimates during the initial phases of the project.

Since ground improvements are designed and installed by specialty contractors, who each have their own proprietary system, the actual cost is generally provided by the specialty installer and in most instances is not available during the initial phases of the project. Other factors such as the need to place about 7 feet of fill to achieve the required grades also affect the design of the rigid inclusions and may result in a spacing between ground-improvement elements that is not competitive when compared to the Pile Option. The placement of fill will likely require installing wick drains and/or the need to use light-weight fill which will add to the cost of the Ground Improvement Option.

Since from a geotechnical and logistic standpoint, both options are viable, the selection of the Pile Option versus the Ground Improvement Option should be based on a cost-benefit analysis that takes into account the cost of the piles, structural slab, and pile caps as compared with the cost of installing the rigid inclusions combined with the installation of wick drains and using light-weight fill.

While LGCI is confident about the technical feasibility of rigid inclusions and believes that there is a potential for cost savings associated with this option, we recommend carrying the cost of the Pile Option in the initial cost estimates for the project. We recommend that the project design team engage in discussions with ground improvement specialty contractors to gain familiarity with the Ground Improvement Option. If cost information becomes available that substantiates cost saving, the design documents could be prepared showing spread footings and a slab-on-grade supported on ground that is improved using rigid inclusions.

Our recommendations for the Pile Option (driven piles) and for Ground Improvement Option (rigid inclusions) are presented in Sections 3.2 and 3.3, respectively.

3.2 Driven Piles (Pile Option)

3.2.1 General

We considered several types of piles, including precast pre-stressed concrete (PPC) piles, closed end, concrete filled steel pipe piles (CFP), and H-piles. PPC piles are generally more economical than CFP piles. However, PPC piles are not easy to splice and are generally more susceptible to breakage during handling and installation than steel piles. A few of the borings indicated a transition from soft clay directly into rock or the presence of a thin layer of sand overlying bedrock. This condition is of concern to us as it would result in high potential for damage to the bottom of the PPC piles during pile driving. Where a special connection to the pile cap is needed, PPC piles that are cut need to be drilled to install grouted dowels. Furthermore, PPC piles are generally difficult to cut and are best suited at sites where known pile lengths are required.

If the project proceeds with piles and a structural slab, we recommend supporting the proposed building on either H-piles or CFP piles. Our H-pile and CFP pile recommendations are presented in Section 3.2.2. All foundations should be designed in accordance with *The Commonwealth of Massachusetts State Building Code 780 CMR, Eighth Edition* (MSBC 8th Edition).

CFP piles and H-piles can typically be installed to depths of up to 120 feet and can achieve high capacities. They are both well suited for friction and end bearing, and can be installed by most pile driving contractors. CFP wall thicknesses are available between 0.16 inch and

more than 1 inch. CFP piles and H-piles are easy to splice and are therefore suited to sites with variable subsurface conditions such as at the project site. CFP piles and H-piles are slightly more costly than PPC piles but generally require a smaller crane during installation as they are lighter than PPC piles; and therefore have a lower cost of mobilization of the pile driving equipment.

For this project, we recommend installing CFP piles or H-piles to derive their capacity in end bearing in rock or in the sand layer underlying the clay.

Where the proposed foundations are supported on piles, the proposed slab should be designed as a structural slab supported on grade beams spanning between pile caps.

3.2.2 Driven Pile Design

- Using the boring data, we have estimated the ultimate tip bearing capacity in rock and in the sand layer underlying the clay.

- Typically, steel piles driven through undisturbed soils do not require corrosion protection. However, since the piles will be driven through up to 10 feet of fill, we recommend that the piles be provided with about 1/16-inch sacrificial thickness for corrosion protection.

- We recommend pile cutting shoes to reduce the likelihood of pile deformation during driving.

- For piles driven to rock, the pile capacity will be controlled by the structural capacity of the piles. Piles driven to rock are typically the preferred option as they achieve higher capacity as illustrated in the table below. However, the choice of the pile should be based on actual pile loads. For instance, piles supporting structural slabs are not required to be designed with high capacities. Accordingly, if CFP piles are used to support the proposed slabs, they may be designed to achieve lower capacities and be terminated in the sand layer beneath the clay. If H-piles are used, they will have to be driven to rock, including the piles supporting the slabs.

- For CFP piles bearing in the sand, we used a friction angle in the sand of 38 degrees. Using the Nordlund/Thurman Method, we estimate for CFP piles bearing in the sand underlying the clay layer an allowable tip bearing capacity of about 65 tons per square foot (tsf). This capacity is calculated with a factor of safety, FS, equal to 2, consistent with a pile design confirmed by a pile load test as described in Section 3.2.4. So, for a CFP pile with an outside diameter of 12.75 inches (PP12.75), we estimate a tip resistance in the sand of 55 tons. Assuming that the piles penetrate about 2 feet into the sand layer before reaching the required capacity, and based on the results of the borings, we estimate that the pile lengths will range between about 40 and 67 feet for piles bearing in the sand layer.

- End bearing piles bearing on rock should be driven to practical refusal. Practical refusal is 20 blows per inch of driving penetration as defined by the 2006 FHWA publication "Volume 1: Design and Construction of Driven Piles."

- If piles with different capacities are used on the project, more than one pile load test will be needed as described below.

- For piles driven to rock, the pile capacity will be controlled by the structural capacity of the piles. Assuming a maximum allowable stress from MSBC 8th Edition, Table 1810.3.2.6 of the lesser of 0.35 times the yield stress, Fy, and 16 ksi, we provide estimates of pile capacities for common CFP pile and H-pile sections in the table below.

Pile Section	Yield Stress (ksi)	Maximum Allowable Stress[1)] (ksi)	Cross Sectional Area[2)] (in^2)	Maximum Allowable Load (kips)
HP 14 x 89	50[4)]	16	20.8	332
HP 12 x 53	50[4)]	16	11.1	176
PP 12.75[3)]	45[5)]	15.75	12.1	190
PP 12[3)]	45[5)]	15.75	11.4	178

Notes:
1. Maximum allowable stress equals the lesser of 0.35 Fy or 16 ksi.
2. Cross sectional area has been reduced for 1/16th inch loss of steel to account for corrosion.
3. PP section assume 0.375 wall thickness.
4. ASTM A572 Grade 50
5. ASTM A252 Grade 45

- We recommend using H-piles conforming to ASTM A572, Grade 50 (minimum yield strength, Fy = 50 ksi).

- We recommend using CFP piles conforming to ASTM A252, Grade 3 (minimum yield strength, F_y = 45 ksi) with minimum wall thickness of 0.375 inches.

- Piles should be spaced (center to center) at a minimum of three (3) pile diameters.

- Pile splices should not be positioned within 20 feet of the pile top, which must be considered in planning of pile segment lengths prior to driving

- Pile splices must include full penetration welds around the full perimeter to provide required uplift capacity.

- Where caps contain more than 4 piles, the sequence of installation must proceed from interior of group outward in all directions.

- Piles and pile caps should be braced in accordance with Section 1810.2.2 of MSBC 8th Edition.

- A wave equation analysis should be performed to establish the preliminary driving criteria and the requirements for the pile driving hammer. The analysis should be performed by a professional engineer registered in the Commonwealth of Massachusetts and engaged by the contractor.

3.2.3 Pile Settlement

We estimate for piles constructed in accordance with the recommendations contained in this report, that the total post-construction settlement will be less than about 1 inch and that the differential settlement will be 3/4 inch or less over a distance of 25 feet. The differential settlement will be primarily between piles driven into rock and those driven into the sand layer and between piles driven to different depths. Some of this settlement will occur during construction. Total and differential settlements of these magnitudes are usually considered tolerable for the anticipated construction. However, the tolerance of the proposed structure to the predicted total and differential settlements should be assessed by the structural engineer. LGCI should be engaged to refine our settlement estimates as the proposed building loads become available in the design phase.

3.2.4 Pile Load Test

A combination of static load testing and dynamic pile testing is recommended for an initial indicator pile program at the Beverly Middle School as follows:

- At least one (1) static load test should be performed. If piles with different capacities or piles of different types are used on the project, e.g., high capacity piles to support columns and lower capacity piles to support structural slabs, a pile load test will be needed for each type of pile driven to different strata to different driving criteria. The piles selected for the pile load tests should be installed in the same manner as the production piles and should be loaded to twice the allowable capacity of the selected pile section.

- In addition to the static pile load test, we recommend performing at least two (2) dynamic tests on indicator piles in accordance with ASTM D-4945 for each type of pile.

- Pile Dynamic Analyzer (PDA) testing and CAPWAP analysis should be conducted on the indicator piles and static load test pile during initial driving to confirm capacity and driving

criteria. We recommend restrike of each indicator pile approximately five (5) days after initial end of driving.

- Based on the results of the indicator pile installation and testing program, the driving criteria for production piles will be confirmed or revised from that used for the indicator piles. If it is necessary to change the pile hammer or driving criteria, then additional indicator piles and tests may be required.

3.2.5 Pile Caps

The pile caps should be placed at a minimum of 4 feet beneath the ground surface for frost protection. The piles should be placed at least 12 inches from the edge of the pile cap.

3.2.6 Downdrag

Downdrag occurs when the clay settles under the weight of fill placed to raise the grades. As the clay settles, the downward movement of the soil with respect to the piles will cause negative skin friction to develop between the soil and the piles. This movement causes downdrag settlement. As the soil moves relative to the pile, it creates drag loads acting on the piles. The relative movement between the soil and the pile is most severe near the top of the pile and decreases with increasing depth until it becomes zero at a point where the movement of the soil is equal to the movement of the pile. This point is located on the neutral plane. The downdrag settlement of the pile is equal to the settlement of the soil below the neutral plane.

The total settlement at the pile head is equal to the downdrag settlement plus the elastic deformation at the pile head under the applied load.

For pile types with large tip resistance, such as end bearing CFP piles and H-piles, the neutral plane is close to the pile tip. Accordingly, for these types of piles, the downdrag settlement is small, and the drag load will not affect the pile geotechnical capacity but may cause settlement of the pile. To maintain the pile integrity, the drag load should be estimated and the structural capacity of the pile should be checked against the sum of the dead loads and drag load acting on the piles.

Once the pile type and size are selected, LGCI should be engaged to estimate the downdrag load.

3.3 Rigid Inclusions (Ground Improvement Option)

3.3.1 General

Rigid inclusions are a ground improvement technique whereby rigid, cylindrical concrete elements are installed through a soil that is not suitable to support shallow foundations, such as the clay at the site. The concrete is installed using a bottom feed from a mandrel as the mandrel is extracted from the ground. After the ground is improved using rigid inclusions, the proposed building may be supported on shallow foundations and the slab may be constructed as a slab-on-grade. Before the footings and slabs are constructed, a layer of granular fill is placed at the top of the rigid inclusions to serve as a load transfer pad (LTP), and the load from the slab and footings is transferred via the LTP through the rigid inclusions to the deep bearing layer where the rigid inclusions are terminated.

Rigid inclusions generally generate little spoils.

The design of the rigid inclusions, including the size and layout of the inclusions, is performed by the specialty contractor. However, based on our discussions with specialty contractors and our experience with other ground improvement techniques, we anticipate that the rigid inclusions at the site will consist of 12- to 16-inch elements extending to the top of the sand layer underlying the clay. The rigid inclusions should be placed under the proposed footings and under the proposed slab. Generally the spacing of the rigid inclusions is tighter under the footings than under the slab.

In the following sections we discuss the footing design, slab-on-grade, design submittals, and the required modulus tests.

3.3.2 Footing Design

- For footings bearing in ground improved using rigid inclusions, we recommend using a net allowable bearing pressure of 4,000 pounds per square foot (psf).

- The subgrade of footings and the placement of the LTP should be performed in accordance with the recommendations of the specialty contractor installing the rigid inclusions.

- All foundations should be designed in accordance with *The Commonwealth of Massachusetts State Building Code 780 CMR, Eighth Edition* (MSBC 8th Edition).

- Exterior footings and footings in unheated areas should be placed at a minimum depth of 4 feet below the final exterior grade to provide adequate frost cover protection. Interior

footings in heated areas may be designed and constructed at a minimum depth of 2 feet below finished floor grades.

- We recommend that wall footings have a minimum width of 2 feet, and that column footings have a minimum width of 3 feet. For foundations with a least lateral dimension smaller than 3 feet, the allowable bearing pressure should be reduced to 1/3 of the recommended allowable bearing pressure times the least dimension in feet.

- Wall footings should be designed and constructed with continuous, longitudinal steel reinforcement for greater bending strength to span across small areas of loose or soft soils that may go undetected during construction.

- A representative of LGCI should observe the subgrade of footings to verify that the subgrade has been prepared in accordance with our recommendations.

3.3.3 Slab-on-Grade

- The proposed floor slabs can be constructed as slabs-on-grade after the subgrade is prepared in accordance with recommendations in this Section and in Section 4.1.

- We recommend supporting the proposed slab on Structural Fill placed on ground improved using rigid inclusions. The spacing of the rigid inclusions should be optimized to reduce the number of rigid inclusions.

- A vapor retarder membrane with a minimum thickness of 15 mils could be used beneath the slabs. The need for such a membrane should be evaluated by the architect. The membrane should be protected from puncture during placement of the steel mesh and construction of the slabs.

Please note that cracking of slabs-on-grade can occur as a result of heaving or compression of the underlying soil, but also as a result of concrete curing stresses. To reduce the potential for cracking, the precautions listed below should be closely followed for construction of all slabs-on-grade:

- Construction joints should be provided between the floor slab and the walls and columns in accordance with the American Concrete Institute (ACI) requirements, or other applicable code.

- Backfill in interior and exterior utility trenches should be properly compacted as recommended in Section 4.3.

- In order for the movement of exterior slabs not to be transmitted to the building foundation or superstructure, exterior slabs such as approach slabs and sidewalks, should be isolated from the building superstructure.

3.3.4 Design Submittals

The design of the ground improvements is performed by the specialty contractor. The contractor should submit shop drawings that include the diameter, the spacing, and the configuration of the rigid inclusions, details about the installation procedure, and the sequence of construction. The submittal should also include the planned cut off and tip elevations of the rigid inclusions, details about the material used, proposed equipment, instrumentation, mix design, design calculations, and a plan showing the locations and numbers of the rigid inclusions.

3.3.5 Modulus Tests

We recommend performing two (2) modulus tests as follows: 1) one test on a single rigid inclusion, and 2) a test on a pair of adjacent rigid inclusions with the LTP in place and a load acting on the LTP.

3.4 Ground and Slab-on-Grade Settlement

3.4.1 General

The fill placed to raise the grades will induce settlement in the clay. The settlement will affect the performance of the piles due to the downdrag movement that will create drag loads on the piles. For the Pile Option, the structural slab may be constructed without placing fill to raise the grades. This will reduce the potential for drag loads and will require formwork for the proposed slab and maintenance of a space beneath the proposed slab (crawl space). The settlement has a greater effect on the Ground Improvement Option. As the clay settles the LTP above the rigid inclusions could settle causing settlement of the slab-on-grade.

In the following section we have estimated the primary and secondary consolidation as well as the time rate consolidation.

3.4.2 Primary Consolidation Settlement

We estimated the primary consolidation of the clay using the soil profile from boring B-101 and a fill surcharge of 875 psf corresponding to 7 feet of fill with a unit weight of 125 pcf. Using a compression ratio, CC, of 0.12, and a recompression ratio, CR, of 0.02 and the stress history shown in Section 2.6, we estimate that the primary consolidation settlement will be about 4.5 inches.

To explore ways to reduce the settlement, we considered the option of filling with light-weight fill. Using 7 feet of light-weight fill with a unit weight of 65 pcf, we estimated the primary consolidation settlement in the clay to be just under 2 inches.

3.4.3 Time-Rate Consolidation

We estimated the time required to achieve 80 percent consolidation, i.e., the time after which the clay would experience 20 percent of the estimated settlement. We used a coefficient of vertical consolidation, C_v, of 2.5×10^{-6} ft^2/sec. Assuming that the clay layer is double drained and has a total thickness of 60 feet, we estimate a duration of 6 ½ years. In reality, the clay contained occasional thin layers of sand that may promote drainage, and the actual primary consolidation time may be shorter but would extend past the completion of the construction.

Most of the settlement will occur after the end of construction. For the Ground Improvement Option, this settlement would result in settlement of the slab-on-grade. Therefore, measures to shorten the consolidation process such as by means of wick drains are recommended for the Ground Improvement Option.

3.4.4 Wick Drains

To expedite the consolidation process, we estimated the consolidation time for different percentages of consolidation using wick drains to promote lateral drainage. We assumed 4-inch wide drains with a thickness of 1/8 inch. We used a coefficient of horizontal consolidation, C_h, ranging between 1 x C_v and to 2 x C_v. Assuming wick drains installed in a triangular configuration with a spacing of 5 and 6 feet, we estimated the time to achieve different percentages of consolidation as shown in Figure 6. For instance, for a wick drain spacing of 5 feet and using a C_h value of 2.5×10^{-6} ft^2/sec., we estimate that the required time to reach 90 percent consolidation is 102 days.

Wick drains should be installed after the fill is placed and should have their tops exposed to the atmosphere.

3.4.5 Secondary Consolidation

In addition to the primary consolidation settlement discussed above, the clay will experience secondary consolidation settlement that occurs after the primary consolidation is mostly completed.

From the laboratory test results we estimated a secondary compression ratio C_α of 8×10^{-4}, where C_α is the slope of the settlement versus time curve as determined from a logarithmic

(log) scale. Assuming that 90 percent of primary consolidation is completed at 100 days with the aid of wick drains as described above, we estimate that the secondary consolidation over one log cycle, i.e., within about 3 years from the end of the primary consolidation to be 0.5 inch.

3.4.6 Settlement of the Slab-on-Grade

The total settlement of the slab-on-grade installed 100 days after the installation of the wick drains will be the total of 10 percent of the primary consolidation estimated in Section 3.4.2, i.e., about 0.45 inches and the secondary consolidation settlement of 0.5 inch, i.e., a total of less than 1 inch.

3.5 Exterior Slabs and approach Platforms

- In order for the movement of exterior slabs not to be transmitted to the building foundation or superstructure, exterior slabs such as approach platforms and sidewalks, should be isolated from the building superstructure.

- Depending on the magnitude of exterior slab loads and where the grades will be raised, the exterior slabs (not supported on piles or on ground that is improved with rigid inclusions) will experience settlement. To reduce the potential for tripping hazard caused by settlement, approach platforms may need to be resurfaced as they settle. Alternatively, they can be installed as hinged, tilt slabs, supported on the exterior building grade beams on one side and on the ground on the other side.

3.6 Under-slab Drains

Based on the groundwater levels observed in our explorations and the finished grades provide to us at the time of this report, an under-slab drainage system is not required under the proposed building.

3.7 Seismic Design Criteria

In accordance with Section 1613 of MSBC 8th Edition, the seismic criteria for the site are as follows:

- Site Class: E
- Spectral Response Acceleration at short period (S_s): 0.32g
- Spectral Response Acceleration at 1 sec. (S_1): 0.072g
- Site Coefficient F_a (Table 9.4.1.2.4a): 2.28
- Site Coefficient F_v (Table 9.4.1.2.4b): 3.5
- Adjusted spectral response S_{ms}: 0.728g
- Adjusted spectral responses S_{m1}: 0.252g

Based on the results of the borings and in accordance with Section 1806.4 of MSBC 8th Edition, the natural soils at the site are not susceptible to liquefaction during a seismic event.

3.8 Lateral Pressures for Wall Design and Perimeter Drains

3.8.1 Lateral Earth Pressures

We recommend using the following values for the design of retaining walls, if any:

Coefficient of Active Earth Pressure, K_A:	0.31
Coefficient of At-Rest Earth Pressure, K_o:	0.5
Coefficient of Passive Earth Pressure, K_p:	3.3
Total Unit Weight, γ:	125 pounds per cubic foot

Note: The values in the table are based on a friction angle for the backfill of 32 degrees and neglecting friction between the backfill and the wall. The design active and passive coefficients are based on horizontal surfaces (non-sloping backfill) on both the active and passive sides, and a vertical wall face.

- Site retaining walls should be designed using the active earth pressure coefficient shown above. Perimeter walls of below-ground spaces, if any, should be designed using the at-rest earth pressures.

- Passive earth pressures should only be used at the toe of the wall where special measures or provisions are taken to prevent disturbance or future removal of the soil on the passive side of the wall, or in areas where the wall design includes a key.

- Where a permanent vertical uniform load will be applied on the active side immediately adjacent to the wall, a horizontal surcharge load equal to half of the uniform vertical load should be applied over the height of the wall. At a minimum, a temporary construction surcharge of 100 psf should be applied uniformly over the height of the wall.

- We recommend using an ultimate friction factor of 0.50 between the natural sand and the bottom of the retaining wall. Retaining walls should be designed for minimum factors of safety of 1.5 for sliding and 2.0 for overturning.

3.8.2 Seismic Pressure

- In accordance with the *Massachusetts State Building Code, 8th Edition, Section 1610*, a lateral earthquake force equal to $0.100*(S_s)*(F_a)*\gamma*H^2$ should be included in the design of the wall (for horizontal backfill), where S_s is the maximum considered earthquake spectral

response acceleration (defined in Section 3.7), F_a is the site coefficient (defined in Section 3.7), γ is the total unit weight of the soil backfill, and H is the height of the wall.

The earthquake force should be distributed as an inverted triangle over the height of the wall. In accordance with MSBC 8th Edition, Section 1610.2, a load factor of 1.43 shall be applied to the earthquake force for wall strength design.

- Temporary surcharges should not be included when designing for earthquake loads. Surcharge loads applied for extended periods of time shall be included in the total static lateral soil pressure and their earthquake lateral force shall be computed and added to the force determined above.

3.8.3 Perimeter Drains

If the proposed building includes an elevator, the elevator pit may require perimeter drains if not designed as a waterproof box. LGCI will finalize this recommendation after the proposed building layout is established, including the location of any below-ground spaces or elevator pits.

3.9 Parking Lots, Driveways, and Sidewalks

3.9.1 General

The subsurface conditions encountered at the site are generally suitable to support the proposed driveways and parking lots after preparation of the subgrade as described in Section 4.1.

- We recommend removing the surficial topsoil/subsoil within the footprint of the proposed paved areas.

- In existing fill areas, the ground should be improved by excavating at least one foot of the existing fill beneath the bottom of the proposed subbase and compacting the exposed subgrade as described in Section 4.1.

- The clay is anticipated to experience settlement under the weight of fill placed to raise grades. Depending on the magnitude of the fill, large settlements could be experienced that could cause damage to pavement and utilities. To the extent possible, the proposed exterior grades should be kept as close to the existing grades as possible.

3.9.2 Sidewalks

- Sidewalks should be placed on a minimum of 12 inches of Structural Fill with less than 5 percent fines.

- To reduce the potential for heave caused by surface water penetrating under the sidewalk, the sidewalk concrete sections should be sealed with a waterproof compound. The sidewalks should be sloped away from the building or other vertical surfaces to promote flow of water. To the extent possible, roof leaders should not discharge onto sidewalk surfaces.

3.9.3 Typical Pavement Sections

A typical, minimum, standard-duty pavement section that could be used for parking areas is as follows:

1.5"	Asphalt "Top Course"
2.0"	Asphalt "Base Course"
8"	Processed Gravel for Sub-Base (MassDOT M1.03.1)

A typical, minimum, heavy-duty pavement section that could be used for areas of heavy truck traffic is as follows:

2.0"	Asphalt "Top Course"
2.5"	Asphalt "Base Course"
12"	Processed Gravel for Sub-Base (MassDOT M1.03.1)

The pavement sections shown above represent minimum thicknesses representative of typical local construction practices for similar use. Periodic maintenance should be anticipated.

Pavement material types and construction procedures should conform to specifications of the "Standard Specifications for Highways and Bridges," prepared by the Commonwealth of Massachusetts Department of Public Works and dated 1988 (with 2012 Supplemental Specifications).

Areas to receive relatively highly concentrated, sustained loads such as dumpsters, loading areas, and storage bins are typically installed over a rigid pavement section to distribute concentrated loads and reduce the possibility of high stress concentrations on the subgrade. Typical rigid pavement sections consist of 6 inches of concrete placed over a minimum of 8 inches of subbase material.

Once the proposed grades are finalized within the proposed parking lots, LGCI should be engaged to estimate the settlement at the ground surface and to assess its impact on site utilities.

3.10 Underground Utilities

Utilities should be placed on suitable bedding material in accordance with the manufacturer's recommendations. "Cushion" material should be placed, by hand, above the utility pipe in maximum 6-inch lifts. The lift should be compacted by hand to avoid damage to the utility. Where the bedding/cushion material consists of crushed stone, it should be wrapped in a geotextile fabric.

Compaction of fill in utility trenches should be in accordance with our recommendations in Section 4.3. To reduce the potential for damage to utilities, placement and compaction of fill immediately above the utilities should be performed in accordance with the manufacturer's recommendations.

To accommodate relative movements at the transition between the ground and the proposed building, flexible utility connections should be provided at the transition, or the utilities should be installed in sleeves with diameters larger than the utilities.

4. CONSTRUCTION CONSIDERATIONS

4.1 Pile Installation and Subgrade Preparation

- If the pile cap sizes and column loads require that the spacing between piles is closer than three (3) pile diameters, pre-augering may be required to reduce the potential for piles heaving during pile driving. Our final recommendation about pre-augering will be determined after the column loads are known.

- Due to the presence of boulders in the fill, pre-trenching of the existing fill will be required before pile driving.

- The piles should be outfitted with flat end plates with a minimum thickness of one inch or with conical tips to reduce the potential for damage to the pile tips.

4.2 Subgrade of Footings and Slab-on-grade on Improved Ground

- The rigid inclusions should be installed after the fill required to raise the site grades has been placed.

- Before placing fill for the LTP, the top of the rigid inclusions should be exposed. There should be no soft material between the LTP and the top of the rigid inclusions.

- The subgrade of the footings should be compacted with a plate compactor imparting a minimum effort of 4 kips.

- The subgrade of the slabs-on-grade should be compacted with a vibratory compactor imparting a minimum effort of 10 kips.

- If the grades are raised using light-weight fill, the top 6 inches of fill under the slab should consist of Structural Fill and should be separated from the underlying light-fill fill using a geotextile fabric for separation.

4.3 Subgrade of Sidewalks and Paved Areas

- Fill placed in the top 12 inches beneath sidewalks should consist of Structural Fill with less than 5 percent fines as shown in Section 4.5.1.

- Fill placed under the subbase of paved areas, should meet the gradation and compaction requirements of Ordinary Fill shown in Section 4.3.2.

4.4 Subgrade Protection

The on-site sand may be frost susceptible. If construction takes place during freezing weather, special measures should be taken to prevent the subgrade from freezing. Such measures should include the use of heat blankets, or excavating the final six inches of soil just before pouring concrete. Filling operations should be halted in freezing weather.

Materials with high fine contents are typically difficult to handle when wet as they are sensitive to moisture content variations. Subgrade support capacities may deteriorate when such soils become wet and/or disturbed. The contractor should keep exposed subgrades properly drained and free of ponded water. Subgrades should be protected from machine and foot traffic to reduce disturbance.

4.5 Fill Materials

Structural Fill and Ordinary Fill should consist of inert, hard, durable sand and gravel, free from organic matter, clay, surface coatings and deleterious materials, and should conform to the gradation requirements shown below.

4.5.1 Structural Fill

The Structural Fill should have a plasticity index of less than 6, and should meet the gradation requirements shown below. Structural Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of optimum moisture content.

Sieve Size	Percent Passing by Weight
3 inches	100
1 ½ inch	80 - 100
½ inch	50 – 100
No. 4	30 – 85
No. 20	15 – 60
No. 60	5 – 35
No. 200*	0 – 10

* 0 – 5 Under sidewalks

4.5.2 Ordinary Fill

Ordinary Fill should have a plasticity index of less than 6, and should meet the gradation requirements shown below. Ordinary Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of optimum moisture content.

Sieve Size	Percent Passing by Weight
6 inches	100
1 inch	50 - 100
No. 4	20 – 100
No. 20	10 - 70
No. 60	5 – 45
No. 200	0 – 20

4.6 Reuse of Onsite Materials

Based on the grain-size analysis, the existing fill does not meet the gradation requirements for Structural Fill or Ordinary Fill.

All materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.7 Groundwater Control Procedures

Based on the groundwater levels encountered in our explorations, we do not anticipate that major groundwater control procedures will be needed during excavations for pile caps or utilities. We expect that filtered sump pumps installed in pits located at least three feet below the bottom of the excavation may be sufficient to handle the perched groundwater or surface runoff that may enter the excavation.

The contractor should be permitted to employ whatever commonly accepted means and practices as necessary to maintain the groundwater level below the bottom of the excavation, and to maintain a dry excavation during wet weather. Groundwater levels should be maintained at a minimum of 1-foot below the bottom of excavations during construction. Placement of reinforcing steel or concrete in standing water should not be permitted.

4.8 Temporary Excavations

All excavations to receive human traffic, including utility trenches, basement or footing excavations, or others (i.e. underground storage tanks, etc.), should be constructed in accordance with the OSHA guidelines.

The site soils should generally be considered Type “C” and should have a maximum allowable slope of 1.5 Horizontal to 1 Vertical (1.5H:1V) for excavations less than 20 feet deep. Deeper excavations, if needed, should have shoring designed by a professional engineer.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of the excavation sides and bottom.

5. RECOMMENDATIONS FOR FUTURE WORK

We recommend engaging LGCI to perform the following services:

- Review the geotechnical aspects of the contract drawings and provide written comments.
- Review the geotechnical aspects of contractor submittals.
- Provide a field representative during construction to observe pile driving operations and the subgrade of paved areas and exterior slabs, and submit daily field reports documenting our observations and field recommendations.

6. REPORT LIMITATIONS

Our analysis and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminates in or around the site.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from anticipated conditions are encountered, it may be necessary to revise the recommendations in this report. We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Ai3 Architects LLC for the specific application to the proposed Middle School in Beverly, Massachusetts as conceived at this time.

7. REFERENCES

Massachusetts Highway Department (1988), "Standard Specifications for Highways and Bridges."

Massachusetts Highway Department (2014), "Interim supplemental Specification."

Becker, D. E., Crooks, J. H. A, Been, K., and Jefferies, M. G. (1987), *Work as a Criterion for Determining in Situ and Yield Stresses in Clay*, Canadian Geotechnical Journal, Volume 24, pp. 549-564

The Commonwealth of Massachusetts (2010), "The Massachusetts State Building Code, 780 CMR, Eighth Edition."

The Department of Labor, Occupational Safety and Health Administration (1989), "Occupational Safety and Health Standards - Excavations; Final Rule," 20 CFR Part 1926, Subpart P.

USGS Beverly, MA topographic map from www.MyTopo.com

Table 1 - Summary of 1952 Borings
Proposed Middle School
Beverly, Massachusetts
LGCI Project No. 1435

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater Depth / El. (ft.)	Bottom of Topsoil/Subsoil Depth / El. (ft.)*	Bottom of Fill Depth / El. (ft.)	Bottom of Clay Depth / El. (ft.)	Refusal Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
1	20.98	0.5 / 20.5	2 / **19.0**	7 / **14.0**	- / **-**	- / **-**	22 / **-1.0**
2	22.75	2.0 / 20.8	2 / **20.8**	7.5 / **15.3**	- / **-**	- / **-**	20 / **2.8**
3	23.61	1.5 / 22.1	2 / **21.6**	7.5 / **16.1**	- / **-**	- / **-**	20.5 / **3.1**
4	21.61	0.5 / 21.1	1.5 / **20.1**	9.5 / **12.1**	48 / **-26.4**	54.5 / **-32.9**	54.5 / **-32.9**
5	20.56	0.1 / 20.5	1.5 / **19.1**	7.5 / **13.1**	- / **-**	- / **-**	22.5 / **-1.9**
6	18.62	0.5 / 18.1	2.5 / **16.1**	10.5 / **8.1**	- / **-**	- / **-**	20.5 / **-1.9**
7	21.76	0.5 / 21.3	1.5 / **20.3**	11 / **10.8**	- / **-**	- / **-**	20 / **1.8**
8	21.18	1 / 20.2	2 / **19.2**	10 / **11.2**	- / **-**	- / **-**	22.5 / **-1.3**
9	19.44	1 / 18.4	2 / **17.4**	10 / **9.4**	53.5 / **-34.1**	53.5 / **-34.1**	53.5 / **-34.1**
10	17.92	0.5 / 17.4	2 / **15.9**	6 / **11.9**	- / **-**	- / **-**	20 / **-2.1**
11	23.66	0.1 / 23.6	1.5 / **22.2**	8 / **15.7**	58 / **-34.3**	58 / **-34.3**	58 / **-34.3**
12	24.54	2 / 22.5	2 / **22.5**	10.5 / **14.0**	- / **-**	- / **-**	20.5 / **4.0**
13	23.61	1 / 22.6	2 / **21.6**	7.5 / **16.1**	- / **-**	- / **-**	20 / **3.6**
14	22.76	0.5 / 22.3	2 / **20.8**	6 / **16.8**	- / **-**	- / **-**	20 / **2.8**
15	22.44	1.5 / 20.9	1.5 / **20.9**	6 / **16.4**	56 / **-33.6**	58 / **-35.6**	58 / **-35.6**
16	23.71	1.5 / 22.2	1.5 / **22.2**	7.5 / **16.2**	- / **-**	- / **-**	21 / **2.7**
17	23.59	0.5 / 23.1	1.5 / **22.1**	6 / **17.6**	53.5 / **-29.9**	56.5 / **-32.9**	56.5 / **-32.9**
18	21.12	0.5 / 20.6	2.5 / **18.6**	8 / **13.1**	- / **-**	- / **-**	21 / **0.1**

1. Ground surface elevations obtained from logs of previous borings dated 01/15/1952 and included in the Record Specifications. Elevations have been converted to NAVD 1988.

Table 2 - Summary of Test Pits
Proposed Middle School
Beverly, Massachusetts
LGCI Project No. 1435

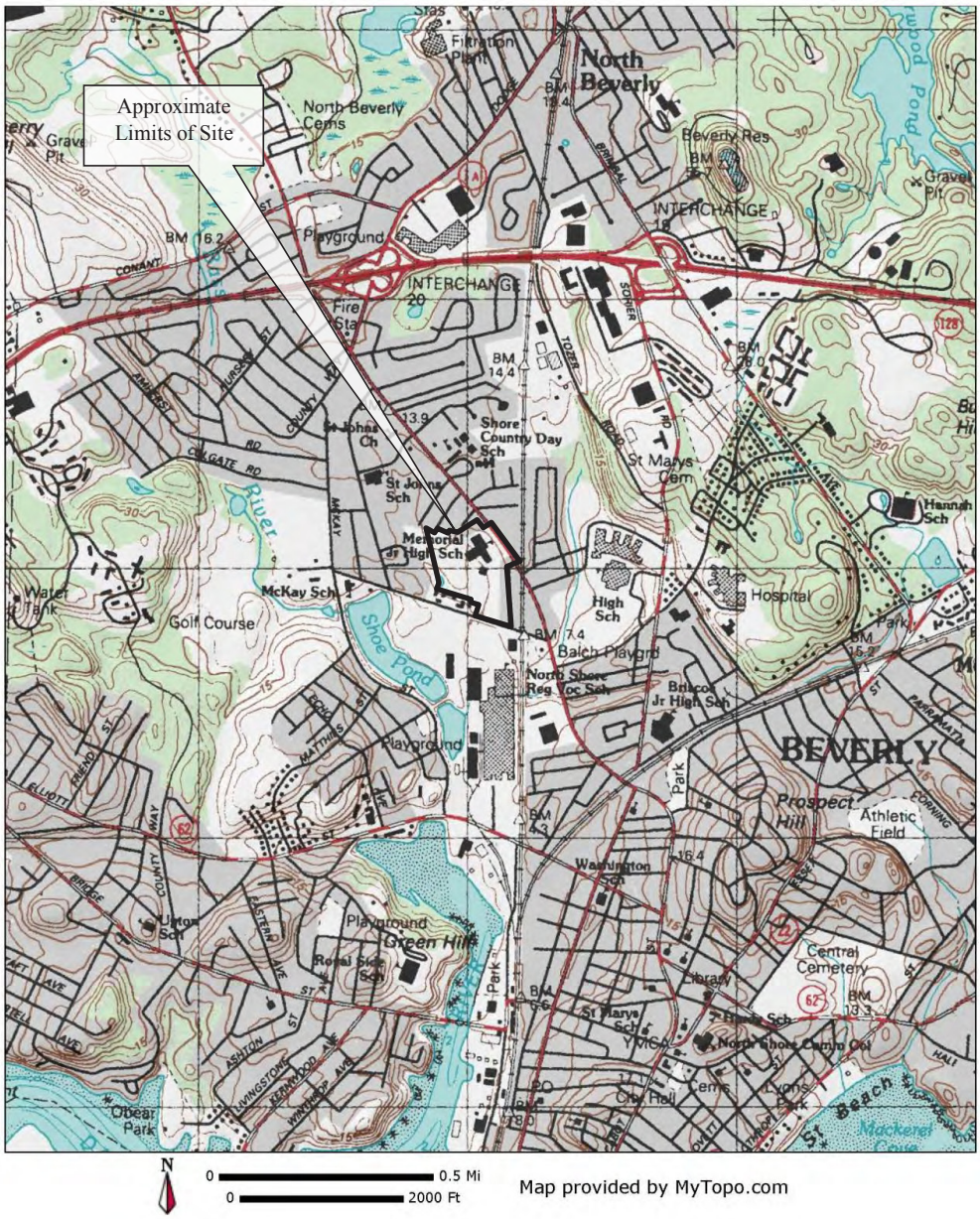
Test Pit No.	Ground Surface Elevation (ft.)*	Groundwater Depth / El. (ft.)*	Bottom of Topsoil/Subsoil Depth / El. (ft.)*	Bottom of Fill Depth / El. (ft.)*	Bottom of Test Pit Depth / El. (ft.)*
TP-1	19.5	- / -	1.6 / **17.9**	1.8 / **17.7**	7.5 / **12**
TP-2	19.5	- / -	1 / **18.5**	7.5 / **12**	8.8 / **10.7**
TP-3	20	5 / 15	1 / **19.0**	8 / **12**	10 / **10**
TP-4	19.5	9 / 10.5	1.3 / **18.2**	9.8 / **9.7**	10.3 / **9.2**
TP-5	20	- / -	2 / **18.0**	- / **-**	10 / **10**
TP-6	20	- / -	1.3 / **18.7**	2.2 / **17.8**	10 / **10**

* Ground surface elevation estimated from drawing titled: "Existing Conditions Survey" prepared by Welch Associates Land Surveyors, Inc. and dated June 12, 2015.

Table 3 - Summary of LGCI Borings
Proposed Middle School
Beverly, Massachusetts
LGCI Project No. 1435

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater Depth / El. (ft.)[2]	Bottom of Topsoil/Subsoil Depth / El. (ft.)*	Bottom of Fill Depth / El. (ft.)	Bottom of Clay Depth / El. (ft.)*	Refusal Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
B-1	20	12.3 / 7.7	0.9 / **19.1**	2 / **18.0**	53 / **-33.0**	53 / **-33.0**	58 / **-38.0**
B-2	20.5	11.3 / 9.2	1.2 / **19.3**	2 / **18.5**	38 / **-17.5**	40.6 / **-20.1**	40.6 / **-20.1**
B-3-OW	20	14 / 6.0	2.8 / **17.2**	4 / **16.0**	52 / **-32.0**	- / **-**	57 / **-37.0**
B-4[3]	21	14 / 7.0	1.2 / **19.8**	10 / **11.0**	38 / **-17.0**	- / **-**	43 / **-22.0**
B-5	21	1 / 20.0	0.8 / **20.2**	6 / **15.0**	33 / **-12.0**	- / **-**	48 / **-27.0**
B-6	28	12.4 / 15.6	0.9 / **27.1**	4.9 / **23.1**	58.8 / **-30.8**	61.8 / **-33.8**	61.8 / **-33.8**
B-101	20	10.5 / 9.5	0.6 / **19.4**	2 / **18.0**	56.5 / **-36.5**	65.5 / **-45.5**	69 / **-49.0**
B-102	22	10 / 12.0	0.4 / **21.6**	- / **-**	38 / **-16.0**	47.5 / **-25.5**	50.5 / **-28.5**
B-103 (GP)	20	- / -	0.5 / **19.5**	1.9 / **18.1**	62.8 / **-42.8**	- / **-**	67 / **-47.0**
B-104	24.5	8 / 16.5	0.8 / **23.7**	3.3 / **21.2**	60.5 / **-36.0**	74 / **-49.5**	77 / **-52.5**
B-105 (GP)	20.5	- / -	1 / **19.5**	1.25 / **19.3**	61.3 / **-40.8**	- / **-**	61.6 / **-41.1**
B-106	26	6 / 20.0	1.25 / **24.8**	6 / **20.0**	61.5 / **-35.5**	73.5 / **-47.5**	77 / **-51.0**
B-107 (GP)	21.5	- / -	/ **21.5**	6.25 / **15.3**	60 / **-38.5**	- / **-**	64.5 / **-43.0**
B-108 (GP)	26	- / -	1.2 / **24.8**	7.5 / **18.5**	64.8 / **-38.8**	- / **-**	67 / **-41.0**
B-109	23	12 / 11.0	/ **23.0**	4 / **19.0**	63 / **-40.0**	70.5 / **-47.5**	74 / **-51.0**
B-110 (GP)	29	- / -	0.8 / **28.2**	3.25 / **25.8**	50 / **-21.0**	- / **-**	51.3 / **-22.3**
B-111 (GP)	29	- / -	/ **29.0**	- / **-**	41.3 / **-12.3**	- / **-**	42.3 / **-13.3**
B-112	29	13.5 / 15.5	0.75 / **28.3**	6.7 / **22.3**	45 / **-16.0**	50.5 / **-21.5**	59 / **-30.0**
B-113 (GP)	20	- / -	0.6 / **19.4**	1.25 / **18.8**	42.9 / **-22.9**	- / **-**	46.9 / **-26.9**
B-114 (GP)	24.5	- / -	0.8 / **23.7**	2.7 / **21.8**	63.5 / **-39.0**	- / **-**	66.7 / **-42.2**
B-115 (GP)	25	- / -	1.5 / **23.5**	3.1 / **21.9**	54.7 / **-29.7**	- / **-**	57.9 / **-32.9**

1. Ground surface elevation estimated from drawing titled: "Existing Conditions Survey" prepared by Welch Associates Land Surveyo Inc. and dated June 12, 2015.
2. Groundwater observed at the end of drilling. The groundwater level was not monitored in the probes.
3. Cored through a boulder from 38.5 feet to 40.5 feet.
4. OW designates that a groundwater observation well was installed near B-3.
5. GP designates the boring was done with a probe.



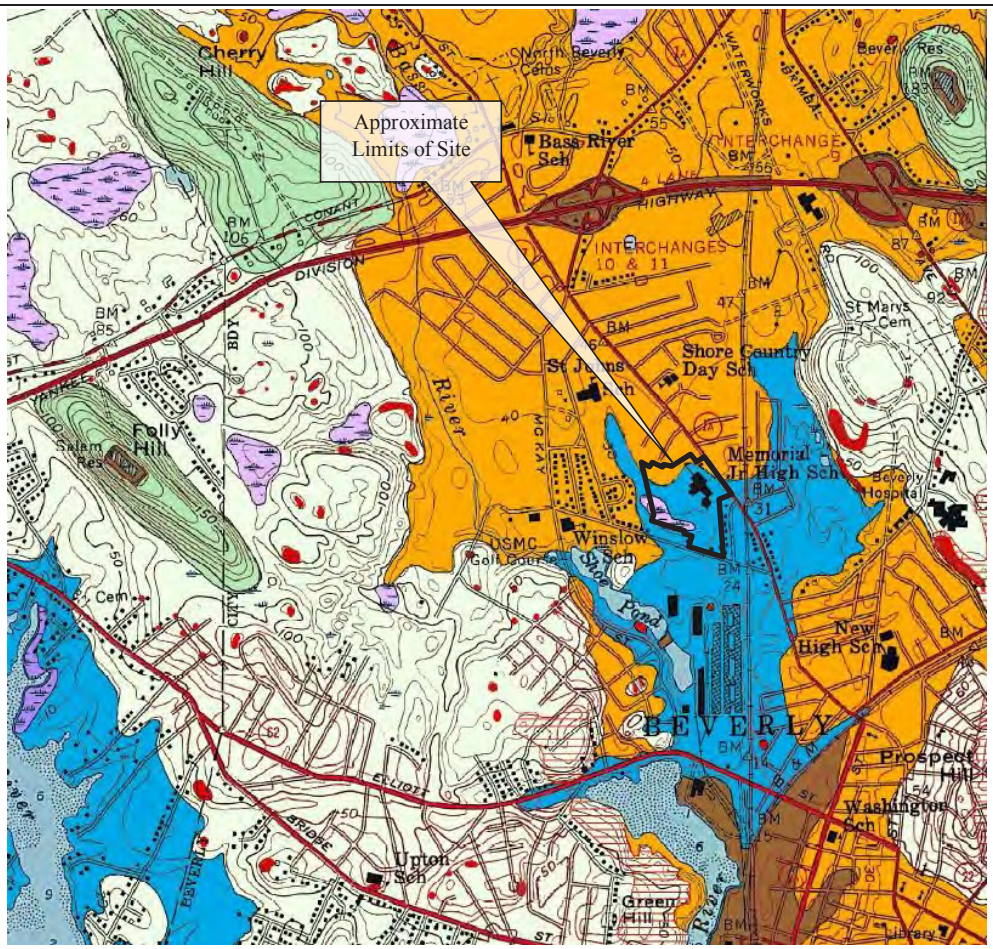
Contour Intervals: 3 meters

Client:	Project:	Figure 1 – Site Location Map	
Ai3 Architects LLC	Proposed Middle School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Beverly, MA	LGCI Project No.: 1435	Date: July 2015

N

Note: Figure based on Aerial view of site from google.earth.com

Client:	Project:	Figure 2 – Historic Aerial View of Site from 1995	
Ai3 Architects LLC	Proposed Middle School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Beverly, MA	LGCI Project No.: 1435	Date: July 2015



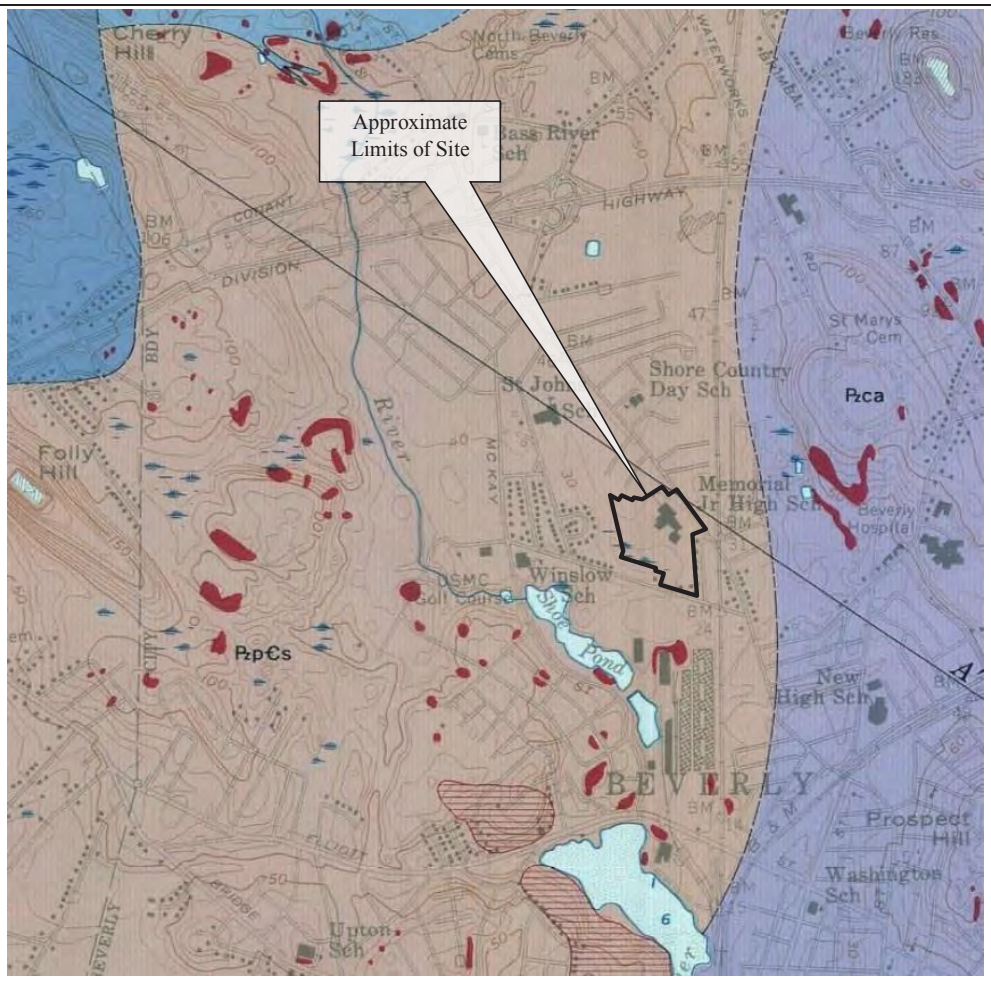
Glaciolacustrine Fine deposits include very fine sand, silt, and clay that occurs as well-sorted, thin layers of alternating silt and clay, or thicker layers of very fine sand and silt deposited in glacial lakes. Very fine sand commonly occurs at the surface and grades downward into rhythmically bedded silt and clay varves. Locally, this map unit may include areas underlain by fine sand.

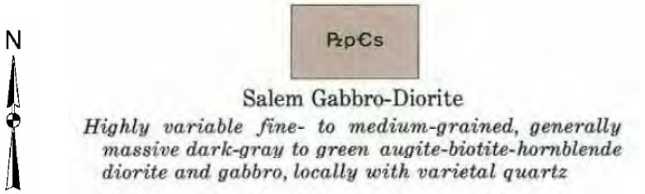
N

Swamp deposits—organic muck and peat that contain minor amounts of sand, silt, and clay, stratified and poorly sorted, in kettle depressions or poorly drained areas. Most swamp deposits are less than about 10 ft thick. Swamp deposits overlie glacial deposits or bedrock. They locally overlie glacial till even where they occur within thin glacial meltwater deposits.

Note: Figure based on "Surficial Geologic Map of the Salem-Newburyport East-Wilmington-Rockport 16 Quadrangle Area in Northeast Massachusetts," prepared by Stone, B.D., Stone, J.R., and DiGiacomo-Cohen, M.L., U.S. Geological Survey, Open-File Report 2006-1260-B, 2006.

Client:	Project:	**Figure 3 – Surficial Geologic Map (NTS)**	
Ai3 Architects LLC	Proposed Middle School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Beverly, MA	LGCI Project No.: 1435	Date: July 2015





Note: Figure based on map titled "Bedrock geology of the Salem quadrangle and vicinity, Massachusetts," prepared by Toulmin, Priestley for U.S. Geological Survey, Bulletin 1163-A,1964.

Client:	Project:	**Figure 4 – Bedrock Geologic Map (NTS)**	
Ai3 Architects LLC	Proposed Middle School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Beverly, MA	LGCI Project No.: 1435	Date: July 2015

Note:

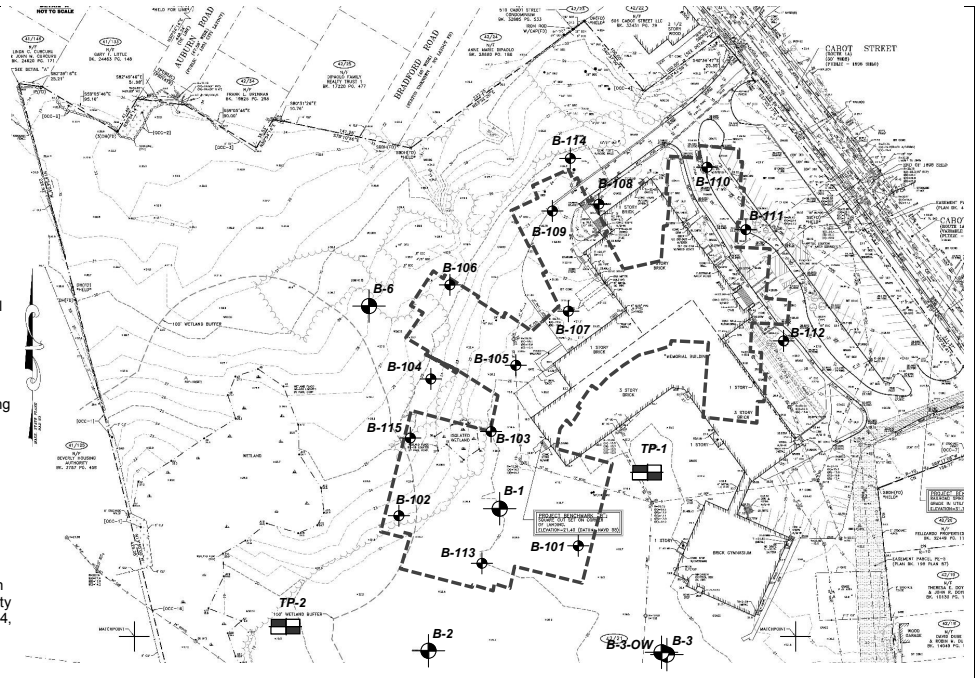
Figure based draft grading plan provided to us by Ai3 Architects LLC on June 16, 2015, and on plan titled: "Existing Conditions Survey, Memorial Building, 502 Cabot Street Beverly, Massachusetts," prepared by Welch Associates Land Surveyors, Inc. and dated June 12, 2015.

Legend

Approximate location of boring advanced by Technical Drill Service of Sterling, Massachusetts between October 6 and 10, 2014 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI). Depth below the boring symbol indicates the depth to the bottom of the clay layer.

Approximate location of boring advanced by Northern Drill Service, Inc. of Northborough, MA between June 3 and 12, 2015 and observed by LGCI.

Approximate location of test pit excavated by the City of Beverly DPW on October 14, 2014 and observed by LGCI.



Approximate Scale
30' 0 30' 60'

Client:	Project:	Figure 5A – Boring and Test Pit Location Plan	
Ai3 Architects LLC	Proposed Middle School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Beverly, MA	LGCI Project No.: 1435	Date: July 2015

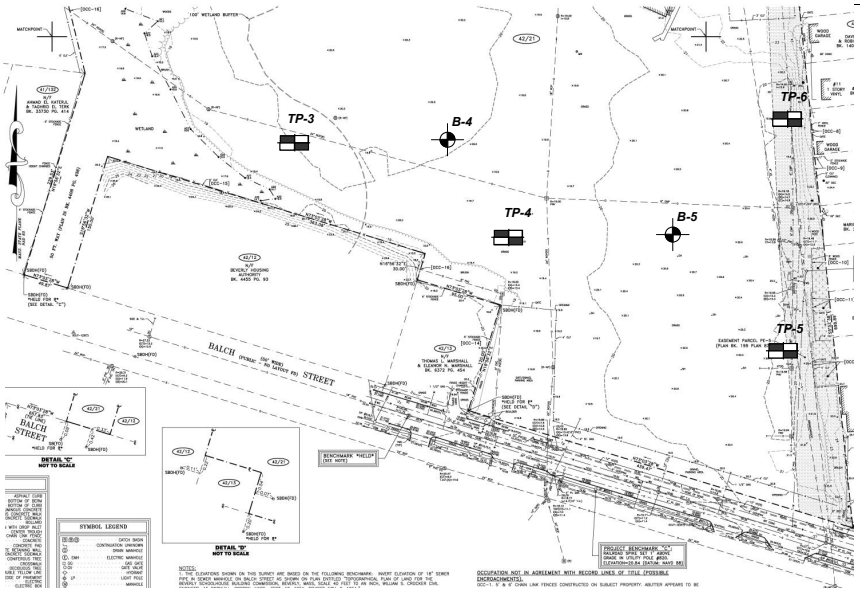
Note:

Figure based draft grading plan provided to us by Ai3 Architects LLC on June 16, 2015, and on plan titled: "Existing Conditions Survey, Memorial Building, 502 Cabot Street Beverly, Massachusetts," prepared by Welch Associates Land Surveyors, Inc. and dated June 12, 2015.

Legend

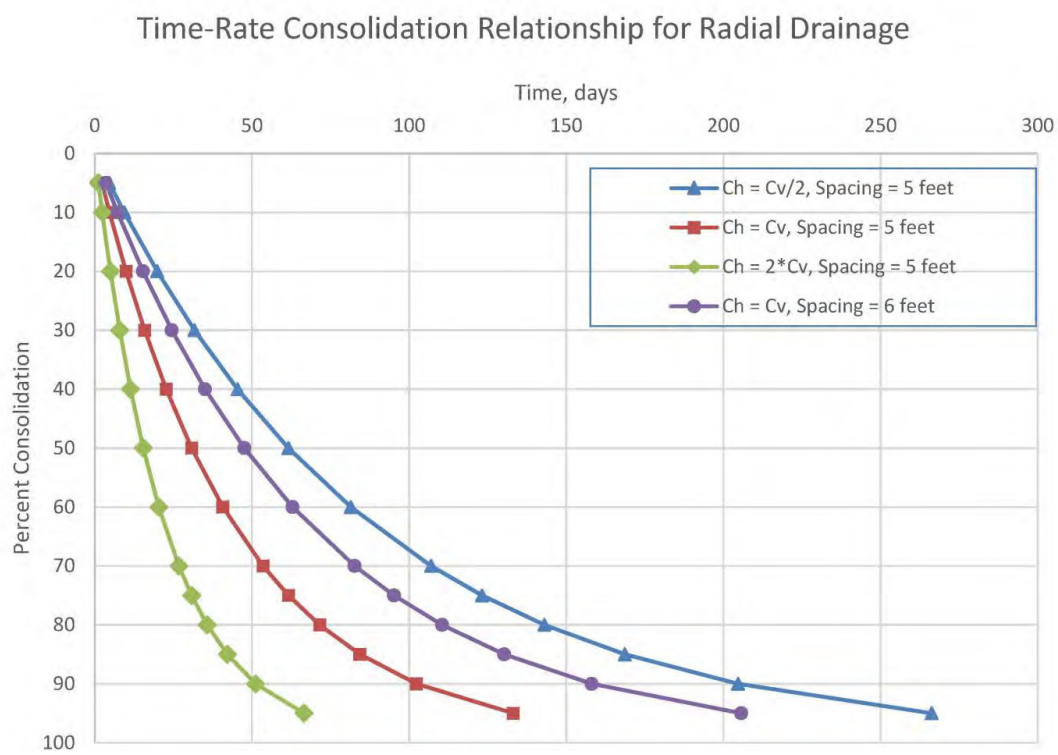
Approximate location of boring advanced by Technical Drill Service of Sterling, Massachusetts between October 6 and 10, 2014 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI). Depth below the boring symbol indicates the depth to the bottom of the clay layer.

Approximate location of test pit excavated by the City of Beverly DPW on October 14, 2014 and observed by LGCI.



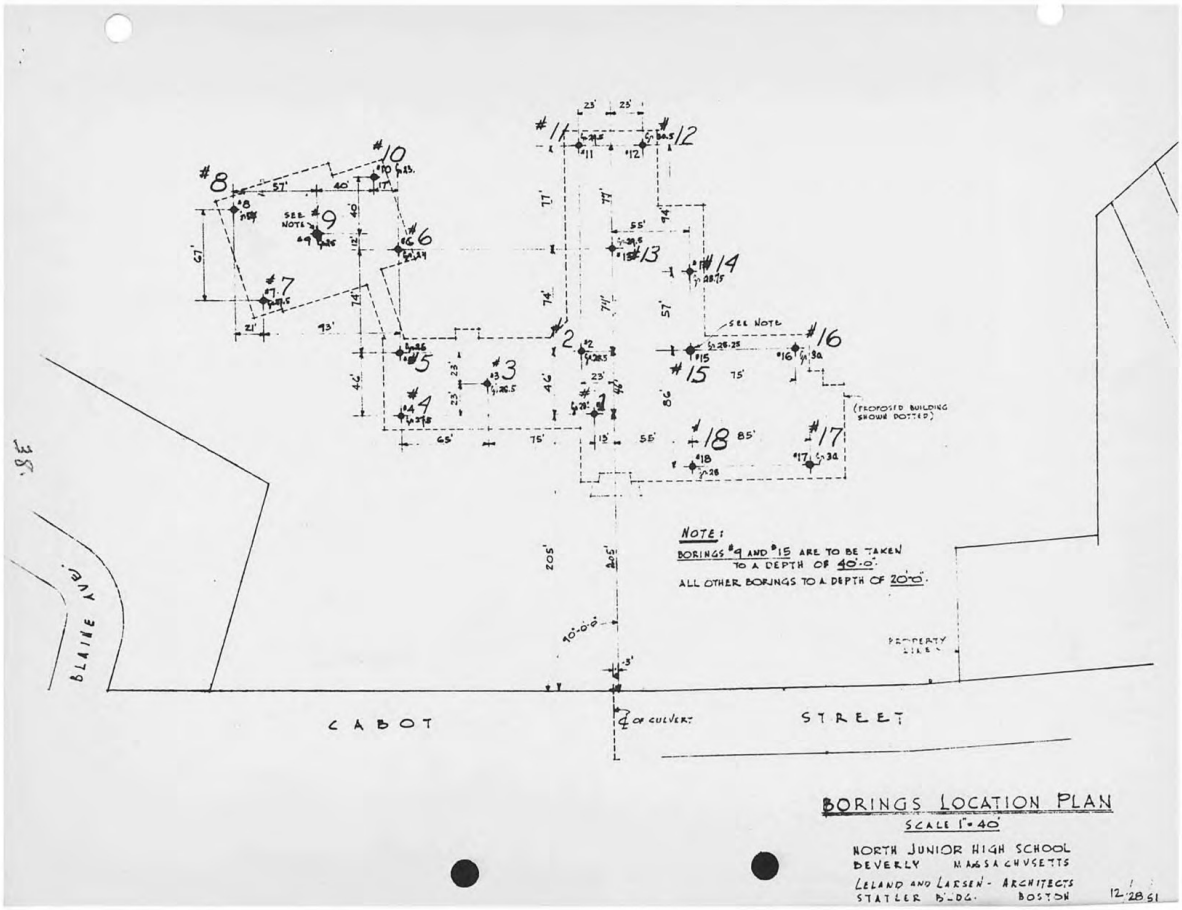
Approximate Scale
30' 0 30' 60'

Client:	Project:	Figure 5B – Boring and Test Pit Location Plan	
Ai3 Architects LLC	Proposed Middle School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Beverly, MA	LGCI Project No.: 1435	Date: July 2015



Client:	Project:	**Figure 6 – Time-Rate Consolidation Plots for Wick Drains**	
Ai3 Architects LLC	Proposed Middle School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Beverly, MA	LGCI Project No.: 1435	Date: July 2015

Attachment A – Previous Explorations


BORINGS LOCATION PLAN
SCALE 1"=40'
NORTH JUNIOR HIGH SCHOOL
BEVERLY MASSACHUSETTS
LELAND AND LARSEN - ARCHITECTS
STATLER BLDG. BOSTON
12/28/61
NOTE:
BORINGS #9 AND #15 ARE TO BE TAKEN TO A DEPTH OF 40'-0".
ALL OTHER BORINGS TO A DEPTH OF 20'-0".
CABOT STREET
BLAIKIE AVE.
(PROPOSED BUILDING SHOWN DOTTED)
SEE NOTE
PROPERTY LINE
℄ OF CULVERT

TEST BORING REPORT

RAYMOND

CONCRETE PILE COMPANY 1055 Park Sq. Building,

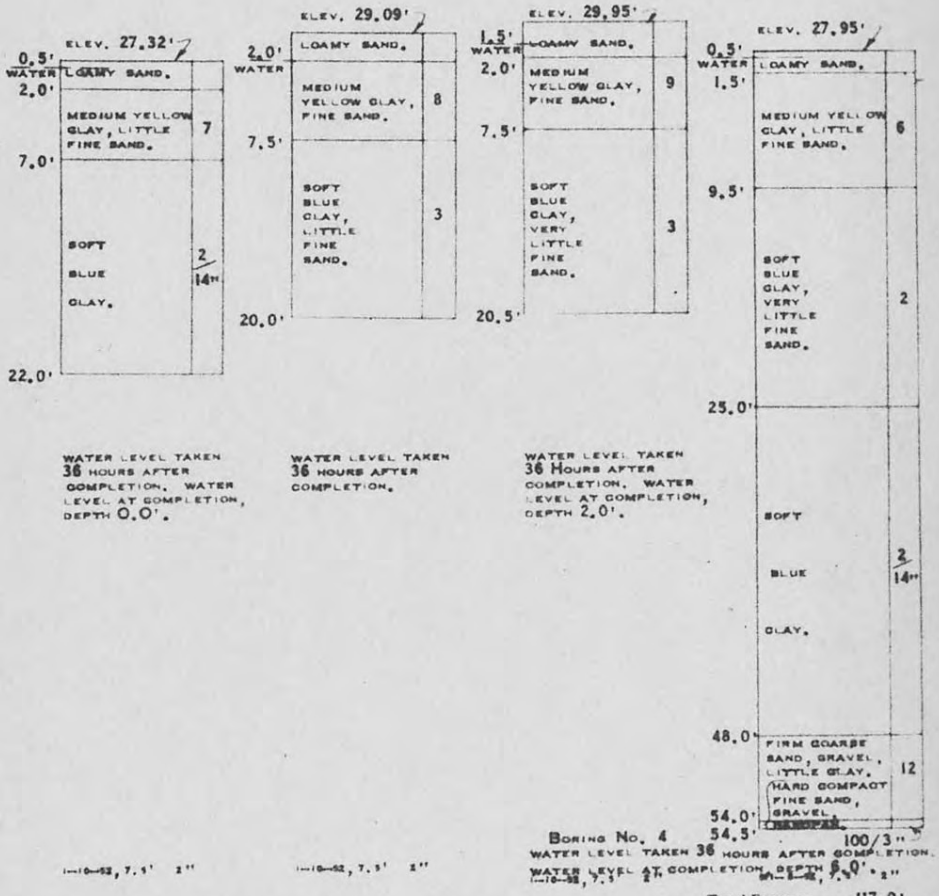
NEW YORK GOW DIVISION BOSTON 16, Massachusetts,

To Leland & Larson Date January 15th,1952 Job No. B-9380-BOS

Location of Borings North Junior High School, Cabot Street and Blaine Avenue, BEVERLY, Massachusetts.

All borings are plotted to a scale of 1" = 8 ft. using _____ as a fixed datum.

No. 1 No. 2 No. 3 No. 4



Figures in right hand column indicate number of blows required to drive sampling pipe one foot, using 140-lb. weight falling 30 inches.

Total Footage 117.0'

Foreman Wm. J. Ronan

Classification by _____

Sheet 2 of 6

39.

TEST BORING REPORT

RAYMOND

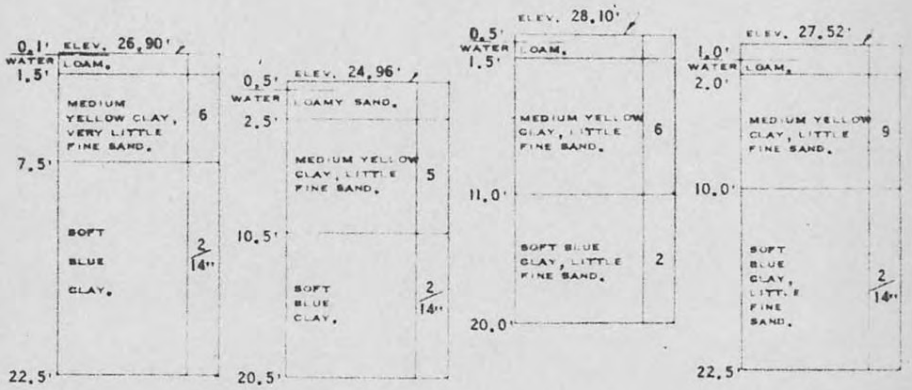
CONCRETE PILE COMPANY 1055 Park Sq. Building,

NEW YORK GOW DIVISION BOSTON 16, Massachusetts,

To Leland & Larsen Date January 15th, 1952 Job No. B-9380-BOS

Location of Borings North Junior High School, Cabot Street and Blaine Avenue, BEVERLY, Massachusetts.

All borings are plotted to a scale of 1" = 8 ft. using as a fixed datum.



WATER LEVEL TAKEN 36 HOURS AFTER COMPLETION. WATER LEVEL AT COMPLETION, DEPTH 4.5'.

WATER LEVEL TAKEN 36 HOURS AFTER COMPLETION. WATER LEVEL AT COMPLETION, DEPTH 3.5'.

WATER LEVEL TAKEN 36 HOURS AFTER COMPLETION. WATER LEVEL AT COMPLETION, DEPTH 6.0'.

WATER LEVEL TAKEN 36 HOURS AFTER COMPLETION. WATER LEVEL AT COMPLETION, DEPTH 3.0'.

1-8-52, 7.5' 2" 1-7-52, 7.5' 2" 1-7-52, 7.5' 2" 1-7-52, 7.5' 2"

Figures in right hand column indicate number of blows required to drive sampling pipe one foot, using 140-lb. weight falling 30 inches.

Total Footage 85.5'

Foreman Wm. J. Ronan

Classification by

Sheet 3 of 6

40.

TEST BORING REPORT

RAYMOND

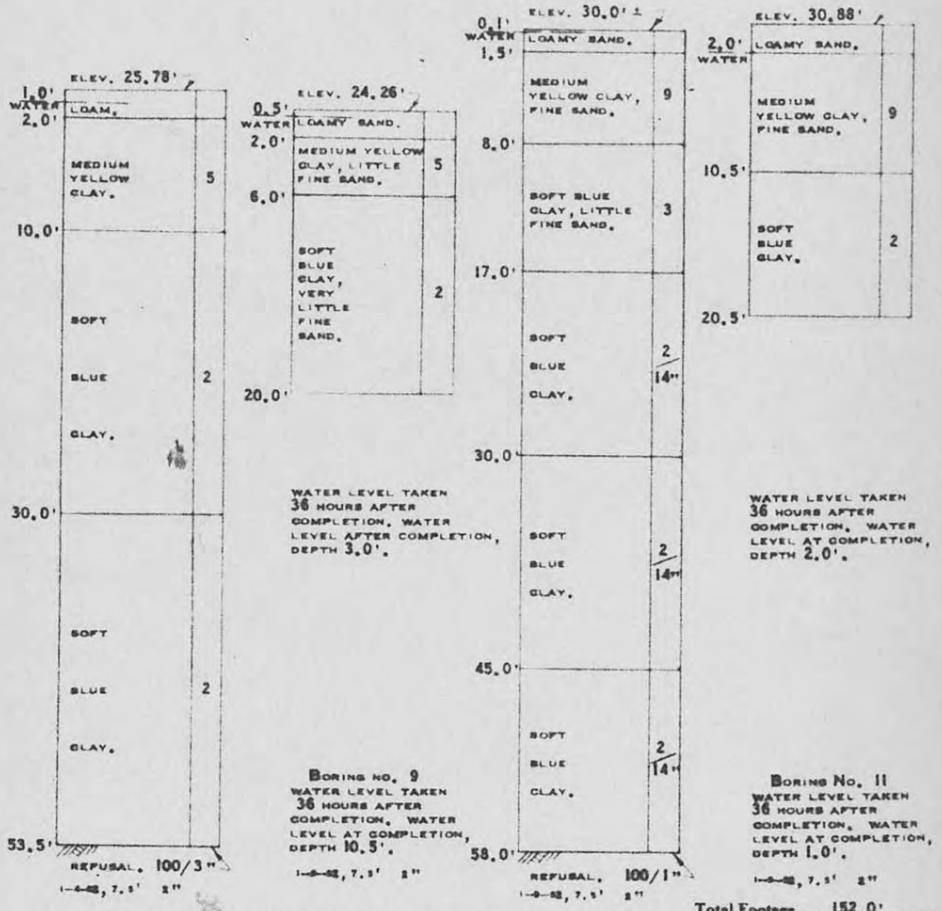
CONCRETE PILE COMPANY 1055 Park Sq. Building,

NEW YORK GOW DIVISION BOSTON 16, Massachusetts,

To Leland & Larsen Date January 15th, 1952 Job No. B-9380-BOS

Location of Borings North Junior High School, Cabot Street and Blaine Avenue, BEVERLY, Massachusetts.

All borings are plotted to a scale of 1" = 8 ft. using _____ as a fixed datum.



Figures in right hand column indicate number of blows required to drive sampling pipe one foot, using 140-lb. weight falling 30 inches.

Total Footage 152.0'

Foreman Wm. J. Ronan

Classification by _____

Sheet 4 of 6

TEST BORING REPORT

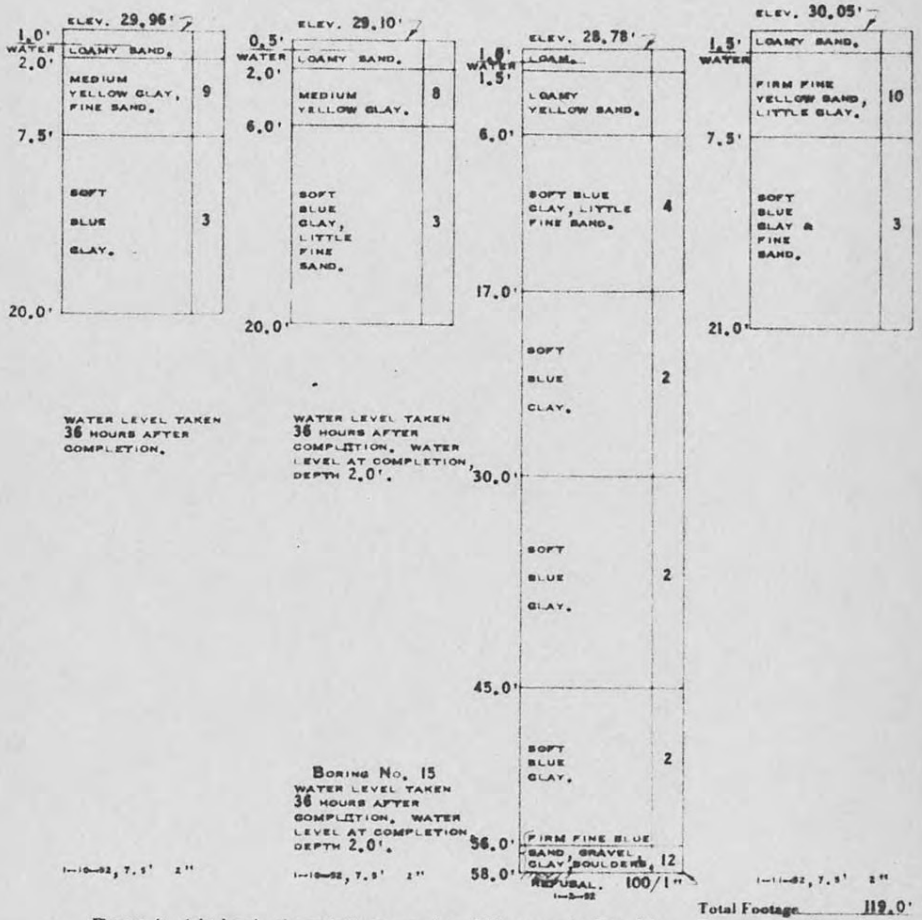
RAYMOND

CONCRETE PILE COMPANY 1055 Park Sq. Building,
NEW YORK GOW DIVISION BOSTON 16, Massachusetts,

To Leland & Larsen Date January 15th, 19 52 Job No. B-9380-BOS

Location of Borings North Junior High School, Cabot Street and Blaine Avenue, BEVERLY, Massachusetts.

All borings are plotted to a scale of 1" = 8 ft. using as a fixed datum.



Figures in right hand column indicate number of blows required to drive sampling pipe one foot, using 140-lb. weight falling 30 inches.

Total Footage 119.0'
Foreman Wm. J. Ronan
Classification by
Sheet 5 of 6

TEST BORING REPORT

RAYMOND

CONCRETE PILE COMPANY 1055 Park Sq. Building,

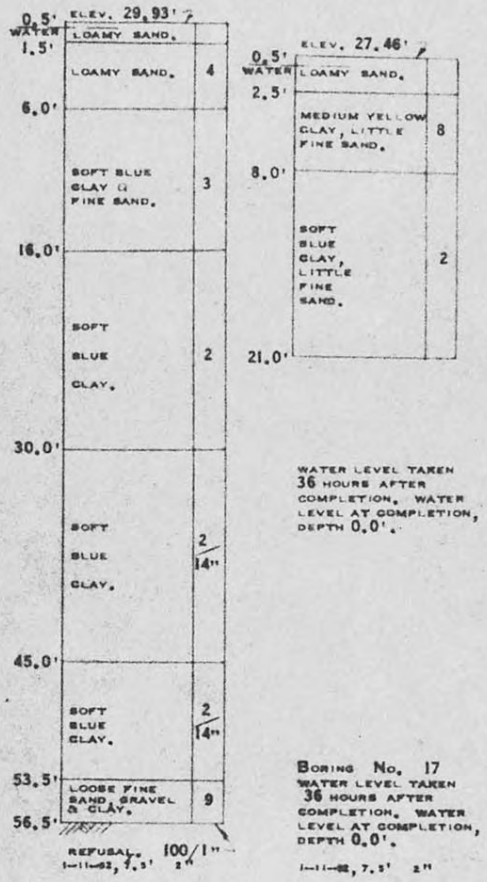
NEW YORK GOW DIVISION BOSTON 16, Massachusetts,

To Leland & Larsen Date January 15th, 1952 Job No. B-9380-BOS

Location of Borings North Junior High School, Cabot Street and Blaine Avenue, BEVERLY, Massachusetts.

All borings are plotted to a scale of 1" = 8 ft. using as a fixed datum.

No. 17 No. 18 No. No.



Figures in right hand column indicate number of blows required to drive sampling pipe one foot, using 140-lb. weight falling 30 inches.

Total Footage 77.5'

Foreman Wm. J. Ronan

Classification by

Sheet 6 of 6

Attachment B – Test Pit Logs

LGCI
Lahlaf Geotechnical Consulting, Inc.

TP-1 **Page 1 of 1**

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Excavation Subcontractor: City of Beverly DPW		Date Started:	10/14/14
Excavation Foreman : Dana Monies		Date Completed:	10/14/14
LGCI Engineer:	Geetha Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 19.5 feet (see remark 1)	Total Depth:	7.5 feet
Groundwater Depth:	Not encountered	Excavator Type:	DEERE 410E Rubber Tire Backhoe
		Test Pit Dimensions:	2.5' x 8'

Depth Scale	Exc. Effort	Strata	Soil Description
	E	Topsoil/ Subsoil ~1.6'	11": Topsoil 11" - 1.6': Silty SAND (SM), mostly fine, ~30% fines, ~5% organics, two ~6 inch cobbles, reddish brown, moist (subsoil)
	E - M	Fill	1.6' - 1.8': SILT with Sand (ML), slightly plastic, 25-30% fine sand, gray-brown, moist (fill)
	M	Clayey Silt / Silty Clay	1.8' - 5': Clayey SILT with Sand (ML), desiccated, slightly plastic, 15-20% fine sand, gray-brown with occasional reddish brown mottles, moist PP = 2 tsf
	M		
5 ft	M		
	M		5' - 7.5': Silty CLAY with Sand (CL), slightly desiccated, slightly to moderately plastic, varved, occasional thin (~1/32") layers of fine sand, gray, moist PP = 1.0 - 1.5 tsf
	M		
	M		Bottom of test pit at 7.5 feet. Backfilled with excavated material. Beverly DPW/Parks Department restored ground surface with topsoil .
10 ft			
15 ft			

Remarks: E = Easy, M = Moderate, D = Difficult, V = Very Difficult

1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Assoc. Land Surveyors, Inc. dated 6/12/15.

LGCI
Lahlaf Geotechnical Consulting, Inc.

TP-2 **Page 1 of 1**

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Excavation Subcontractor: City of Beverly DPW		Date Started:	10/14/14
Excavation Foreman : Dana Monies		Date Completed:	10/14/14
LGCI Engineer:	Geetha Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 19.5 feet (see remark 1)	Total Depth:	8.8 feet
Groundwater Depth:	Not encountered	Excavator Type:	DEERE 410E Rubber Tire Backhoe
		Test Pit Dimensions:	2.5' x 9' (see remark 2)

Depth Scale	Exc. Effort	Strata	Soil Description
	E	Topsoil/ Subsoil ~1'	7": Topsoil 7" - 1': Silty SAND with Gravel (SM), mostly fine to medium, 15-20% fines, ~15% fine gravel ~5% roots, brown, moist (subsoil)
	E - M	Fill	1' - 1.5': Silty SAND with Gravel (SM), fine to medium, 5-10% coarse, ~15% fines, 25-30% coarse, sub-rounded gravel, brown, moist (fill)
	M		1.5' - 5' to 7.5': Clayey SILT with Sand (ML), slightly plastic, 15-20% fine sand, ~5% cobbles up to 12 inches, one ~18" boulder, gray-brown, moist (fill) (see remark 2)
	M		
5 ft	M	~5' to 7.5'	
	M	Clayey Silt	
	M		
	M		5' to 7.5' - 8.8': Clayey SILT (ML), desiccated, slightly to moderately plastic, varved, 5-10% fine sand, gray-brown with occasional reddish brown mottles, moist to wet PP = 2.5 - 3 tsf
	M		
10 ft			Bottom of test pit at 8.8 feet. Backfilled with excavated material. Beverly DPW/Parks Department restored ground surface with topsoil .
15 ft			

Remarks: E = Easy, M = Moderate, D = Difficult, V = Very Difficult

1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Assoc. Land Surveyors, Inc. dated 6/12/15.

2 - Exposed a portion of top of corrugated PVC drain pipe at 5 feet on south side of test pit, and continued excavation away from drain pipe to 8.8 feet. Bottom of drain pipe was not exposed, however estimated to be at 7.5 feet.

LGCI
Lahlaf Geotechnical Consulting, Inc.

TP-3 **Page 1 of 1**

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Excavation Subcontractor: City of Beverly DPW		Date Started:	10/14/14
Excavation Foreman : Dana Monies		Date Completed:	10/14/14
LGCI Engineer:	Geetha Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 20 feet (see remark 1)	Total Depth:	10 feet
Groundwater Depth:	Standing water at 9.3 feet	Excavator Type:	DEERE 410E Rubber Tire Backhoe
	Seeped at 5 feet	Test Pit Dimensions:	2.5' to 5' x 8' (see remark 2)

Depth Scale	Exc. Effort	Strata	Soil Description
	E	Topsoil/ Subsoil ~1'	7": Topsoil 7" - 1': Silty SAND (SM), mostly fine to medium, ~30% fines, ~5% organics, ~5% roots, dark brown, moist (subsoil)
	E - M	Fill	1' - 1.7': Silty SAND (SM), fine to medium, ~25% fines, ~5% fine gravel, dark brown, moist (fill)
	E - M E - M		1.7' - 4.8': Silty SAND with Organics (SM), mostly fine, 30-35% fines, occasional thin (3" to 6") layers of organics, black-bright brown, moist (fill)
5 ft	M		
	M M M	~8'	4.8' - 8': Silty SAND (SM), mostly fine to medium, ~10% coarse, ~25% fines, gray, wet (fill)
	M	Clayey Silt	8' - 10': Clayey SILT (ML), desiccated, slightly to moderately plastic, varved, 5-10% fine sand, gray-brown with occasional reddish brown mottles, moist to wet PP = 2.5 - 3 tsf
10 ft	M		
			Bottom of test pit at 10 feet. Backfilled with excavated material. Beverly DPW/Parks Department restored ground surface with topsoil .
15 ft			

Remarks: E = Easy, M = Moderate, D = Difficult, V = Very Difficult
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Assoc. Land Surveyors, Inc. dated 6/12/15.
2 - Unstable sides between 5 feet and 8 feet.

LGCI
Lahlaf Geotechnical Consulting, Inc.

TP-4 **Page 1 of 1**

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Excavation Subcontractor: City of Beverly DPW		Date Started:	10/14/14
Excavation Foreman : Dana Monies		Date Completed:	10/14/14
LGCI Engineer:	Geetha Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 19.5 feet (see remark 1)	Total Depth:	10.3 feet (see remark 2)
Groundwater Depth:	Standing water at 9 feet	Excavator Type:	DEERE 410E Rubber Tire Backhoe
		Test Pit Dimensions:	2.5' x 11'

Depth Scale	Exc. Effort	Strata	Soil Description
	E	Topsoil/ Subsoil ~1.3'	9": Topsoil 9" - 1.3': Silty SAND (SM), mostly fine, 30-35% fines, ~5% organics, ~5% roots, dark brown, moist (subsoil)
	E - M	Fill	1.3' - 3.5': Silty SAND with Gravel (SM), fine to medium, 25-30% fines, 30-35% fine to coarse, angular gravel, <5% cobbles up to 12 inches, ~2 foot boulder, brown, moist (fill)
	M		
	M - D		3.5' - 6.5': Clayey SAND with Cobbles and Boulders (SC), mostly fine to medium, ~ 30% slightly plastic fines, ~25 % gravel, ~10% cobbles up to 12 inches, boulders up to 2.5 feet, dark gray, moist (fill)
5 ft	D		
	D - V		
	D - V		6.5' - 9': Clayey SILT with Sand (ML), slightly plastic, ~25% fine to medium sand, 5-10% small to medium size roots, two ~12" long and, ~6" and 8" stumps, one ~3 foot long and ~8" dia stump, dark gray, moist (fill)
	D - V		
	D - V		
	D	~9.8'	9' - 9.8': Mostly fine gravel, wet (fill)
10 ft	D	Clayey Silt	9.8' - 10.3': Clayey SILT with Sand (ML), slightly plastic, 25-30% fine sand, gray, wet
	D		Bottom of test pit at 10.3 feet. Backfilled with excavated material. Beverly DPW/Parks Department restored ground surface with topsoil .
15 ft			

Remarks: E = Easy, M = Moderate, D = Difficult, V = Very Difficult

1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Assoc. Land Surveyors, Inc. dated 6/12/15.

2 - Test pit could not be excavated deeper without opening wide because of large boulders and tree stumps, and was collapsing below 9 feet.

LGCI
Lahlaf Geotechnical Consulting, Inc.

TP-5 **Page 1 of 1**

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Excavation Subcontractor: City of Beverly DPW		Date Started:	10/14/14
Excavation Foreman : Dana Monies		Date Completed:	10/14/14
LGCI Engineer:	Geetha Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 20 feet (see remark 1)	Total Depth:	10 feet
Groundwater Depth:	Not encountered	Excavator Type:	DEERE 410E Rubber Tire Backhoe
		Test Pit Dimensions:	2.5' x 6'

Depth Scale	Exc. Effort	Strata	Soil Description
	E	Topsoil/ Subsoil	10": Topsoil 10" - 1.3': Clayey SILT (ML), slightly plastic, ~5% organics, ~5% roots, gray-brown, moist (subsoil) 1.3' - 1.6': Buried Top soil 1.6' - 2': Clayey SILT (ML), slightly to moderately plastic, ~5% organics, gray-brown, moist (buried subsoil)
	E - M	~2'	
	M	Clayey Silt / Silty Clay	2' - 5': Clayey SILT (ML), desiccated, slightly to moderately plastic, 10-15% fine sand, gray-brown with occasional dark brown mottles, moist PP = 2.5 tsf
	M		
5 ft	M		
	M		5' - 7.5': Clayey SILT (ML), desiccated, slightly to moderately plastic, ~10% fine sand with occasional thin (<1/16") layers, gray-brown with occasional reddish brown mottles, moist PP = 2 tsf
	M		
	M		7.5' - 10': Silty CLAY (CL), slightly desiccated, slightly to moderately plastic, varved, 5-10% fine sand, gray, moist PP = 1.0 - 1.5 tsf
	M		
10 ft	M		
			Bottom of test pit at 10 feet. Backfilled with excavated material. Beverly DPW/Parks Department restored ground surface with topsoil .
15 ft			

Remarks: E = Easy, M = Moderate, D = Difficult, V = Very Difficult

1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Assoc. Land Surveyors, Inc. dated 6/12/15.

LGCI
Lahlaf Geotechnical Consulting, Inc.

TP-6 **Page 1 of 1**

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Excavation Subcontractor: City of Beverly DPW		Date Started:	10/14/14
Excavation Foreman : Dana Monies		Date Completed:	10/14/14
LGCI Engineer:	Geetha Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 20 feet (see remark 1)	Total Depth:	10 feet
Groundwater Depth:	Not encountered	Excavator Type:	DEERE 410E Rubber Tire Backhoe
		Test Pit Dimensions:	2.5' x 6'

Depth Scale	Exc. Effort	Strata	Soil Description
	E	Topsoil/ Subsoil ~1.3'	10": Topsoil 10" - 1.3': Clayey SILT (ML), slightly plastic, ~10% fine sand, ~5% organics, ~5% roots, gray-brown, moist (subsoil)
	E - M	Fill ~2.2'	1.3' - 2.2': Clayey SILT with Sand (ML), slightly plastic, ~15% fine sand, gray-brown, moist (fill)
	M	Clayey Silt / Silty Clay	2.2' - 7': Clayey SILT (ML), desiccated, slightly to moderately plastic, 10-15% fine sand, gray-brown with occasional dark brown to reddish brown mottles, moist PP = 2.5 - 3 tsf
	M		
5 ft	M		
	M		
	M		
	M		7' - 10': Silty CLAY with Sand (CL), slightly desiccated, slightly to moderately plastic, varved, 15-20% fine sand with occasional thin (<1/16" layers), gray, moist PP = 1.0 - 1.5 tsf
	M		
10 ft	M		
			Bottom of test pit at 10 feet. Backfilled with excavated material. Beverly DPW/Parks Department restored ground surface with topsoil .
15 ft			

Remarks: E = Easy, M = Moderate, D = Difficult, V = Very Difficult

1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Assoc. Land Surveyors, Inc. dated 6/12/15.

Attachment C – Boring Logs and Groundwater Observation Well Installation Reports

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-1
Page 1 of 3

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Technical Drilling Services	Date Started:	10/8/2014
Drilling Foreman:	Brett Balyk	Date Completed:	10/9/2014
LGCI Engineer:	G. Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 20 feet (see remark 1)	Total Depth:	58 feet
Groundwater Depth:	12.3 feet at end of drilling	Drill Rig Type:	CME 55 Rubber Track ATV
		Drilling Method:	4-in casing to 53 ft / Tri-cone roller bit
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NX
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0 - 2	S1	4	4	7	6	24	11		Topsoil/ subsoil	S1 - Top 5": Top soil
										Fill ~2'	Bot. 6": Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 30-35% mostly coarse, angular gravel, reddish brown, moist (fill/subsoil)
	2 - 4	S2	7	5	4	4	24	21			(traces of reddish brown clayey silt (subsoil) at tip of the split spoon sampler)
5ft										Silty Clay	S2 - Clayey SILT with Sand (ML), slightly plastic, varved, 25-30% fine sand, reddish brown-gray to gray, moist PP = 0.75 tsf
	8 - 10	S3	2	1	1	2	24	24			S3 - Silty CLAY (CL), slightly desiccated, slightly to moderately plastic, varved, ~10% fine sand, gray, wet Tv = 0.5 - 0.75 tsf
10ft											
	13 - 15	S4	WOH/18"			3	24	24			S4 - Silty CLAY (CL), slightly to moderately plastic, 5-10% fine sand with occasional thin (~1/32") layers, gray, wet PP = 0.5 tsf at top 12 inches to Tv = 0.25 tsf below
15ft											
	18 - 20	S5	WOH/18"			1	24	24			S5 - Silty CLAY (CL), moderately plastic, gray, wet Tv = 0.25 - 0.3 tsf
20ft											
	23 - 25	S6	WOH/18"			2	24	24			S6 - Similar to S5, ~5% fine sand, gray, wet Tv = 0.25 - 0.3 tsf

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-1
Page 2 of 3

Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	28 - 30	S7	WOH/24"				24	24		Silty Clay	S7 - Silty CLAY (CL), slightly to moderately plastic, ~5% fine sand, gray, wet Tv = 0.3 tsf
30 ft											
	33 - 35	S8	WOH/24"				24	24			S8 - Similar to S7 Tv = 0.15 - 0.2 tsf
35 ft											
	38 - 40	S9	WOH/24"				24	24			S9 - Similar to S7, 5-10% fine sand with occasional thin (~1/32") layers, gray, wet Tv = 0.2 - 0.25 tsf
40 ft											
	43 - 45	S10	WOH/18"			3	24	20			S10 - Similar to S7 Tv = 0.25 tsf
45 ft											
	48 - 50	S11	WOH/18"			2	24	24			S11 - Silty CLAY (CL), moderately plastic, gray, wet Tv = 0.2 tsf
50 ft											
	53	S12					0	0	2	53.0'	S12 - No Recovery
	53 - 58	C1					60	36	3	Bedrock	C1 - 5, 5, 3, 1.5, 1.5 min/ft
									4		

Remarks:
2 - At 53 ft spoon refusal, and roller bit advanced at rate of 3 min/0.5 inch at 53 ft.
3 - Lost about 150 gallons of water when attempted to roller bit at 53 ft with 4-in casing at 8 ft. Then, advanced 4-in casing to 53 ft and cored.
4 - Lost about 150 gallons of drill water during core run C1.

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-1
Page 3 of 3

Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Bedrock	C1 - Hard, slightly weathered, moderately to extremely fractured, fine to medium grained, light gray GRANITE in top 10 inches and dark gray GABRO DIORITE in bottom 26 inches, very close to close, fairly smooth, low angle to moderately dipping joints REC = 60%, RQD = 20%
60 ft											
											End of boring at 58 feet. Backfilled with drill cuttings, about 3/4 bag of bentonite above 5 ft, and then sand in top 2 ft.
65 ft											
70 ft											
75 ft											
80 ft											

Remarks:

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-2
Page 1 of 2

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Technical Drilling Services	Date Started:	10/10/2014
Drilling Foreman:	Brett Balyk	Date Completed:	10/10/2014
LGCI Engineer:	G. Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 20.5 feet (see remark 1)	Total Depth:	40.6 feet
Groundwater Depth:	11.3 feet at end of drilling	Drill Rig Type:	CME 55 Rubber Track ATV
		Drilling Method:	4-in casing to 8 ft / Tri-cone roller bit
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0 - 2	S1	4	6	8	3	24	14		Topsoil/ Subsoil	S1 - Top 5": Top soil
									2	Fill	Bot. 9": Silty SAND (SM), fine to medium, ~30% fines, ~1.5" coarse, angular gravel piece, ~5% organics, brown, moist (subsoil)
	2 - 4	S2	6	4	6	9	24	5		Silty Clay	S2 - Sandy SILT (ML), traces of plastic fines, varved, 30-35% fine sand, gray-reddish brown, moist
5ft											
	5 - 7	S3	5	6	7	8	24	22			S3 - Clayey SILT with Sand (ML), desiccated, slightly plastic, varved, ~25% fine sand, gray-brown with occasional dark brown mottles, moist PP = 1.5 - 2 tsf
	8 - 10	S4	3	3	4	4	24	24			S4 - Clayey SILT with Sand (ML), desiccated, slightly to moderately plastic, varved, 15-20% fine sand, gray-brown with occasional dark brown mottles, moist PP = 1.5 - 2 tsf
10ft											
	13 - 15	S5	2	2	2	2	24	24			S5 - Silty CLAY (CL), slightly to moderately plastic, ~10% fine sand, gray, wet Tv = 0.35 tsf
15ft											
	18 - 20	S6	WOH/18"			2	24	24			S6 - Silty CLAY (CL), slightly to moderately plastic, 5-10% fine sand, gray, wet Tv = 0.25 tsf
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.
2 - Estimated strata change based on drilling condition.

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BORING LOG

Boring B-2
Page 2 of 2

Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	28 - 30	S7	WOH/24"				24	24		Silty Clay	S7 - Silty CLAY (CL), slightly to moderately plastic, gray, wet Tv = 0.3 tsf
30 ft											
35 ft											
									3	38.0'	
	38 - 40	S8	4	8	12	33	24	8		Sand and Gravel	S8 - Silty SAND with Gravel (SM), mostly fine to medium, 30-35% fines, traces of plastic fines, 20-25% coarse, angular gravel, gray, wet S9 - No Recovery
40 ft											
	40.6	S9	120/0"				0	0	4		
45 ft											End of boring at 40.6 feet. Backfilled with drill cuttings, about 3/4 bag of bentonite above 5 ft, and then sand in top 2 ft.
50 ft											

Remarks:
3 - At 38 ft observed hard drilling, and change of strata based on observed drilling condition.
4 - At 40 ft observed very hard drilling, roller bit advanced at 2 to 4 min/inch, and roller bit refusal at 40.6 feet. Lost drill water below 40 feet.

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BORING LOG

Boring B-3 (OW)
Page 1 of 3

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Technical Drilling Services	Date Started:	10/6/2014
Drilling Foreman:	Brett Balyk	Date Completed:	10/6/2014
LGCI Engineer:	G. Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 20 feet (see remark 1)	Total Depth:	57 feet
Groundwater Depth:	14 feet at end of drilling	Drill Rig Type:	CME 55 Rubber Track ATV
		Drilling Method:	4-in casing to 13 ft / Tri-cone roller bit
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0 - 2	S1	3	3	5	7	24	17		Topsoil/ Subsoil ~2.8'	S1 - Top 9": Top soil, ~1" piece of glass Bot. 8": Silty SAND (SM), fine to medium, ~5% coarse, ~25% fines, <5% fine gravel, ~5% organics, ~5% roots, dark brown, moist (subsoil)
	2 - 4	S2	12	9	7	8	24	9			S2 - Similar to bot. 8" of S1, thin (~1") angular gravel near bottom of sample, ~5% organics, dark brown, moist (subsoil)
5ft	4 - 6	S3	3	4	5	7	24	16	2	Cobble ~4'	Based on drilling action possible cobble between 3 ft. and 4 ft. (fill)
	6 - 8	S4	7	11	9	12	24	15		Silty Clay	S3 - Clayey SILT (ML), desiccated, slightly to moderately plastic, varied, 10-15% reddish brown fine sand, reddish brown-gray, moist PP = 4 test S4 - Similar to S3 PP = 4 test in top 6 inches and 2 test below
	8 - 10	S5	2	2	1	1	24	6			S5 - Silty CLAY (CL), moderately plastic, ~5% fine sand, gray, wet TV = 0.1 test (split spoon sample was disturbed)
10ft											
	13 - 15	S6	WOH/24"				24	24			S6 - Silty CLAY (CL), moderately plastic to plastic, ~5% fine sand, gray, wet TV = 0.2 test
15ft											
	18 - 20	S7	WOH/24"				24	23			S7 - Similar to S6 TV = 0.1 test
20ft											
	23 - 25	S8	WOH/24"				24	24			S8 - Similar to S6, occasional thin (~1/32") layer of fine sand in middle of sample, gray, wet TV = 0.25 test

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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BORING LOG

Boring B-3 (OW)
Page 2 of 3

Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	28 - 30	S9	WOH/24"				24	8		Silty Clay	S9 - Silty CLAY (CL), moderately plastic to plastic, ~5% fine sand, gray, wet Tv = 0.2 tsf
30 ft											
	33 - 35	S10	WOH/24"				24	24			S10 - Silty CLAY (CL), moderately plastic to plastic, occasional thin (~1/32") layers of fine sand, gray, wet Tv = 0.2 tsf
35 ft											
	38 - 40	S11	WOH/24"				24	24			S11 - Silty CLAY (CL), moderately plastic to plastic, ~5% fine sand, gray, wet Tv = 0.1 tsf
40 ft											
	43 - 45	S12	WOR	WOH/12"		3	24	20			S12 - Similar to S11 Tv = 0.2 tsf
45 ft											
	48 - 50	S13	WOR	WOH/18"			24	24			S13 - Similar to S11 Tv = 0.15 - 0.25 tsf
50 ft											
									3	52.0'	
	52.2-54.2	S14	16	12	16	22	24	2	4	Gravel with Sand	S14 - ~0.5" - 1" gravel pieces
	53 - 55	S15	4	5	18	32	24	2			S15 - ~1" - 1.5" coarse, angular gravel pieces

Remarks:
3 - At 52 ft observed hard drilling, and a split spoon sample S14 was taken at 52.2 ft.
4 - After S14 roller bit to 53 ft and took split spoon samples S15 and S16.

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BORING LOG

Boring B-3 (OW)
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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	55 - 57	S16	45	12	20	16	24	4	5	Gravel with Sand	S16 - Poorly Graded GRAVEL with Silt and Sand (GP), mostly coarse, angular gravel, ~10% fines, 20-25% fine to coarse sand, gray, wet
60 ft											End of boring at 57 feet. Backfilled with drill cuttings, and then sand in top 2 ft. Moved 5 feet west and drilled to 21 feet and installed a groundwater observation well.
65 ft											
70 ft											
75 ft											
80 ft											

Remarks:
5 - End of boring at 57 feet because driller had 55 ft of maximum drill rod length.

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BORING LOG

Boring B-4
Page 1 of 2

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Technical Drilling Services	Date Started:	10/7/2014
Drilling Foreman:	Brett Balyk	Date Completed:	10/8/2014
LGCI Engineer:	G. Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 21 feet (see remark 1)	Total Depth:	43 feet (see remarks 4 and 5)
Groundwater Depth:	15 feet on 10/8/14 at 8 a.m.	Drill Rig Type:	CME 55 Rubber Track ATV
	16.3 feet at end of drilling	Drilling Method:	4-in casing to 39 ft / Tri-cone roller bit
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NX
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0 - 2	S1	4	4	8	11	24	14		Topsoil/ Subsoil	S1 - Top 7": Top soil, ~1.5" coarse, angular gravel Bot. 7": Silty SAND (SM), fine to medium, ~30% fines, ~5% fine gravel, ~5% roots, brown, moist (subsoil)
	2 - 4	S2	6	9	7	8	24	18			S2 - Top 6": Buried Topsoil, traces of thin (~1") layer of buried subsoil
5ft	4 - 6	S3	22	17	10	13	24	13		Fill	Mid 3": Silty SAND (SM), mostly fine to medium, 5-10% coarse, 30-35% slightly plastic fines, dark gray, moist (fill) Bot. 9": SILT with Sand (ML), slightly plastic fines, ~20% fine to medium sand, ~5% coarse sand, dark gray, moist (fill)
	6 - 8	S4	21	14	6	15	24	1	2		S3 - Top 5": ~1.5" to 2" coarse, angular gravel pieces (fill) Bot. 8": Silty GRAVEL with Sand (GM), mostly coarse, angular gravel, ~30% slightly plastic fines, ~30% mostly fine to medium sand, dark gray, wet (fill)
	8 - 10	S5	8	8	1	1	24	0			S4 - ~1" sub-angular gravel pieces (fill) S5 - No Recovery
10ft									2	~10'	
	10 - 12	S6	4	7	7	11	24	22		Silty Clay	S6 - Clayey SILT (ML), desiccated, slightly to moderately plastic, varved, 5-10% fine sand, gray-brown, wet PP = 2 tsf at top of sample to 1.5 tsf below
	12 - 14	U1					24	24			U1 - Silty CLAY (CL), moderately plastic, brown, gray, wet Tv = 0.45 tsf
15ft	14 - 16	S7	WOH/12"		2	2	24	24			S7 - Silty CLAY (CL), moderately plastic to plastic, ~5% fine sand, gray, wet Tv = 0.25 - 0.3 tsf
	16 - 18	U2					24	24			U2 - Silty CLAY (CL), moderately plastic to plastic, ~5% fine sand, gray, wet Tv = 0.25 tsf
	18 - 20	S8	WOH/18"			1	24	24			S8 - Similar to S7 Tv = 0.2 tsf
20ft											
	23 - 25	S9	WOH/24"				24	24			S9 - Similar to S7 Tv = 0.15 tsf

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.
2 - Observed fine gravel in drill cuttings. Fill appears to consist mostly of coarse gravel and cobble fill between 5 feet and 10 feet.

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BORING LOG

Boring B-4
Page 2 of 2

Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	28 - 30	S10	WOH/24"				24	24		Silty Clay	S10 - Silty CLAY (CL), moderately plastic to plastic, ~5% fine sand, gray, wet Tv = 0.2 tsf
30 ft											
	33 - 35	U3					24	24			U3 - Silty CLAY (CL), moderately plastic to plastic, gray, wet Tv = 0.3 tsf
35 ft											
	35 - 37	S11	WOH/12"		9	6	24	24			S11 - Silty CLAY (CL), moderately plastic to plastic, ~5% fine sand, 0.75" gravel at tip of the spoon, gray, wet Tv = 0.25 tsf
	38	S12	120/0"				0	0	3	38.0'	S12 - No Recovery
40 ft	38.5-40.5	C1					24	24		Boulder	C1 - Cored through a boulder at a rate of 4 to 5 min/ft 37.5 ft - 40.5 ft: A boulder (see remark 2)
	40.5-42.5	S13	9	8	9	11	24	4	4	Gravel	S13 - ~1" coarse, angular gravel pieces (appears wash)
									5		
45 ft											End of boring at 43 feet. Backfilled with drill cuttings, about 3/4 bag of bentonite above 5 ft, and then sand in top 2 ft.
50 ft											

Remarks:
3 - At 37.5 ft observed hard drilling. Spoon refusal at 38 ft and roller bit refusal at 38.5 ft. Cored through a boulder from 38.5 ft to 40.5 ft.
4 - After S13, roller bit to 43 ft but borehole did not stay open below 42 ft. Then advanced 4-in casing from 16 ft and hard driving of casing below 37 ft.
5 - Lead 4-in casing broke at 39 ft and end of boring at 43 ft.

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BORING LOG

Boring B-5
Page 1 of 2

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Technical Drilling Services	Date Started:	10/10/2014
Drilling Foreman:	Brett Balyk	Date Completed:	10/10/2014
LGCI Engineer:	G. Mathiyalakan	Location:	Athletic field
Ground Surface El:	~ El. 21 feet (see remark 1)	Total Depth:	48 feet
Groundwater Depth:	1 feet at end of drilling	Drill Rig Type:	CME 55 Rubber Track ATV
		Drilling Method:	4-in casing to 7 ft / Tri-cone roller bit
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0 - 2	S1	2	5	6	7	24	19		Topsoil/ Subsoil	S1 - Top 5": Top soil Mid. 5": Silty SAND (SM), fine to medium, ~25% fines, ~5% organics, dark brown, moist (subsoil) Bot. 9": Clayey SILT with Sand (CL), slightly plastic, 25-30% fine to medium sand, ~5% coarse, gray-brown, moist (fill) S2 - Top 11": Silty SAND (SM), fine to medium, ~5% coarse, 25-30% fines, traces of plastic fines in top 3 inches, ~10% organics, dark brown, moist (fill) Bot. 10": Buried Topsoil
	2 - 4	S2	2	4	5	5	24	21		Fill	
5ft											
									2	~6'	
	7 - 9	S3	2	4	4	6	24	21		Silty Clay	S3 - Clayey SILT with Sand (ML), desiccated, slightly plastic, varved, ~30% fine sand, gray-brown with occasional dark brown mottles, moist PP = 1.5 tsf
10ft											
	12 - 14	S4	WOH/18"			3	24	24			S4 - Silty CLAY (CL), slightly to moderately plastic, varved, ~10% fine sand, gray, wet Tv = 0.3 tsf
15ft											
	18 - 20	S5	WOH/24"				24	24			S5 - Silty CLAY (CL), moderately plastic, ~5% fine sand with occasional thin (~1/32") layers in bottom half of sample, gray, wet Tv = 0.1 - 0.3 tsf
20ft											
	23 - 25	S6	WOH/24"				24	24			S6 - Similar to S5 Tv = 0.25 tsf

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.
2 - Estimated strata change based on observed drilling condition.

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BORING LOG

Boring B-5
Page 2 of 2

Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	28 - 30	S7	WOH/24"				24	24		Silty Clay	S7 - Silty CLAY (CL), slightly to moderately plastic, ~5% fine sand, gray, wet Tv = 0.3 tsf
30 ft											
										33.0'	
	33 - 35	S8	9	9	17	19	24	14		Sand and Gravel	S8 - Silty SAND (SM), mostly fine to medium, ~10% coarse, 30-35% fines, traces of plastic fines, ~1.5" coarse, angular gravel at top of sample, traces of weathered rock fragments, gray, wet
35 ft											
	38 - 40	S9	20	19	20	22	24	7			S9 - Similar to S8, 5-10% mostly coarse, angular gravel, gray, wet (~3 inches of fine to coarse gravel wash at top of sample S9)
40 ft											
	43 - 45	S10	24	21	28	29	24	13	3		S10 - Silty SAND with Gravel (SM), mostly fine to medium, ~5% coarse, 15-20% fines, 35-40% mostly coarse, angular gravel, gray, wet
45 ft											
									4		
50 ft											
											End of boring at 48 feet. Backfilled with drill cuttings, about 3/4 bag of bentonite above 5 ft, and then sand in top 2 ft.

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.
4 - Drillers advanced roller bit to 48 feet but borehole did not stay open and collapsed to 44 feet. End of boring at 48 feet.

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BORING LOG

Boring B-6
Page 1 of 3

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Technical Drilling Services	Date Started:	10/6/2014
Drilling Foreman:	Brett Balyk	Date Completed:	10/7/2014
LGCI Engineer:	G. Mathiyalakan	Location:	Wooded area west of existing school
Ground Surface El:	~ El. 30 feet (see remark 1)	Total Depth:	61.8 feet
Groundwater Depth:	12.4 feet at end of drilling	Drill Rig Type:	CME 55 Rubber Track ATV
		Drilling Method:	4-in casing to 8 ft / Tri-cone roller bit
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0 - 2	S1	3	4	5	8	24	17		Topsoil/ Subsoil	S1 - Top 4.5": Top soil Mid. 7": Silty SAND (SM), mostly fine, ~40% fines, ~5% organics, ~5% roots, dark brown, moist (subsoil) Bot. 5.5": SILT with Sand (ML), slightly plastic , 15-20% fine to medium sand, reddish brown-gray, moist (fill)
	2 - 4	S2	6	7	9	7	24	15		Fill	S2 - Top 10": Similar to bot. 5.5" of S1, 20-25% fine to medium sand, reddish brown-gray, moist (fill) Bot. 5": Silty SAND (SM), mostly fine to medium, ~15% fines, reddish brown, moist (fill)
5ft	4 - 6	S3	8	6	9	8	24	13		~4.9'	S3 - Top 11": Silty SAND (SM), very fine, 30-35% fines, brown to reddish brown near bottom of sample, wet (fill/ buried subsoil)
	8 - 10	S4	4	5	4	5	24	18		Silty Clay	Bot. 2": Clayey SILT with Sand (ML), slightly to moderately plastic, varved, 15-20% fine sand, gray, wet S4 - Clayey SILT with Sand (ML), slightly desiccated, moderately plastic, varved, 20-25% fine sand, gray, moist PP = 1.5 - 2 tsf
10ft											
	13 - 15	S5	2	2	1	1	24	24			S5 - Silty CLAY with Sand (CL), moderately plastic, 15-20% fine sand with occasional thin (~1/32") layers, gray, wet Tv = 0.15 tsf
15ft											
	18 - 20	S6	WOH/18"			2	24	23			S6 - Silty CLAY (CL), moderately plastic, ~5% fine sand, gray, wet Tv = 0.25 - 0.3 tsf
20ft											
	23 - 25	S7	6	7	6	6	24	15			S7 - Sandy Silty CLAY (CL), slightly to moderately plastic 30-35% fine sand with occasional thin (~1") layers, gray, wet

Remarks:
1 - Ground surface elevation interpolated from GIS Topographic Plan and is approximate.

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BORING LOG

Boring B-6
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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	28 - 30	S8	WOH/12"		3	3	24	15		Silty Clay	S8 - Silty CLAY (CL), moderately plastic, varved, gray, wet Tv = 0.25 tsf
30 ft											
	33 - 35	S9	WOH/18"			2	24	24			S9 - Silty CLAY (CL), moderately plastic, ~5% fine sand with occasional thin (~1/32") layers, gray, wet Tv = 0.2 tsf
35 ft											
	38 - 40	S10	WOH/18"			2	24	24			S10 - Silty CLAY (CL), moderately plastic to plastic, gray, wet Tv = 0.2 tsf
40 ft											
	43 - 45	S11	WOH/24"				24	24			S11 - Silty CLAY (CL), moderately plastic, ~5% fine sand with occasional thin (~1/32") layers, gray, wet Tv = 0.2 tsf
45 ft											
	48 - 50	S12	WOR/12"		WOH/12"		24	24			S12 - Silty CLAY (CL), moderately plastic to plastic, gray, wet Tv = 0.2 tsf
50 ft											
	53 - 55	S13	WOH/18"			2	24	24			S13 - Similar to S12 Tv = 0.2 tsf

Remarks:

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BORING LOG

Boring B-6
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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	58 - 60	S14	12	40	13	12	24	16	2	Silty Clay 58.8'	S14 - Top 9": Silty CLAY (CL), moderately plastic to plastic, gray, wet Tv = 0.2 tsf
60 ft										Gravel and Sand	Bot.7": Silty GRAVEL with Sand (GM), mostly coarse, angular gravel, 25-30% slightly to moderately plastic fines, 30-35% fine to medium sand, gray, wet
									2		
											End of boring at 61.8 feet. Backfilled with drill cuttings.
65 ft											
70 ft											
75 ft											
80 ft											

Remarks:
2 - At 59 ft observed hard drilling, and at 61.8 feet roller bit advanced at a rate of 2 min/1 inch. Lost drill water below 60 feet and end of boring at 61.8 feet.

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BORING LOG

Boring B-101
Page 1 of 3

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/5/2015
Drilling Foreman:	Tim Tucker	Date Completed:	6/5/2015
LGCI Engineer:	Andrew Jefferson	Location:	Southern side of proposed building
Ground Surface El:	~ 20' (see remark 1)	Total Depth:	69 feet
Groundwater Depth:	10.5' (during drilling)	Drill Rig Type:	Mobile Drill B-48 ATV
		Drilling Method:	4" casing to 6'/ 3" casing starting at 58.5'
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	7	4	3	24	14		Topsoil 7" Fill ~2'	S1 - Top 7": Topsoil Bot. 7": Well Graded SAND with Silt (SW-SM), fine to medium, 10-15% fines, ~5% fine gravel, trace of roots, brown, dry (fill)
	2-4	S2	4	4	6	9	24	22		Lean Clay	S2 - Lean CLAY (CL), desiccated, moderately plastic to plastic, brown to light brown with orange staining, moist
5ft	4-6	S3	3	4	5	7	24	20			S3 - Lean CLAY (CL), moderately plastic to plastic, brown to light brown, wet, TV=0.6 tsf, PP=2.2 tsf
	6-8	T1					24	23			T1 - Lean CLAY (CL), moderately plastic to plastic, grey, wet, PP=2.2 tsf, TV=0.6 tsf
	8-10	S4	WOH	1	1	1	24	24			S4 - Lean CLAY (CL), moderately plastic to plastic, thin layer of fine silty sand (~2") at top of sample, grey, wet, TV=0.12 tsf, PP=0.25 tsf
10ft	10-12	S5	WOH/18"			3	24	24			S5 - Similar to S4, thin layers of fine silty sand (<1/16") at top 6" of sample, TV=0.5 tsf, PP=0.5 tsf
15ft	14-16	S6	WOH/24"				24	24			S6 - Similar to S4, thin layer of fine silty sand (~3") in top 6" of sample, TV=0.2 tsf, PP=0.25 tsf
20ft	19-21	S7	WOH/24"				24	24			S7 - Similar to S4, TV=0.25 tsf, PP=0.5 tsf
	21-23	T2					24	22			T2 - Lean CLAY (CL), plastic, grey, wet
	23-25	S8	WOH/24"				24	24			S8 - Similar to S4, thin layer of fine silty sand (~4") in top 6" of sample, TV=0.25 tsf, PP=0.5 tsf

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft	29-31	S9	WOR/12"		WOH/12"		24	24		Lean Clay	S9 - Lean CLAY (CL), moderately plastic to plastic, grey, wet, TV=0.1 tsf, PP=0.25 tsf
35 ft	34-36	S10	WOR/12"		WOH/12"		24	18			S10 - Similar to S9, TV=0.1 tsf, PP=0.25 tsf
40 ft	39-41	S11	WOR/24"				24	24			S11 - Similar to S9, TV=0.1 tsf, PP=0.25 tsf
	41-43	T3					24	24			T3 - Lean CLAY (CL), plastic, grey, wet
	43-45	S12	WOH/24"				24	24			S12 - Similar to S9, TV=0.15 tsf, PP=0.5 tsf
45 ft											
50 ft	49-51	S13	WOR/24"				24	24			S13 - Similar to S9, TV=0.1 tsf, PP=0.25 tsf
	54-56	S14	WOR/24"				24	24			S14 - Similar to S9, TV=0.1 tsf, PP=0.25 tsf

Remarks:

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Clay 56.5'	
									2	Boulder 58.5'	Possible boulder from 57' to 58.5'
60 ft	59-61	S15	32	42	19	14	24	8		Gravel	S15 - Poorly Graded GRAVEL with Sand (GP), fine, sub-rounded to angular, 0-5% fines, 15-20% sand, dark grey, wet (gravel broken into angular pieces indicating the presence of a cobble or boulder)
	64-	S16	25/0"				0	0		64.0'	S16 - Spoon bouncing - no recovery
65 ft									3	Boulder	Possible boulder from 64' to 65'
										Gravel	Softer material drilled through from 65' to 65.5'
										Bedrock	Hard drilling with button bit observed from 65.5' and continued to 69.0'
70 ft											End of boring at 69.0'. Backfilled borehole with drill cuttings.
75 ft											
80 ft											

Remarks:
2 - Strata change based on chattering of drill rig starting at 56.5'.
3 - Ended 3" casing at 64'.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/8/2015
Drilling Foreman:	Tim Tucker	Date Completed:	6/8/2015
LGCI Engineer:	Andrew Jefferson	Location:	SW corner of proposed building
Ground Surface El:	~ 22' (see remark 1)	Total Depth:	50.5 feet
Groundwater Depth:	10' (during drilling)	Drill Rig Type:	Mobile Drill B-48 ATV
		Drilling Method:	4" casing to 4'/ 3" casing starting at 41'
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	1	2	5	24	19		Topsoil	S1 - Top 5": Topsoil
	2-4	S2	5	7	12	8	24	24		Lean Clay	Bot. 14": Lean Clay (CL), desiccated, moderately plastic to plastic, trace of roots, brown with orange staining, moist, thin layer of fine silty sand (~3") at bottom of sample (possible fill) S2 - Top 19": Similar to bottom 14" of S1, without trace of roots
5ft	4-6	S3	2	3	5	5	24	20			Bot. 5": Lean CLAY (CL), moderately plastic to plastic, 10-15% fine sand, grey, moist S3 - Lean CLAY (CL), plastic, grey, moist, PP=2.0 tsf, TV=0.5 tsf
	6-8	T1					24	24			T1 - Lean Clay (CL), plastic, grey, wet
	8-10	S4	WOH	2	3	2	24	24			S4 - Similar to S3, thin layer of fine silty sand (~2") in bottom 6" of sample, wet, PP=1.5 tsf, TV=0.45 tsf
10ft	10-12	S5	3	3	3	3	24	24			S5 - Similar to S3, thin layers of fine silty sand (~1/16" to 1") in bottom and top 5" of sample, PP=1.0 tsf, TV=0.35 tsf
15ft	14-16	S6	WOH	1	3	2	24	24			S6 - Similar to S3, PP=1.25 tsf, TV=0.35 tsf
20ft	19-21	S7	WOH/24"				24	22			S7 - Similar to S3, PP=1.0 tsf, TV=0.35 tsf
	24-26	S8	WOH/24"				24	24			S8 - Similar to S3, thin layers of fine silty sand (<1/16") in top 2" of sample, PP=0.75 tsf, TV=0.3 tsf

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft	29-31	S9	WOH/24"				24	24		Lean Clay	S9 - Similar to S3, thin layers of fine silty sand (<1/16") in intervals of 4" to 6", clay altered between stiffer and softer portions near layers of silty sand, PP=0.5 - 0.75 tsf, TV=0.2 - 0.25 tsf
35 ft	34-36	S10	WOH/24"				24	24			S10 - Similar to S3, thin layers of fine silty sand (<1/16") in intervals of ~2" in top 12" of sample, PP=0.5 tsf, TV=0.25 tsf
									2	38.0'	
40 ft	39-41	S11	17	25	14	19	24	11		Gravel	S11 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine, angular, gravel broken into circular pieces indicating presence of cobble or boulder, 10-15% fines, 20-25% sand, grey to dark grey, wet
									3		
									4		
45 ft	44-46	S12	27	22	26	29	24	7			S12 - Well Graded GRAVEL with Sand and Silt (GW-GM), fine, angular, 10-15% fines, 30-35% sand, grey, wet
										47.5'	
50 ft										Bedrock	Started hard drilling with button bit at 47.5'
											End of boring at 50.5'. Backfilled borehole with drill cuttings.

Remarks:
2 - Strata change based on chattering of drill rods at 38'.
3 - Telescoped 3" casing at 41'.
4 - Ended 3" casing at 44', then continued open hole.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/11/2015
Drilling Foreman:	Chris DeVillers	Date Completed:	6/11/2015
LGCI Engineer:	Andrew Jefferson	Location:	South central section of prop. blg.
Ground Surface El:	~ 20' (see remark 1)	Total Depth:	67.0'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	60		Topsoil	S1 - Top 6.5": Topsoil
										Fill 1.9'	Mid. 16": Lean CLAY (CL), desiccated, moderately plastic, 5-10% fine sand, fine sand mottles in bottom 5" of 16" sample, light brown, moist (possible fill)
										Lean Clay	Bot. 37.5": Lean CLAY (CL), moderately plastic to plastic, thin layers of fine silty sand (<1/16" to 1") in intervals of 1" to 3", PP=1.5 - 1.75 tsf, TV=0.55 - 0.6 (top)/0.5 (side) tsf
5ft											
	5-10	S2					60	50			S2 - Top 25": Similar to bottom 37.5" of S1, thin layers of fine silty sand (<1/16") in intervals of 1/2" to 2" in the inner 12" of 25" sample, PP=1.5-2.0 tsf, TV=0.3 tsf (side) / 0.2 tsf (top) Bot. 25": Similar to bottom 37.5" of S1, softer clay in comparison to upper half of S2, thin layers of fine silty sand (<1/16") in intervals of 1/2" in top 12" and 2"-3" in bottom half of sample, PP=0.25-0.5 tsf, TV=0.2 tsf (side) / 0.2 tsf (top)
10ft											
15ft											
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Lean Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlaying the clay.
30 ft											
35 ft											
40 ft											
45 ft											
50 ft											

Remarks:

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
60 ft										Lean Clay	
	62-67	S2					60	35	2	62.8'	S2 - Top 10": Lean CLAY (CL), plastic, grey, wet
65 ft										Gravel	Bot. 25": Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded to angular, 10-15% fines, 15-20% sand, grey, wet
70 ft											End of boring at 67.0'. Backfilled borehole with sand.
75 ft											
80 ft											

Remarks:
2 - Encountered strata change based on tip refusal at 62.8'.

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/3/2015
Drilling Foreman:	Tim Tucker	Date Completed:	6/4/2015
LGCI Engineer:	Andrew Jefferson	Location:	Western side of prop. blg.
Ground Surface El:	~24.5' (see remark 1)	Total Depth:	77 feet
Groundwater Depth:	8' (during drilling)	Drill Rig Type:	Mobile Drill B-48 ATV
		Drilling Method:	4" casing to 4'/ 3" casing starting at 68'
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	WOH	1	3	3	24	15		Topsoil	S1 - Top 10": Topsoil
										Fill ~3.3'	Bot. 5": Silty SAND (SM), fine, 25-30% fines, trace of organics and bricks, dark brown to brown, moist (fill)
	2-4	S2	4	7	7	5	24	19			S2 - Top 16": Similar to bottom 5" of S1
										Lean Clay	Bot. 3": SILT with Sand (ML), ~30% fine sand, slightly to moderately plastic, olive grey, moist
5ft	4-6	S3	3	6	6	5	24	19			S3 - Lean CLAY (CL), moderately plastic to plastic, thin layers of fine silty sand (~3") at 6" intervals, grey, wet
	6-8	S4	8	6	7	7	24	24			S4 - Similar to S3, thin layers of fine silty sand (~1/2") at 3" intervals
10ft	9-11	S5	1	2	4	5	24	21			S5 - Lean CLAY (CL), moderately plastic to plastic, silt with sand in bottom 6", grey, wet
15ft	14-16	S6	WOH/20"			2	24	24			S6 - Lean CLAY (CL), plastic, thin layers (~1/4") of fine silty sand at 2" to 12" intervals, grey, wet
20ft	19-21	S7	WOH	5	9	6	24	10			S7 - Similar to S6, thin layers of fine silty sand (~1/2") at bottom 4" of sample
	24-26	S8	WOH/24"				24	24			S8 - Similar to S6, thin layer of fine silty sand (~1/16") in top 12" of sample

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft	29-31	S9	WOH/24"				24	24		Lean Clay	S9 - Similar to S6, thin layers of fine silty sand (~1/16") in bottom 12" of sample
35 ft	34-36	S10	WOH/24"				24	24			S10 - Similar to S6, no layers of sand
40 ft	39-41	S11	WOR/12"		WOH/12"		24	24			S11 - Similar to S6, thin layers of fine silty sand (~1/16") in bottom 12" of sample
45 ft	44-46	S12	WOR/18"			WOH	24	24			S12 - Similar to S6, thin layers of fine silty sand (~1/16") in bottom 12" of sample
50 ft	49-51	S13	WOR/18"			WOH	24	24			S13 - Similar to S6, thin layer of fine silty sand (~1/16") in bottom 12" of sample
	54-56	S14	WOR/14"		WOH/10"		24	24			S14 - Similar to S6, thin layers of fine silty sand (~1/16") separated ~2" apart in top 6" of sample

Remarks:

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
60 ft	59-61	S15	WOR/13"		WOH	24	24	24		Lean Clay 60.5'	S15 - Similar to S6, gravel at tip of spoon
									2	Gravel	Hard drilling with roller bit from 61.4' to 62.9'
65 ft	64-66	S16	29	28	12	11	24	8			S16 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine, angular, 10-15% fines, 15-20% sand, dark grey, wet (possible weathered rock)
	66-68	S17	10	18	59	48	24	12	3		S17 - Similar to S16
70 ft										Boulder	Hard drilling with button bit from 68.5' to 71.5' through possible boulder (rock chips in return water)
	71.5-73.5	S18	77	34	41	48	24	13	4	Gravel 74.0'	S18 - Silty GRAVEL with Sand (GM), fine to coarse, subrounded to angular, 20-25% fines, 20-25% fine to coarse sand, dark grey, wet
75 ft										Bedrock	Started hard drilling with button bit at 74' Stopped hard drilling with button bit at 77'
80 ft											End of boring at 77.0'. Backfilled borehole with drill cuttings.

Remarks:
2 - Started losing water at ~61.4 feet. Used 1000+ gallons of water to 75 feet.
3 - Telescoped 3" casing at 68 feet.
4 - Ended 3" casing at 71.5', then continued open hole.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/11/2015
Drilling Foreman:	Chris DeVillers	Date Completed:	6/11/2015
LGCI Engineer:	Andrew Jefferson	Location:	West central section of prop. blg.
Ground Surface El:	~20.5' (see remark 1)	Total Depth:	61.6'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	53		Topsoil	S1 - Top 12": Topsoil
										Fill	12-15": Poorly Graded SAND with Silt (SP-SM), fine, 10-15% fines, light brown, moist (fill)
											15-24": Lean CLAY (CL), desiccated, moderately plastic, light brown, moist
5ft										Lean Clay	24-53": Lean CLAY (CL), plastic, layers of fine silty sand (<1/16" to 1/2") in 3" intervals, 4" layer of fine silty sand in bottom half of sample (32" to 36"), grey, moist, PP=2.0-2.25 tsf, TV=0.5 tsf (top)/ 0.65 tsf (side)
	5-10	S2					60	39			S2 - Lean CLAY (CL), plastic, thin layers of fine silty sand (<1/16" to 1") in intervals of 4", 4" layer of fine silty sand at bottom of sample, PP=1.0-1.6 tsf, TV=0.25 tsf (side)/ 0.4 tsf (top)
10ft											
15ft											Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Lean Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
30 ft											
35 ft											
40 ft											
45 ft											
50 ft											

Remarks:

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Lean Clay	
60 ft	60.8-										
	61.6	S3					10	10		61.3'	S3 - Top 6": Lean CLAY (CL), plastic, grey, moist, PP=0.25 tsf, TV=0.2 tsf (side)/ 0.15 tsf (top)
									2		Bot. 4": Well Graded GRAVEL with Silt and Sand (GW-GM), fine, angular, 5-10% fines, 20-25% sand, grey, moist
											End of boring at 61.6'. Backfilled borehole with sand.
65 ft											
70 ft											
75 ft											
80 ft											

Remarks:
2 - Encountered sampler refusal at 61.6'.

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/4/2015
Drilling Foreman:	Tim Tucker	Date Completed:	6/4/2015
LGCI Engineer:	Andrew Jefferson	Location:	Western side of prop. blg.
Ground Surface El:	~26' (see remark 1)	Total Depth:	77 feet
Groundwater Depth:	6' (during drilling)	Drill Rig Type:	Mobile Drill B-48 ATV
		Drilling Method:	4" casing to 4'/ 3" casing starting at 66'
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	WOH	1	1	2	24	17		Topsoil	S1 - Top 15": Topsoil
	2-4	S2	3	6	8	8	24	20		Fill	Bot. 2": Silty SAND (SM), fine, 25-30% fines, traces of organics and roots, brown to dark brown, wet (fill) S2 - Top 10": Silty SAND (SM), fine, ~25% fines, grey with brown mottles (appears reworked - fill) Bot. 10": Silty SAND (SM), fine, ~35-40% fines, brown, moist
5ft	4-6	S3	6	7	6	8	24	15			S3 - Similar to bottom 10" of S2, slightly plastic, orange brown in top 7", lean clay in bottom 1/2"
										~6'	
	6-8	S4	6	7	10	9	24	18		Lean Clay	S4 - Lean CLAY (CL), moderately plastic, brown to grey, orange staining, wet
10ft	9-11	S5	4	5	6	6	24	22			S5 - Top 18": Lean CLAY with Sand (CL), 15-20% fine sand, moderately plastic, grey, moist Bot. 4": Lean CLAY (CL), moderately plastic to plastic, grey, moist
15ft	14-16	S6	3	3	2	2	24	23			S6 - Top 10": Lean CLAY with Sand (CL), moderately plastic, 25-30% fine sand, moderately plastic, grey, wet Bot. 13": Lean CLAY (CL), moderately plastic to plastic, thin layers of fine silty sand (<1/16") at ~3" intervals, grey, wet
20ft	19-21	S7	WOH	3	2	3	24	24			S7 - Lean CLAY (CL), plastic, thin layers of fine silty sand (<1/16") at ~3" intervals in top 12" of sample, grey, wet
	24-26	S8	2	1	2	3	24	24			S8 - Similar to S7

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft	29-31	S9	WOH/18"			3	24	24		Lean Clay	S9 - Lean CLAY (CL), plastic, grey, wet
35 ft	34-36	S10	WOH/24"				24	24			S10 - Similar to S9, thin layer of fine silty sand (<1/16") in top 3" of sample
40 ft	39-41	S11	WOR/18"			WOH	24	24			S11 - Similar to S9, thin layers of fine silty sand (~1/16") in intervals of 3" to 6" in top half of sample
45 ft	44-46	S12	WOR/24"				24	24			S12 - Similar to S9, thin layers of fine silty sand (~1/16") at intervals of 3"
50 ft	49-51	S13	WOR/24"				24	21			S13 - Similar to S9, thin layer of fine silty sand (~1/16") in intervals of 3" in bottom half of sample
	54-56	S14	WOR/20"			WOH	24	24			S14 - Similar to S9, thin layers of fine silty sand (~1/16") in intervals of ~3" to 4" in top and bottom 8" of sample

Remarks:

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
60 ft	59-61	S15	WOR/20"			WOH	24	24		Lean Clay	S15 - Similar to S9
									2	61.5'	
65 ft	64-66	S16	28	9	18	33	24	5		Gravel	S16 - Well Graded GRAVEL with Sand (GW), fine, subrounded to angular, <5% fines, 15-20% coarse sand, dark grey, wet
	66-68	S17	10	42	15	30	24	11	3		S17 - Well Graded GRAVEL with Sand and Silt (GW-GM), fine, angular, 10-15% fines, 15-20% coarse sand, dark grey to black, wet
70 ft	69-71	S18	21	20	23	24	24	13	4		S18 - Similar to S17, subrounded to angular gravel
										73.5'	
75 ft										Bedrock	Began button bit drilling at 73.5' Ended button bit drilling at 77'
80 ft											End of boring at 77.0'. Backfilled borehole with drill cuttings.

Remarks:
2 - Encountered strata change based on chatter of drill rods at 61.5'.
3 - Telescoped 3" casing at 66 feet.
4 - Stopped 3" casing at 69 feet, then continued open hole.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/11/2015
Drilling Foreman:	Chris DeVillers	Date Completed:	6/11/2015
LGCI Engineer:	Andrew Jefferson	Location:	NW section of prop. blg.
Ground Surface El:	~21.5' (see remark 1)	Total Depth:	64.5
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	28		Asphalt	S1 - Top 6": Asphalt
										Fill	Mid. 12": Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, ~15% gravel, brown, dry (fill) Bot. 10": Similar to middle 12", slighty plastic, moist
5ft											
	5-10	S2					60	20		~6.25'	S2 - Top 15": Similar to middle 12" of S1, trace of root (fill) Bot. 5": Lean CLAY with Gravel (CL), desiccated, moderately plastic, 5-10% fine gravel, moist
10ft										Lean Clay	
	10-15	S3						24			S3 - Top 21": Gravelly CLAY (CL), moderately plastic, 30-35% fine gravel, 10-15% medium sand, grey, moist Bot. 3": Lean CLAY (CL), desiccated, moderately plastic, moist, grey
15ft											
20ft											Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Lean Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
30 ft											
35 ft											
40 ft											
45 ft											
50 ft											

Remarks:

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	59.5-64.5	S4					60	8	2	Lean Clay 60.0'	S4 - Top 6": Lean CLAY (CL), plastic, grey, wet
										Gravel	Bot. 2": Well Graded GRAVEL with Silt and Sand (GW-GM), fine, subrounded to angular, 10-15% fines, 15-20% medium sand, grey, wet
60 ft											
65 ft											End of boring at 64.5'. Backfilled with sand.
70 ft											
75 ft											
80 ft											

Remarks:
2 - Encountered strata change based on tip refusal at 60'.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/12/2015
Drilling Foreman:	Andy Miller	Date Completed:	6/12/2015
LGCI Engineer:	Andrew Jefferson	Location:	Northern section of prop. blg.
Ground Surface El:	~26' (see remark 1)	Total Depth:	67.0'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	48		Topsoil	S1 - Top 14": Topsoil
										Fill	14-26": Well Graded SAND with Silt (SW-SM), coarse to fine, 5-10% fines, ~5% gravel, brown, dry (fill) 26-36": Lean CLAY (CL), slightly plastic, desiccated, 10-15% gravel, trace of root, light brown, dry (possibly fill) Bot. 12": Similar to 14" to 26", moist, light brown
5ft											
	5-10	S2					60	58			S2 - Top 30": Silty SAND (SM), fine, 25-30% fines, slighty plastic, light brown to orange, wet (fill)
										~7.5'	Bot. 28": Lean CLAY (CL), moderately plastic to plastic, grey, moist
10ft										Clay	
15ft											Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Lean Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
30 ft											
35 ft											
40 ft											
45 ft											
50 ft											

Remarks:

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
60 ft										Lean Clay	
									2		
65 ft	64-67	S3					48	34		64.8'	S3 - Top 10": Lean CLAY with Gravel (CL), moderately plastic, ~15% gravel, grey, wet
									3	Gravel	Bot. 24": Silty GRAVEL with Sand (GM), fine to coarse, subrounded to angular, 25-30% fine to medium sand, 15-20% fines, grey, wet
70 ft											End of boring at 67'. Backfilled borehole with sand.
75 ft											

Remarks:
2 - Encountered strata change based on tip refusal at 64.8'.
3 - Encountered sampler refusal at 67'.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/8/2015
Drilling Foreman:	Tim Tucker	Date Completed:	6/9/2015
LGCI Engineer:	Andrew Jefferson	Location:	Northern side of prop. blg.
Ground Surface El:	~23' (see remark 1)	Total Depth:	74 feet
Groundwater Depth:	12' (during drilling)	Drill Rig Type:	Mobile Drill B-59 Truck
		Drilling Method:	4" casing to 6'/ 3" casing starting at 66'
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	12	12	6	8	24	11		Asphalt	S1 - Top 6": Asphalt and subbase
	2-4	S2	10	9	8	8	24	13		Fill ~4'	Bot. 5": Poorly Graded SAND with Silt (SP-SM), fine, 5-10% fines, light brown with orange staining, moist S2 - Similar to bottom 5" of S1, wet
5ft	4-6	S3	3	4	3	4	24	15		Lean Clay	S3 - Lean CLAY with Sand (CL), moderately plastic, 15-20% fine sand, grey, wet
	6-8	S4	3	3	2	3	24	8			S4 - Lean CLAY (CL), moderately plastic to plastic, 10-15% fine sand, thin layer of fine silty sand (<1/16") in bottom 3" of sample, stone in top of sample, grey, wet, PP=2.0 tsf, TV=0.5-0.6 tsf
10ft	9-11	S5	WOH/12"		1	2	24	24			S5 - Top 16": Lean CLAY (CL), plastic, grey, wet, PP=1.5 tsf, TV=0.4 tsf
										Sand	Bot. 8": Silty SAND (SM), fine, 20-25% fines, grey, wet
15ft	14-16	S6	WOH/24"				24	22		Lean Clay	S6 - Lean CLAY (CL), plastic, thin layers of fine silty sand (<1/16") in bottom 10" of sample, grey, wet, PP=0.5 tsf, TV=0.45 tsf
20ft	19-21	S7	WOR/12"		WOH/12"		24	24			S7 - Similar to S6, no layers of silty sand, PP=0.25 tsf, TV=0.5 tsf
	24-26	S8	WOH/24"				24	20			S8 - Similar to S6, no layers of silty sand, PP=0.5 tsf, TV=0.3 tsf

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft	29-31	S9	WOH/24"				24	24		Lean Clay	S9 - Similar to S6, no layers of fine silty sand, PP=0.25 tsf, TV=0.2 tsf
35 ft	34-36	S10	WOR/12"		WOH/12"		24	24			S10 - Similar to S6, thin layer of fine silty sand (<1/16") in middle 12" of sample, PP=0.25 tsf, TV=0.1 tsf
40 ft	39-41	S11	WOH/24"				24	24			S11 - Similar to S6, thin layer of fine silty sand (~1/16") in top 3" of sample, PP=0.25 tsf, TV=0.05 tsf
45 ft	44-46	S12	WOR/18"			WOH	24	24			S12 - Similar to S6, thin layer of fine silty sand (~1/16") in top 3" of sample PP=0.25 tsf, TV=0.1 tsf
50 ft	49-51	S13	WOR/24"				24	24			S13 - Similar to S6, thin layer of fine silty sand (~1/16") in top 5" of sample
	54-56	S14	WOR/24"				24	24			S14 - Similar to S6, no layers of silty sand PP=0.25 tsf, TV=0.15 tsf

Remarks:

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
60 ft	59-61	S15	WOR/24"				24	24		Lean Clay	S15 - Similar to S9, PP=0.25 - 0.5 tsf, TV=0.15 tsf
									2	63.0'	
65 ft	64-66	S16	10	7	12	23	24	6	3	Gravel	S16 - Silty GRAVEL with Sand (GM), fine, subrounded to angular, 15-20% fines, 30-35% fine to coarse sand, grey, wet Hard drilling with button bit from 66.5' to 67.5' (possible boulder)
70 ft	69-70.5	S17	36	31	29		18	8	4	70.5'	S17 - Silty GRAVEL with Sand (GM), coarse to fine, angular, ~20% fines, 35-40 fine to coarse sand, grey, wet (last 6" of spoon hit refusal with 20+ blows without movement)
										Bedrock	Hard drilling with button bit starting at 70.5' Ended button bit drilling at 74.0'
75 ft											End of boring at 74.0'. Backfilled borehole with drill cuttings.
80 ft											

Remarks:
2 - Encountered strata change based on chatter of drill rods at 63'.
3 - Telescoped 3" casing at 66'.
4 - Ended 3" casing at 69', then continued open hole.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/12/2015
Drilling Foreman:	Andy Miller	Date Completed:	6/12/2015
LGCI Engineer:	Andrew Jefferson	Location:	NE corner of prop. blg.
Ground Surface El:	~29' (see remark 1)	Total Depth:	51.3'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	48		Topsoil	S1 - Top 10": Topsoil
										Fill ~3.25'	10-25": Lean CLAY (CL), desiccated, 10-15% medium sand, 5-10% fine gravel, light brown, moist (possible fill) 25-40": Well Graded SAND with Silt (SW-SM), 10-15% fines, light brown, moist
5ft										Clay	40-48": Lean CLAY (CL), desiccated, moderately plastic, grey, moist
10ft											
15ft											Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Lean Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
30 ft											
35 ft											
40 ft											
45 ft											
50 ft									2	50.0'	
	50-51.3	S2					16	14		Gravel	S2 - Clayey GRAVEL with Sand (GC), subrounded to angular, 30-35% plastic fines, 20-25% medium sand, grey, wet
									3		End of boring at 51.3'. Backfilled borehole with sand.

Remarks:
2 - Encountered strata change based on tip refusal at 50'.
3 - Encountered sampler refusal at 51.3'.

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BORING LOG

Boring B-111
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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/12/2015
Drilling Foreman:	Andy Miller	Date Completed:	6/12/2015
LGCI Engineer:	Andrew Jefferson	Location:	Eastern side of prop. blg.
Ground Surface El:	~29' (see remark 1)	Total Depth:	42.3'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
											Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
5ft											
10ft											
15ft											
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft										Clay	
35 ft									2		
40 ft											
	41-42.3	S1					15	6	3	41.3'	S1 (second attempt) - Top 3": Lean CLAY (CL), plastic, grey, wet
									4	Gravel	Bot. 3": Poorly Graded GRAVEL with Sand and Silt (GP-GM), subrounded to angular, 10-15% fines, 30-35% medium sand, grey, wet
45 ft											End of boring 42.3'. Backfilled borehole with sand.
50 ft											

Remarks:
2 - Encountered resistance on first attempt of sampler at 35' (0" pen, no recovery).
3 - Encountered strata change based on resistance of tip at 41.3'.
4 - Encountered sampler refusal at 42.3'.

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BORING LOG

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/9/2015
Drilling Foreman:	Tim Tucker	Date Completed:	6/10/2015
LGCI Engineer:	Andrew Jefferson	Location:	SE corner of prop. blg.
Ground Surface El:	~29' (see remark 1)	Total Depth:	59.0'
Groundwater Depth:	13.5' (during drilling)	Drill Rig Type:	Mobile Drill B-59 Truck
		Drilling Method:	4" casing to 10'/ 3" casing starting at 49'
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	N/A
Drop:	30 inches		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	WOH	2	13	14	24	13		Topsoil	S1 - Top 9": Topsoil
										Fill	Bot. 4": Silty SAND (SM), fine, 15-20% fines, large root, mixture of organics, brown to light brown, moist
	2-4	S2	7	10	8	9	24	1			S2 - Large gravel stuck in tip of spoon, remaining material Silty SAND (SM), fine, 15-20% fines, light brown, moist
5ft	4-6	S3	16	14	4	3	24	14			S3 - Top 8": Silty GRAVEL with Sand (GM), fine, 15-20% fines, 30-35% fine to coarse sand, light brown to brown, wet
	6-8	S4	6	10	10	9	24	18		~6.7'	Bot. 6": Lean CLAY (CL), moderately plastic, desiccated, orange staining, light brown, wet (possible fill)
											S4 - Top 10": Silty SAND (SM), fine, 20-25% fines, light brown, wet (possible fill)
										Lean Clay	Mid. 5": Lean CLAY (CL), moderately plastic, desiccated, orange staining, olive grey, moist
10ft	9-11	S5	3	4	7	10	24	13			Bot. 3": Similar to middle 5", wet, plastic
											S5 - Lean CLAY (CL), moderately plastic, desiccated, orange staining, olive grey, moist
15ft	14-16	S6	WOH	3	2	3	24	24			S6 - Lean CLAY (CL), plastic, grey, wet, PP=1.5 tsf, TV=0.5 tsf
20ft	19-21	S7	WOH/16"		1	2	24	24			S7 - Similar to S6, PP=0.75 tsf, TV=0.3 tsf
	24-26	S8	WOH/24"				24	24			S8 - Similar to S6, thin layers of fine silty sand (<1/16") in bottom 4" of sample, PP=0.5 tsf, TV=0.03 tsf

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

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Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft	29-31	S9	WOR	WOH/18"			24	24		Lean Clay	S9 - Similar to S6, thin layer of fine silty sand (<1/16") in top 3" of sample, PP=0.5 tsf, TV=0.3 tsf
35 ft	34-36	S10	WOR/12"		WOH/12"		24	24			S10 - Similar to S6, thin layers of fine silty sand (<1/16") in intervals of ~2" in bottom 10" of sample, PP=0.25 tsf, TV=0.15 tsf
40 ft	39-41	S11	WOR	WOH/18"			24	24			S11 - Similar to S6, thin layers of fine silty sand (<1/16") in intervals of 5", PP=0.5 tsf, TV=0.2 tsf
45 ft	44-46	S12	WOR	2	47	39	24	13		45.0'	S12 - Top 12": Similar to S6, thin layers of fine silty sand (<1/16") in ~4" intervals Bot. 1": (tip) Silty GRAVEL with Sand (GM), fine, angular, 20-25% fines, 15-20% sand, grey, wet
	46-48	S13	56	36	7	11	24	12		Gravel	S13 - Top 6": Similar to S6, 0-5% sand (wash/wall collapsed) Bot. 6": Similar to bottom 1" of S12, large gravel separating top 6" from bottom 6"
50 ft	49-50.5	S14	17	30	30/3"		15	4	2	50.5'	S14 - Well Graded SAND with Silt (SW-SM), coarse to fine, 10-15% fines, 10-15% fine gravel, angular, grey, wet
									3		
									4	Bedrock	
	54	S15	20/0"				0	0			S15 - Spoon Refusal (no recovery)
	54-59	C1					60	58			C1 - 4, 4, 5, 5, 5 min/ft - REC = 97%, RQD= 76%

Remarks:
2 - Telescoped 3" casing at 49'.
3 - Encountered hard drilling with button bit from 50.5' to 54'.
4 - Button bit drilling speed in comparison to depth was questionable. Conducted rock core to verify sound rock.

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Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Bedrock	
60 ft											End of boring at 59.0'. Backfilled borehole with drill cuttings.
65 ft											
70 ft											
75 ft											
80 ft											

Remarks:

LGCI
Lahlaf Geotechnical Consulting, Inc.

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Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/11/2015
Drilling Foreman:	Chris DeVillers	Date Completed:	6/11/2015
LGCI Engineer:	Andrew Jefferson	Location:	Southern side of prop. blg.
Ground Surface El:	~20' (see remark 1)	Total Depth:	46.9'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	48		Topsoil	S1 - Top 8": Topsoil
										Fill	8-15": Well Graded SAND (SW), fine to medium, 0-5% fines, light brown to brown, dry
										Clay	15-49": Lean CLAY (CL), moderately plastic, desiccated, brown, moist
									2		49-50": Silty SAND (SM), fine, 20-25% fines, orange, dry
5ft											50-60": Lean CLAY (CL), plastic, grey, moist, PP=1.25 tsf, TV=0.5 tsf
	5-10	S2					60	48			S2 - Top 15": Lean CLAY (CL), plastic, grey, moist, PP=2.25 tsf, TV=0.5 tsf (top)/ 0.4 tsf (side)
											Mid. 28": Similar to top 15", thin layers of fine silty sand (<1/16" to 1") in intervals of 1" to 3", PP=0.25 tsf, TV=0.15 tsf
10ft											Bot. 5": Similar to top 15", PP=1.75 tsf, TV=0.55 tsf (side)/ 0.5 tsf (top)
15ft											
											Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.
2 - Gradual color change in desiccated clay indicates natural soil (light brown - olive grey - grey).

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-113
Page 2 of 2

Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
30 ft											
35 ft											
40 ft											
	41.9-46.9	S3					60	22	3	42.9'	S3 - Top 12": Similar to top 15" of S2, PP=0.5 tsf
45 ft										Gravel	Bot. 10": Poorly Graded Gravel with Silt and Sand (GP-GM), coarse, angular to subrounded, 10-15% fines, 20-25% sand, grey, wet
50 ft											End of boring at 46.9'. Backfilled borehole with sand.

Remarks:
3 - Encountered strata change based on tip refusal at 42.9'.

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-114
Page 1 of 3

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/12/2015
Drilling Foreman:	Andy Miller	Date Completed:	6/12/2015
LGCI Engineer:	Andrew Jefferson	Location:	Northern side of prop. blg.
Ground Surface El:	24.5' (see remark 1)	Total Depth:	66.7'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	39		Topsoil	S1 - Top 10": Topsoil
										Fill ~2.7'	10-18": Silty SAND (SM), fine, 20-25% fines, light brown to brown with black/orange staining, moist 18-26": Similar to 10-18", trace of gravel (~5%), slighty plastic, dark brown, wet 26-27": Poorly Graded GRAVEL (GP), coarse, angular, moist 27-33": Similar to 18"-26"
5ft											
										Clay	Bot. 6": Lean CLAY (CL), transition from desiccated to lean clay, moderately plastic to plastic, light brown to grey with orange staining, moist
10ft											
15ft											
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-114
Page 2 of 3

Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Lean Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
30 ft											
35 ft											
40 ft											
45 ft											
50 ft											

Remarks:

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-114
Page 3 of 3

Project:	**Proposed Middle School, Beverly, MA**
Client:	**Ai3 Architects LLC** — LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
60 ft										Clay	
	61.7-66.7	S2					60	50			S2 - Top 22": Lean CLAY (CL), plastic, grey, wet Bot. 28": Silty GRAVEL with Sand (GM), fine to coarse, 20-25% plastic fines, 30-35% sand, grey, wet
65 ft									2	63.5' Gravel	
70 ft											End of boring at 66.7'. Backfilled borehole with sand.
75 ft											

Remarks:
2 - Encountered strata change based on tip refusal at 63.5'

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-115
Page 1 of 3

Project:	**Proposed Middle School, Beverly, MA**		
Client:	**Ai3 Architects LLC**		LGCI Project No.: 1435
Drilling Subcontractor:	Northern Drill Service, Inc.	Date Started:	6/12/2015
Drilling Foreman:	Andy Miller	Date Completed:	6/12/2015
LGCI Engineer:	Andrew Jefferson	Location:	SW corner of prop. blg.
Ground Surface El:	~25' (see remark 1)	Total Depth:	57.9'
Groundwater Depth:	N/A	Drill Rig Type:	Geoprobe 6620DT
		Drilling Method:	Direct Push
Hammer Weight:	N/A	Split Spoon Diameter:	N/A
Hammer Type:	Percussion	Rock Core Barrel Size:	N/A
Drop:	N/A		

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	S1					60	48		Topsoil	S1 - Top 18": Topsoil
										Fill ~3.1'	18-38": Well Graded SAND (SW), brown to dark brown, fine to medium, moist
											38-48": Lean CLAY (CL), desiccated, moderately plastic, light brown, moist, PP=1.25-1.5 tsf, immediate color change in clay (light brown to grey - possible fill)
5ft											
10ft											
										Clay	Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
15ft											
20ft											

Remarks:
1. Ground surface elevation interpolated from plan titled: "Existing Conditions Survey," by Welch Associates Land Surveyors, Inc. dated 6/12/15.

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-115
Page 2 of 3

Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
											Drillers advanced boring without sampling to probe for the top of the sand layer or rock underlying the clay.
30 ft											
35 ft											
40 ft										Lean Clay	
45 ft											
50 ft											
	52.9- 57.9	S2					60	42		54.7'	S2 - Top 22": Lean CLAY (CL), plastic, grey, wet

Remarks:

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

Boring B-115
Page 3 of 3

Project:	**Proposed Middle School, Beverly, MA**	
Client:	**Ai3 Architects LLC**	LGCI Project No.: 1435

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
									2	Gravel	Bot. 20": Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, angular to subrounded, 10-15% fines, 30-35% fine sand, grey, wet
60 ft											End of boring at 57.9'. Backfilled with sand.
65 ft											
70 ft											
75 ft											

Remarks:
2 - Encountered strata change based on tip refusal at 54.7'.

LGCI
Lahlaf Geotechnical Consulting, Inc.

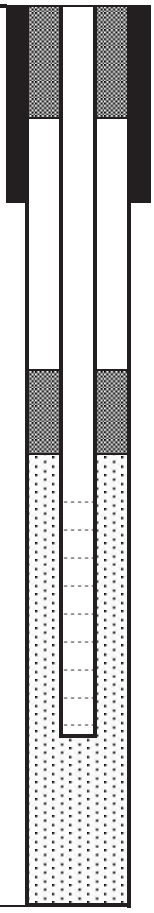
GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Boring No. : **B-3-OW**

Page 1/1

Project Name:	**Proposed Middle School, Beverly, Massachusetts**		
LGCI Project Number:	**1435**		
Client:	**Ai3 Architects LLC**		
Drilling Subcontractor:	Technical Drilling Services, Inc.	Date Started:	10/8/14
Drilling Foreman:	Brett Balyk	Date Completed:	10/8/14
LGCI Engineer:	G. Mathiyalakan	Location:	Athletic Field
Ground Surface Elevation:	~ El. 21 feet (see reamrk 1)	Total Depth of Boring:	21 ft
Ground Water Depth:	9 inches below ground surface (10/9) 6.3 ft (10/10) & 6.4 ft (10/14)	Drill Rig Type:	CME 55 Rubber Track ATV
		Drilling Method:	4 in casing to 4 ft / Tri-cone roller bit

GENERAL SOIL CONDITIONS (not to scale)



Fill

4 feet

Silty Clay

Riser Stickup ~ 6 inches below ground surface

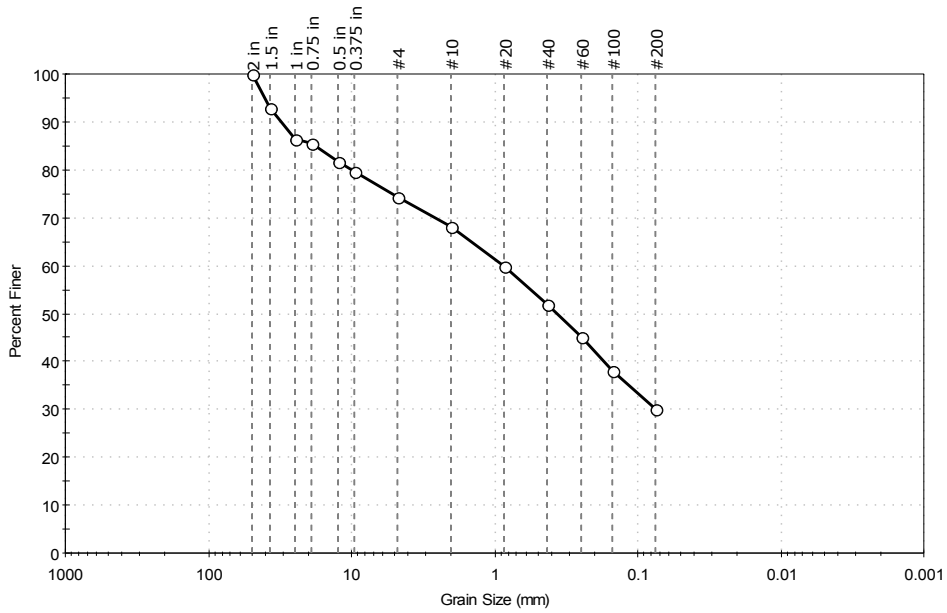
THICKNESS OF SURFACE SEAL	6 inches
TYPE OF SURFACE SEAL	concrete
TYPE OF SURFACE CASING	Road-box
ID OF SURFACE CASING	6 inches
DEPTH TO BOTTOM OF CASING	10 inches
ID OF RISER PIPE	2 inches
TYPE OF RISER PIPE	Schedule 40 PVC
TYPE OF BACKFILL AROUND RISER PIPE	drill cuttings
DEPTH TO TOP OF SEAL	4 feet
TYPE OF SEAL	Bentonite chips
DEPTH TO BOTTOM OF SEAL	7 feet
DEPTH TO TOP OF PERVIOUS SECTION	10 feet
TYPE OF PERVIOUS SECTION	Schedule 40 PVC
DESCRIBE OPENINGS	0.01-inch slots
ID OF PERVIOUS SECTION	2 inches
TYPE OF BACKFILL AROUND PERVIOUS SECTION	Filter Sand
DEPTH TO BOTTOM OF PERVIOUS SECTION	20 ft
DEPTH TO BOTTOM OF SAND COLUMN	21 ft
TYPE OF BACKFILL BELOW PERVIOUS SECTION	Filter Sand
DIAMETER OF BOREHOLE	6 inches
DEPTH TO BOTTOM OF BOREHOLE	21 feet

NOTES:
1 - Ground surface elevation interpolated from GIS Topographic Plan and is approximate.

GeoTesting EXPRESS

Client:	Lahlaf Geotechnical Consulting				
Project:	Prop. Middle School				
Location:	Beverly, MA			Project No:	GTX-302429
Boring ID:	TP-4	Sample Type:	bag	Tested By:	jbr
Sample ID:	TP-4-4'-5'	Test Date:	10/27/14	Checked By:	jdt
Depth :	4-5 ft	Test Id:	312316		
Test Comment:	---				
Sample Description:	Moist, dark olive gray clayey sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	25.6	44.2	30.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	93		
1 in	25.00	87		
0.75 in	19.00	86		
0.5 in	12.50	82		
0.375 in	9.50	80		
#4	4.75	74		
#10	2.00	68		
#20	0.85	60		
#40	0.42	52		
#60	0.25	45		
#100	0.15	38		
#200	0.075	30		

Coefficients

D_{85} = 17.7164 mm D_{30} = N/A
D_{60} = 0.8550 mm D_{15} = N/A
D_{50} = 0.3675 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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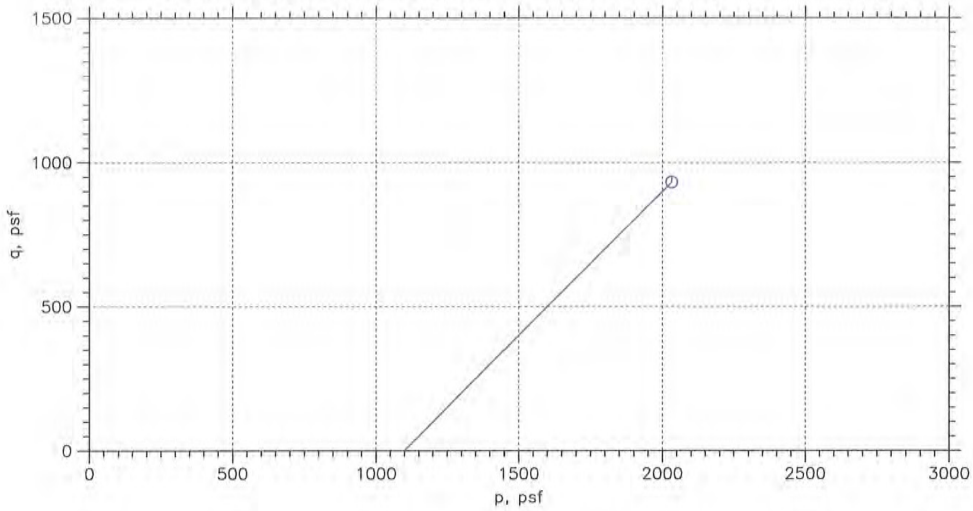
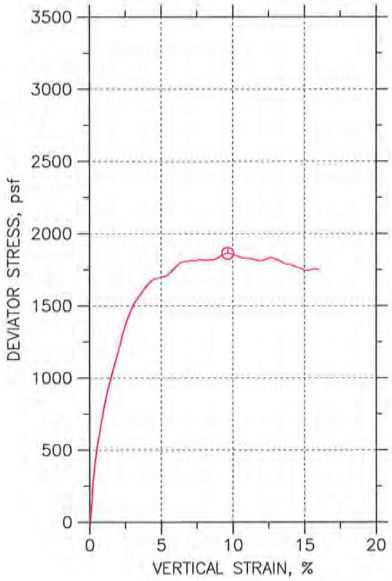
Attachment D – Laboratory Test Results

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	⦶			
Sample No.	B4-U1			
Test No.	UU-1			
Depth	12-14 ft			
Tested by	md			
Test Date	10/21/14			
Checked by	jdt			
Check Date				
Diameter, in	2.87			
Height, in	6.08			
Water Content, %	32.3			
Dry Density, pcf	88.99			
Saturation, %	97.7			
Void Ratio	0.894			
Confining Stress, psf	1100			
Undrained Strength, psf	931.6			
Max. Dev. Stress, psf	1863			
Strain at Failure, %	9.63			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.7			
Liquid Limit	41			
Plastic Limit	19			
Plasticity Index	22			

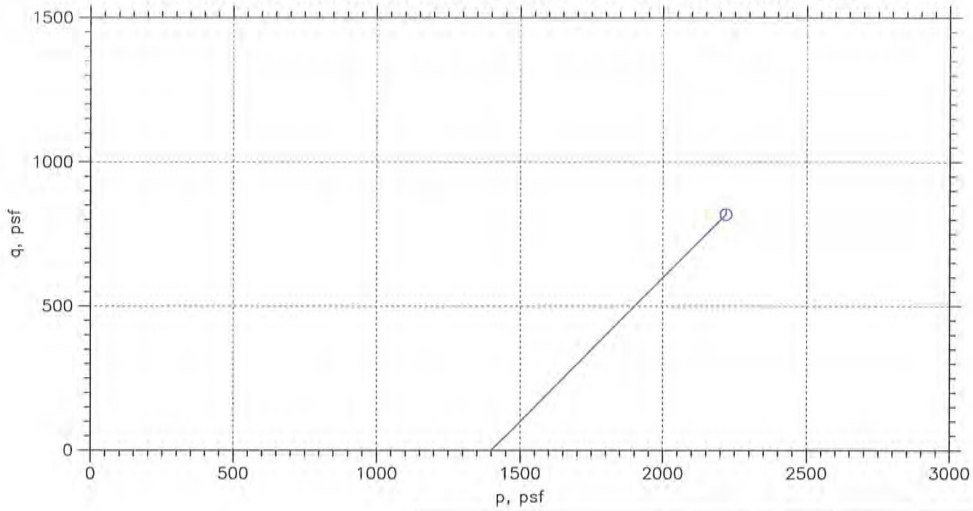
GeoTesting EXPRESS

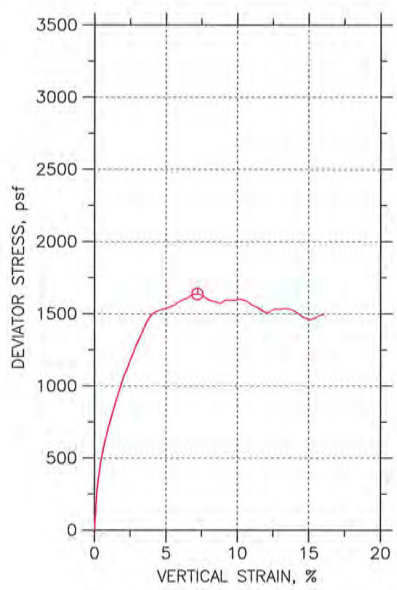
Project: Prop. Middle School
Location: Beverly, MA
Project No.: GTX-302429
Boring No.: B-4
Sample Type: intact
Description: Moist, olive gray clay
Remarks: System X

Phase calculations based on start and end of test.

Wed, 22-OCT-2014 13:57:06

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

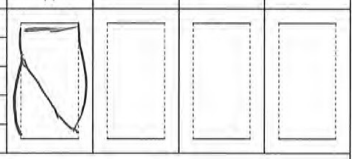




Symbol	⊙			
Sample No.	B4-U-2			
Test No.	UU-1			
Depth	16-18 ft			
Tested by	md			
Test Date	10/21/14			
Checked by	jdt			
Check Date				
Diameter, in	2.86			
Height, in	6.1			
Water Content, %	30.5			
Dry Density, pcf	88.94			
Saturation, %	92.0			
Void Ratio	0.895			
Confining Stress, psf	1400			
Undrained Strength, psf	818.7			
Max. Dev. Stress, psf	1637			
Strain at Failure, %	7.18			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.7			
Liquid Limit	34			
Plastic Limit	17			
Plasticity Index	17			

GeoTesting EXPRESS

Project: Prop. Middle School
Location: Beverly Ma
Project No.: GTX-302429
Boring No.: B-4
Sample Type: intact
Description: Moist, olive gray clay
Remarks: System X



Phase calculations based on start and end of test.

Wed, 22-OCT-2014 14:08:47

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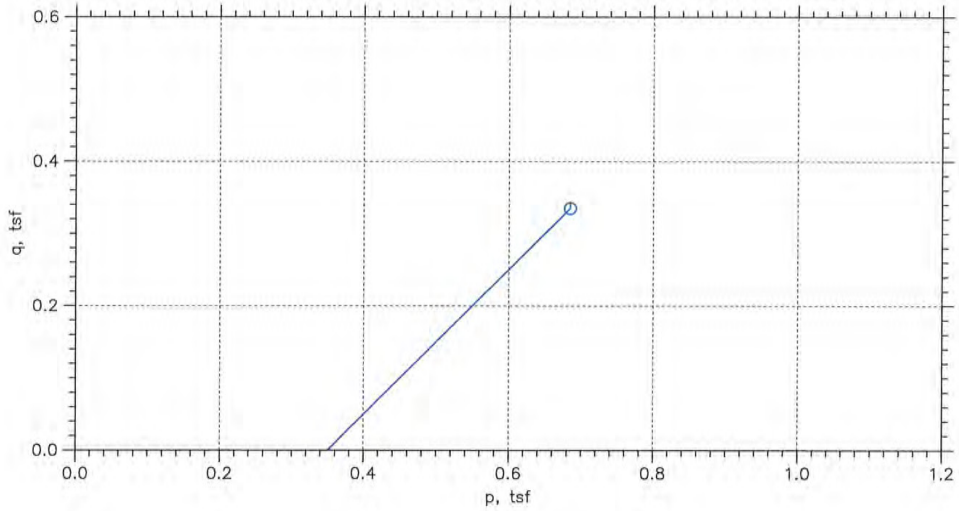
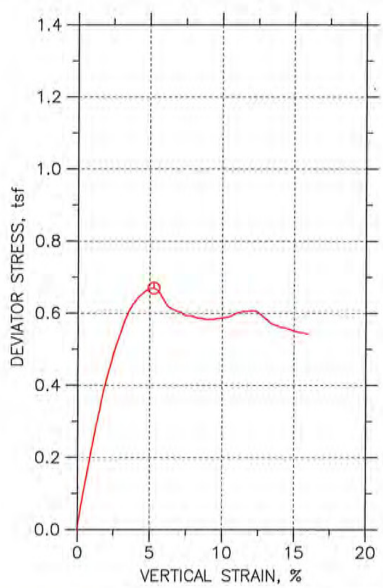
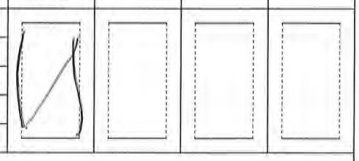




Symbol	⦶			
Sample No.	T1			
Test No.	UU-1			
Depth	6-8 ft			
Tested by	dd			
Test Date	6/29/15			
Checked by	jdt			
Check Date				
Diameter, in	2.05			
Height, in	3.95			
Water Content, %	23.3			
Dry Density, pcf	97.13			
Saturation, %	83.4			
Void Ratio	0.767			
Confining Stress, tsf	0.35			
Undrained Strength, tsf	0.335			
Max. Dev. Stress, tsf	0.6701			
Strain at Failure, %	5.25			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.75			
Liquid Limit	---			
Plastic Limit	---			
Plasticity Index	---			

GeoTesting EXPRESS

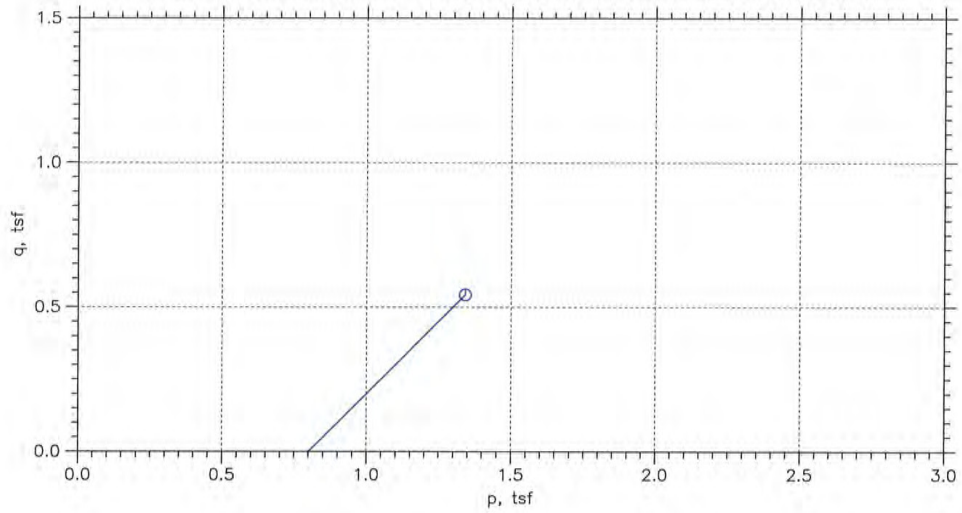
Project: Beverly Middle School
Location: Beverly, MA
Project No.: GTX-303278
Boring No.: BH-101
Sample Type: intact
Description: Moist, gray clay with sand
Remarks: System R

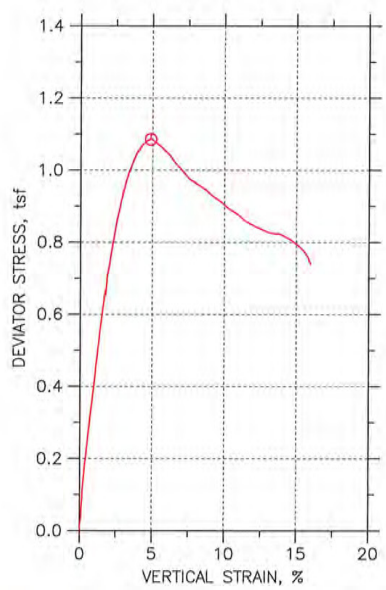


Phase calculations based on start and end of test.

Tue, 30-JUN-2015 13:01:04

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

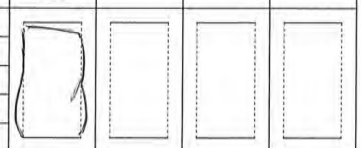




Symbol	⦶			
Sample No.	T2			
Test No.	UU-2			
Depth	21-23 ft			
Tested by	dd			
Test Date	6/29/15			
Checked by	jdt			
Check Date				
Diameter, in	2.05			
Height, in	4.2			
Water Content, %	31.7			
Dry Density, pcf	89.52			
Saturation, %	94.8			
Void Ratio	0.918			
Confining Stress, tsf	0.8			
Undrained Strength, tsf	0.5429			
Max. Dev. Stress, tsf	1.086			
Strain at Failure, %	4.85			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.75			
Liquid Limit	---			
Plastic Limit	---			
Plasticity Index	---			

GeoTesting EXPRESS

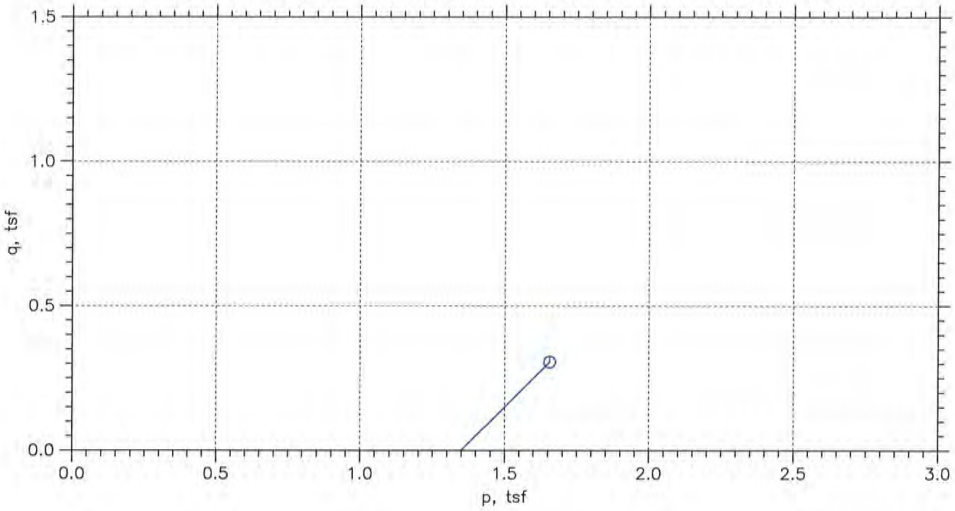
Project: Beverly Middle School
Location: Beverly, MA
Project No.: GTX-303278
Boring No.: BH-101
Sample Type: intact
Description: Moist, gray clay
Remarks: System R

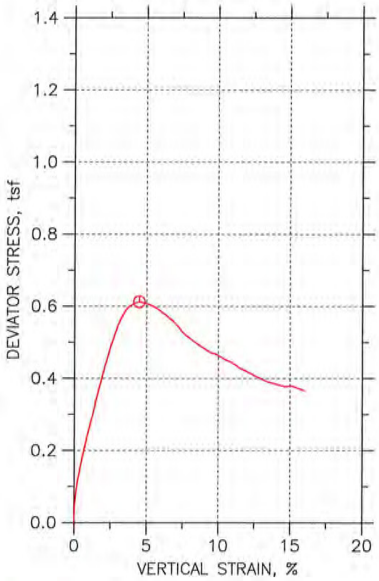


Phase calculations based on start and end of test.

Tue, 30-JUN-2015 13:00:41

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	⦶			
Sample No.	T3			
Test No.	UU-3			
Depth	41-43 ft			
Tested by	dd			
Test Date	6/29/15			
Checked by	jdt			
Check Date				
Diameter, in	2.05			
Height, in	4			
Water Content, %	29.9			
Dry Density, pcf	88.63			
Saturation, %	87.9			
Void Ratio	0.937			
Confining Stress, tsf	1.35			
Undrained Strength, tsf	0.3063			
Max. Dev. Stress, tsf	0.6127			
Strain at Failure, %	4.46			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.75			
Liquid Limit	---			
Plastic Limit	---			
Plasticity Index	---			

GeoTesting EXPRESS

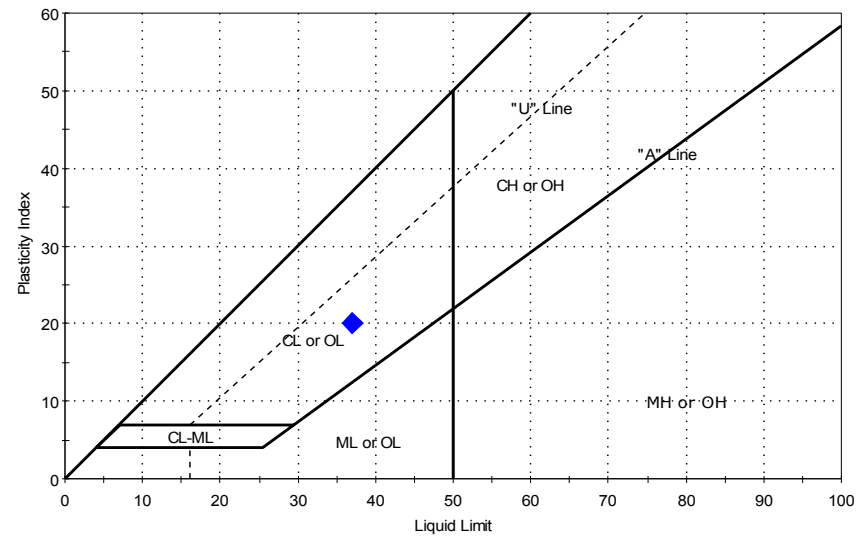
Project: Beverly Middle School
Location: Beverly, MA
Project No.: GTX-303278
Boring No.: BH-101
Sample Type: intact
Description: Moist, gray clay
Remarks: System R

Phase calculations based on start and end of test.

Tue, 30-JUN-2015 13:00:15

Client:	Lahlaf Geotechnical Consulting				
Project:	Beverly Middle School				
Location:	Beverly, MA			Project No:	GTX-303278
Boring ID:	BH-101	Sample Type:	bag	Tested By:	cam
Sample ID:	S5	Test Date:	06/16/15	Checked By:	njh
Depth :	10-12	Test Id:	334664		
Test Comment:	---				
Sample Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S5	BH-101	10-12	29	37	17	20	0.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: SLOW
Toughness: LOW

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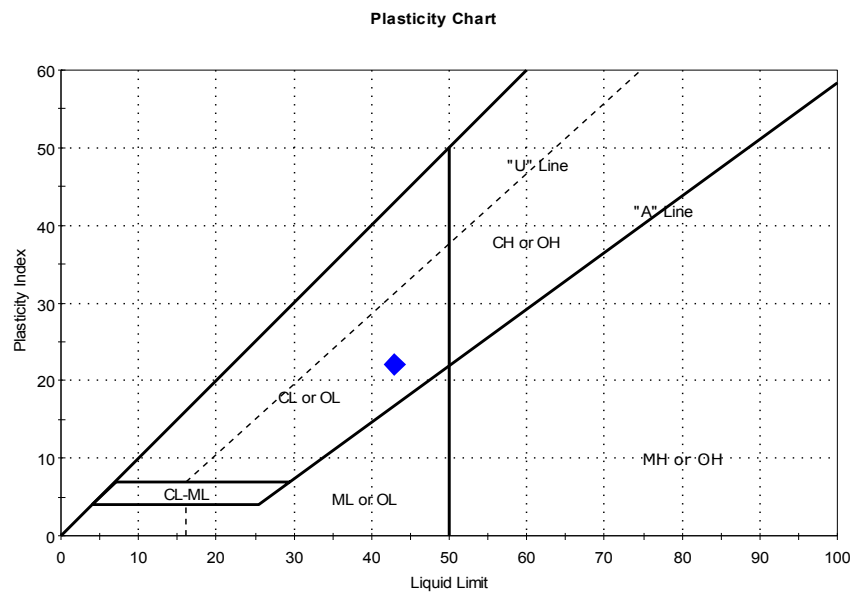
Client:	Lahlaf Geotechnical Consulting				
Project:	Beverly Middle School				
Location:	Beverly, MA			Project No:	GTX-303278
Boring ID:	BH-101	Sample Type:	bag	Tested By:	cam
Sample ID:	S9	Test Date:	06/16/15	Checked By:	njh
Depth :	29-31	Test Id:	334665		
Test Comment:	---				
Sample Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S9	BH-101	29-31	35	43	21	22	0.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: SLOW
Toughness: LOW

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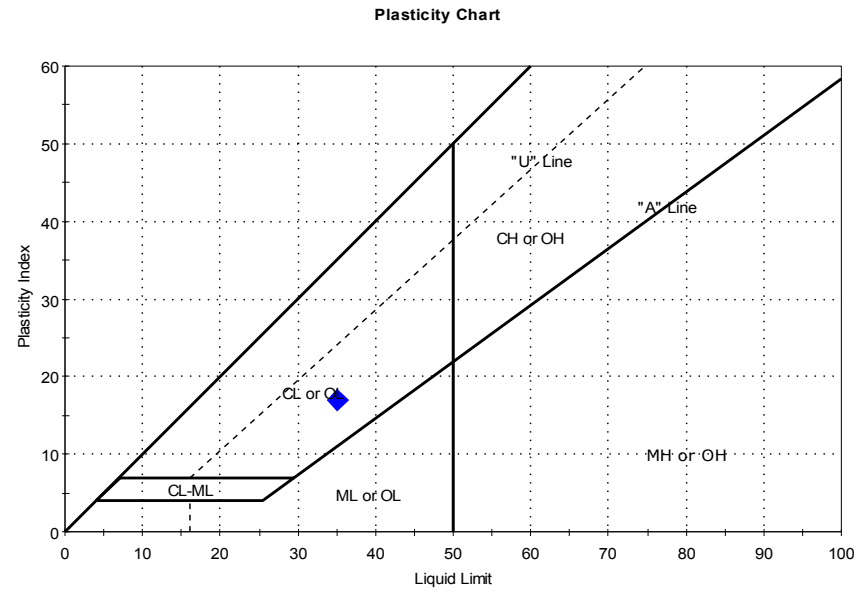
Client:	Lahlaf Geotechnical Consulting				
Project:	Beverly Middle School				
Location:	Beverly, MA			Project No:	GTX-303278
Boring ID:	BH-101	Sample Type:	bag	Tested By:	cam
Sample ID:	S13	Test Date:	06/16/15	Checked By:	njh
Depth :	49-51	Test Id:	334666		
Test Comment:	---				
Sample Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S13	BH-101	49-51	35	35	18	17	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: SLOW
Toughness: LOW

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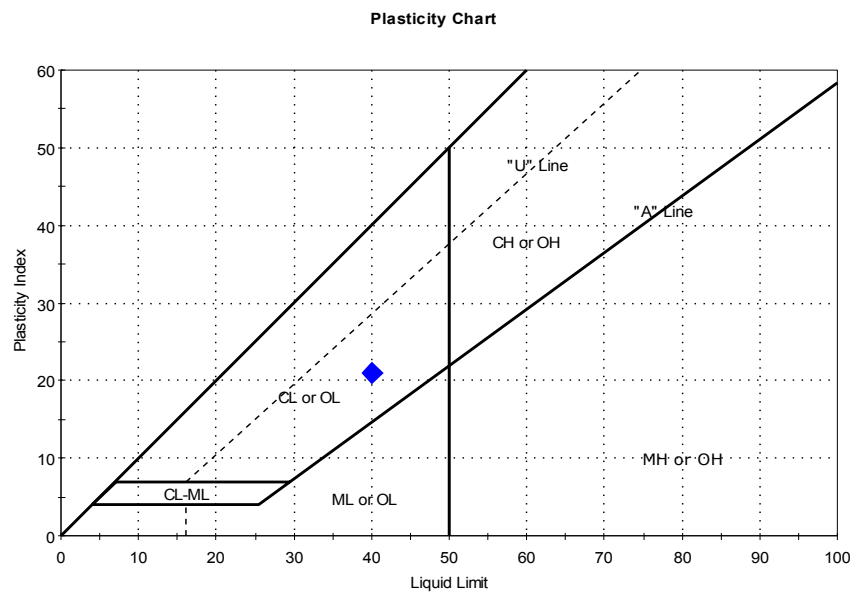
Client:	Lahlaf Geotechnical Consulting				
Project:	Beverly Middle School				
Location:	Beverly, MA			Project No:	GTX-303278
Boring ID:	BH-101	Sample Type:	bag	Tested By:	cam
Sample ID:	S14	Test Date:	06/16/15	Checked By:	njh
Depth :	54-56	Test Id:	334667		
Test Comment:	---				
Sample Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S14	BH-101	54-56	36	40	19	21	0.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: SLOW
Toughness: LOW

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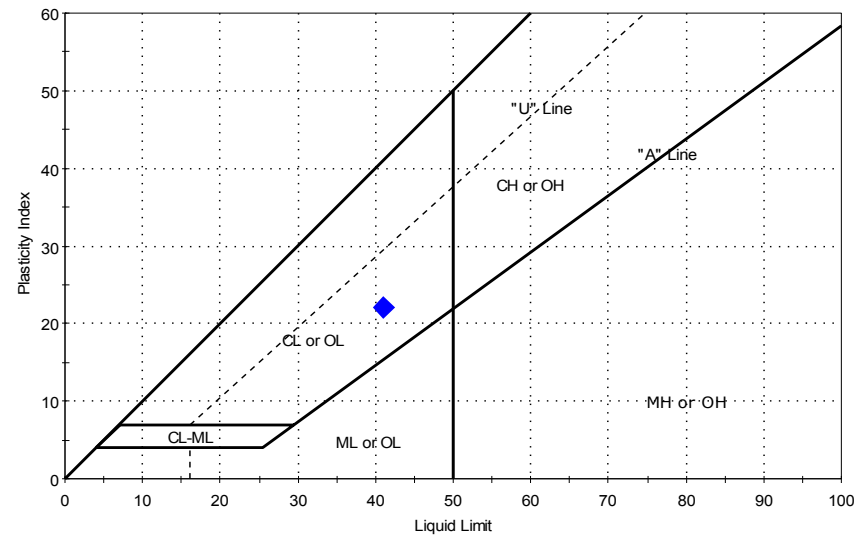
Client:	Lahlaf Geotechnical Consulting				
Project:	Prop. Middle School				
Location:	Beverly, MA			Project No:	GTX-302429
Boring ID:	B4	Sample Type:	tube	Tested By:	cam
Sample ID:	B4-U1-12'-14'	Test Date:	10/21/14	Checked By:	jdt
Depth :	12-14 ft	Test Id:	311100		
Test Comment:	---				
Sample Description:	Moist, olive gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	B4-U1-12'-14'	B4	12-14 ft	32	41	19	22	0.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: SLOW
Toughness: LOW

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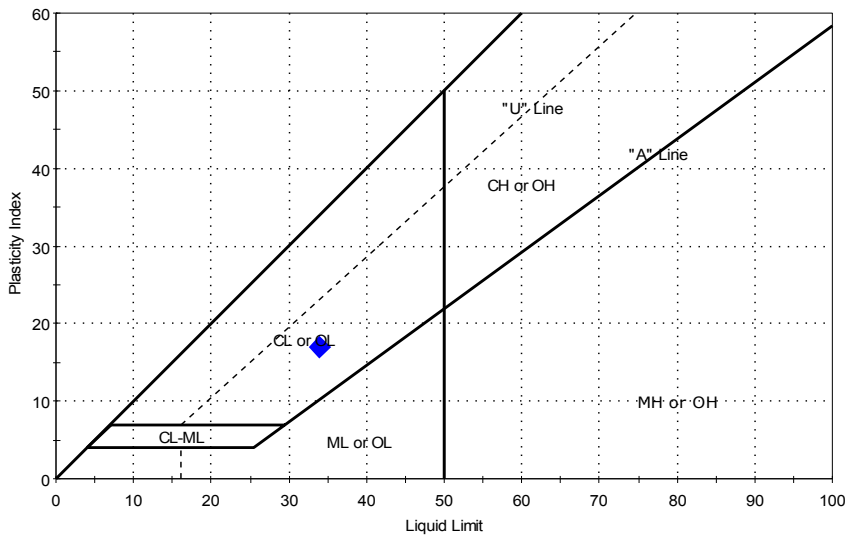
Client:	Lahlaf Geotechnical Consulting				
Project:	Prop. Middle School				
Location:	Beverly, MA			Project No:	GTX-302429
Boring ID:	B4	Sample Type:	tube	Tested By:	cam
Sample ID:	B4-U2-16'-18'	Test Date:	10/22/14	Checked By:	jdt
Depth :	16-18 ft	Test Id:	311101		
Test Comment:	---				
Sample Description:	Moist, olive gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	B4-U2-16'-18'	B4	16-18 ft	22	34	17	17	0.3	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: SLOW
Toughness: LOW

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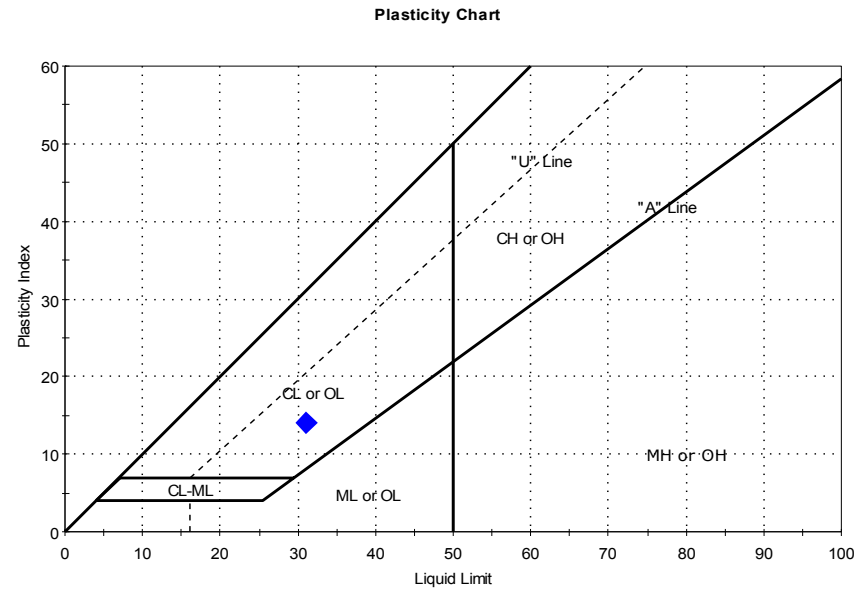
Client:	Lahlaf Geotechnical Consulting				
Project:	Prop. Middle School				
Location:	Beverly, MA			Project No:	GTX-302429
Boring ID:	B4	Sample Type:	tube	Tested By:	cam
Sample ID:	B4-U3-33'-35'	Test Date:	10/21/14	Checked By:	jdt
Depth :	33-35 ft	Test Id:	311102		
Test Comment:	---				
Sample Description:	Moist, olive gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	B4-U3-33'-35'	B4	33-35 ft	29	31	17	14	0.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: SLOW
Toughness: LOW

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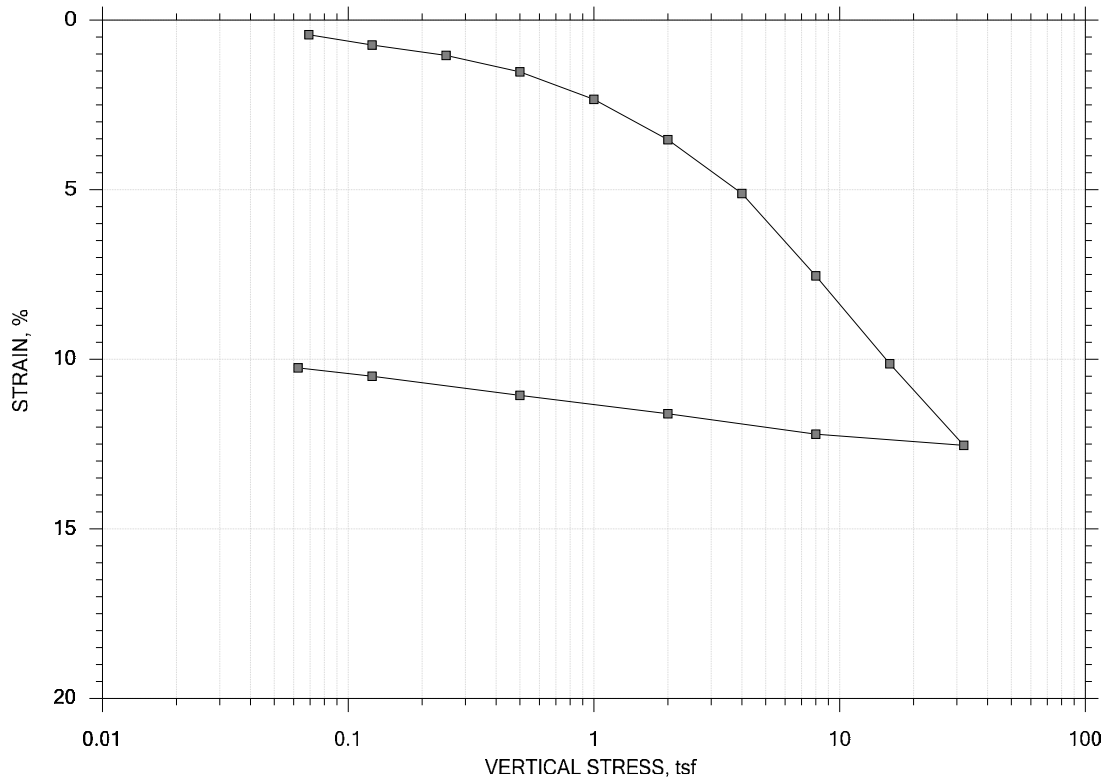
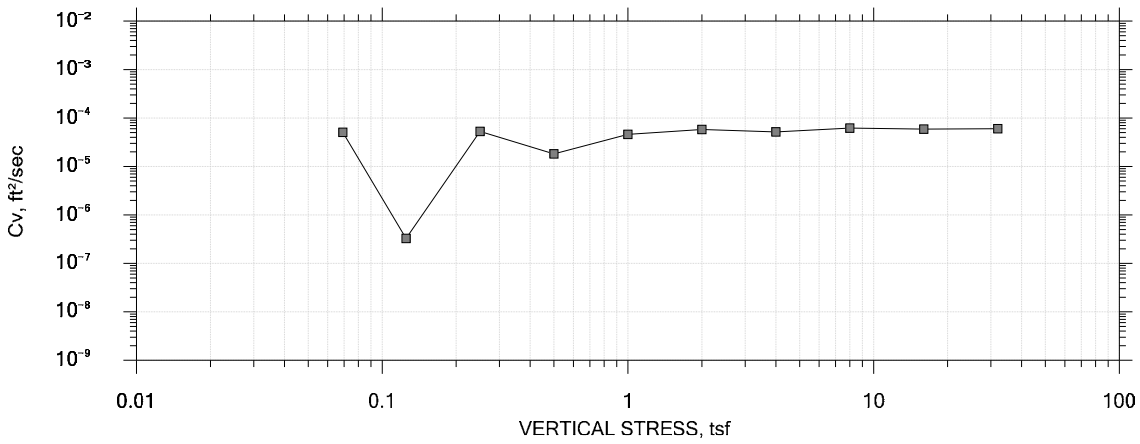
One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

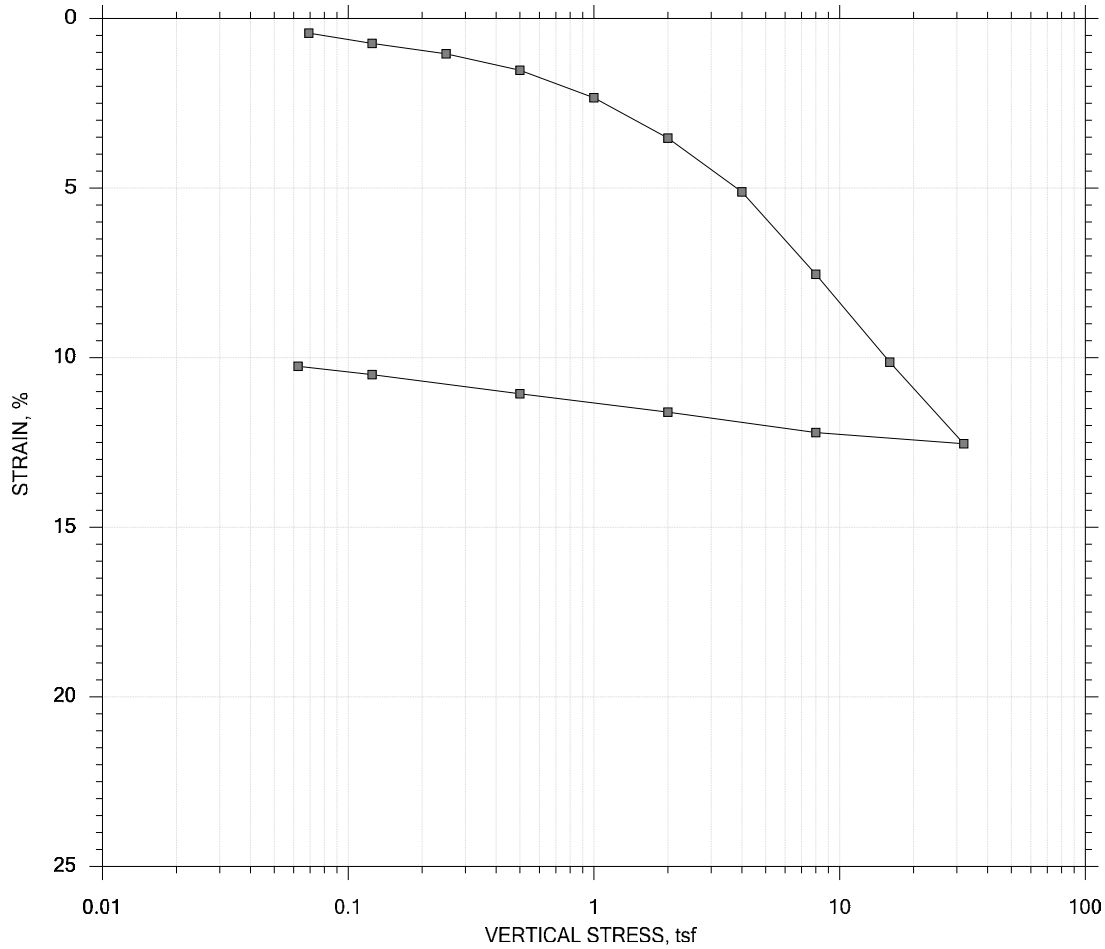




GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ----				Water Content, %	26.86	20.15
Preconsolidation Stress: ----				Dry Unit Weight, pcf	97.978	110.09
Compression Ratio: ----				Saturation, %	98.90	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.74	0.55
LL: ---	PL: ---	PI: ---	GS: 2.74			

GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Beverly Middle School
Boring No.: BH-101
Sample No.: T1
Test No.: IP-2

Location: Beverly, MA
Tested By: md
Test Date: 06/09/15
Sample Type: intact

Project No.: GTX-303278
Checked By: njh
Depth: 6-8 ft
Elevation: ---

Soil Description: Moist, gray clay with sand traces
Remarks: System V, Swell Pressure = 0.0692 tsf

Estimated Specific Gravity: 2.74
Initial Void Ratio: 0.743
Final Void Ratio: 0.551

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.89 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	A-972	RING		A847
Wt. Container + Wet Soil, gm	135.72	271.45	262.98	159.54
Wt. Container + Dry Soil, gm	109.07	237.55	237.55	134.17
Wt. Container, gm	8.3900	111.30	111.30	8.2400
Wt. Dry Soil, gm	100.68	126.25	126.25	125.93
Water Content, %	26.47	26.86	20.15	20.15
Void Ratio	---	0.743	0.551	---
Degree of Saturation, %	---	98.90	100.00	---
Dry Unit Weight, pcf	---	97.978	110.09	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Beverly Middle School
Boring No.: BH-101
Sample No.: T1
Test No.: IP-2

Location: Beverly, MA
Tested By: md
Test Date: 06/09/15
Sample Type: intact

Project No.: GTX-303278
Checked By: njh
Depth: 6-8 ft
Elevation: ---

Soil Description: Moist, gray clay with sand traces
Remarks: System V, Swell Pressure = 0.0692 tsf

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.0692	0.004298	0.735	0.430	0.751	3.25e-005	6.22e-002	5.45e-003
2	0.125	0.007337	0.730	0.734	192.733	1.26e-007	5.44e-002	1.85e-005
3	0.250	0.01040	0.725	1.04	0.983	2.45e-005	2.45e-002	1.62e-003
4	0.500	0.01523	0.716	1.52	2.019	1.18e-005	1.93e-002	6.17e-004
5	1.00	0.02335	0.702	2.34	0.889	2.65e-005	1.62e-002	1.16e-003
6	2.00	0.03524	0.681	3.52	0.812	2.85e-005	1.19e-002	9.12e-004
7	4.00	0.05112	0.654	5.11	0.808	2.78e-005	7.94e-003	5.95e-004
8	8.00	0.07540	0.611	7.54	0.773	2.78e-005	6.07e-003	4.56e-004
9	16.0	0.1013	0.566	10.1	0.729	2.80e-005	3.24e-003	2.44e-004
10	32.0	0.1253	0.524	12.5	0.761	2.53e-005	1.50e-003	1.03e-004
11	8.00	0.1221	0.530	12.2	1.728	1.09e-005	1.36e-004	4.00e-006
12	2.00	0.1160	0.540	11.6	0.504	3.78e-005	1.00e-003	1.02e-004
13	0.500	0.1106	0.550	11.1	0.908	2.13e-005	3.62e-003	2.07e-004
14	0.125	0.1050	0.560	10.5	2.255	8.66e-006	1.51e-002	3.52e-004
15	0.0625	0.1025	0.564	10.3	200.000	9.86e-008	3.94e-002	1.05e-005

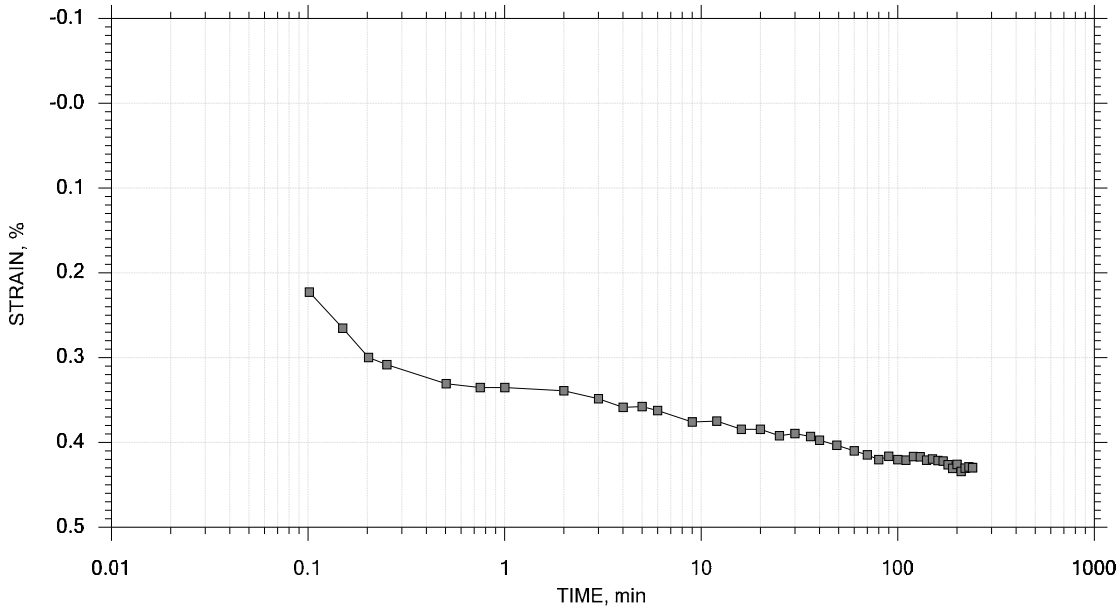
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.0692	0.004298	0.735	0.430	0.000	0.00e+000	6.22e-002	0.00e+000	0.00e+000
2	0.125	0.007337	0.730	0.734	0.000	0.00e+000	5.44e-002	0.00e+000	0.00e+000
3	0.250	0.01040	0.725	1.04	0.000	0.00e+000	2.45e-002	0.00e+000	0.00e+000
4	0.500	0.01523	0.716	1.52	0.000	0.00e+000	1.93e-002	0.00e+000	0.00e+000
5	1.00	0.02335	0.702	2.34	0.000	0.00e+000	1.62e-002	0.00e+000	0.00e+000
6	2.00	0.03524	0.681	3.52	0.000	0.00e+000	1.19e-002	0.00e+000	0.00e+000
7	4.00	0.05112	0.654	5.11	0.000	0.00e+000	7.94e-003	0.00e+000	0.00e+000
8	8.00	0.07540	0.611	7.54	0.000	0.00e+000	6.07e-003	0.00e+000	0.00e+000
9	16.0	0.1013	0.566	10.1	0.000	0.00e+000	3.24e-003	0.00e+000	0.00e+000
10	32.0	0.1253	0.524	12.5	0.000	0.00e+000	1.50e-003	0.00e+000	0.00e+000
11	8.00	0.1221	0.530	12.2	0.000	0.00e+000	1.36e-004	0.00e+000	0.00e+000
12	2.00	0.1160	0.540	11.6	0.000	0.00e+000	1.00e-003	0.00e+000	0.00e+000
13	0.500	0.1106	0.550	11.1	0.000	0.00e+000	3.62e-003	0.00e+000	0.00e+000
14	0.125	0.1050	0.560	10.5	0.316	1.44e-005	1.51e-002	5.84e-004	0.00e+000
15	0.0625	0.1025	0.564	10.3	0.000	0.00e+000	3.94e-002	0.00e+000	0.00e+000

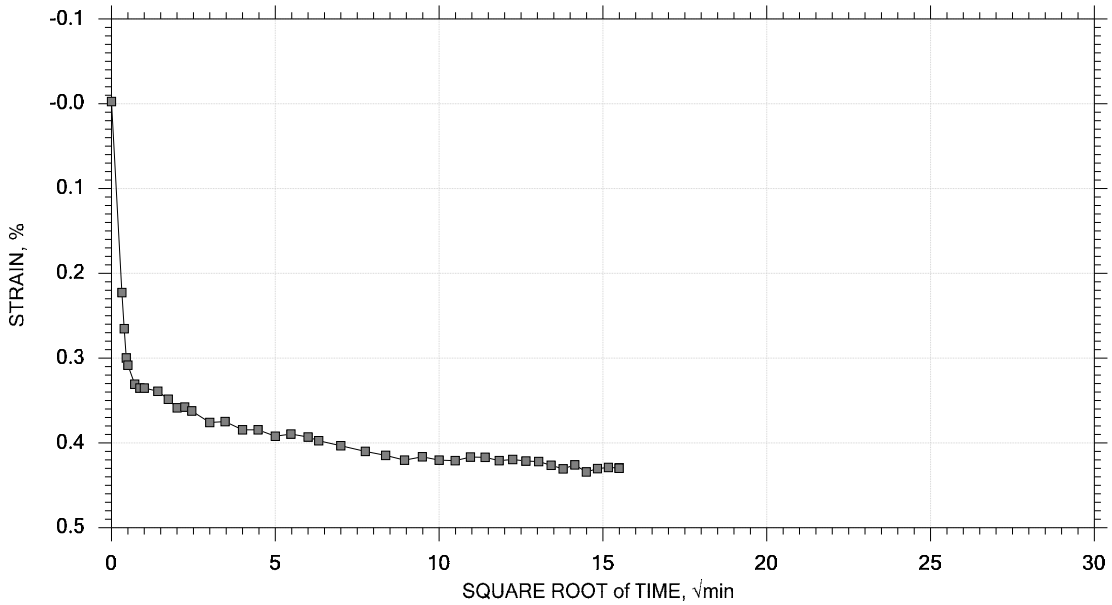
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 15

Stress: 0.069157 tsf





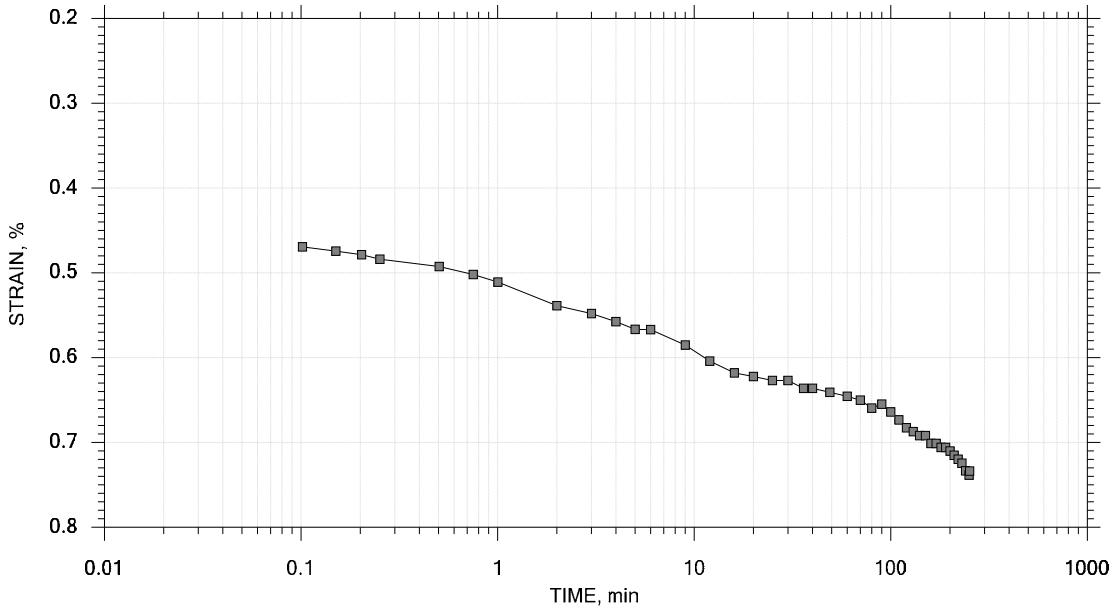
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

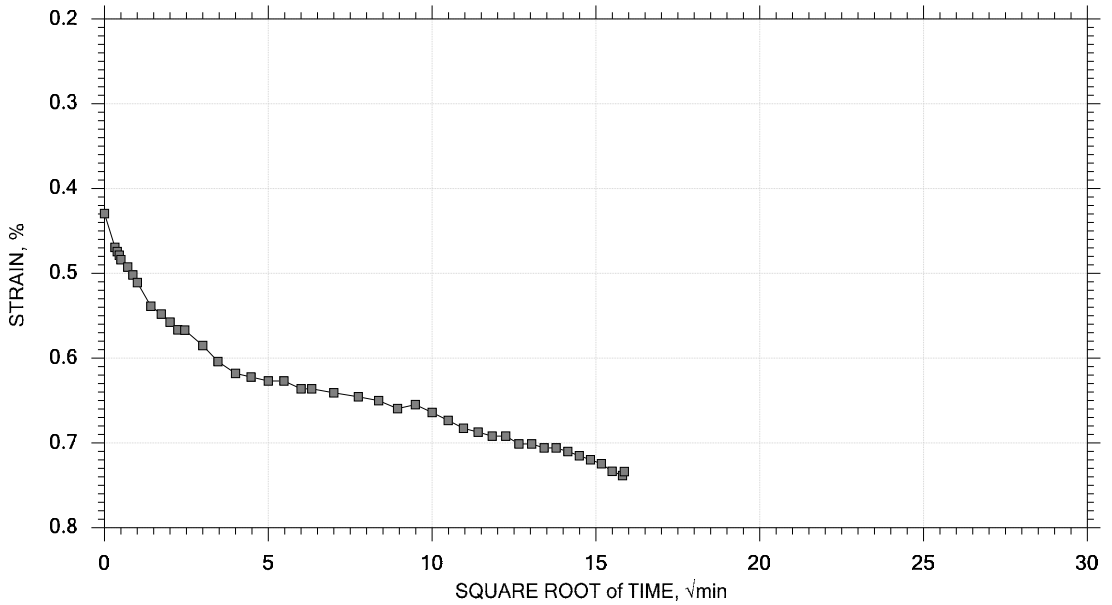
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 0.125 tsf





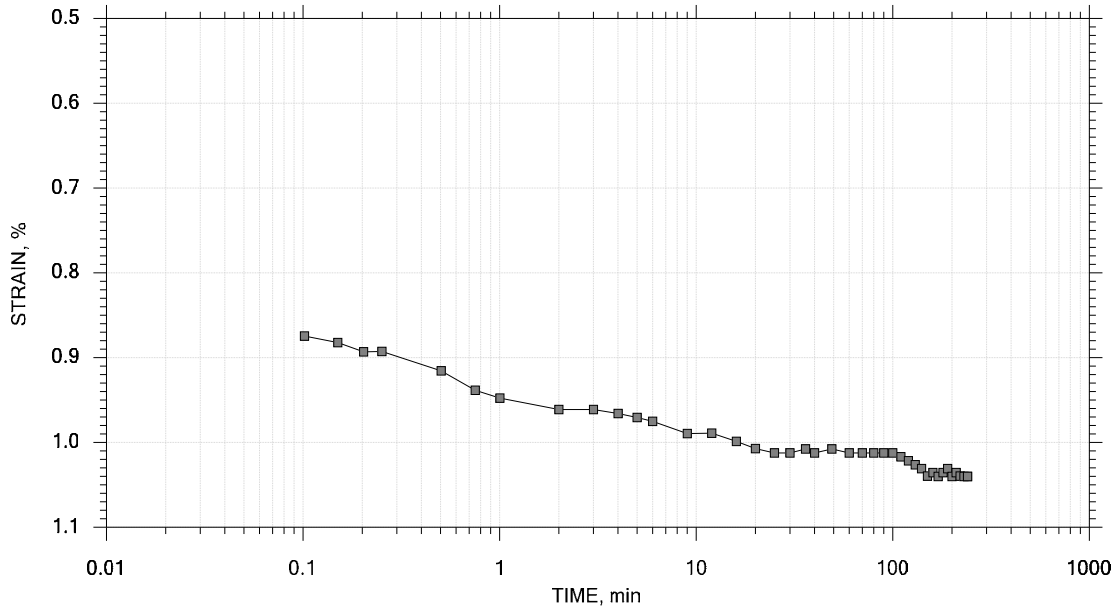
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

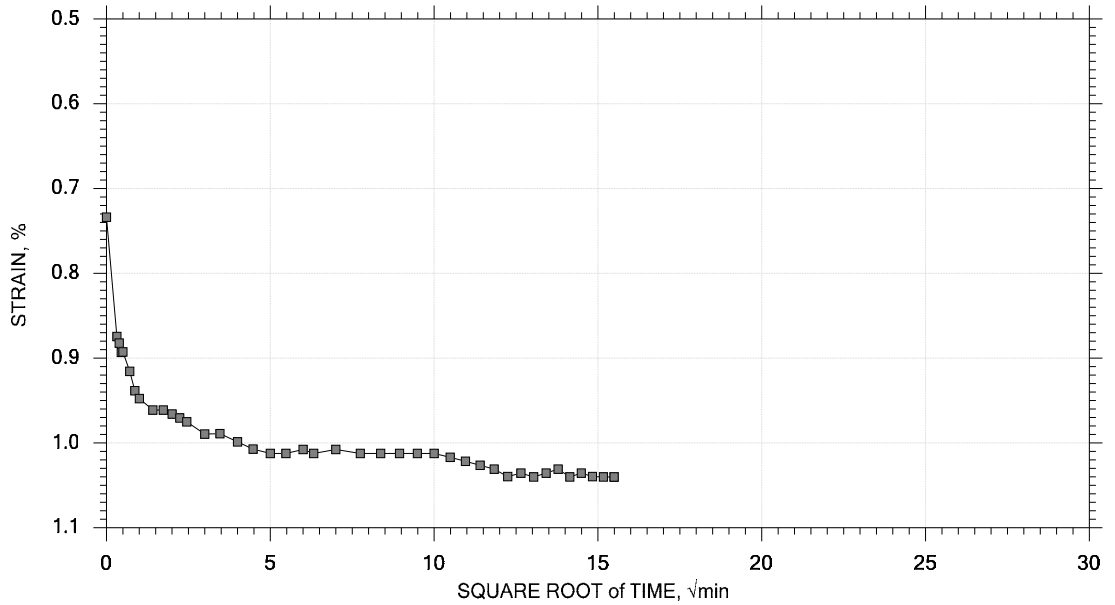
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 0.25 tsf





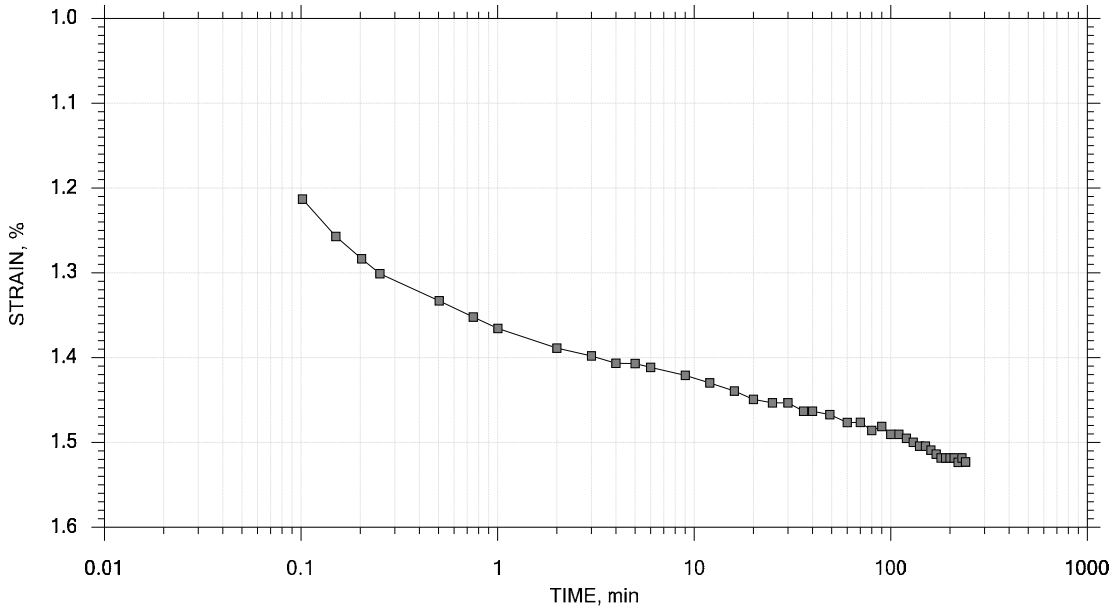
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

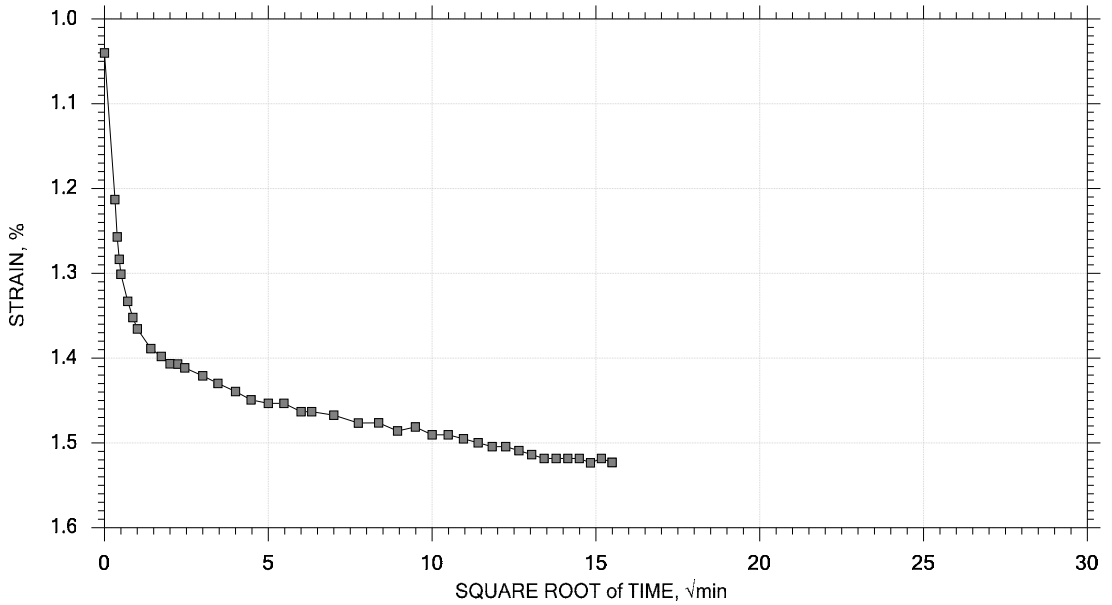
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 0.5 tsf





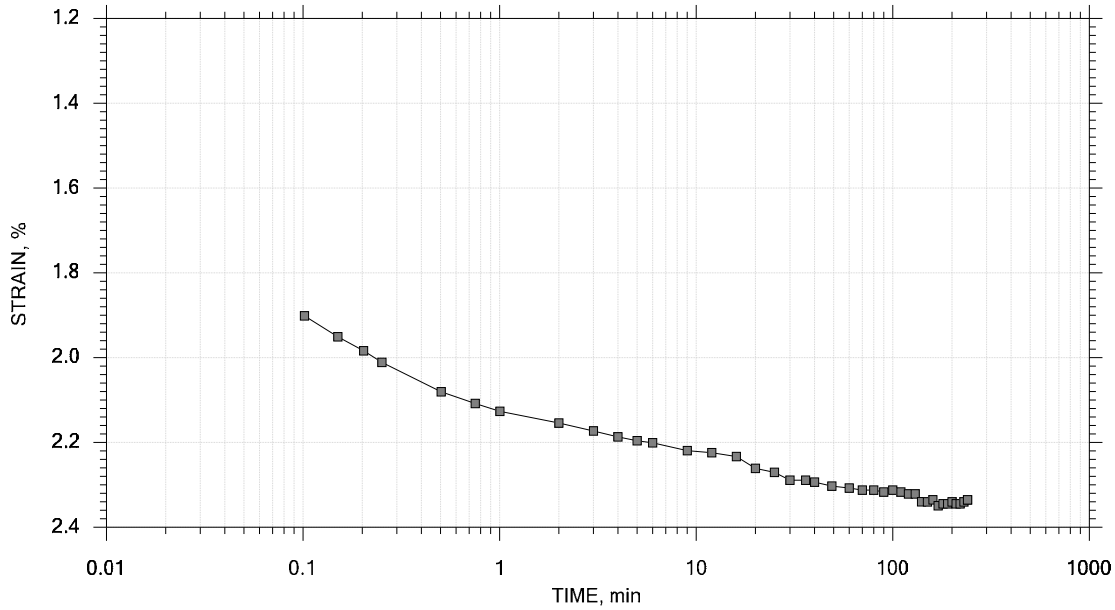
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

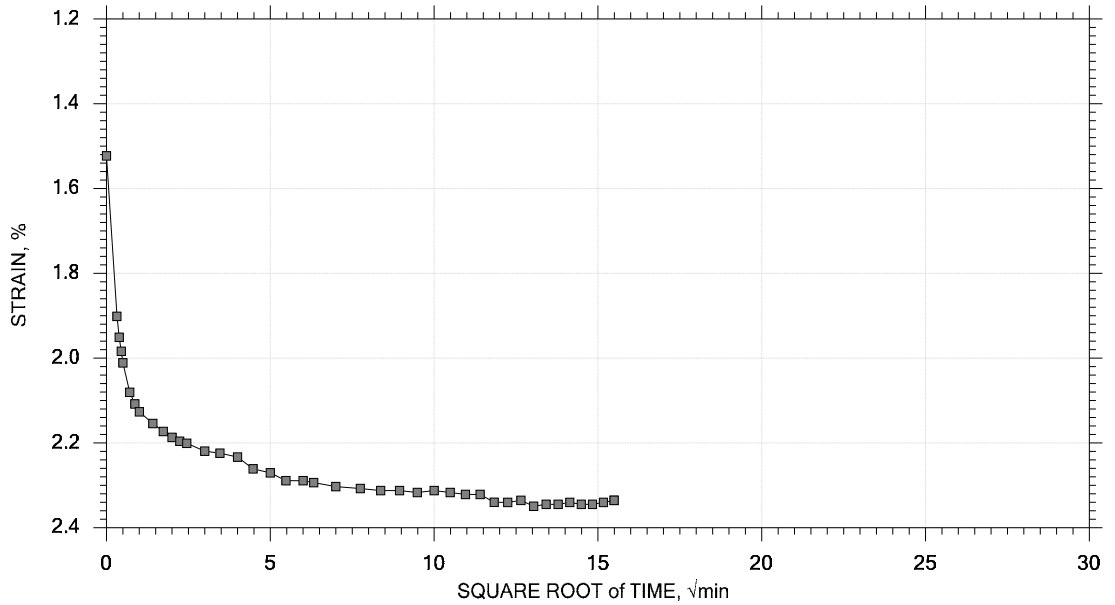
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 1 tsf





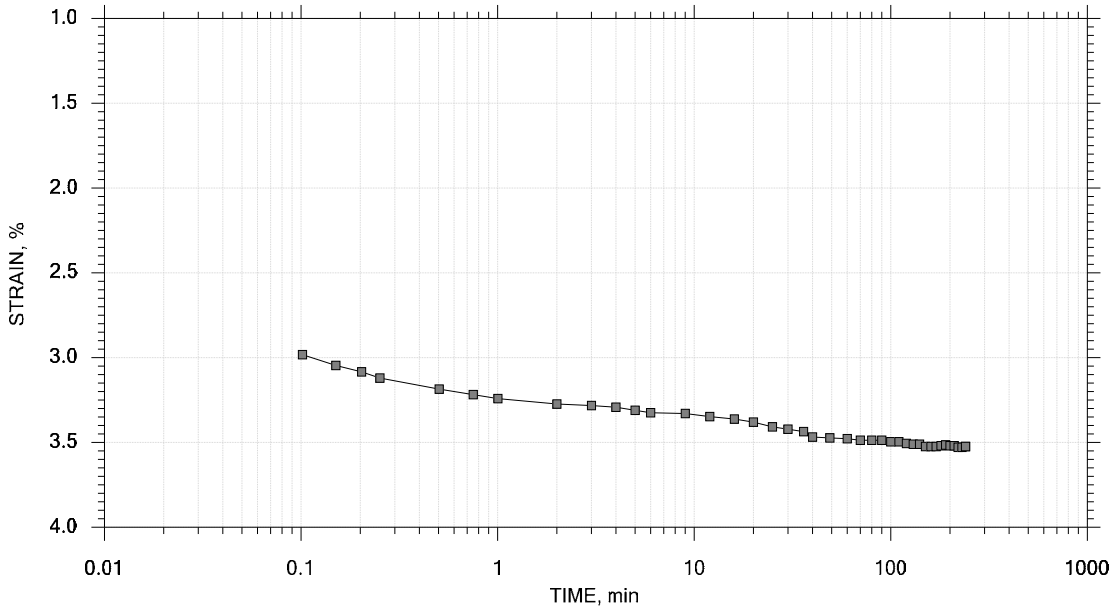
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

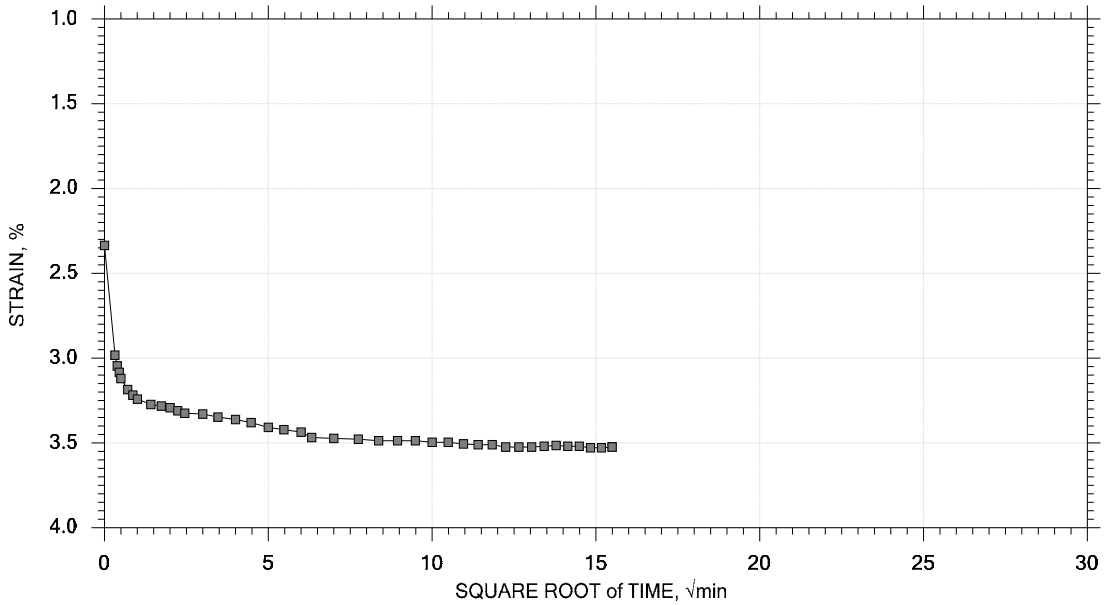
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 2 tsf





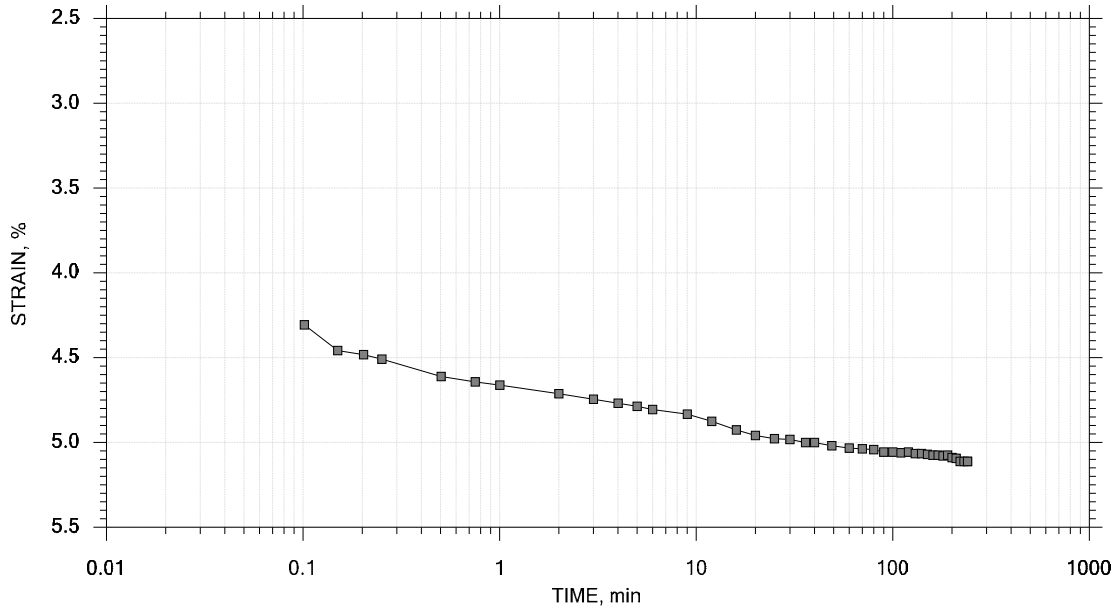
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

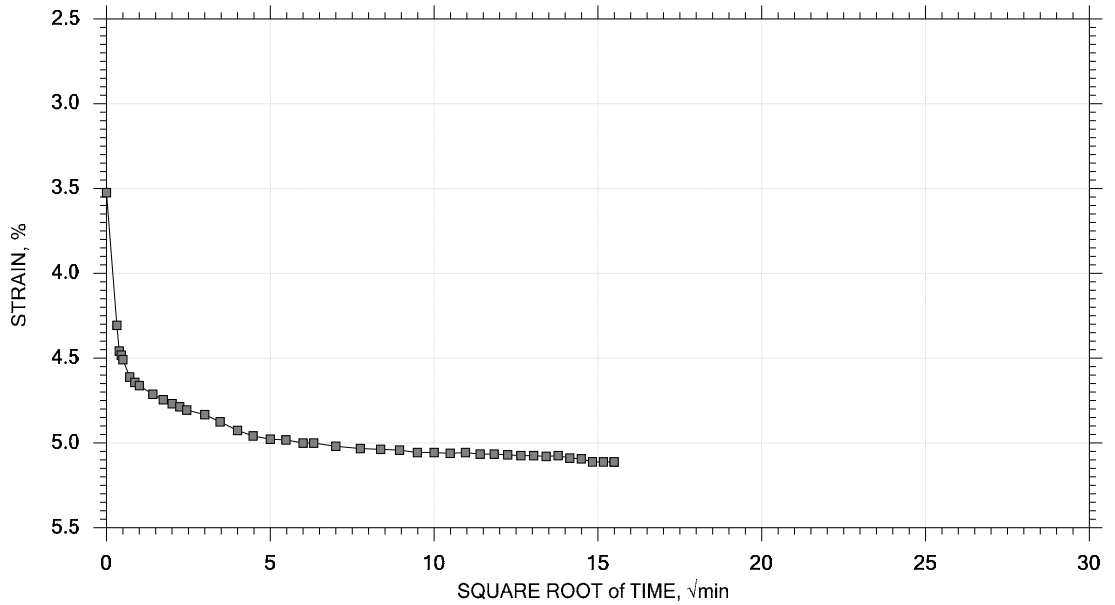
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4 tsf





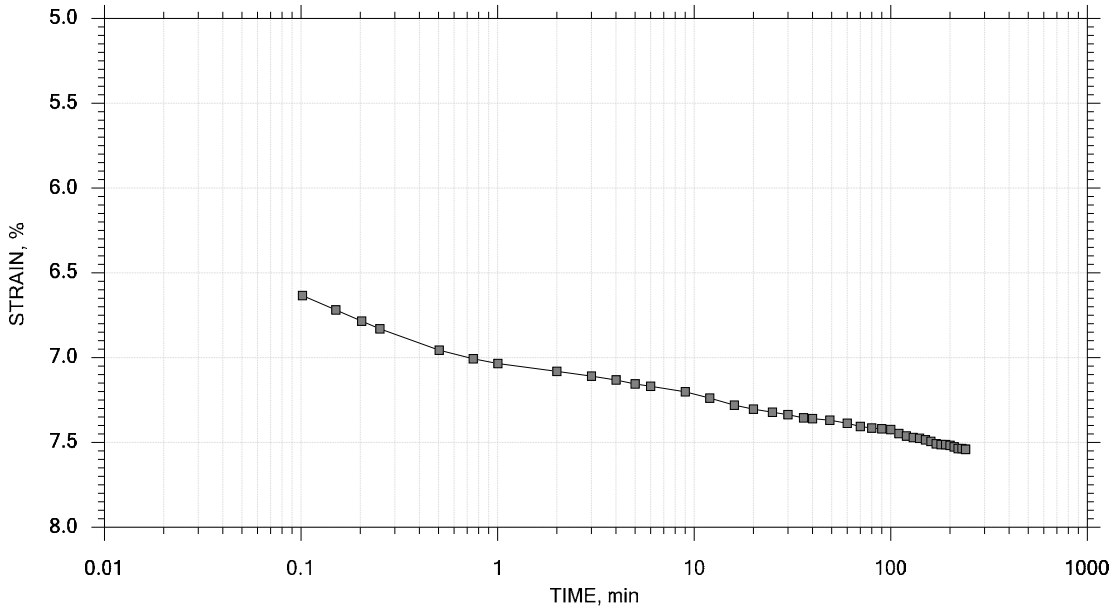
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

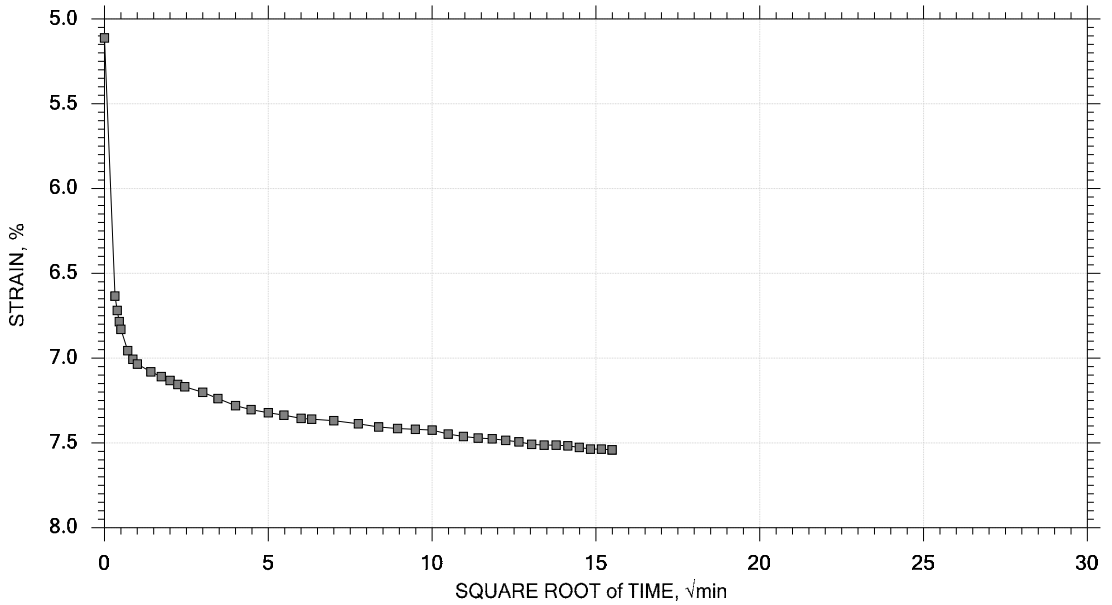
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 8 tsf





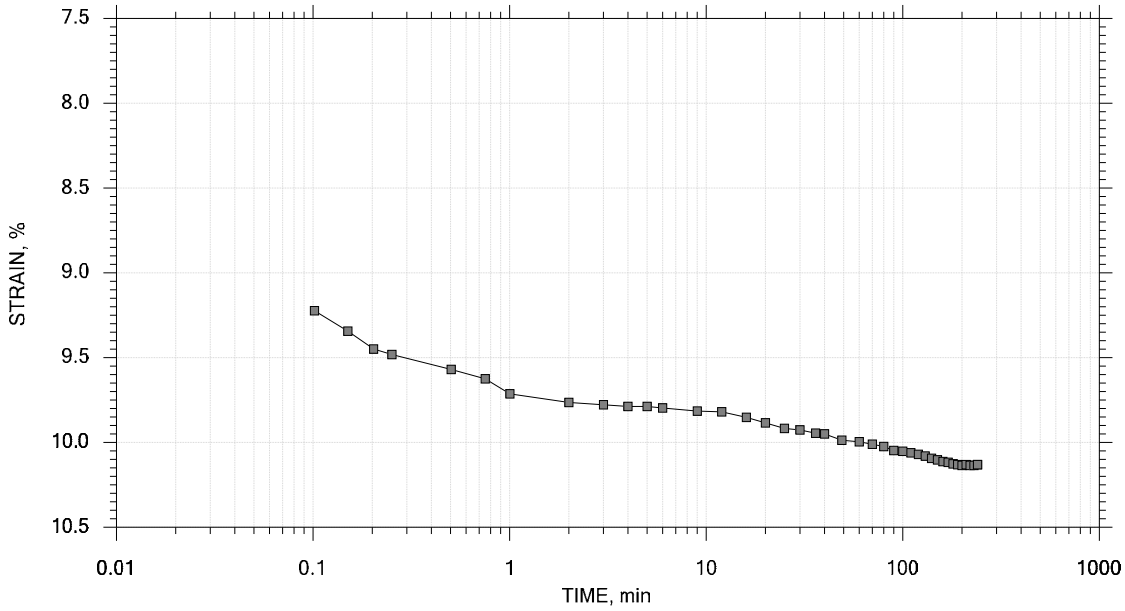
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

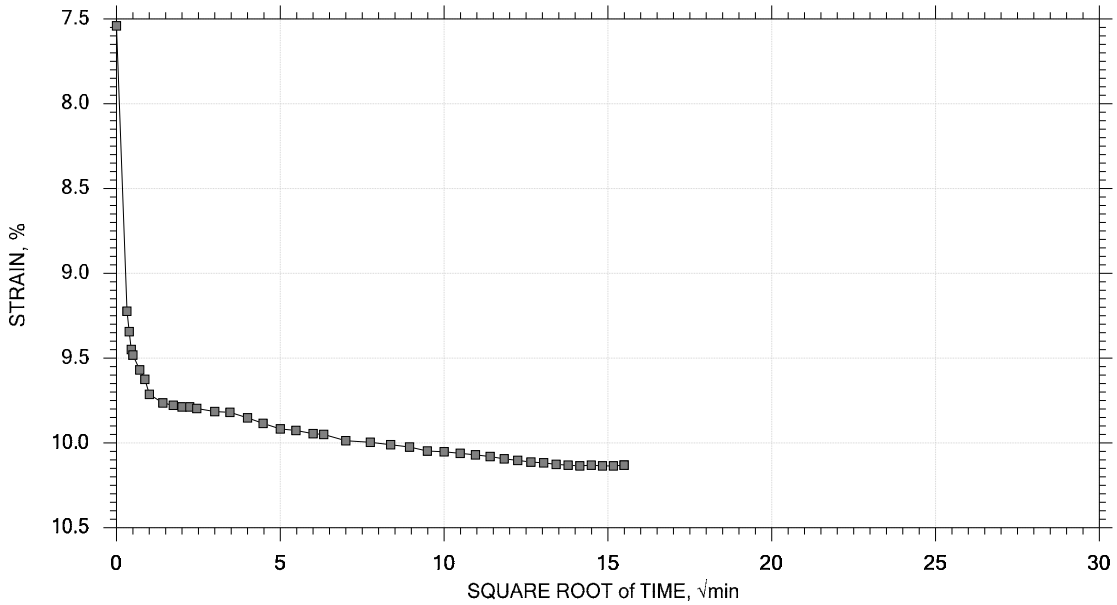
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 16 tsf





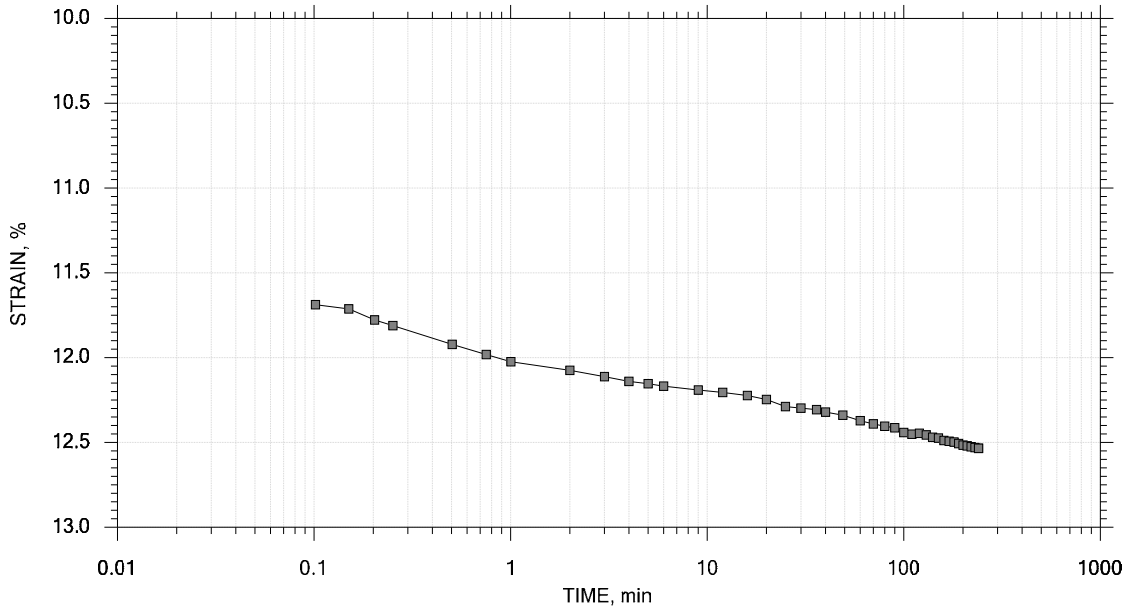
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

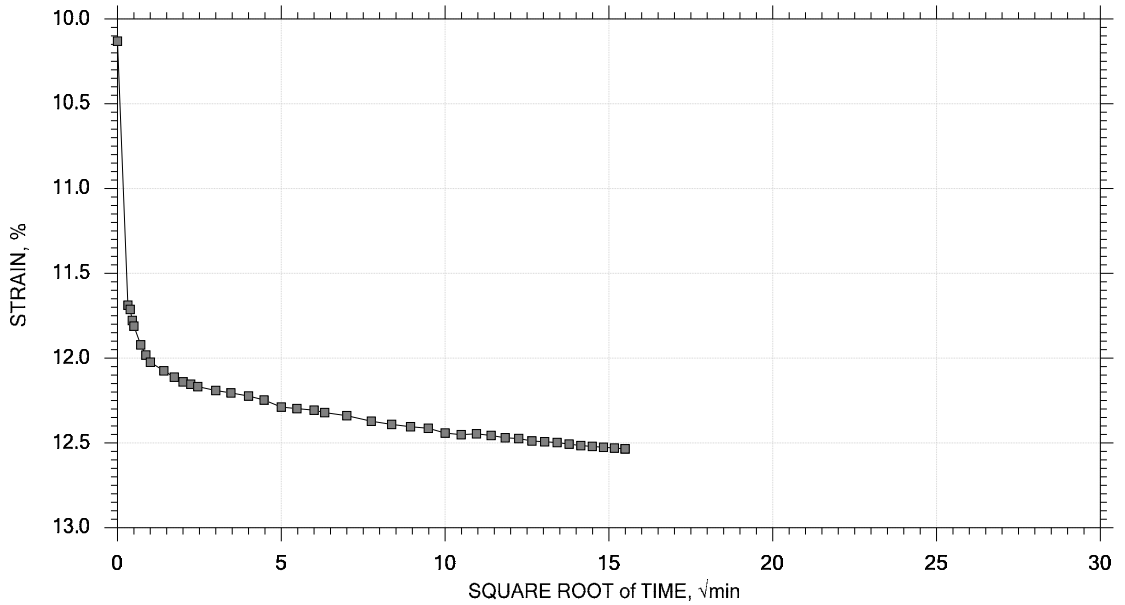
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 15

Stress: 32 tsf





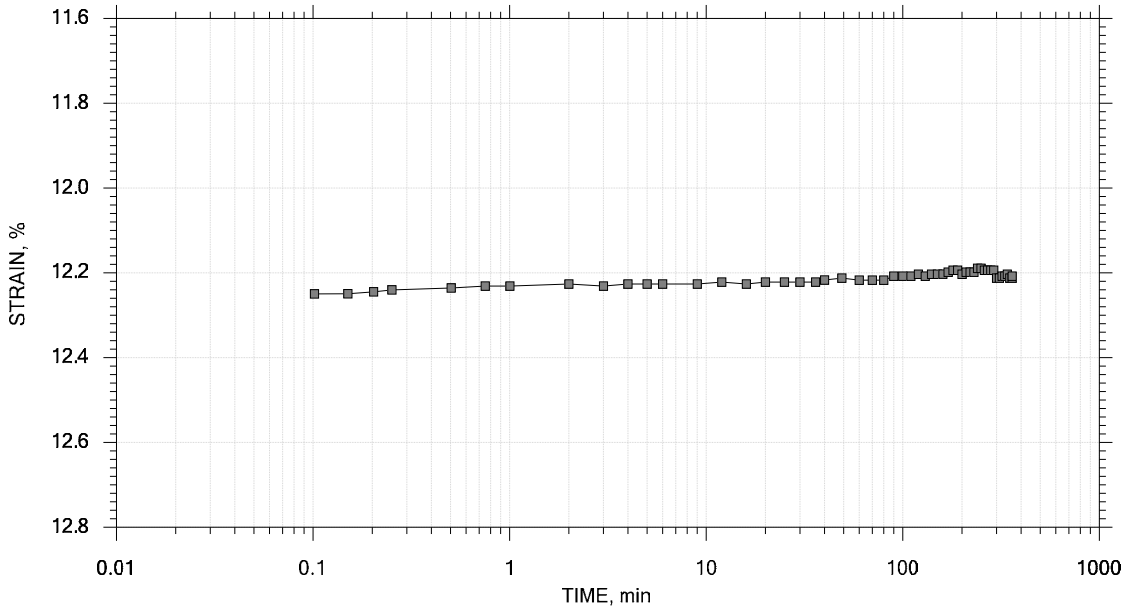
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

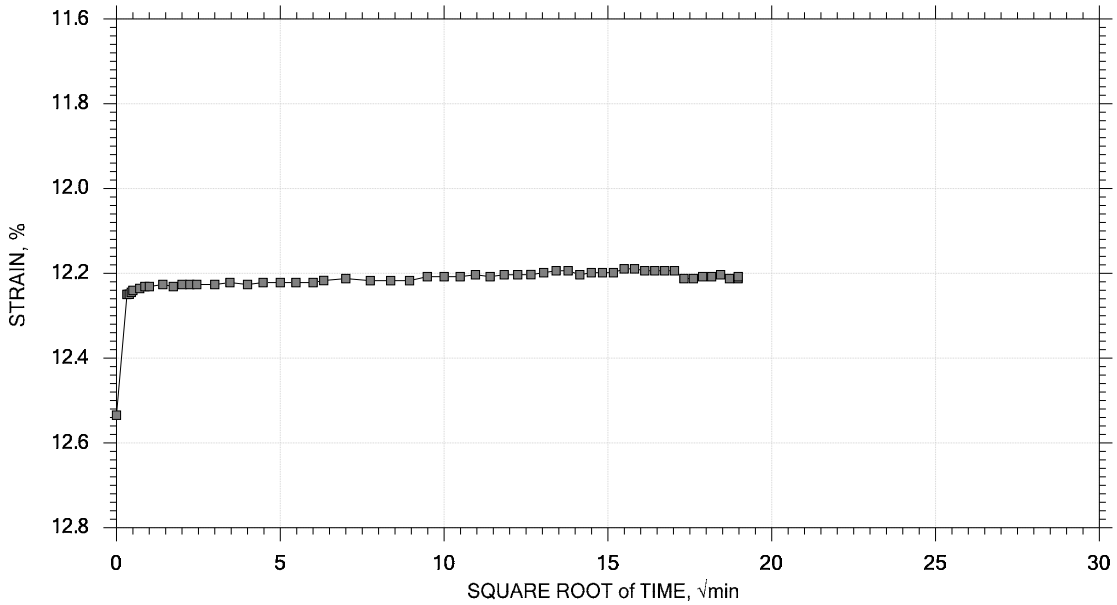
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 8 tsf





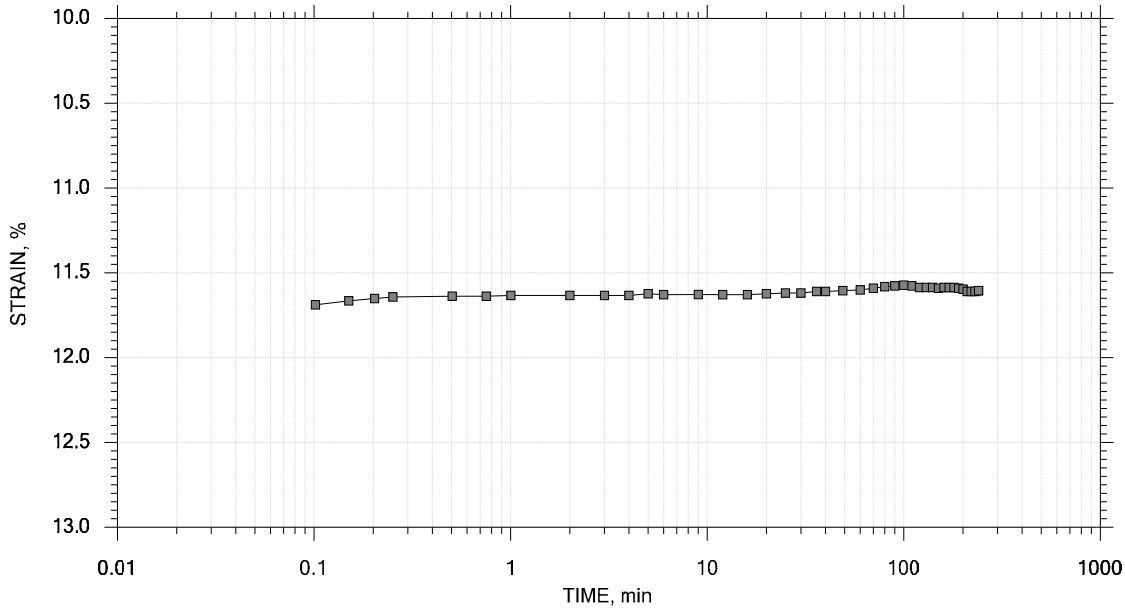
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

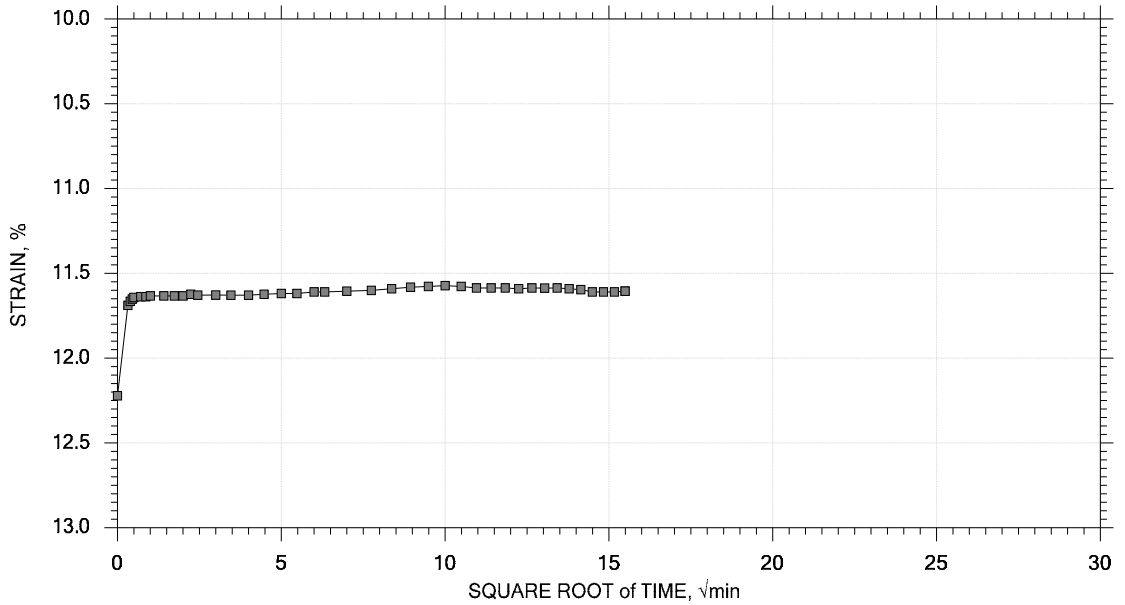
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2 tsf





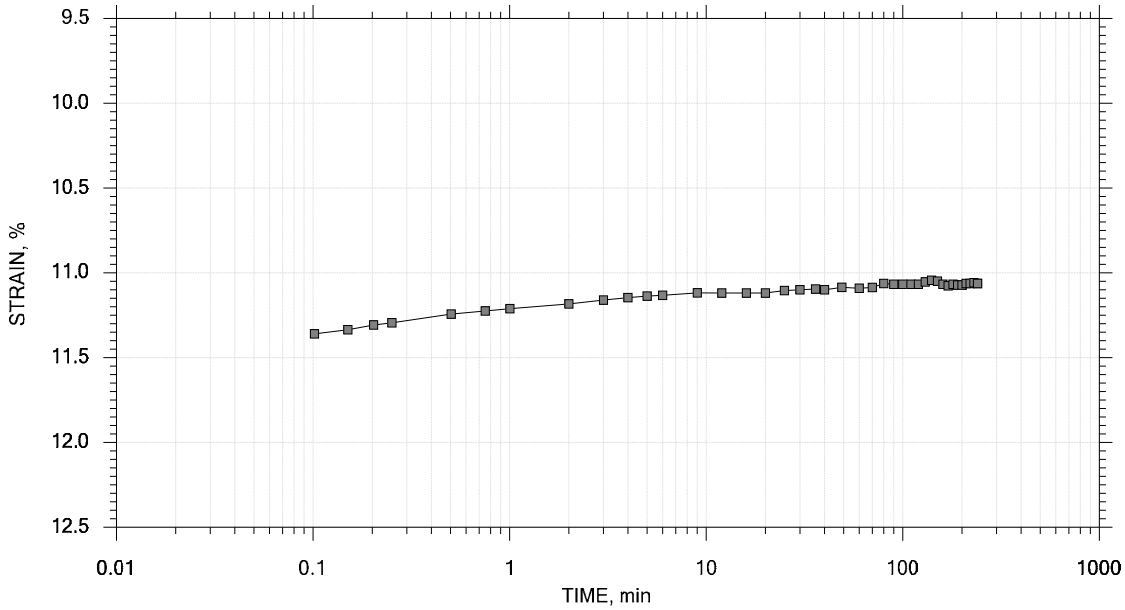
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

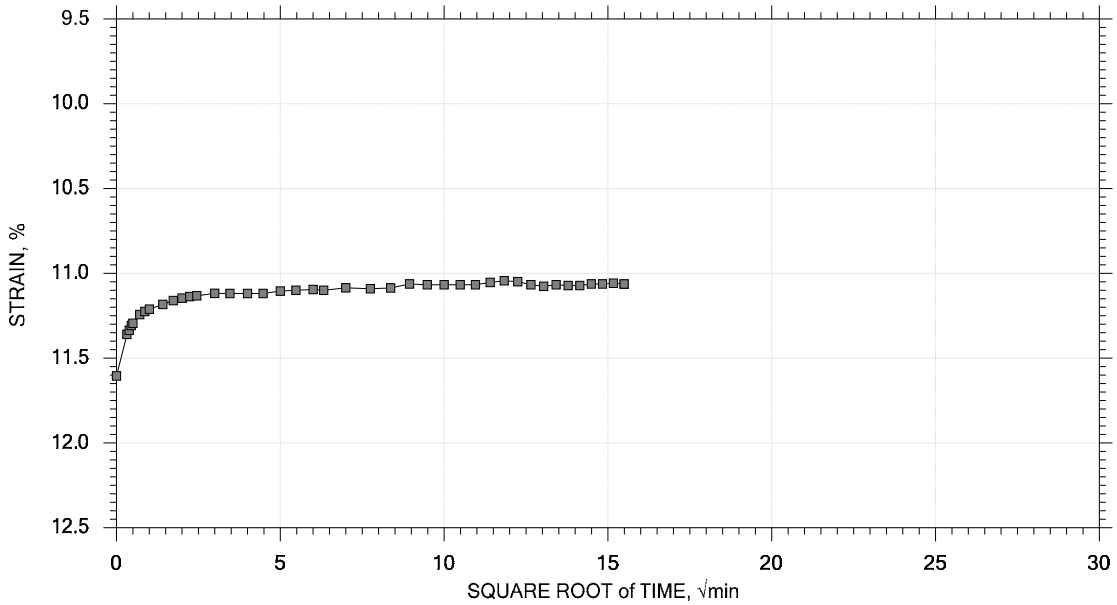
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 0.5 tsf





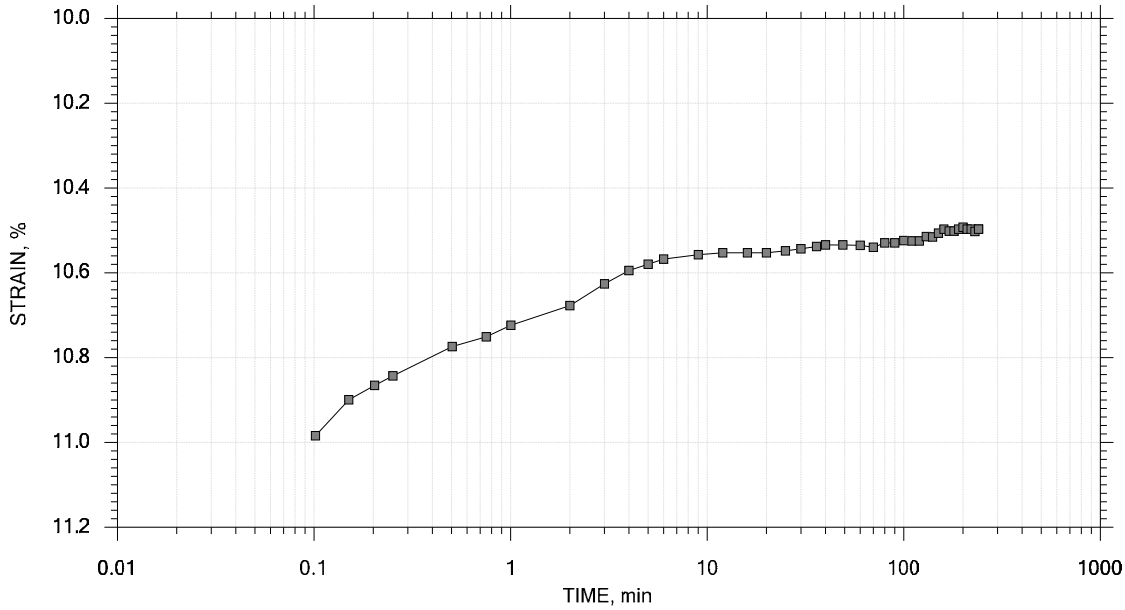
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

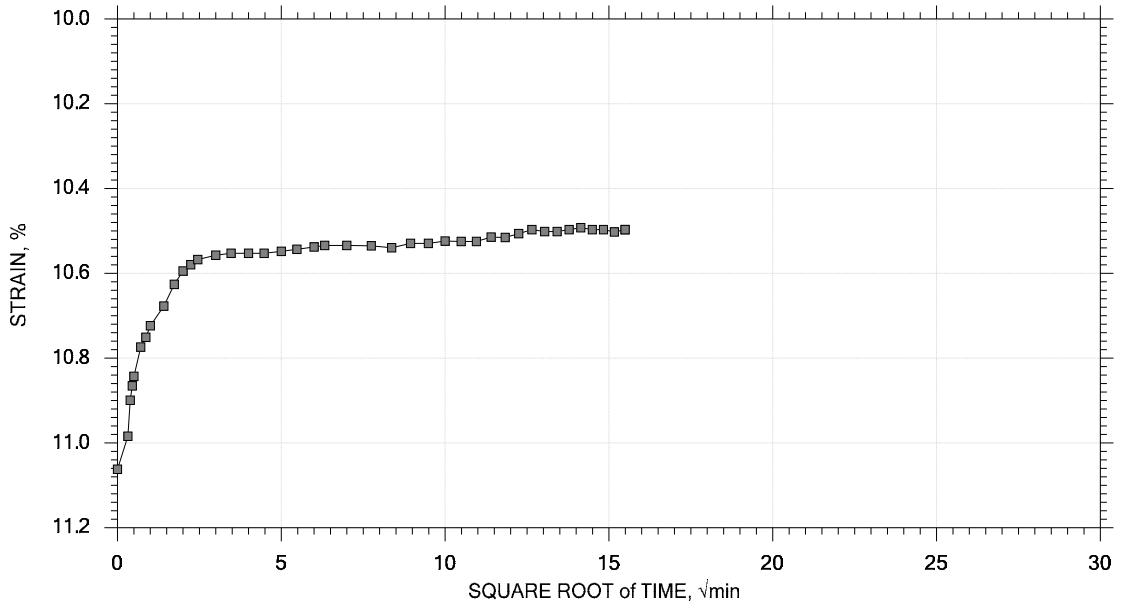
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 0.125 tsf





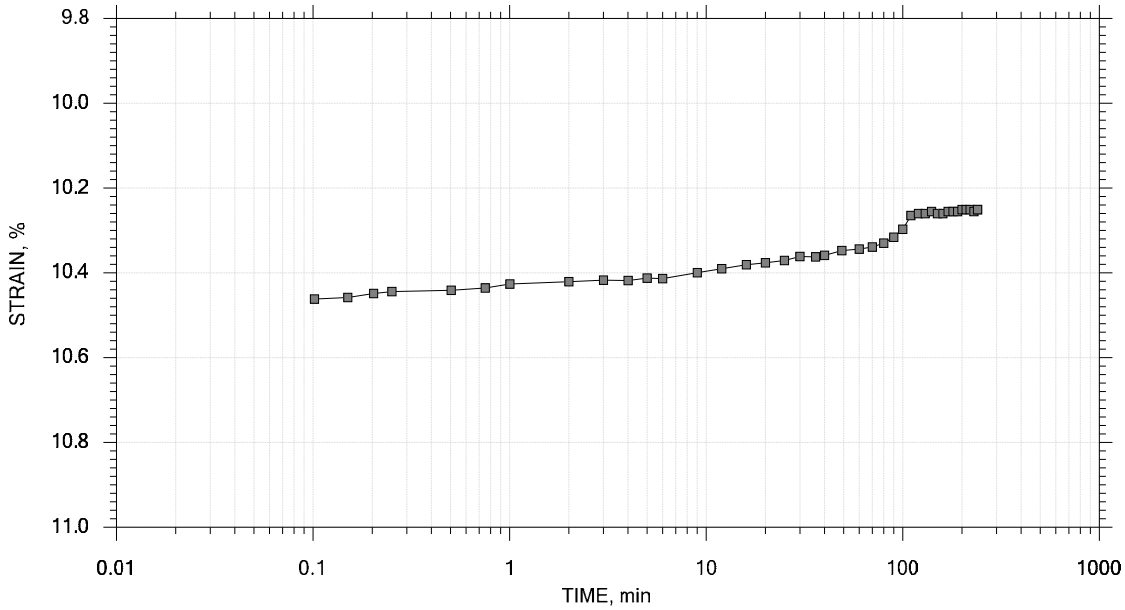
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

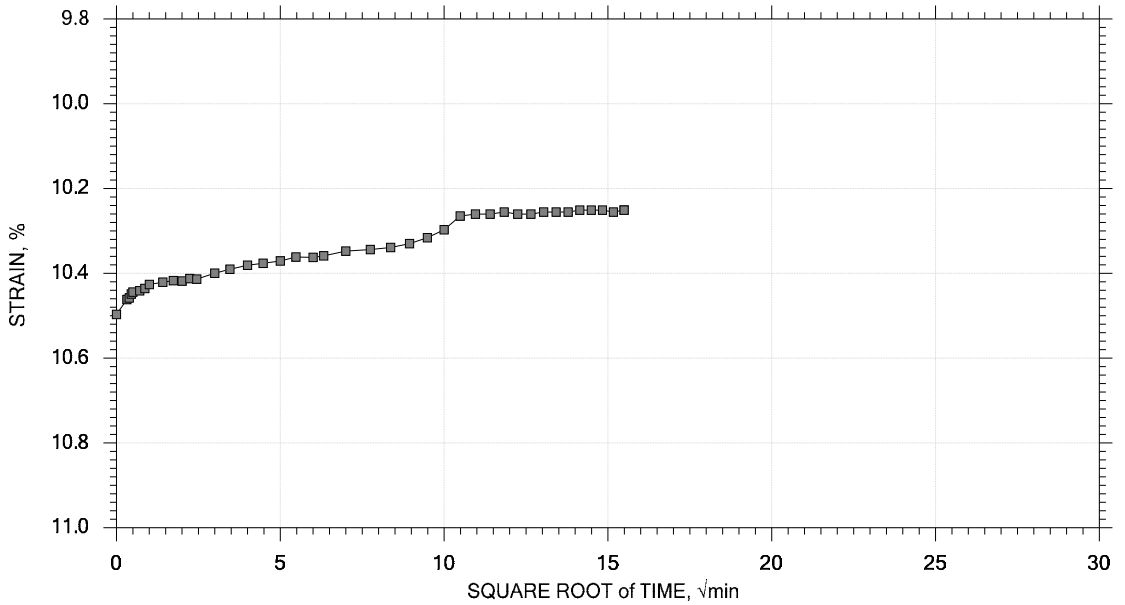
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

Stress: 0.0625 tsf

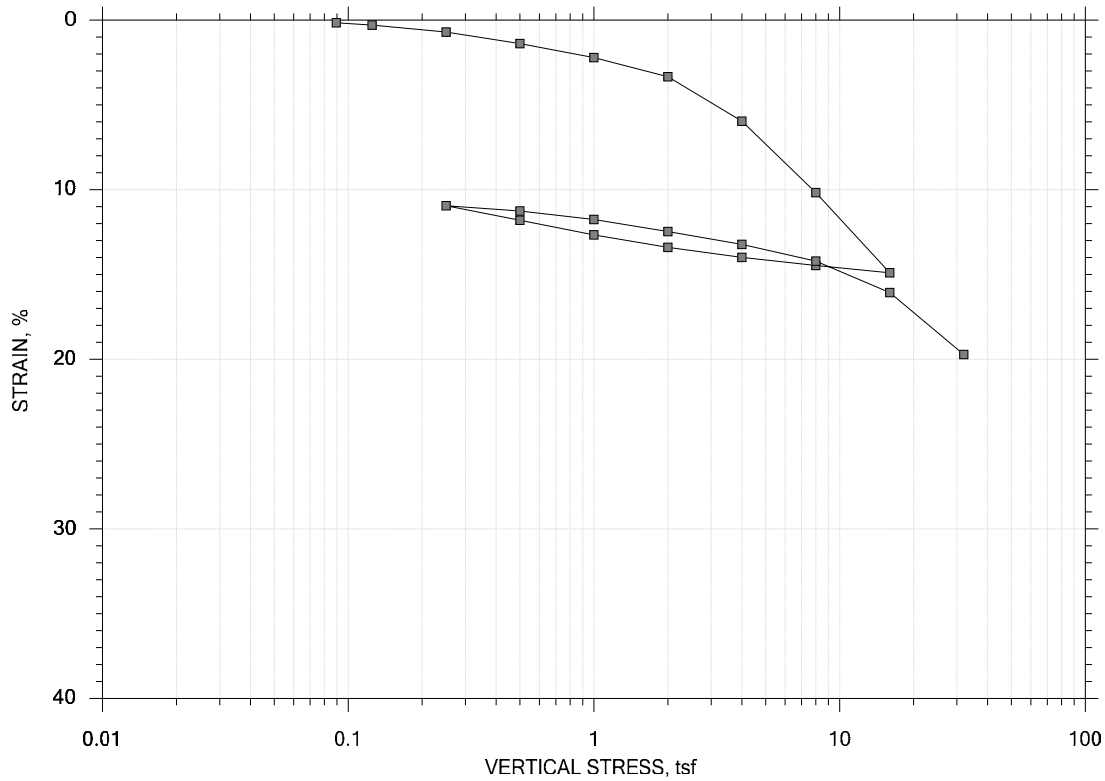


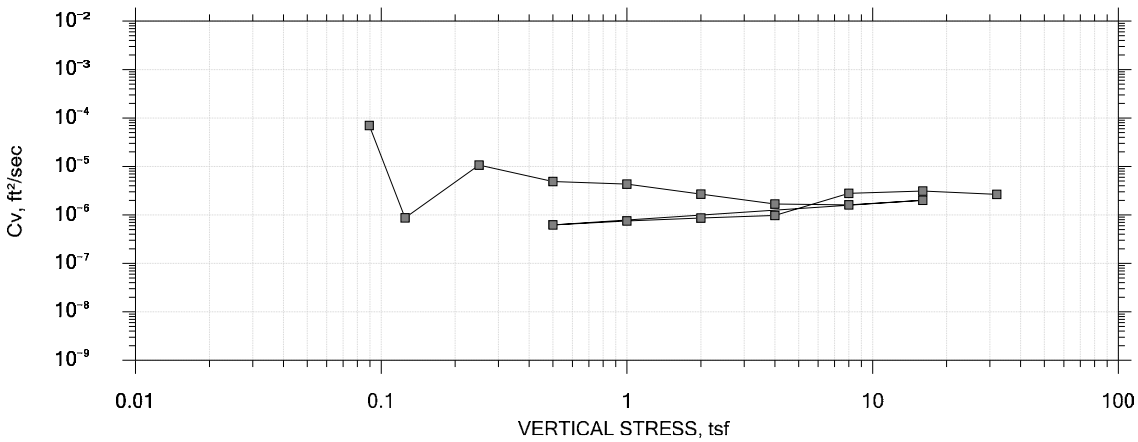


GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T1	Test Date: 06/09/15	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay with sand traces		
	Remarks: System V, Swell Pressure = 0.0692 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

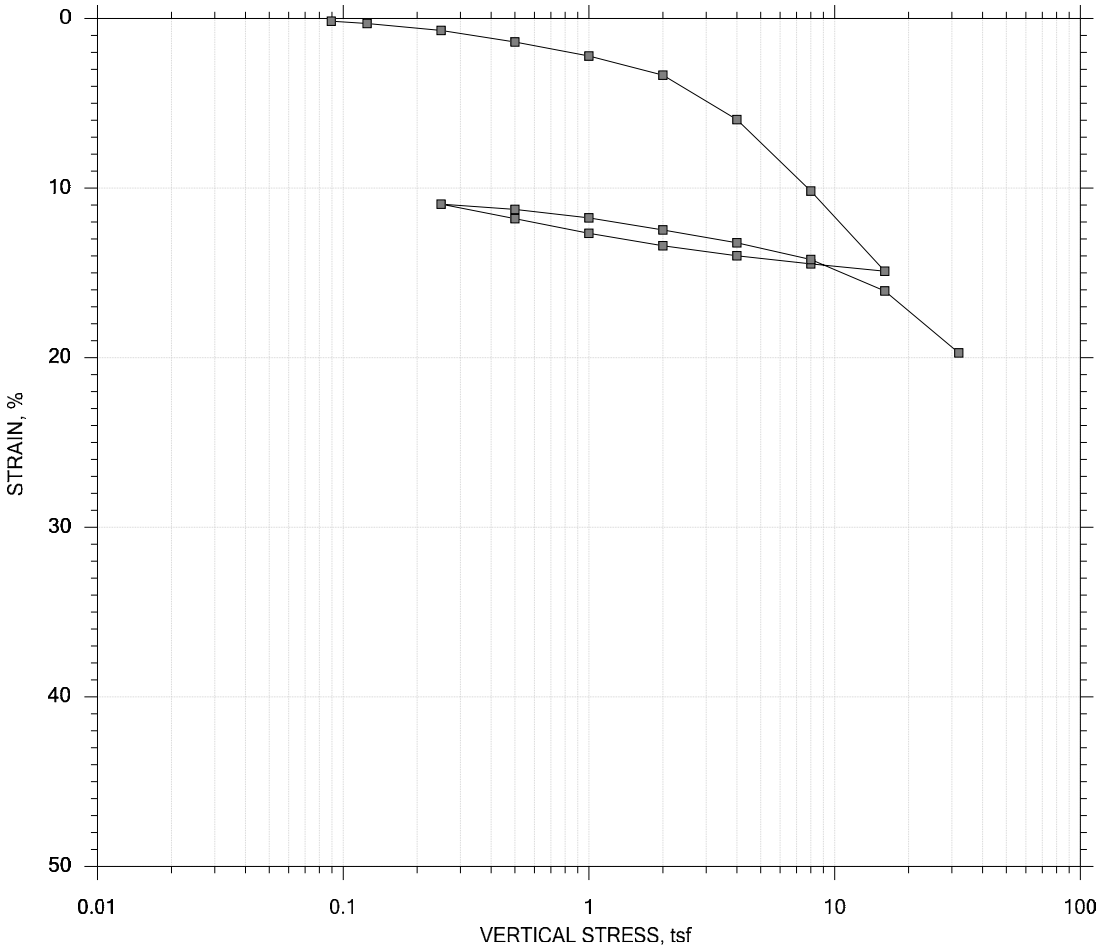




GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ----				Water Content, %	31.68	18.14
Preconsolidation Stress: ----				Dry Unit Weight, pcf	91.919	114.9
Compression Ratio: ----				Saturation, %	99.85	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.88	0.50
LL: ---	PL: ---	PI: ---	GS: 2.76			

GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Beverly Middle School
Boring No.: BH-101
Sample No.: T2
Test No.: IP-3

Location: Beverly, MA
Tested By: md
Test Date: 06/09/15
Sample Type: intact

Project No.: GTX-303278
Checked By: njh
Depth: 21-23 ft
Elevation: ---

Soil Description: Moist, gray clay
Remarks: System X, Swell Pressure = 0.0894 tsf

Estimated Specific Gravity: 2.76
Initial Void Ratio: 0.877
Final Void Ratio: 0.501

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.80 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	16958	RING		15215
Wt. Container + Wet Soil, gm	141.82	267.48	251.45	150.45
Wt. Container + Dry Soil, gm	110.50	229.96	229.96	128.56
Wt. Container, gm	8.3400	111.52	111.52	7.9200
Wt. Dry Soil, gm	102.16	118.44	118.44	120.64
Water Content, %	30.66	31.68	18.14	18.14
Void Ratio	---	0.877	0.501	---
Degree of Saturation, %	---	99.85	100.00	---
Dry Unit Weight, pcf	---	91.919	114.90	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Beverly Middle School
Boring No.: BH-101
Sample No.: T2
Test No.: IP-3

Location: Beverly, MA
Tested By: md
Test Date: 06/09/15
Sample Type: intact

Project No.: GTX-303278
Checked By: njh
Depth: 21-23 ft
Elevation: ---

Soil Description: Moist, gray clay
Remarks: System X, Swell Pressure = 0.0894 tsf

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.0894	0.001569	0.874	0.157	0.751	3.26e-005	1.76e-002	1.54e-003
2	0.125	0.002934	0.871	0.293	117.701	2.08e-007	3.83e-002	2.15e-005
3	0.250	0.007028	0.864	0.703	3.088	7.87e-006	3.28e-002	6.95e-004
4	0.500	0.01381	0.851	1.38	4.266	5.63e-006	2.71e-002	4.12e-004
5	1.00	0.02207	0.835	2.21	6.191	3.82e-006	1.65e-002	1.70e-004
6	2.00	0.03339	0.814	3.34	9.590	2.42e-006	1.13e-002	7.38e-005
7	4.00	0.05955	0.765	5.96	15.061	1.48e-006	1.31e-002	5.23e-005
8	8.00	0.1017	0.686	10.2	12.856	1.61e-006	1.05e-002	4.58e-005
9	16.0	0.1490	0.597	14.9	8.167	2.30e-006	5.91e-003	3.67e-005
10	8.00	0.1447	0.605	14.5	1.093	1.63e-005	5.41e-004	2.38e-005
11	4.00	0.1399	0.614	14.0	8.498	2.12e-006	1.20e-003	6.87e-006
12	2.00	0.1340	0.625	13.4	18.235	1.00e-006	2.93e-003	7.93e-006
13	1.00	0.1266	0.639	12.7	44.360	4.18e-007	7.41e-003	8.36e-006
14	0.500	0.1180	0.655	11.8	78.922	2.40e-007	1.72e-002	1.11e-005
15	0.250	0.1094	0.671	10.9	123.725	1.56e-007	3.42e-002	1.44e-005
16	0.500	0.1125	0.666	11.3	30.003	6.46e-007	1.24e-002	2.15e-005
17	1.00	0.1176	0.656	11.8	26.789	7.17e-007	1.01e-002	1.95e-005
18	2.00	0.1247	0.643	12.5	27.074	7.00e-007	7.12e-003	1.34e-005
19	4.00	0.1322	0.629	13.2	22.136	8.42e-007	3.77e-003	8.56e-006
20	8.00	0.1421	0.610	14.2	6.487	2.82e-006	2.47e-003	1.87e-005
21	16.0	0.1606	0.575	16.1	5.088	3.47e-006	2.32e-003	2.17e-005
22	32.0	0.1972	0.507	19.7	5.542	2.99e-006	2.28e-003	1.84e-005

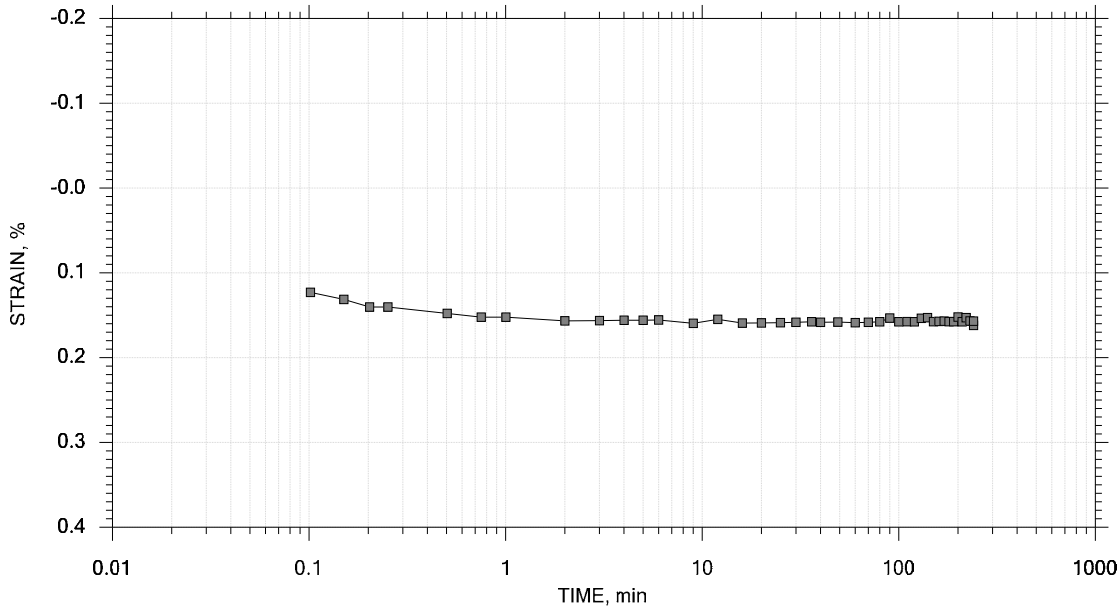
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.0894	0.001569	0.874	0.157	0.000	0.00e+000	1.76e-002	0.00e+000	0.00e+000
2	0.125	0.002934	0.871	0.293	0.000	0.00e+000	3.83e-002	0.00e+000	0.00e+000
3	0.250	0.007028	0.864	0.703	0.000	0.00e+000	3.28e-002	0.00e+000	0.00e+000
4	0.500	0.01381	0.851	1.38	1.277	4.37e-006	2.71e-002	3.20e-004	0.00e+000
5	1.00	0.02207	0.835	2.21	1.218	4.51e-006	1.65e-002	2.01e-004	0.00e+000
6	2.00	0.03339	0.814	3.34	2.048	2.63e-006	1.13e-002	8.03e-005	0.00e+000
7	4.00	0.05955	0.765	5.96	2.819	1.84e-006	1.31e-002	6.49e-005	0.00e+000
8	8.00	0.1017	0.686	10.2	2.974	1.62e-006	1.05e-002	4.60e-005	0.00e+000
9	16.0	0.1490	0.597	14.9	2.362	1.85e-006	5.91e-003	2.94e-005	0.00e+000
10	8.00	0.1447	0.605	14.5	0.000	0.00e+000	5.41e-004	0.00e+000	0.00e+000
11	4.00	0.1399	0.614	14.0	0.000	0.00e+000	1.20e-003	0.00e+000	0.00e+000
12	2.00	0.1340	0.625	13.4	0.000	0.00e+000	2.93e-003	0.00e+000	0.00e+000
13	1.00	0.1266	0.639	12.7	0.000	0.00e+000	7.41e-003	0.00e+000	0.00e+000
14	0.500	0.1180	0.655	11.8	18.915	2.32e-007	1.72e-002	1.08e-005	0.00e+000
15	0.250	0.1094	0.671	10.9	28.802	1.55e-007	3.42e-002	1.44e-005	0.00e+000
16	0.500	0.1125	0.666	11.3	6.905	6.52e-007	1.24e-002	2.17e-005	0.00e+000
17	1.00	0.1176	0.656	11.8	0.000	0.00e+000	1.01e-002	0.00e+000	0.00e+000
18	2.00	0.1247	0.643	12.5	4.743	9.28e-007	7.12e-003	1.78e-005	0.00e+000
19	4.00	0.1322	0.629	13.2	3.682	1.18e-006	3.77e-003	1.20e-005	0.00e+000
20	8.00	0.1421	0.610	14.2	0.000	0.00e+000	2.47e-003	0.00e+000	0.00e+000
21	16.0	0.1606	0.575	16.1	1.420	2.89e-006	2.32e-003	1.81e-005	0.00e+000
22	32.0	0.1972	0.507	19.7	1.670	2.30e-006	2.28e-003	1.42e-005	0.00e+000

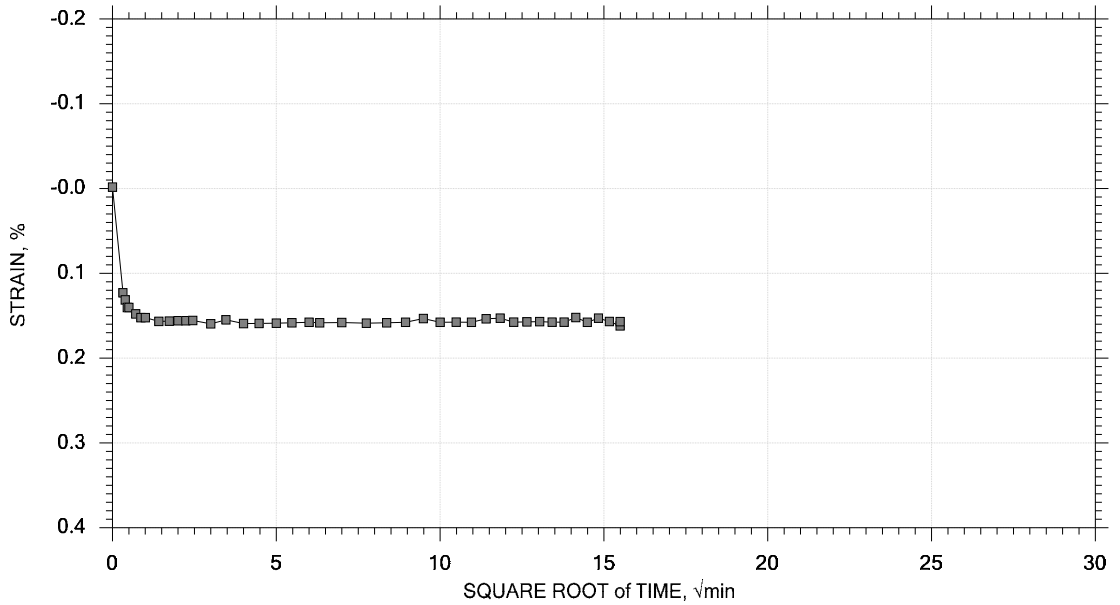
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 22

Stress: 0.089396 tsf





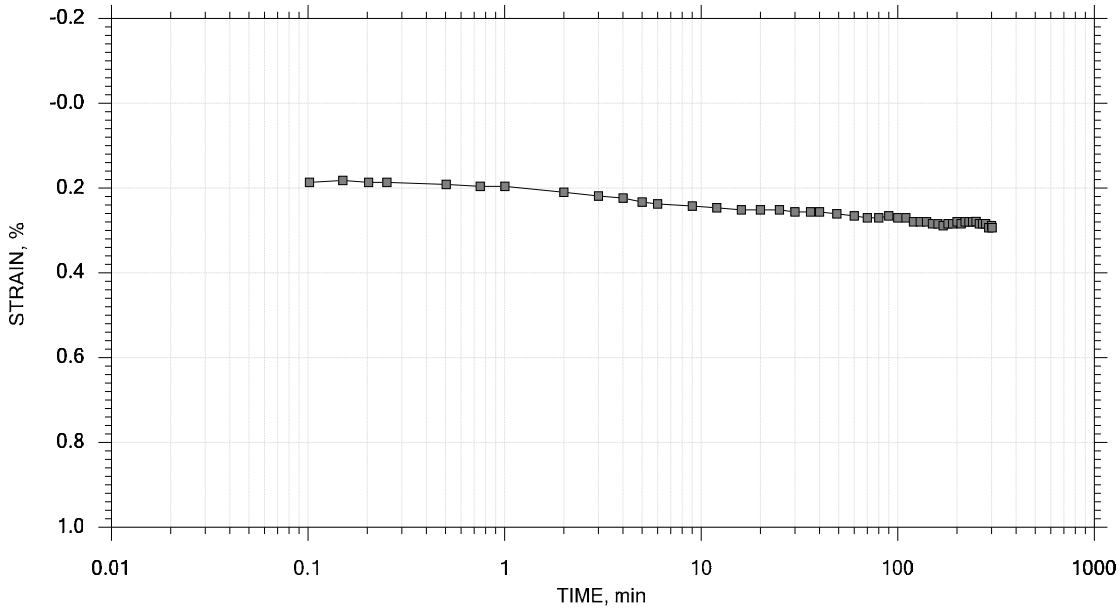
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

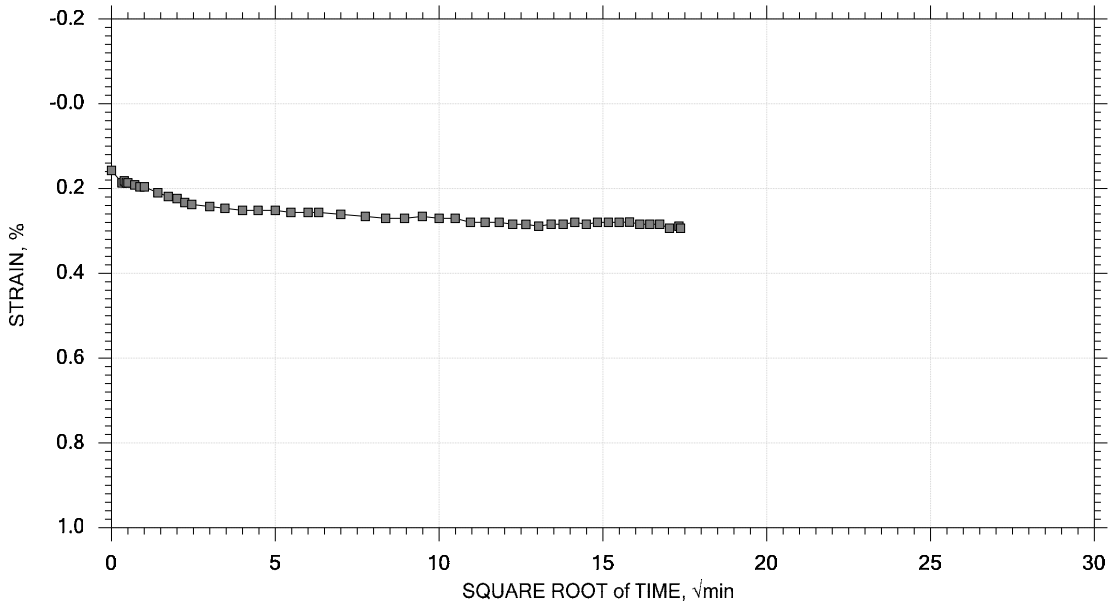
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 22

Stress: 0.125 tsf





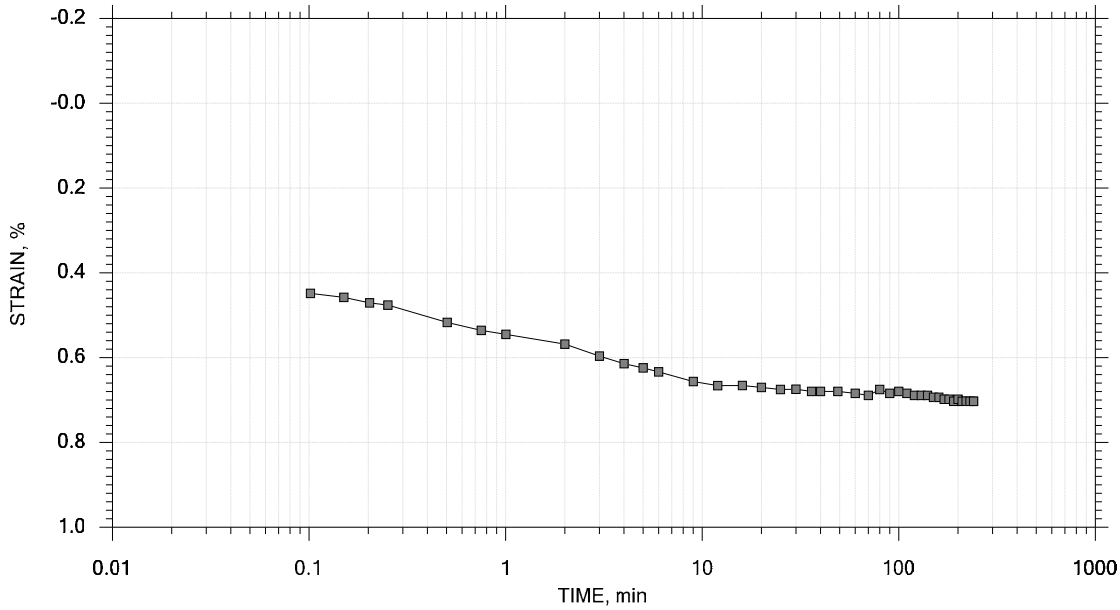
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

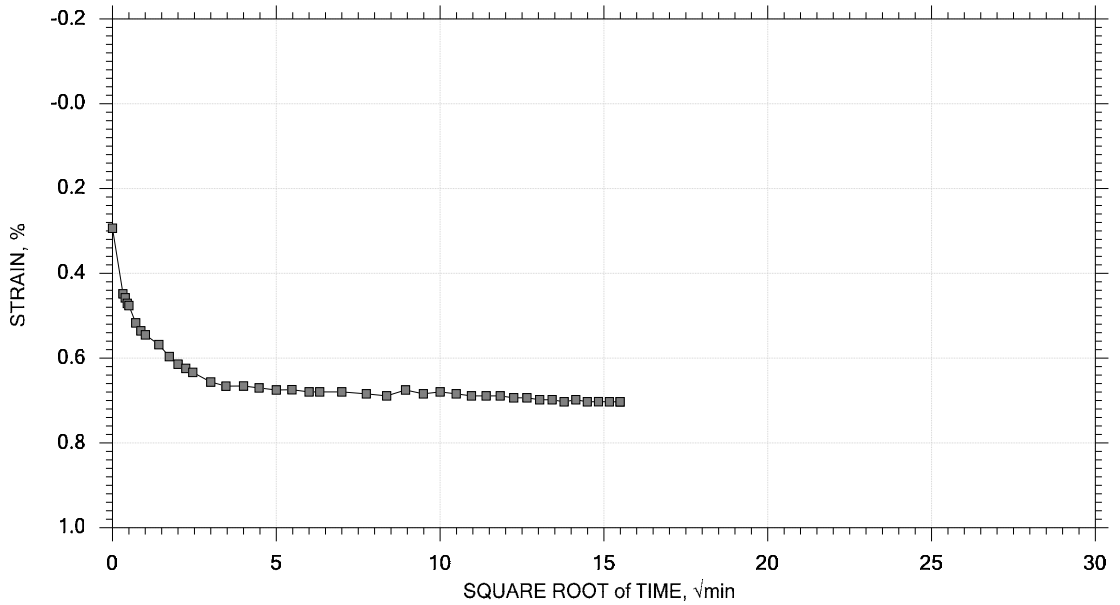
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 22

Stress: 0.25 tsf





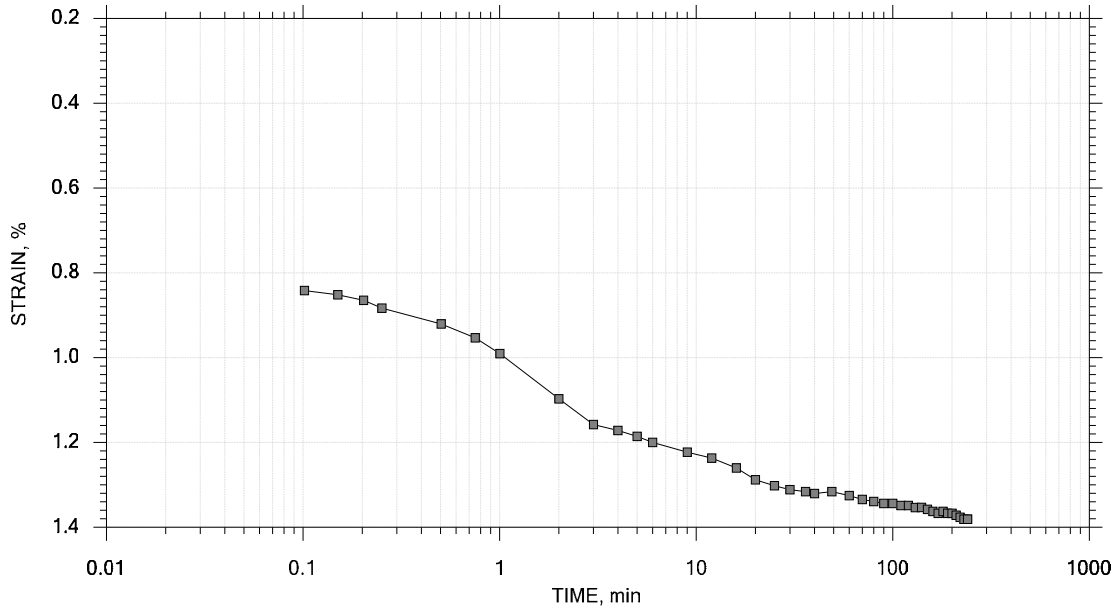
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

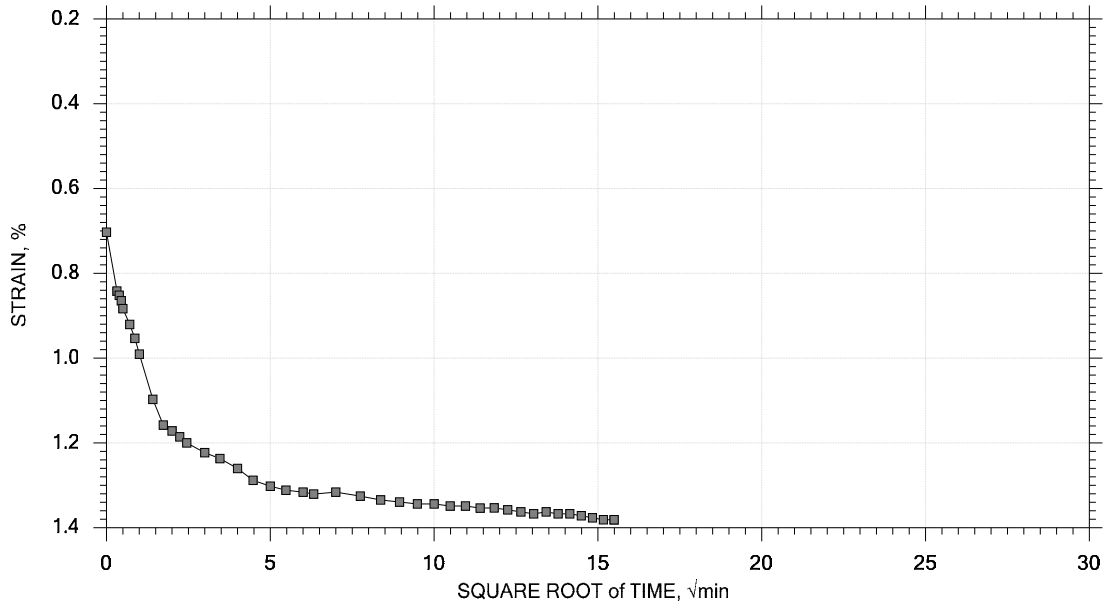
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 22

Stress: 0.5 tsf





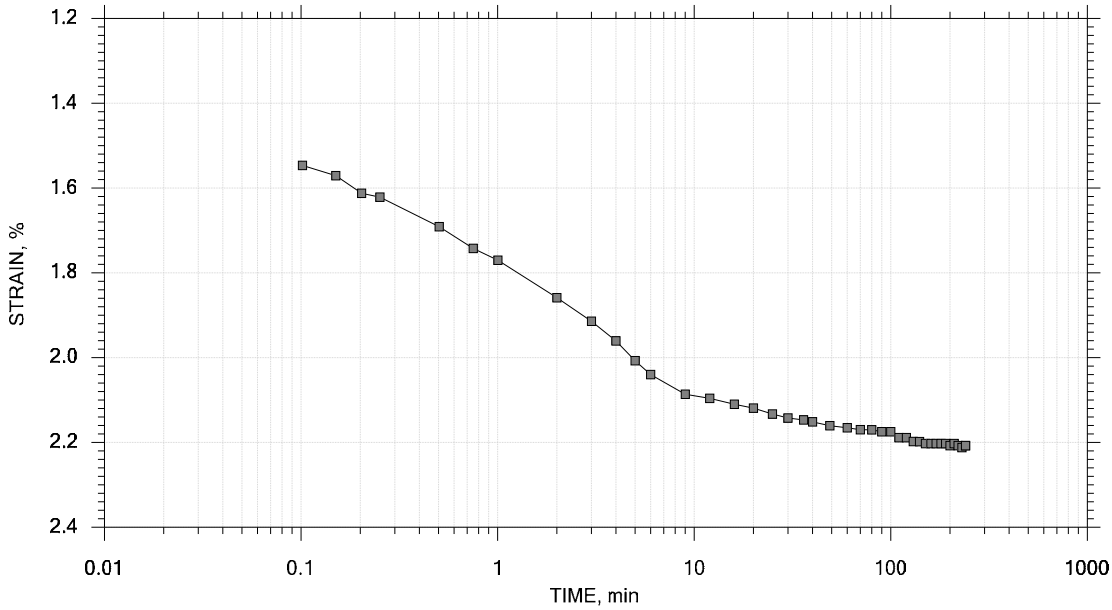
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

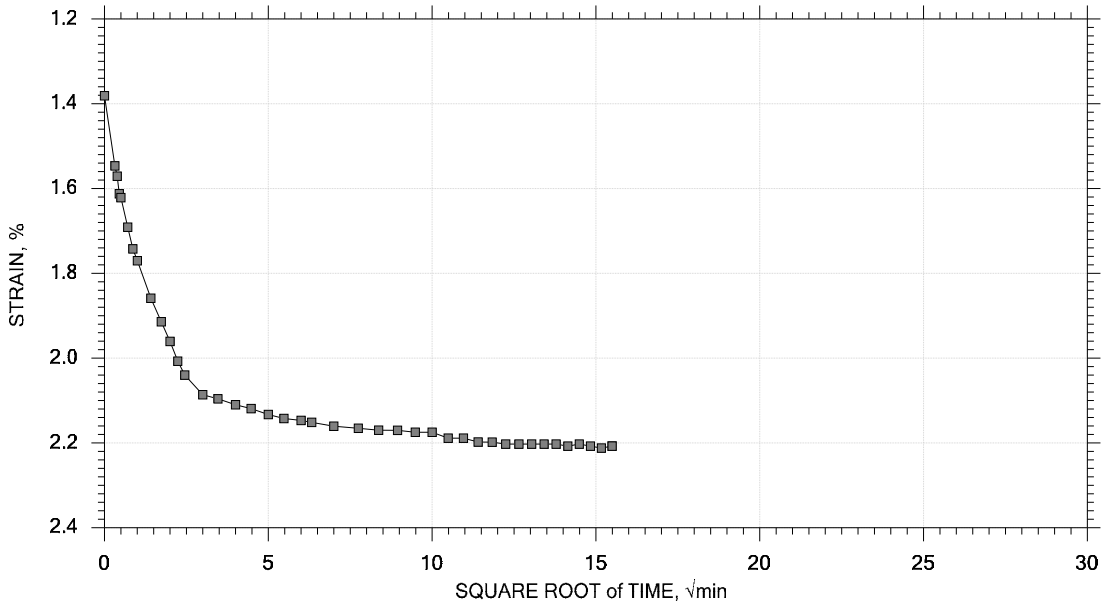
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 22

Stress: 1 tsf





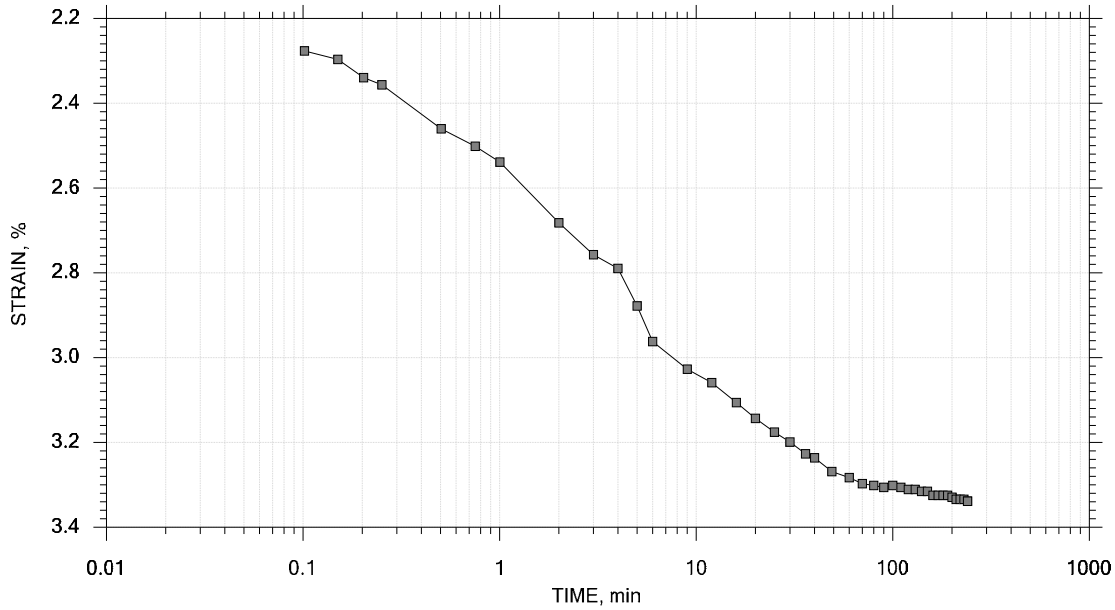
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

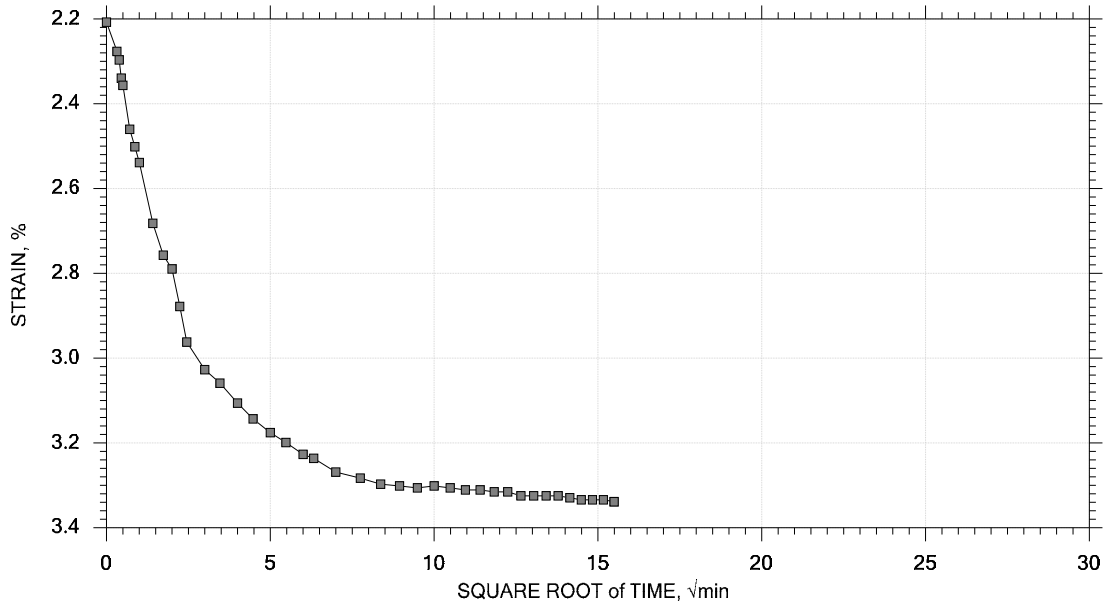
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 22

Stress: 2 tsf





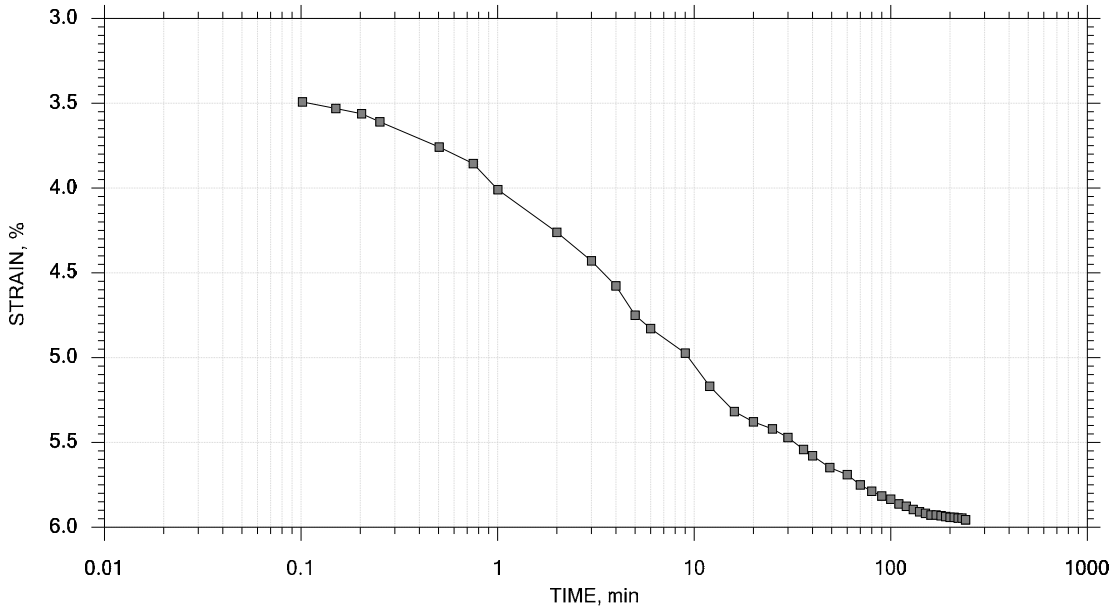
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

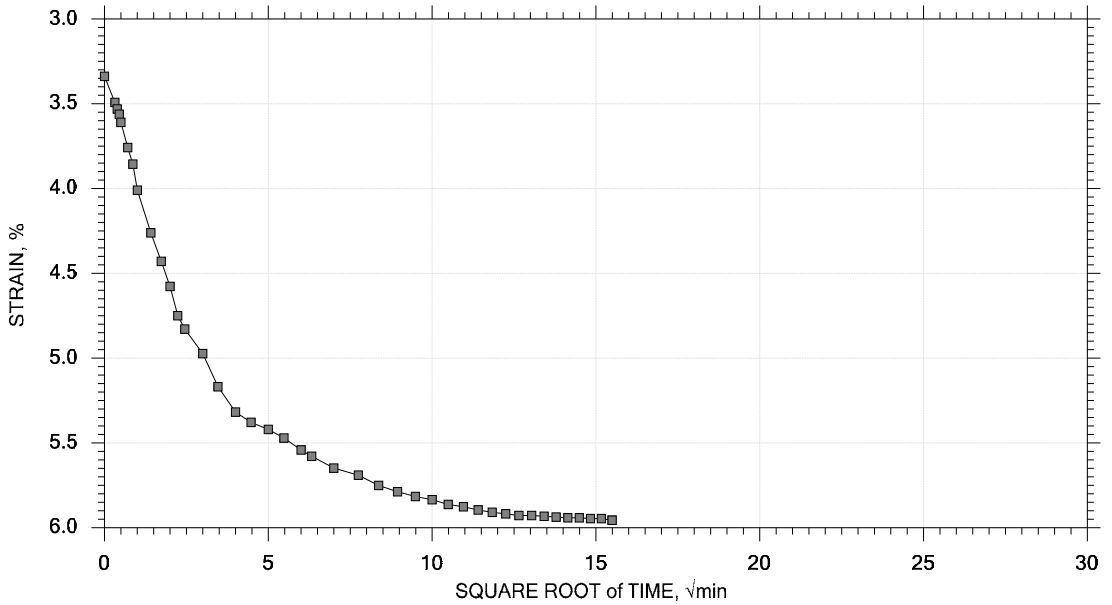
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 22

Stress: 4 tsf





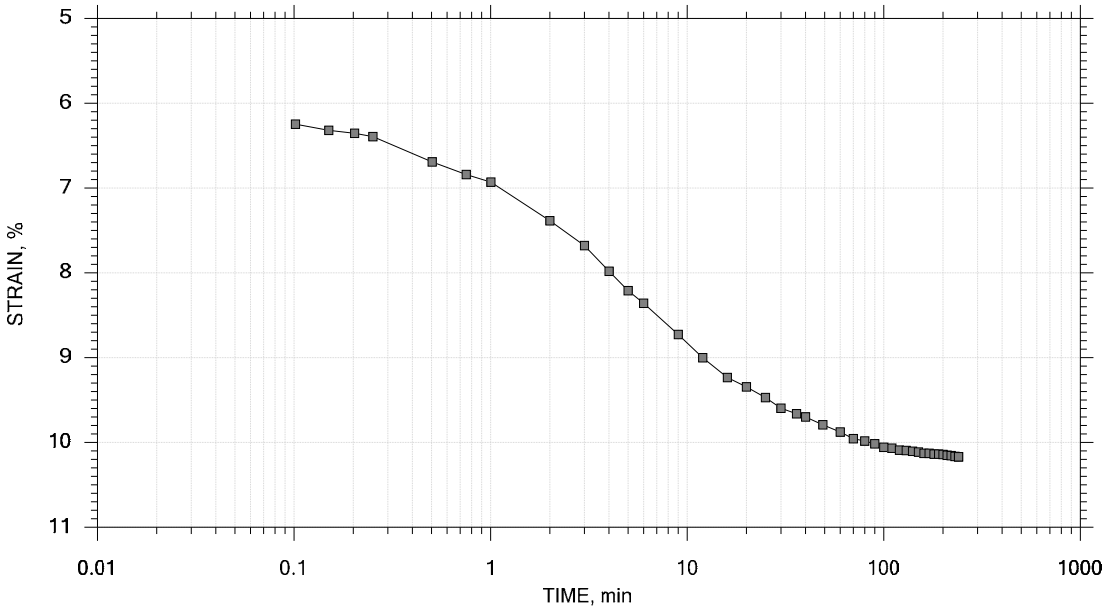
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

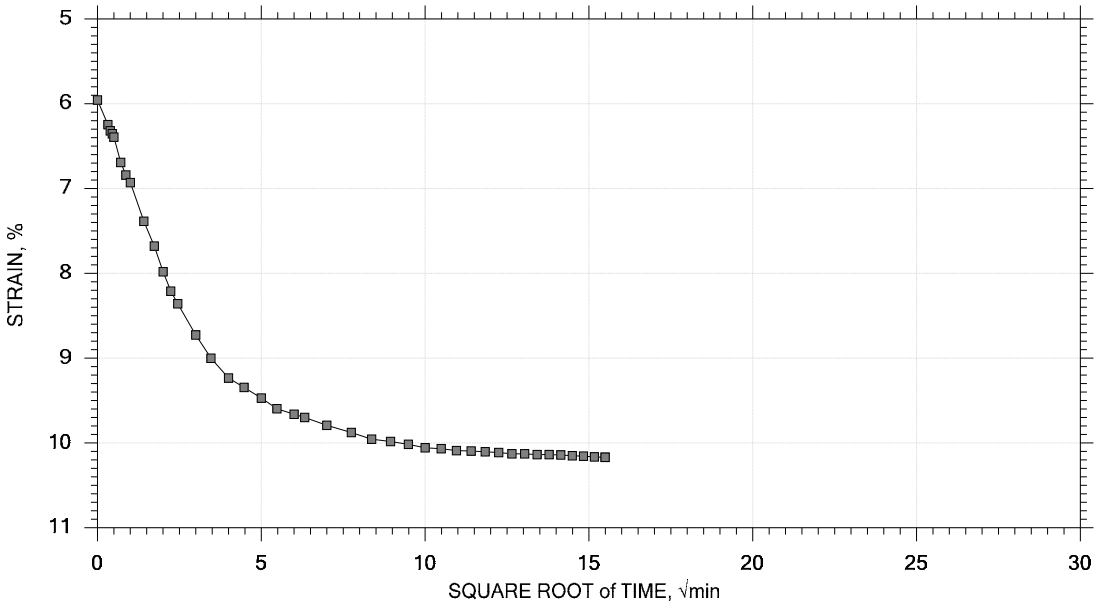
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 22

Stress: 8 tsf





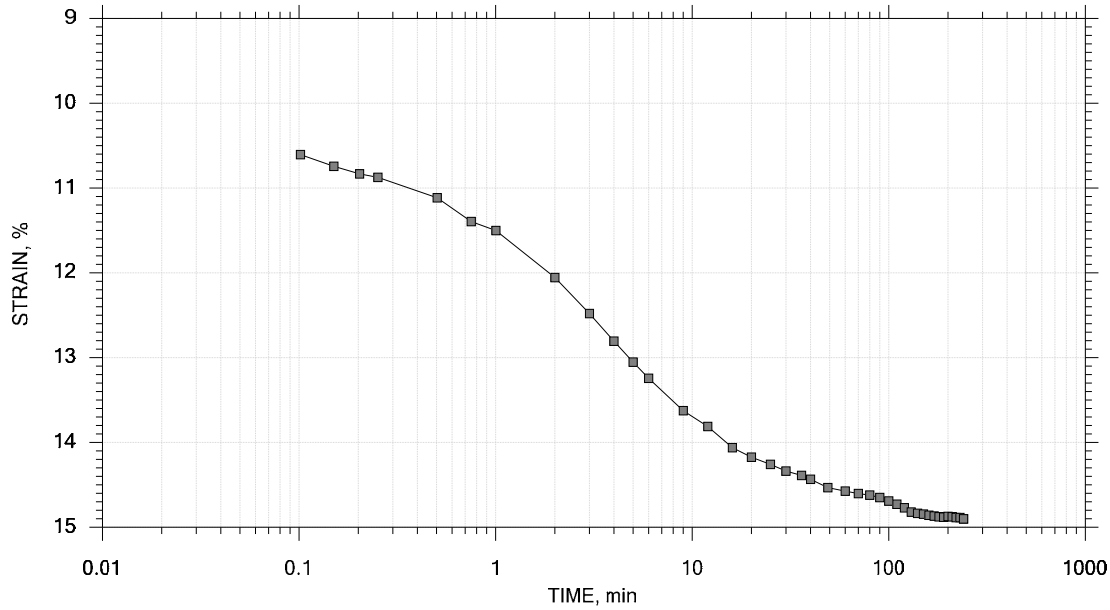
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

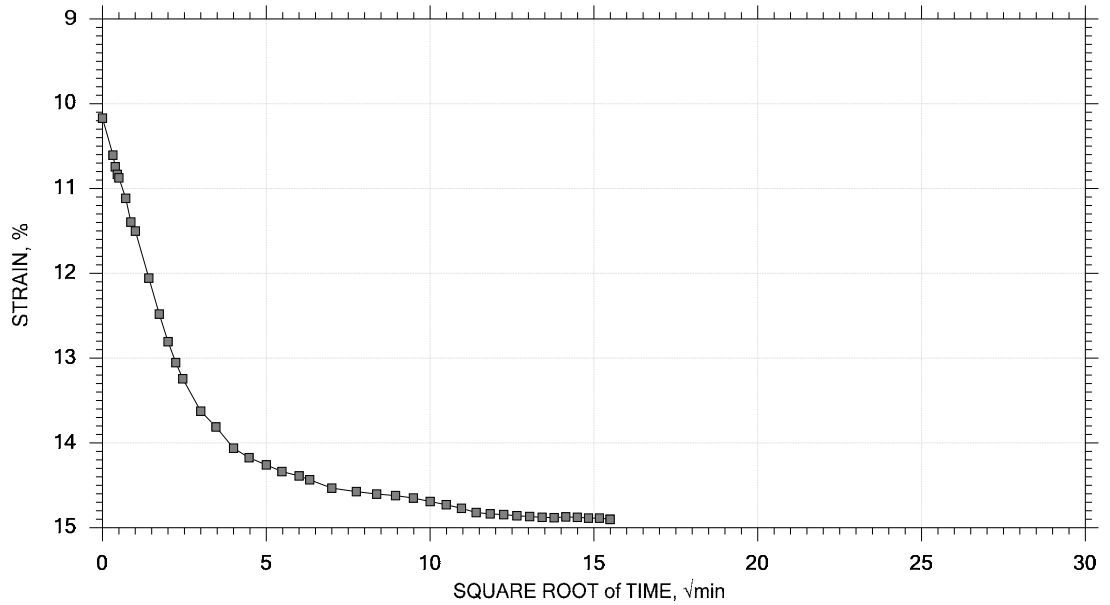
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 22

Stress: 16 tsf





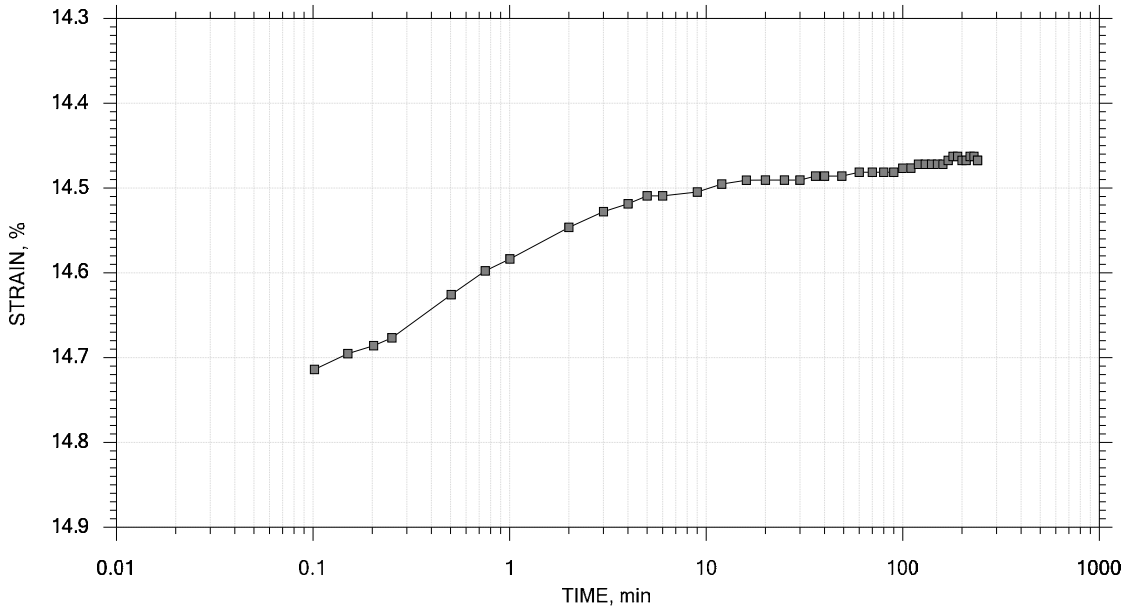
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

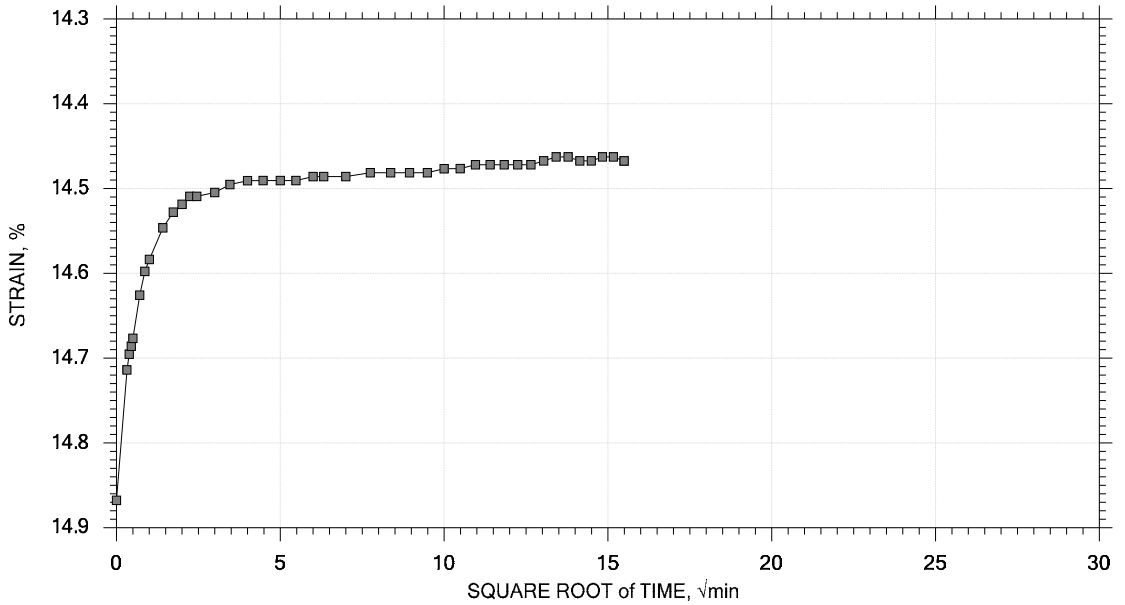
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 22

Stress: 8 tsf





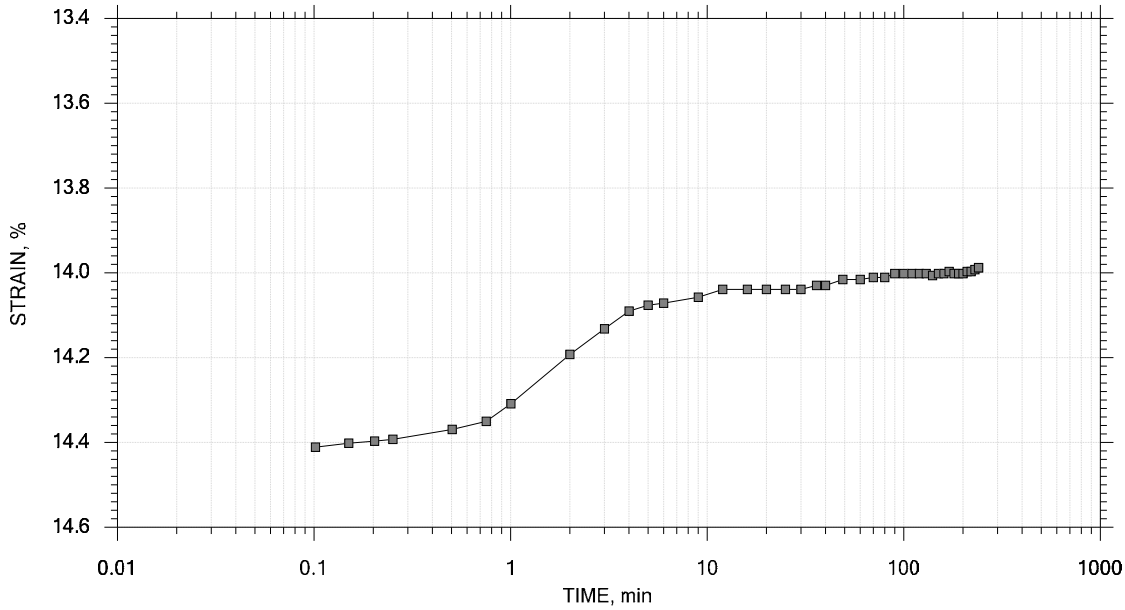
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

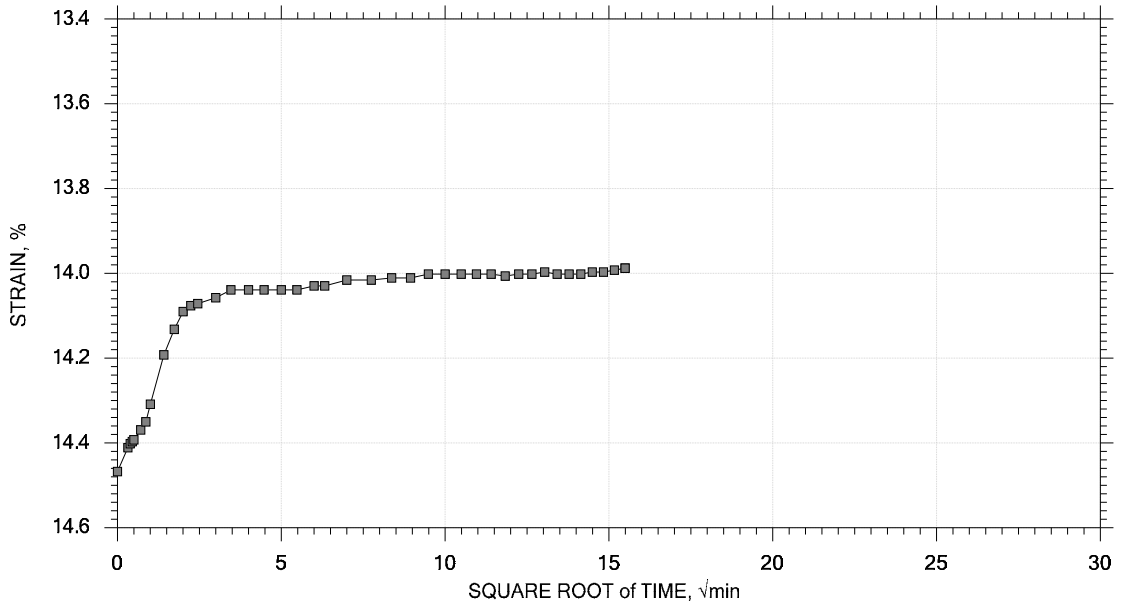
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 22

Stress: 4 tsf





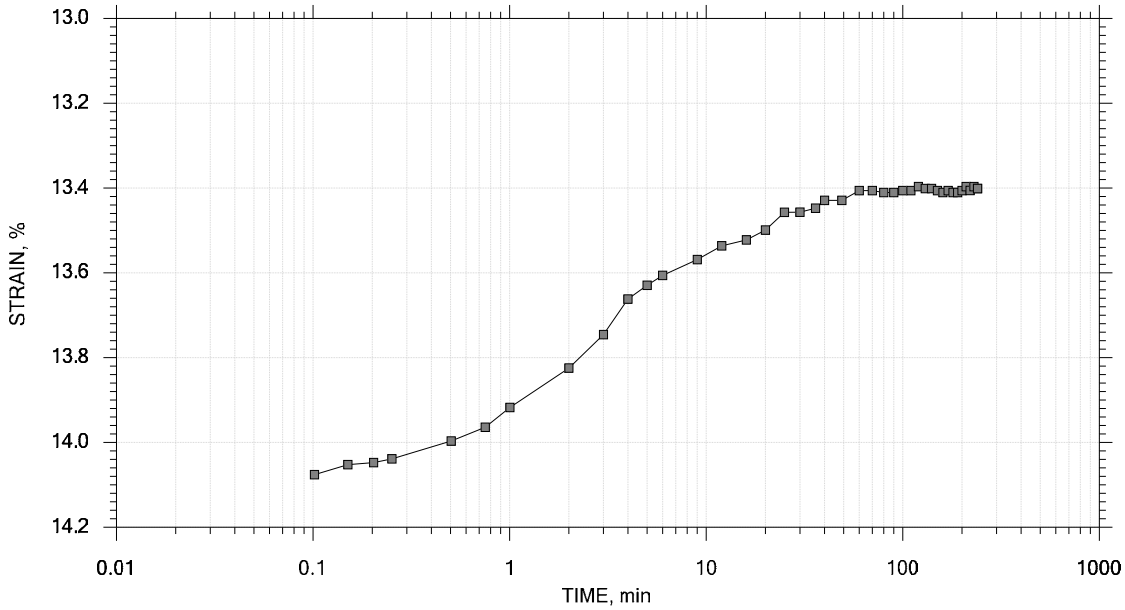
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

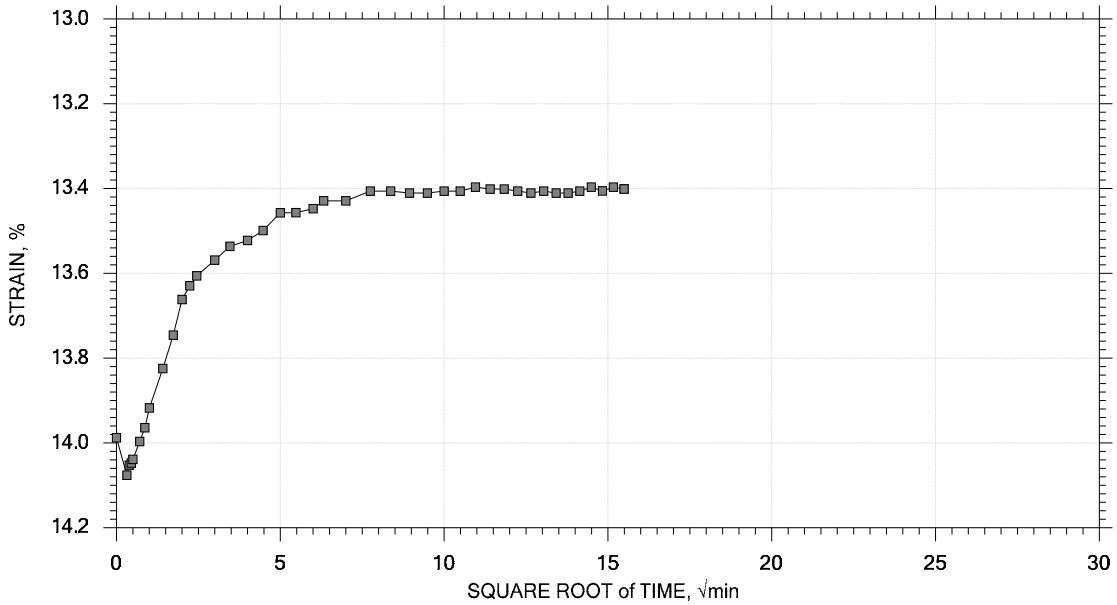
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 22

Stress: 2 tsf





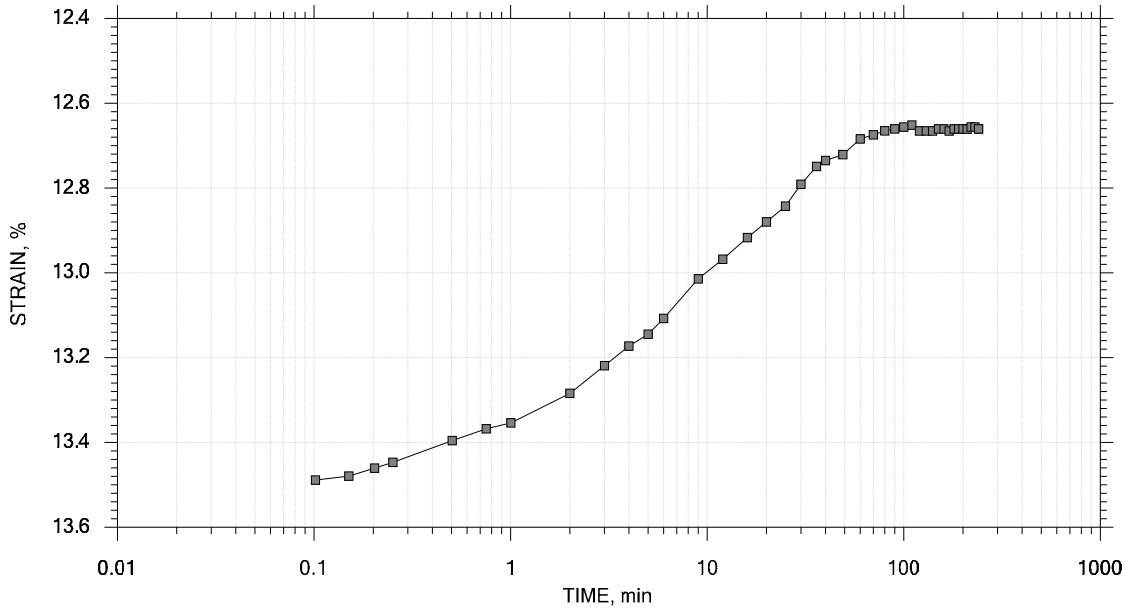
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

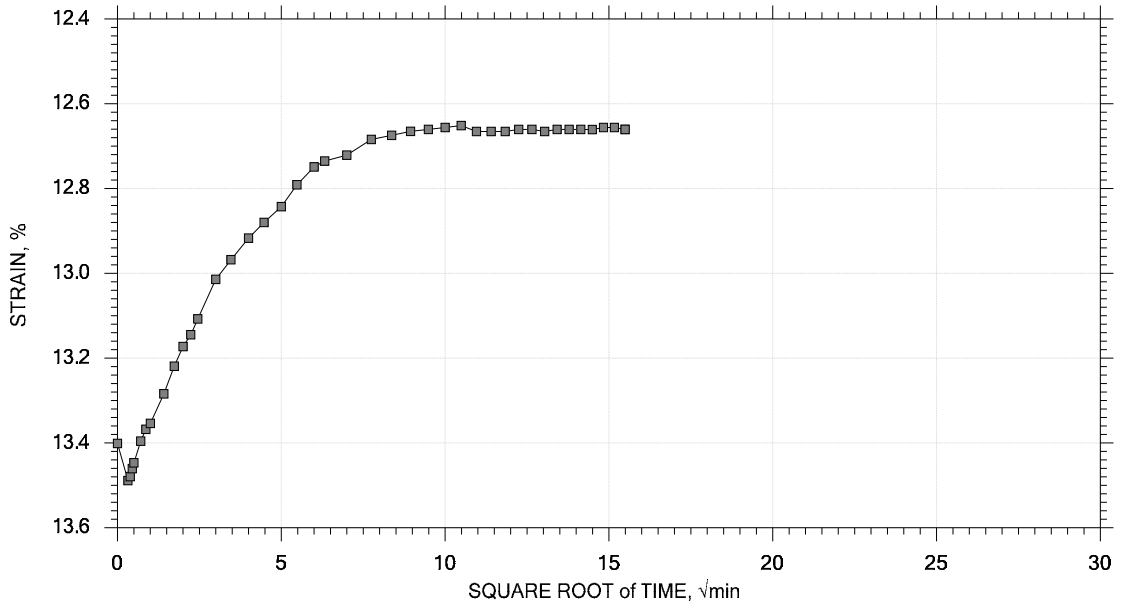
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 22

Stress: 1 tsf





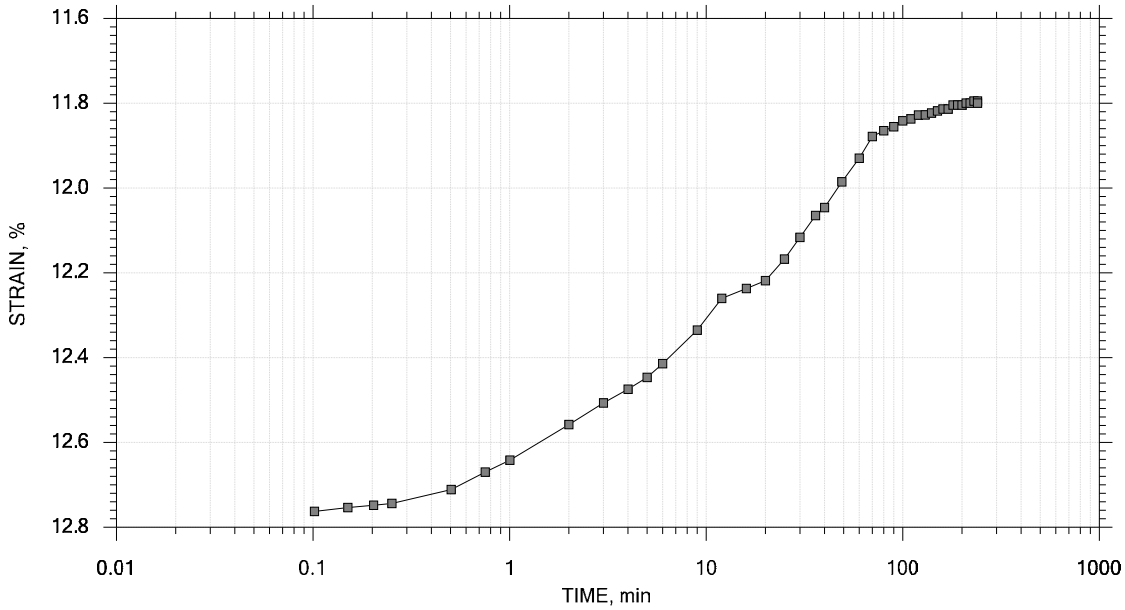
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

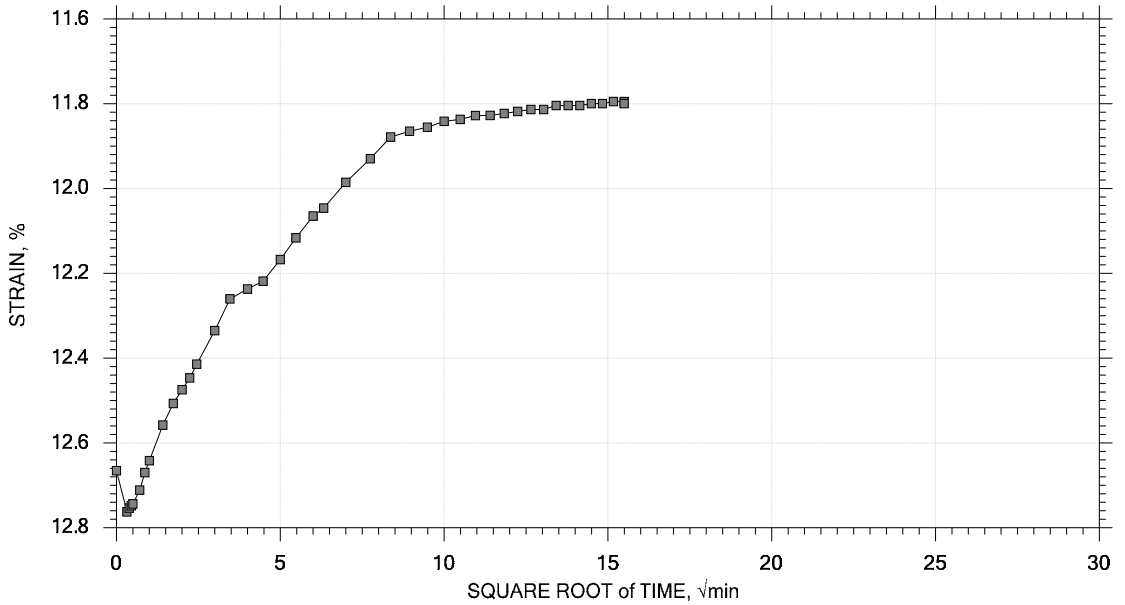
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 22

Stress: 0.5 tsf





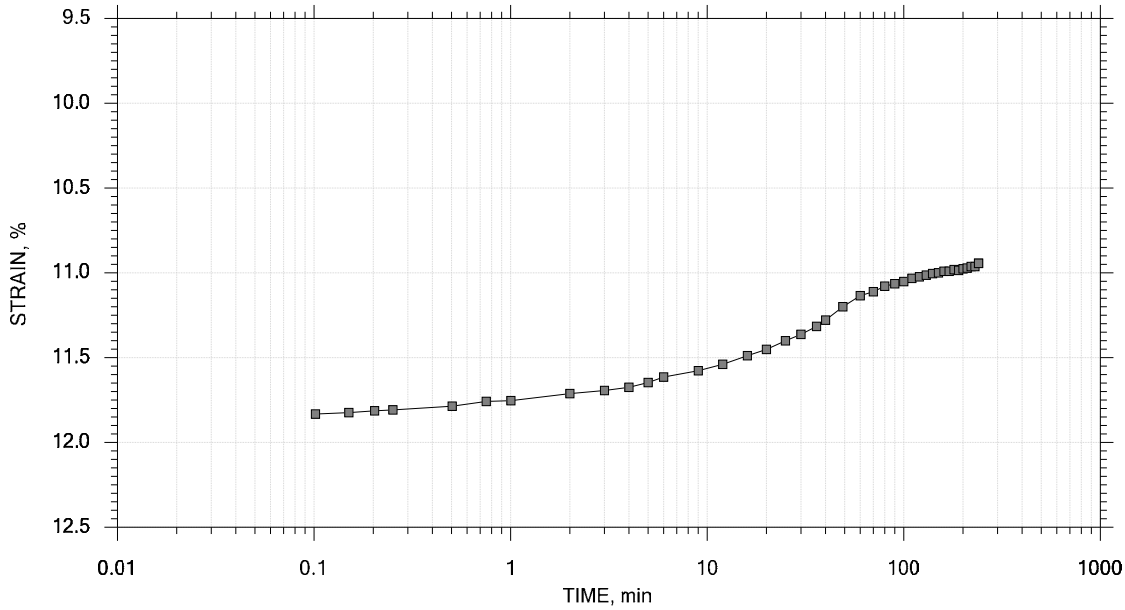
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

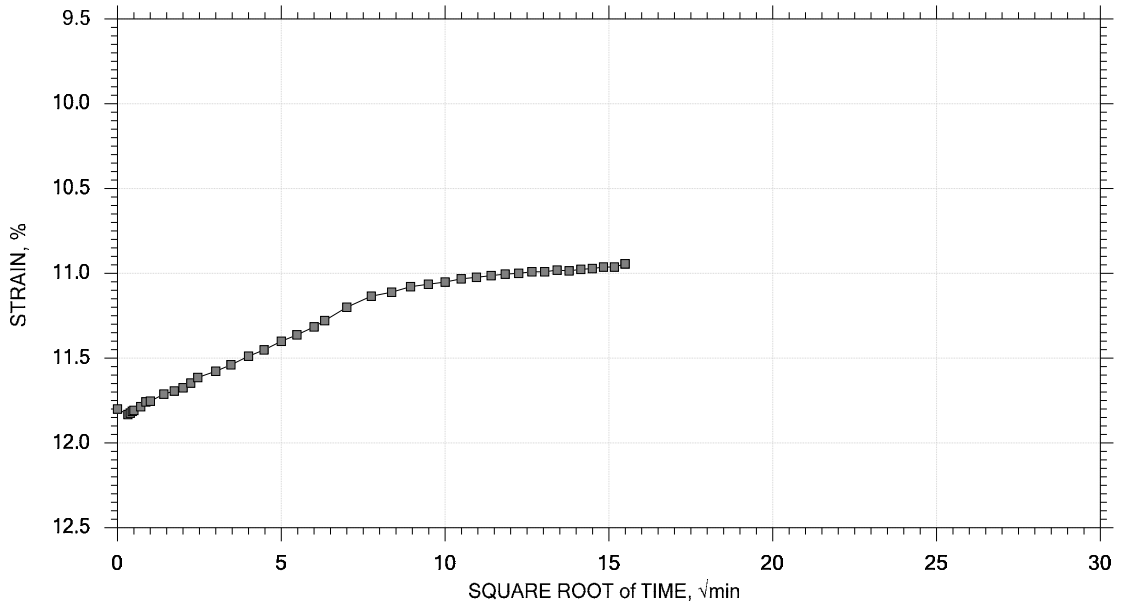
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 22

Stress: 0.25 tsf





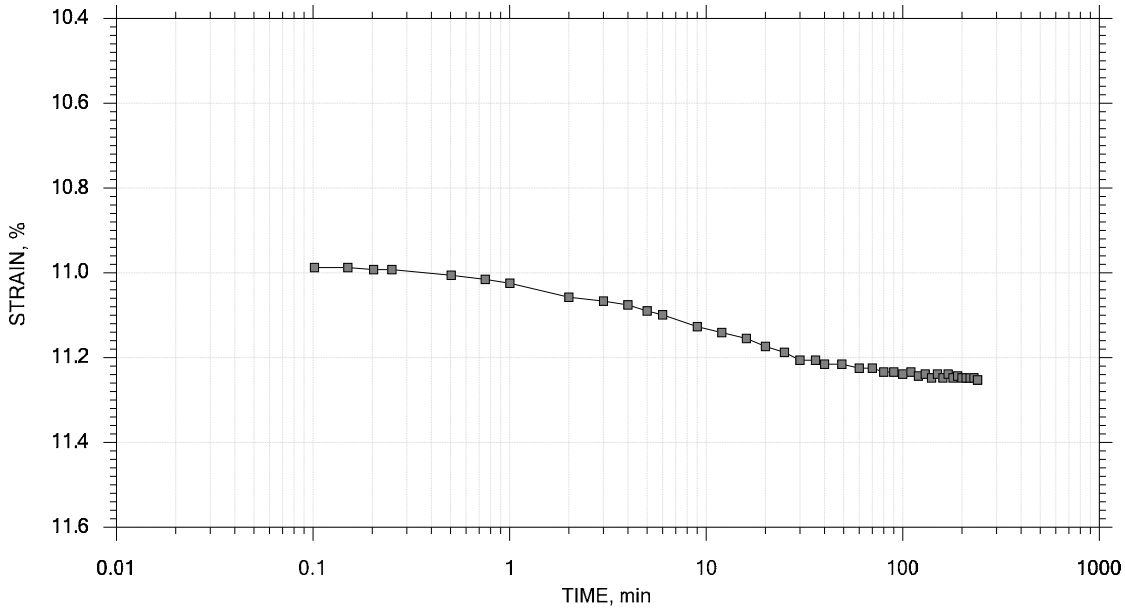
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

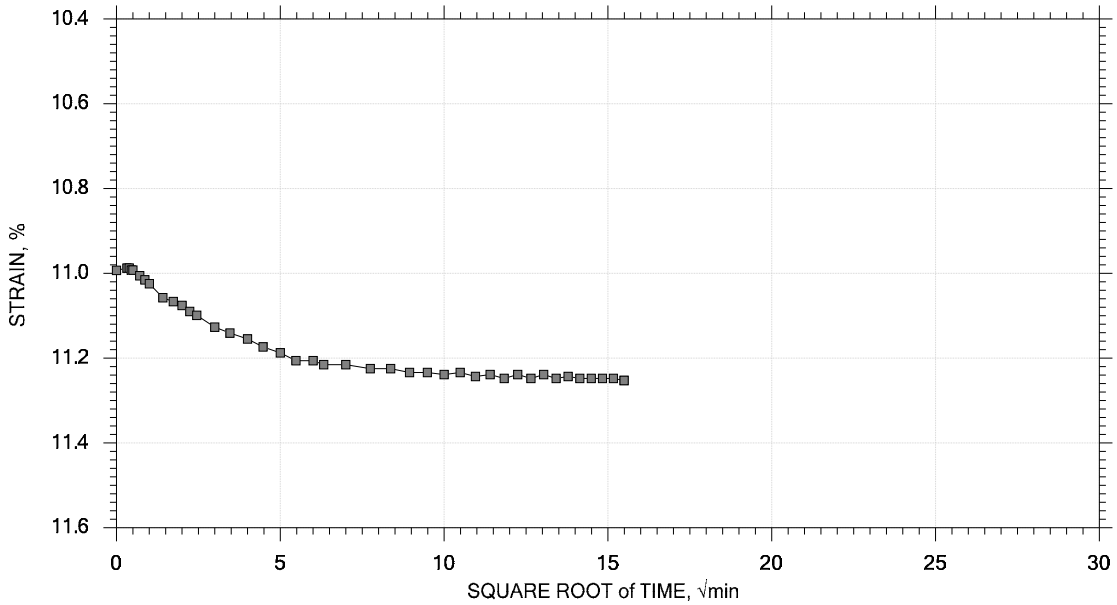
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 22

Stress: 0.5 tsf





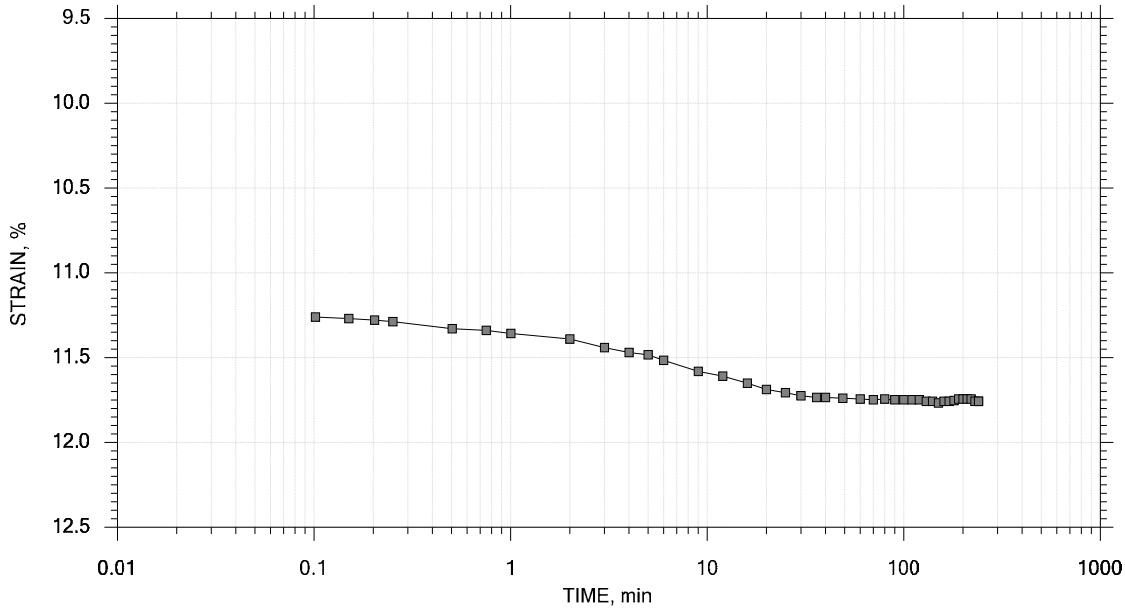
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

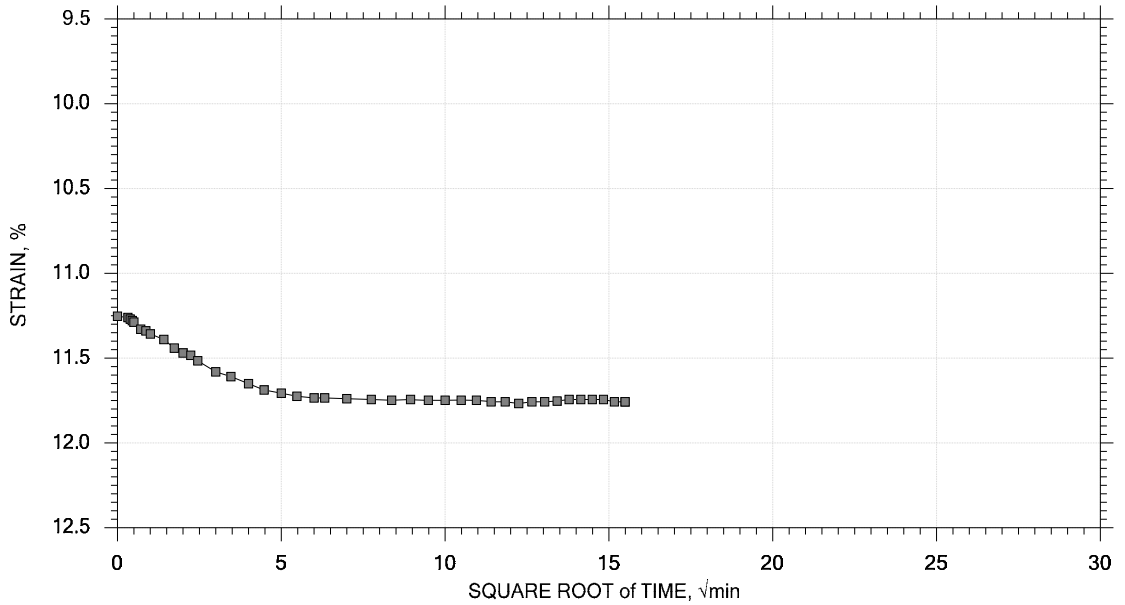
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 22

Stress: 1 tsf





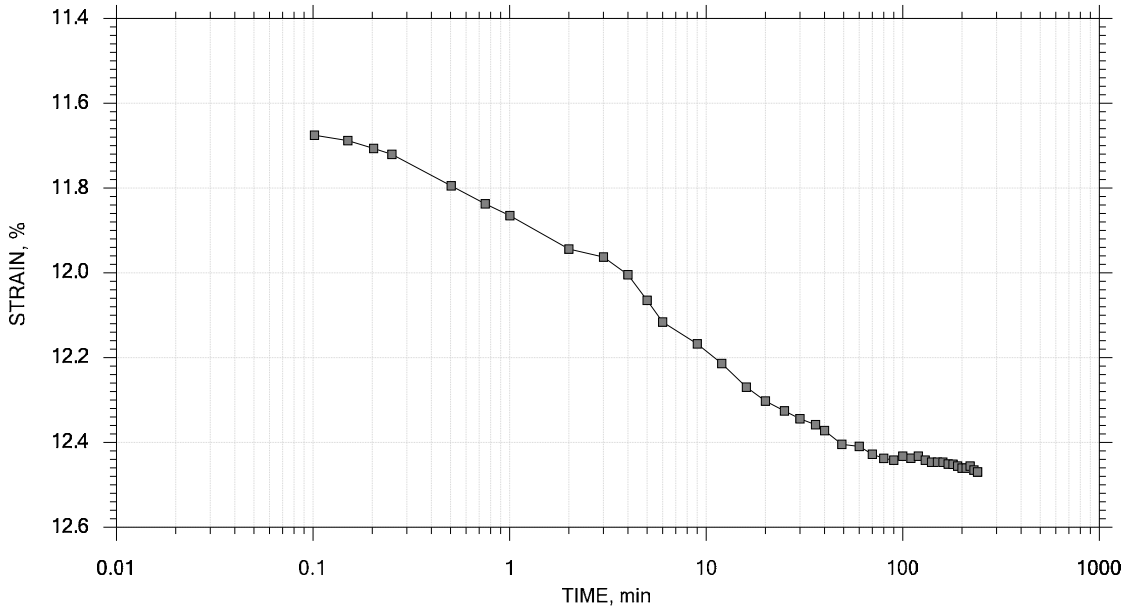
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

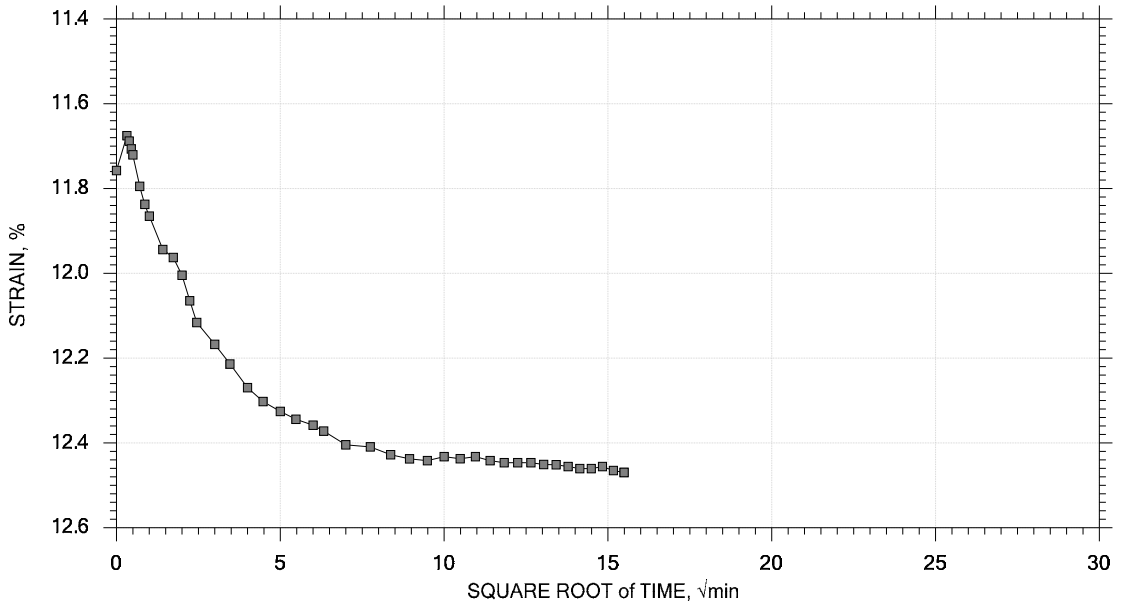
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 18 of 22

Stress: 2 tsf





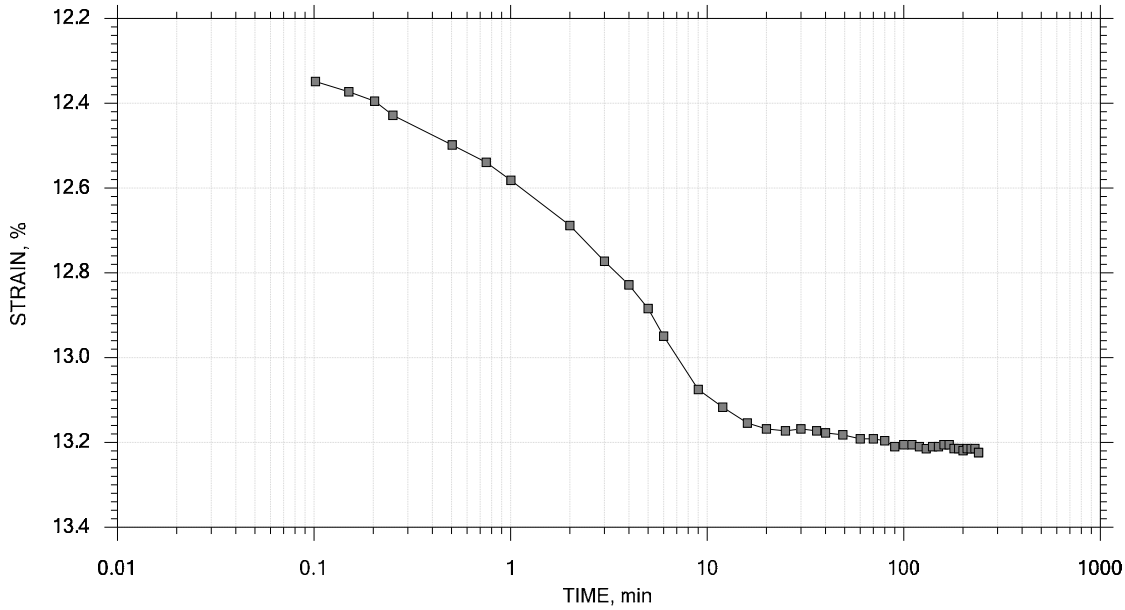
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

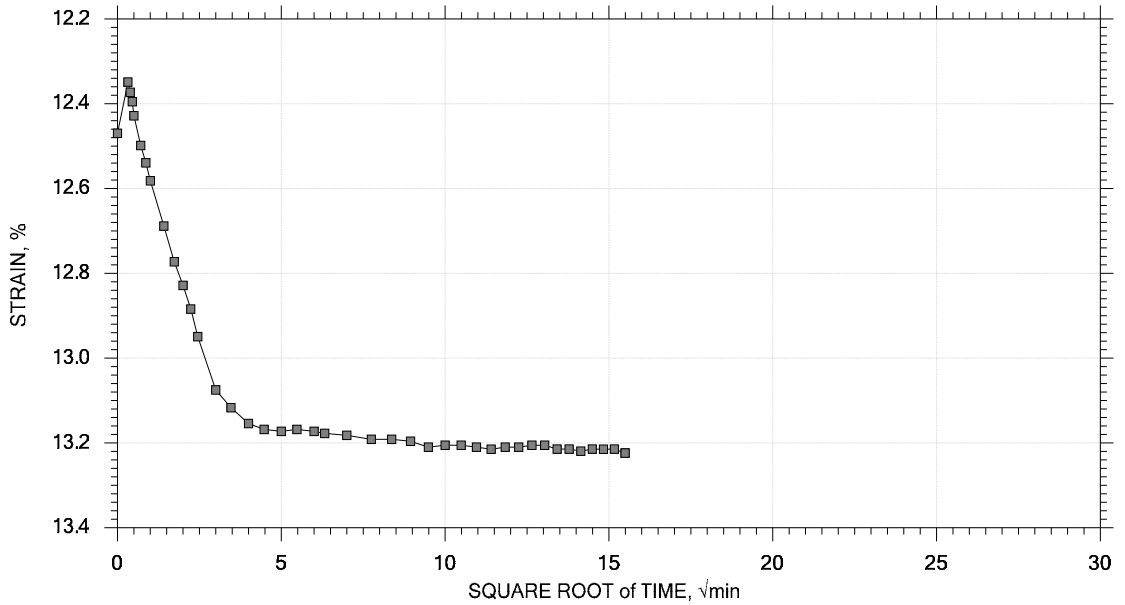
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 19 of 22

Stress: 4 tsf





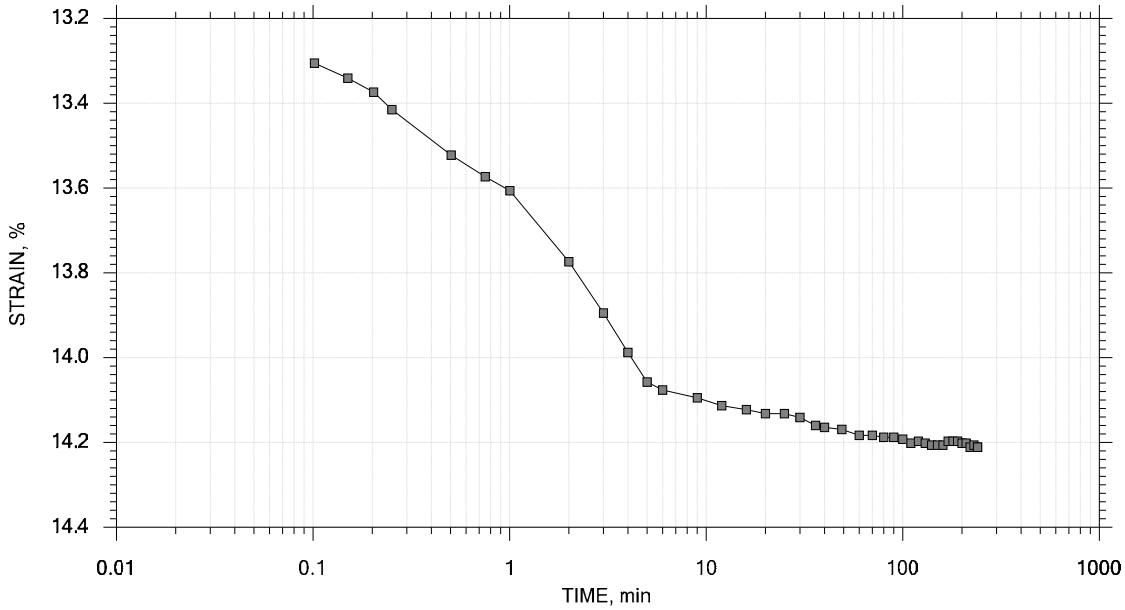
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

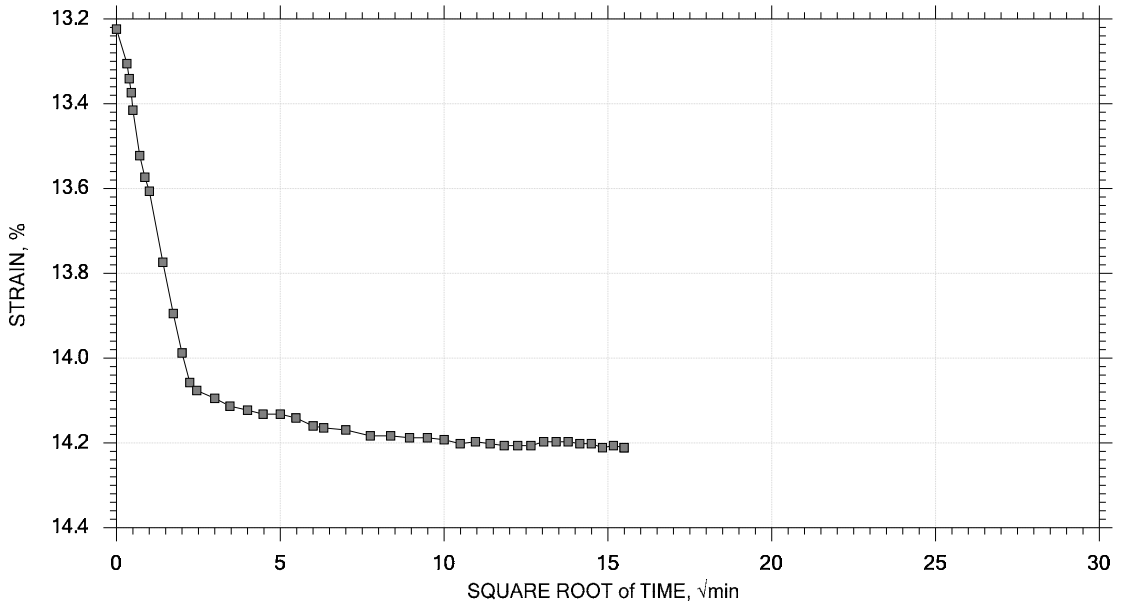
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 20 of 22

Stress: 8 tsf





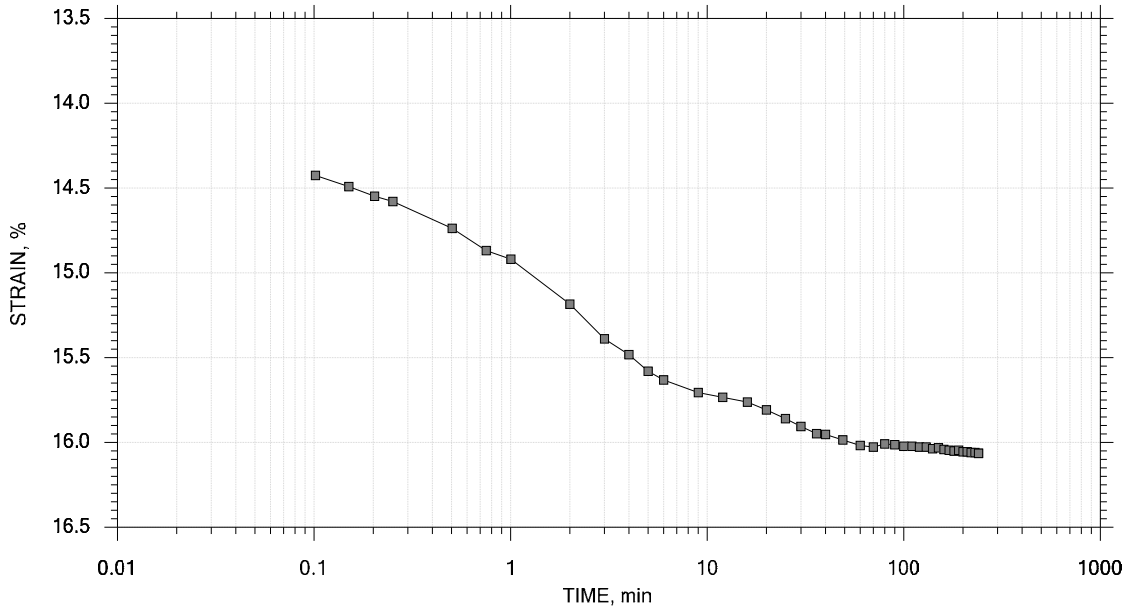
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

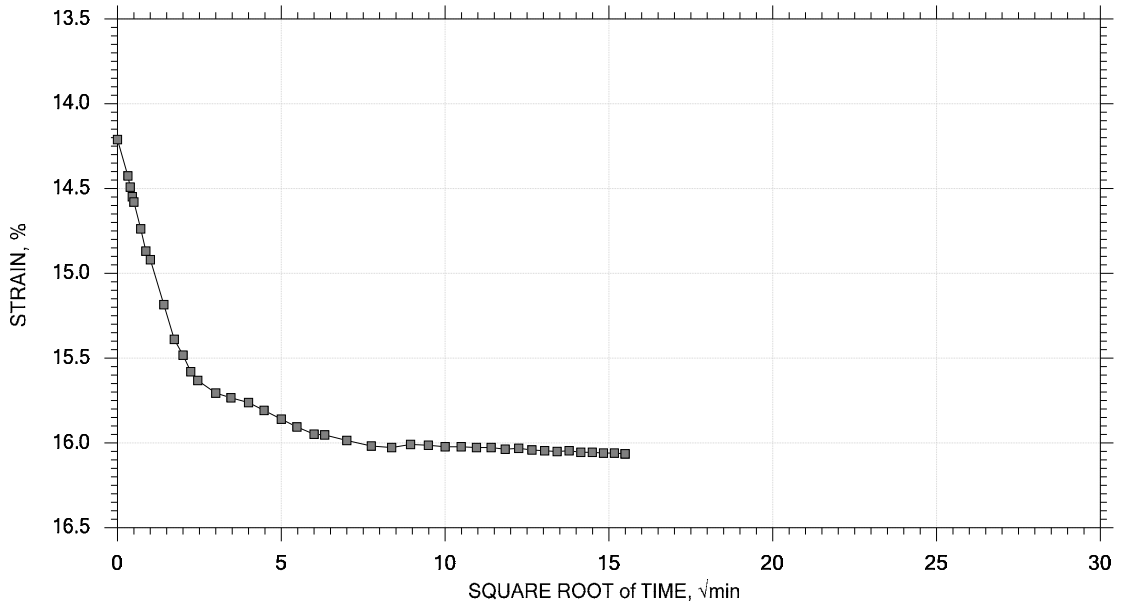
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 21 of 22

Stress: 16 tsf





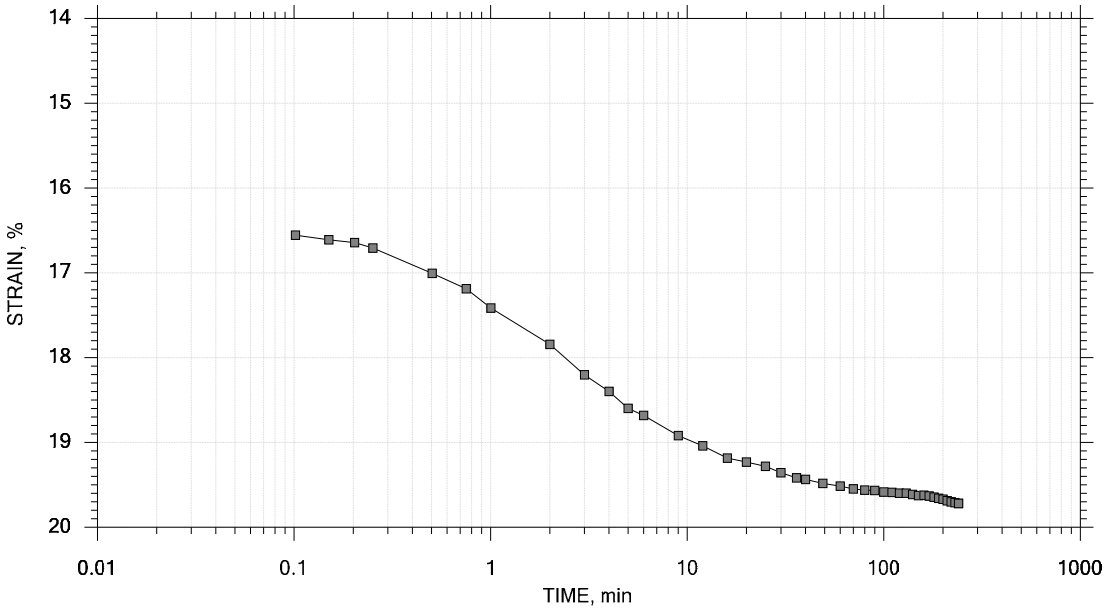
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

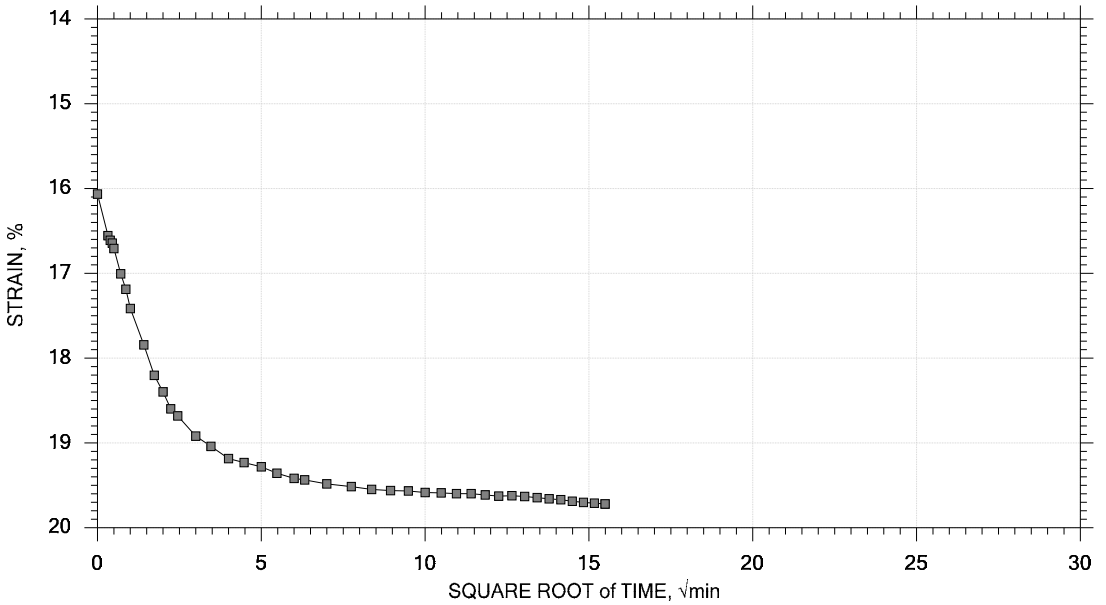
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 22 of 22

Stress: 32 tsf

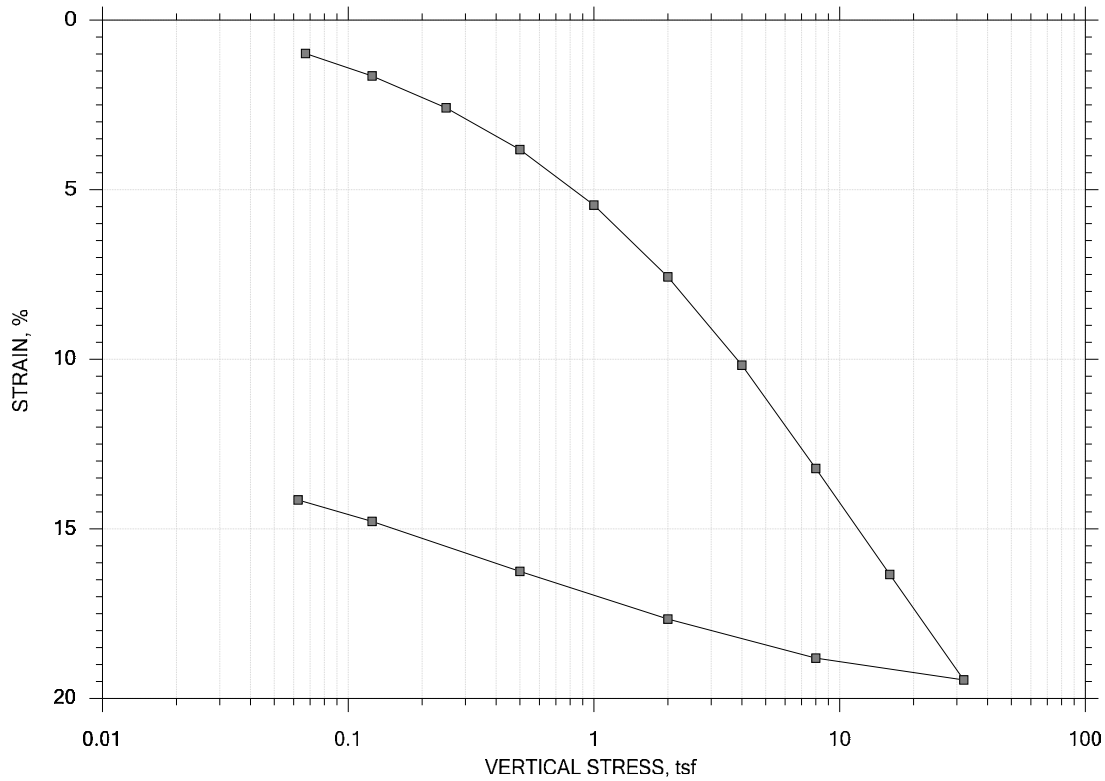


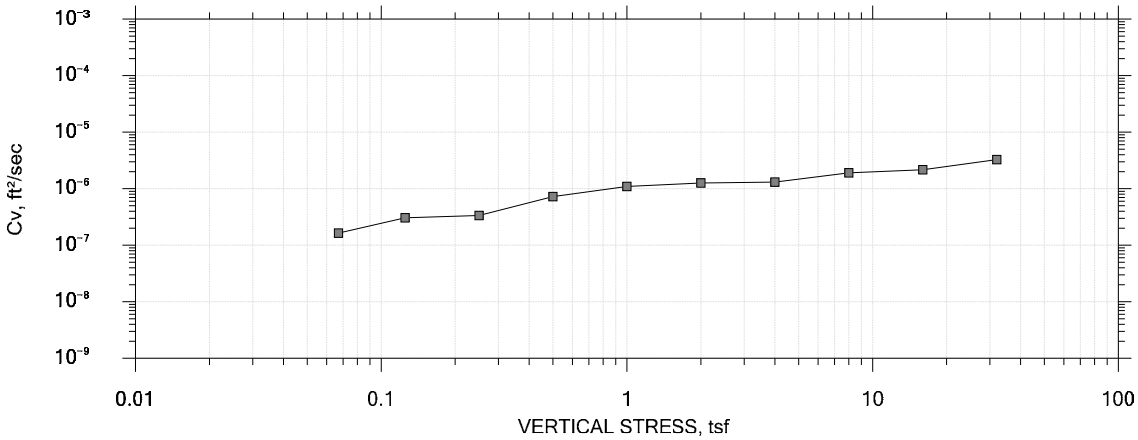


GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T2	Test Date: 06/09/15	Test No.: IP-3
	Depth: 21-23 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System X, Swell Pressure = 0.0894 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

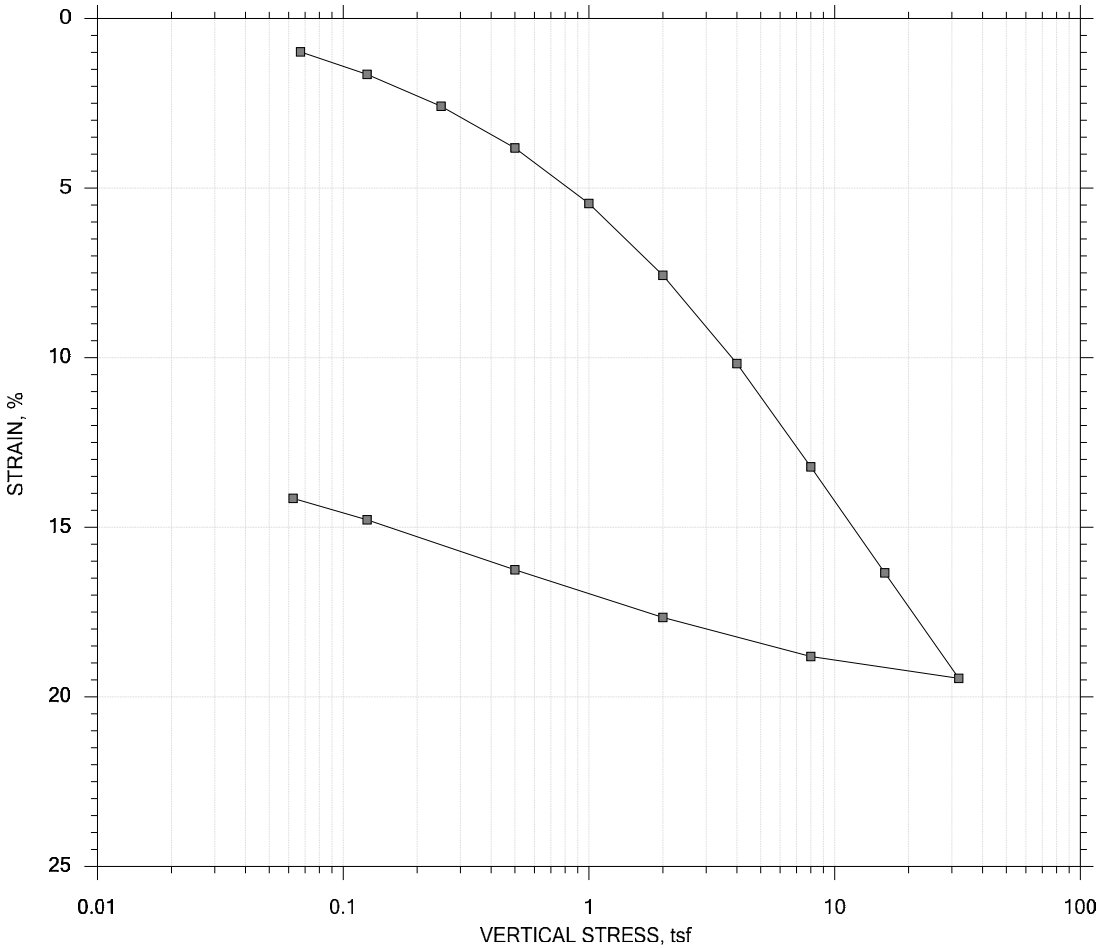




GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ----				Water Content, %	28.22	17.52
Preconsolidation Stress: ----				Dry Unit Weight, pcf	96.607	116.39
Compression Ratio: ----				Saturation, %	99.00	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.79	0.49
LL: ---	PL: ---	PI: ---	GS: 2.77			

GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Beverly Middle School
Boring No.: BH-101
Sample No.: T3
Test No.: IP-1

Location: Beverly, MA
Tested By: md
Test Date: 06/09/15
Sample Type: intact

Project No.: GTX-303278
Checked By: njh
Depth: 41-43 ft
Elevation: ---

Soil Description: Moist, gray clay
Remarks: System S, Swell Pressure = 0.0670 tsf

Estimated Specific Gravity: 2.77
Initial Void Ratio: 0.789
Final Void Ratio: 0.485

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.83 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	A-571	RING		A-526
Wt. Container + Wet Soil, gm	122.86	268.53	255.21	157.57
Wt. Container + Dry Soil, gm	99.090	233.40	233.40	135.34
Wt. Container, gm	8.3100	108.92	108.92	8.4600
Wt. Dry Soil, gm	90.780	124.48	124.48	126.88
Water Content, %	26.18	28.22	17.52	17.52
Void Ratio	---	0.789	0.485	---
Degree of Saturation, %	---	99.00	100.00	---
Dry Unit Weight, pcf	---	96.607	116.39	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Beverly Middle School
Boring No.: BH-101
Sample No.: T3
Test No.: IP-1

Location: Beverly, MA
Tested By: md
Test Date: 06/09/15
Sample Type: intact

Project No.: GTX-303278
Checked By: njh
Depth: 41-43 ft
Elevation: ---

Soil Description: Moist, gray clay
Remarks: System S, Swell Pressure = 0.0670 tsf

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.0670	0.009824	0.772	0.982	145.462	1.67e-007	1.47e-001	6.61e-005
2	0.125	0.01647	0.760	1.65	81.263	2.94e-007	1.15e-001	9.09e-005
3	0.250	0.02584	0.743	2.58	62.263	3.78e-007	7.50e-002	7.63e-005
4	0.500	0.03815	0.721	3.82	34.211	6.72e-007	4.92e-002	8.92e-005
5	1.00	0.05453	0.692	5.45	21.241	1.05e-006	3.28e-002	9.28e-005
6	2.00	0.07570	0.654	7.57	15.565	1.38e-006	2.12e-002	7.87e-005
7	4.00	0.1017	0.607	10.2	13.753	1.48e-006	1.30e-002	5.20e-005
8	8.00	0.1322	0.553	13.2	9.259	2.07e-006	7.61e-003	4.24e-005
9	16.0	0.1634	0.497	16.3	7.364	2.42e-006	3.91e-003	2.55e-005
10	32.0	0.1945	0.441	19.5	4.293	3.85e-006	1.94e-003	2.02e-005
11	8.00	0.1881	0.453	18.8	0.402	3.99e-005	2.67e-004	2.87e-005
12	2.00	0.1766	0.473	17.7	2.102	7.80e-006	1.92e-003	4.04e-005
13	0.500	0.1625	0.499	16.3	37.506	4.51e-007	9.38e-003	1.14e-005
14	0.125	0.1478	0.525	14.8	102.135	1.71e-007	3.93e-002	1.82e-005
15	0.0625	0.1414	0.536	14.1	184.260	9.74e-008	1.01e-001	2.66e-005

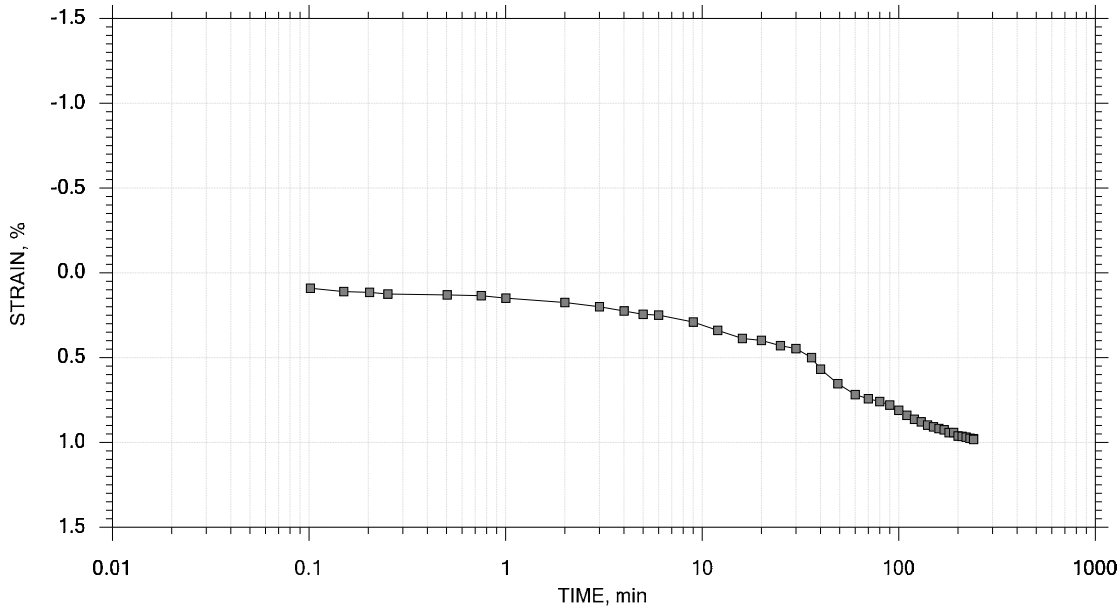
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.0670	0.009824	0.772	0.982	32.097	1.76e-007	1.47e-001	6.96e-005	0.00e+000
2	0.125	0.01647	0.760	1.65	15.628	3.55e-007	1.15e-001	1.10e-004	0.00e+000
3	0.250	0.02584	0.743	2.58	0.000	0.00e+000	7.50e-002	0.00e+000	0.00e+000
4	0.500	0.03815	0.721	3.82	6.946	7.69e-007	4.92e-002	1.02e-004	0.00e+000
5	1.00	0.05453	0.692	5.45	0.000	0.00e+000	3.28e-002	0.00e+000	0.00e+000
6	2.00	0.07570	0.654	7.57	4.448	1.12e-006	2.12e-002	6.40e-005	0.00e+000
7	4.00	0.1017	0.607	10.2	3.828	1.24e-006	1.30e-002	4.34e-005	0.00e+000
8	8.00	0.1322	0.553	13.2	2.457	1.81e-006	7.61e-003	3.71e-005	0.00e+000
9	16.0	0.1634	0.497	16.3	2.090	1.98e-006	3.91e-003	2.09e-005	0.00e+000
10	32.0	0.1945	0.441	19.5	1.304	2.95e-006	1.94e-003	1.54e-005	0.00e+000
11	8.00	0.1881	0.453	18.8	0.000	0.00e+000	2.67e-004	0.00e+000	0.00e+000
12	2.00	0.1766	0.473	17.7	0.000	0.00e+000	1.92e-003	0.00e+000	0.00e+000
13	0.500	0.1625	0.499	16.3	0.000	0.00e+000	9.38e-003	0.00e+000	0.00e+000
14	0.125	0.1478	0.525	14.8	0.000	0.00e+000	3.93e-002	0.00e+000	0.00e+000
15	0.0625	0.1414	0.536	14.1	0.000	0.00e+000	1.01e-001	0.00e+000	0.00e+000

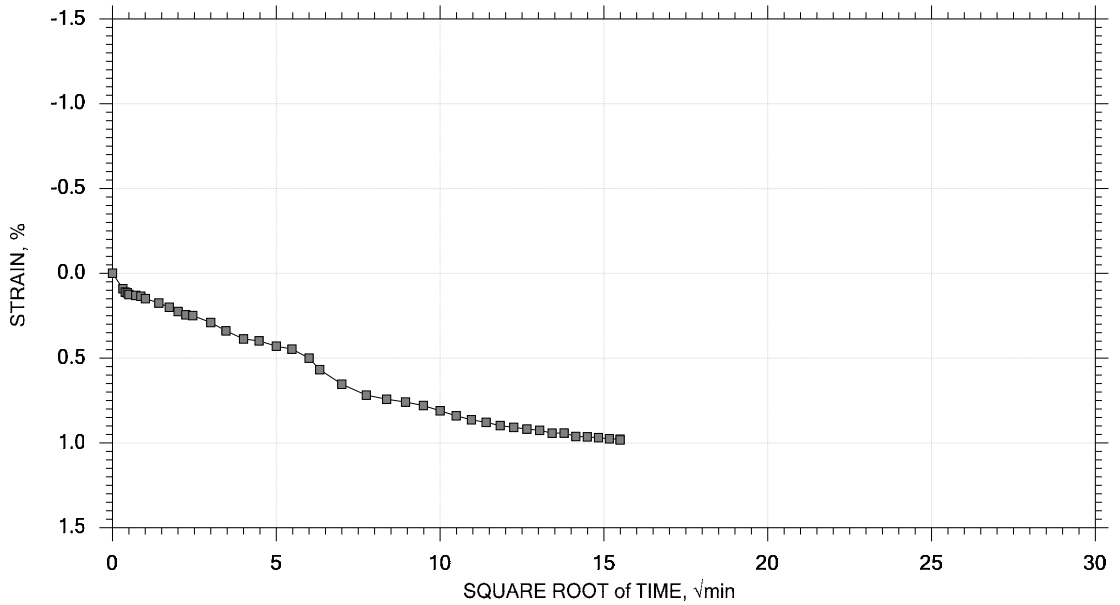
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 15

Stress: 0.066973 tsf





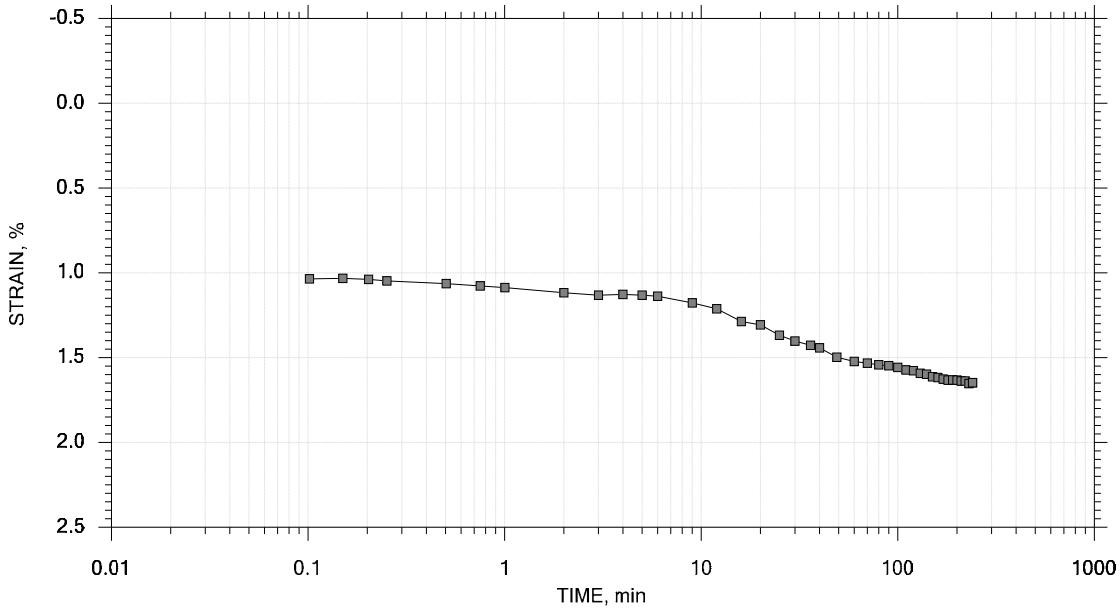
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

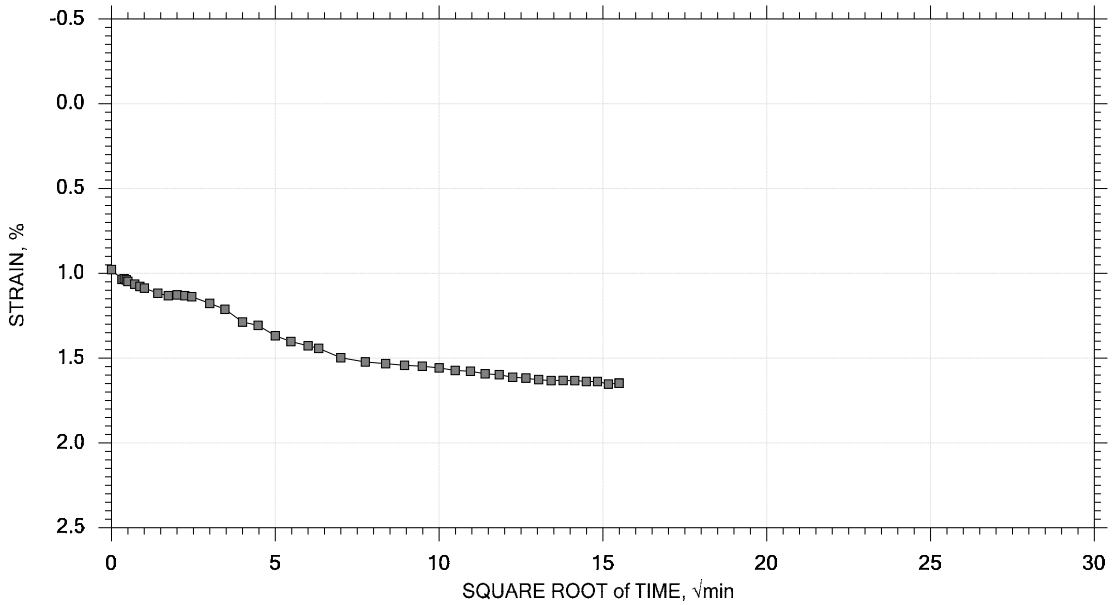
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 0.125 tsf





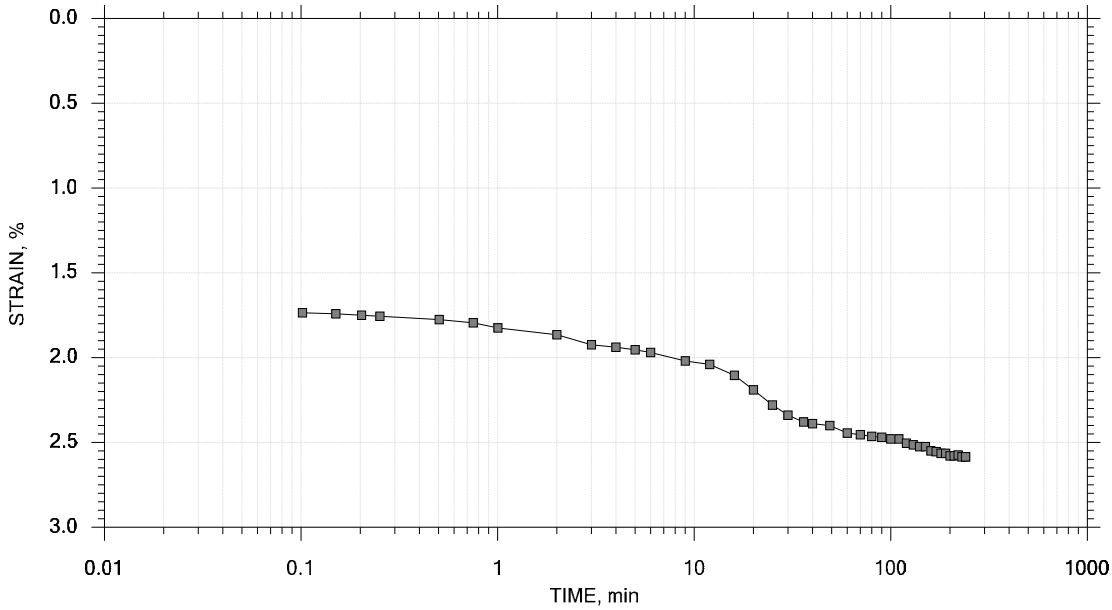
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

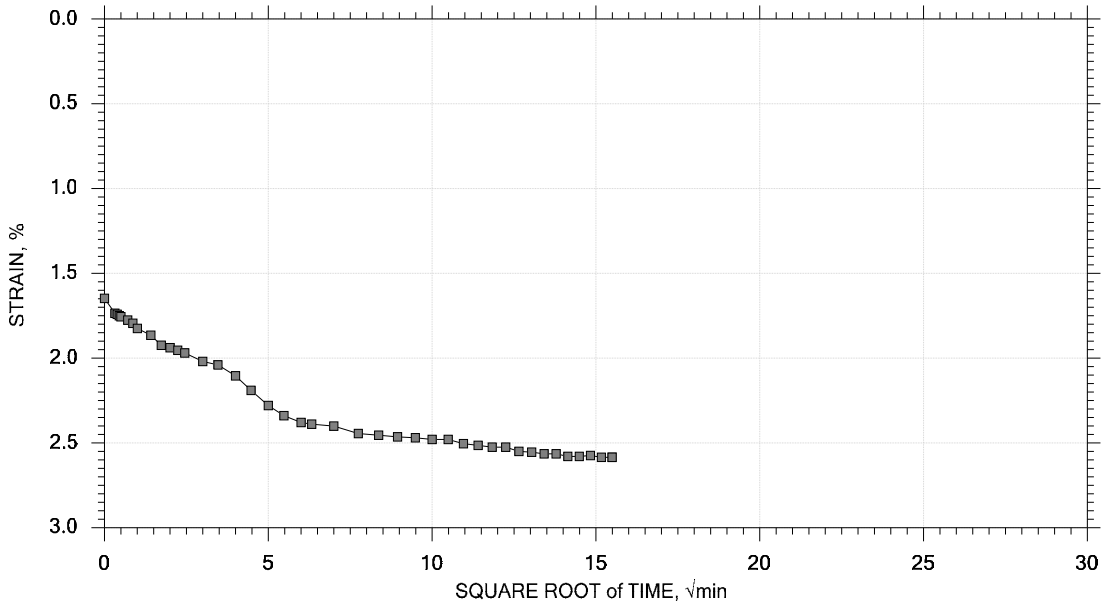
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 0.25 tsf





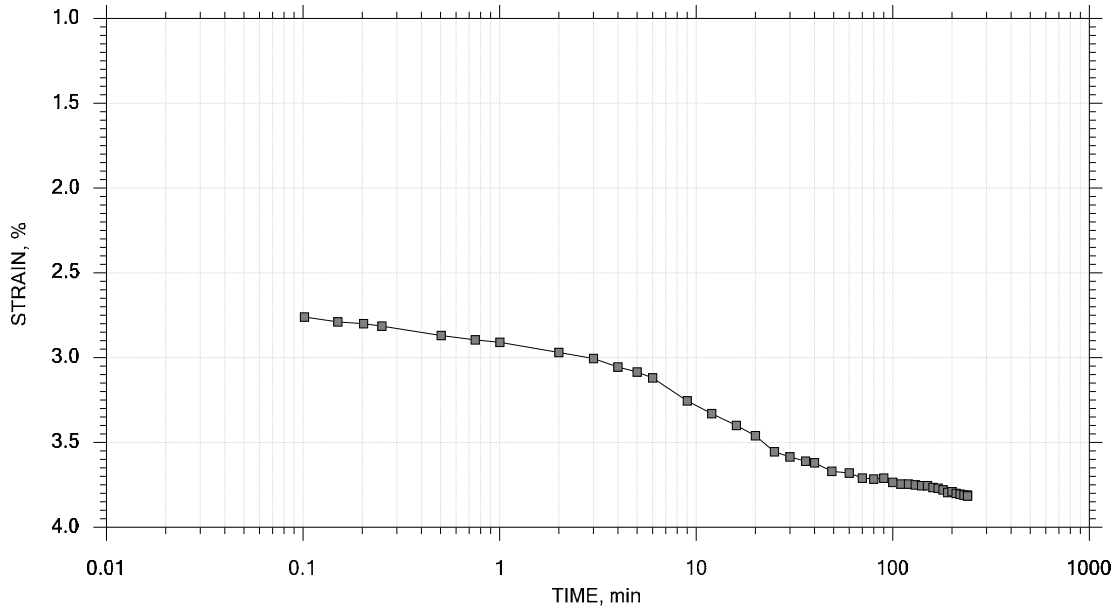
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

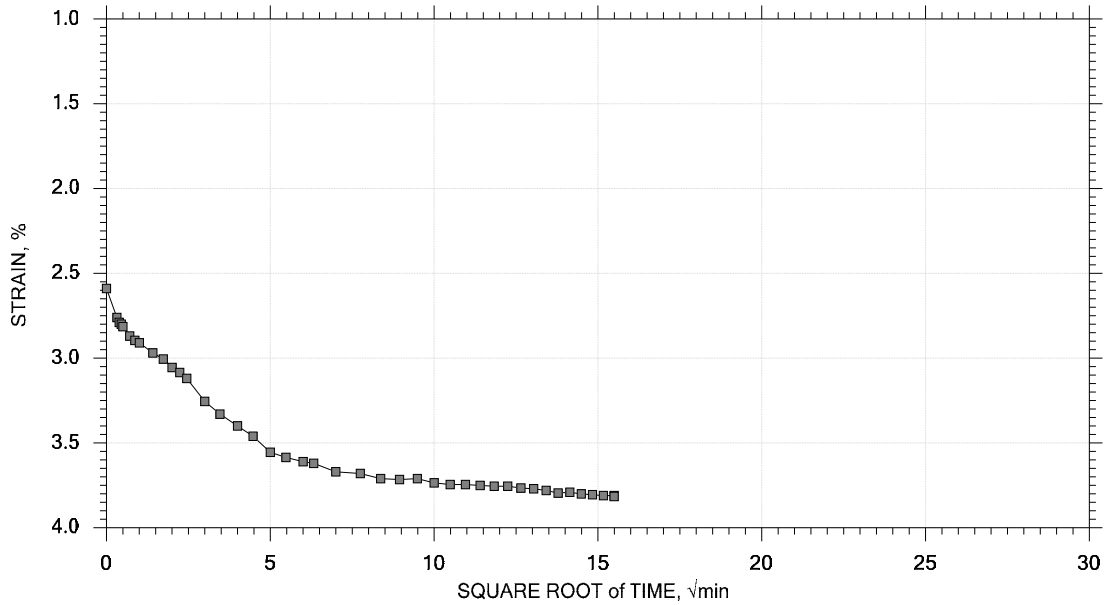
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 0.5 tsf





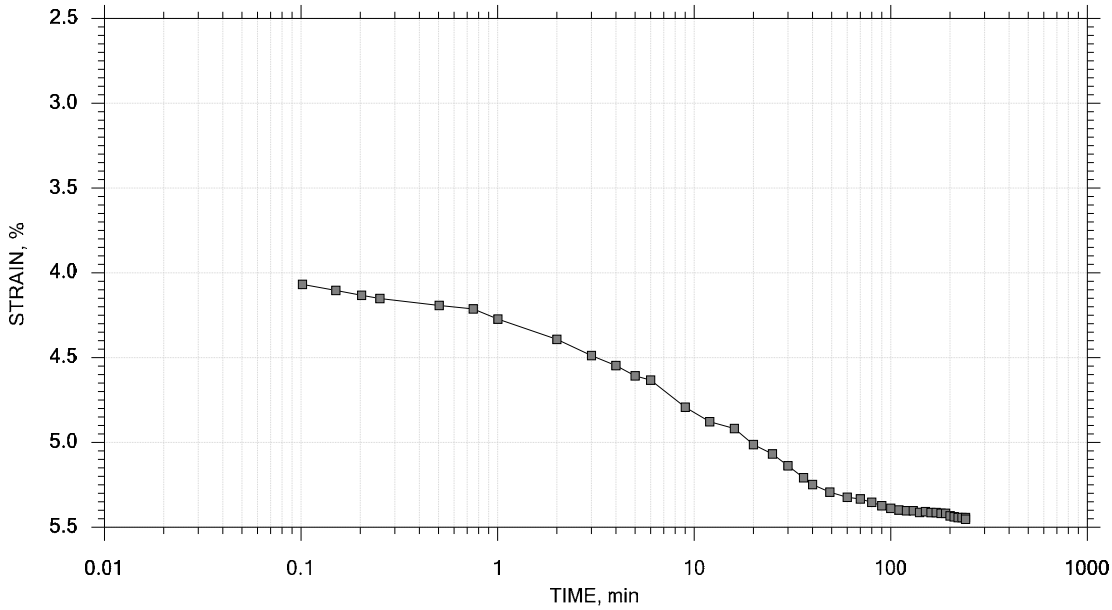
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

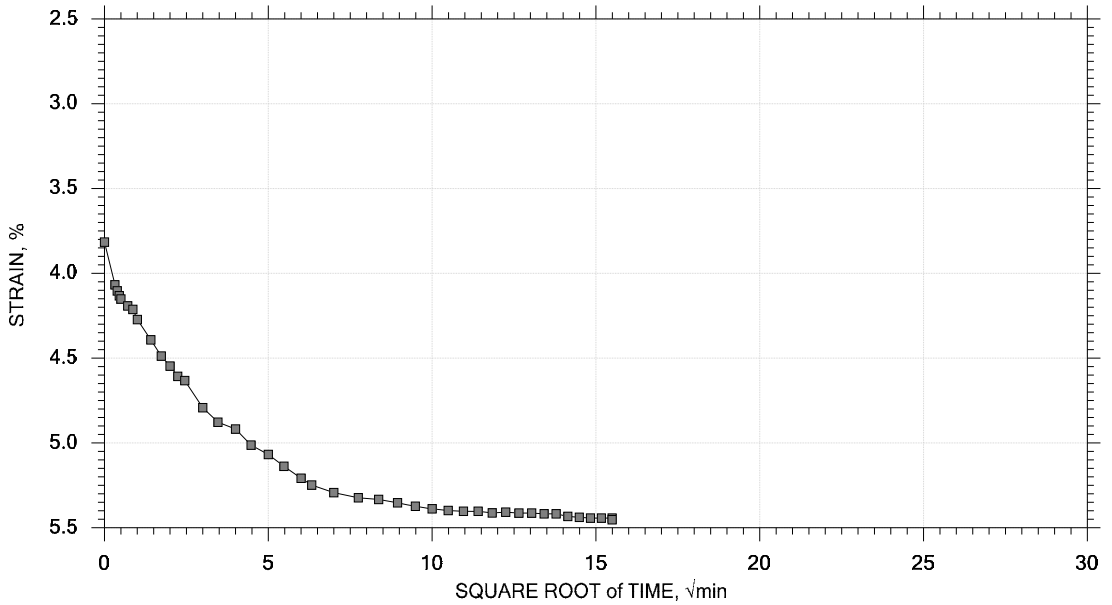
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 1 tsf





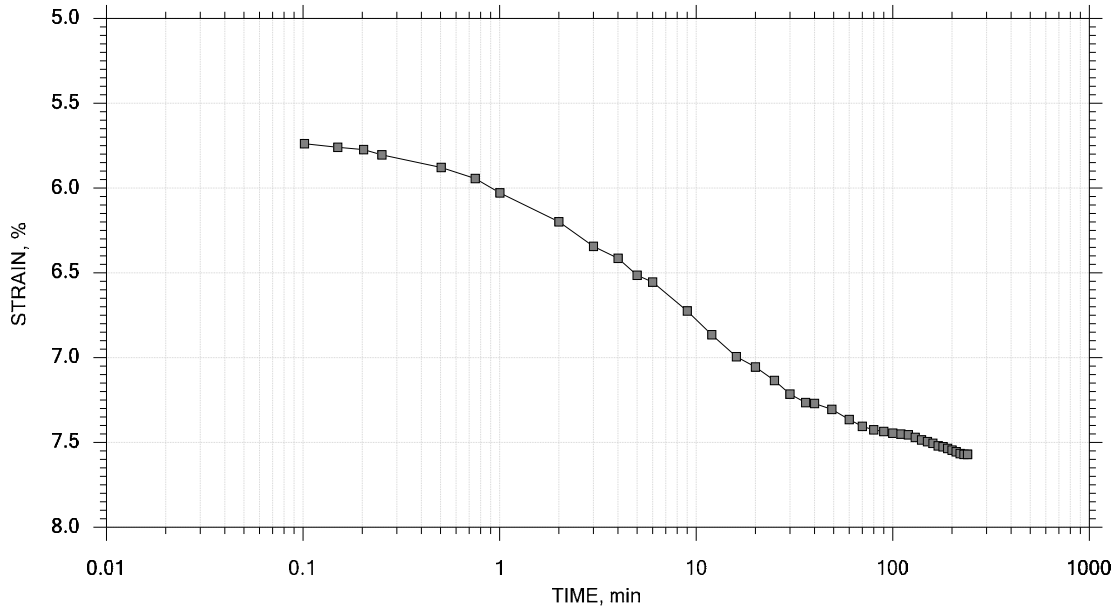
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

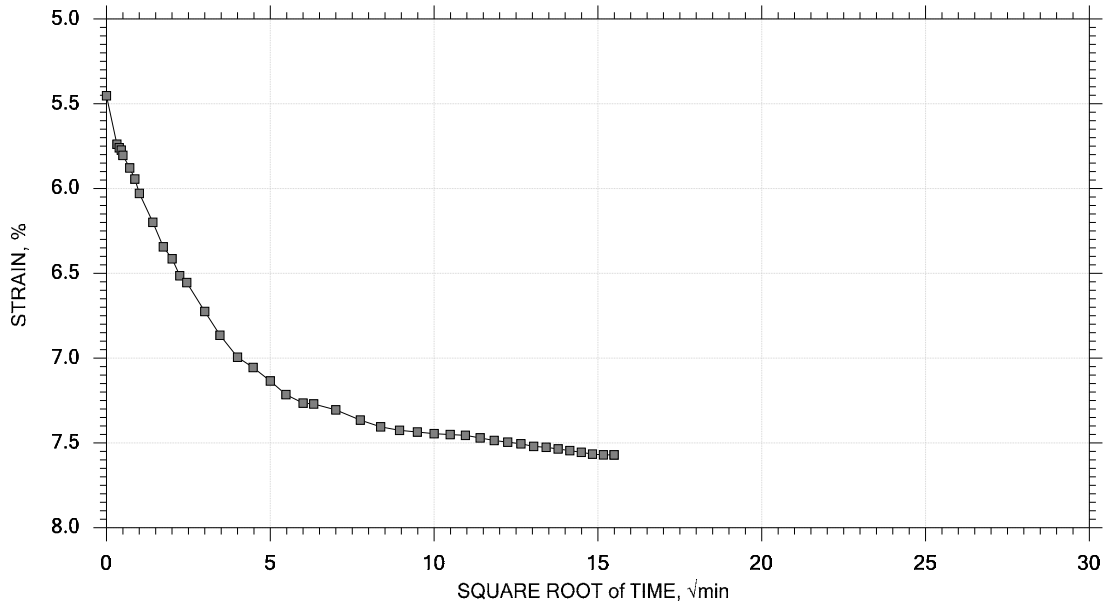
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 2 tsf





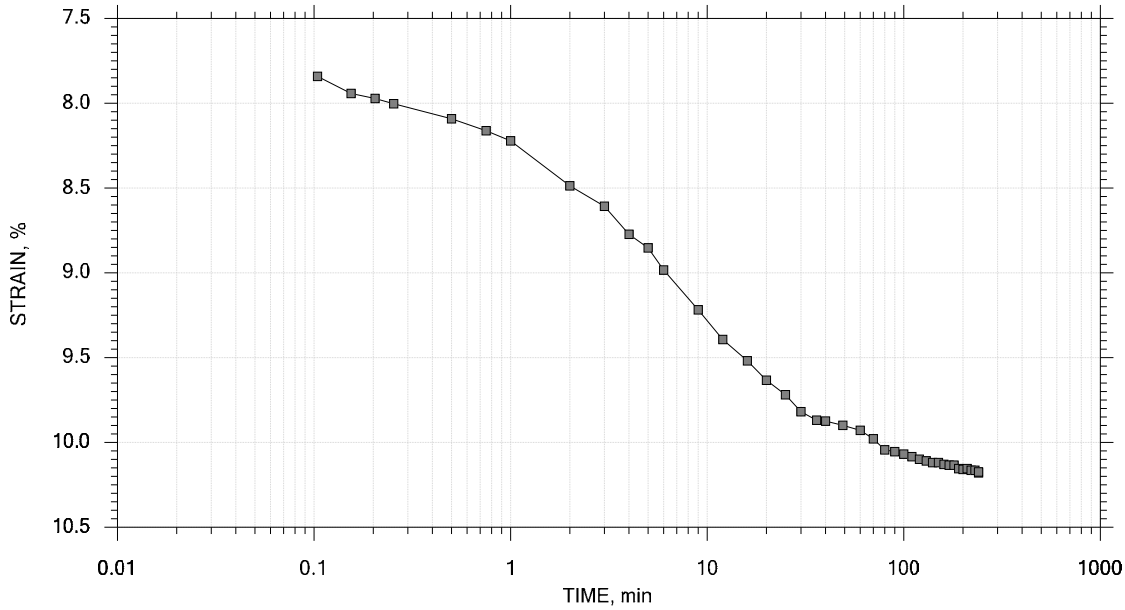
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

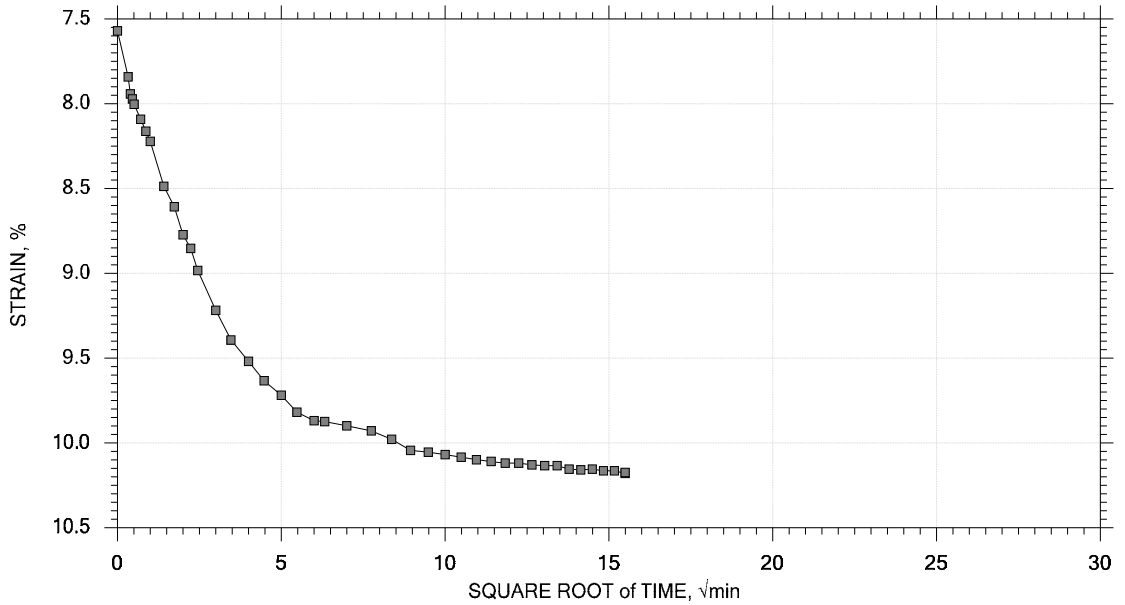
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4 tsf





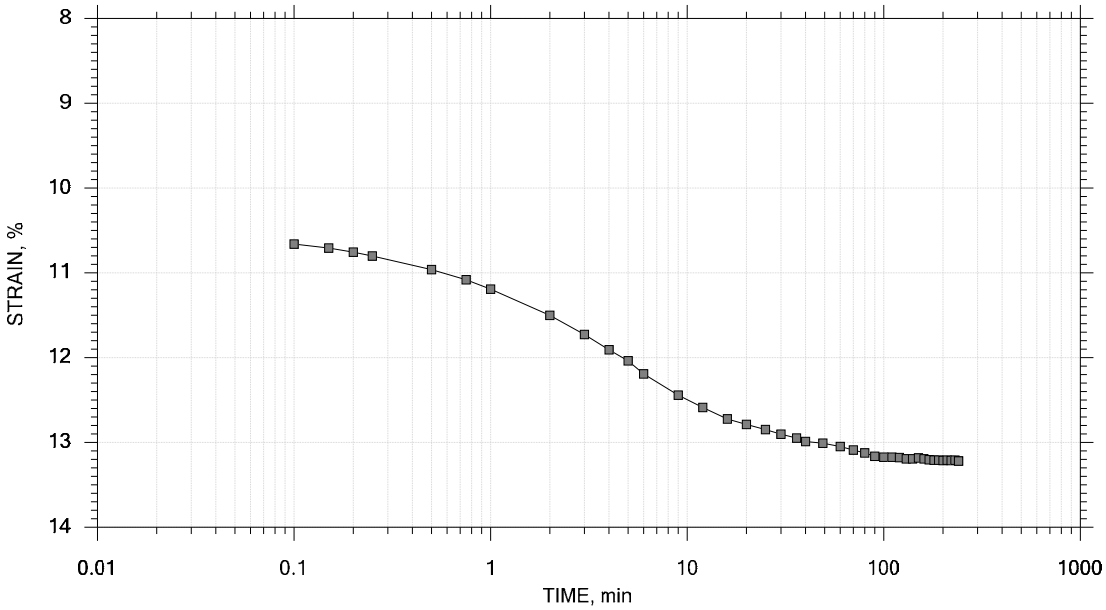
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

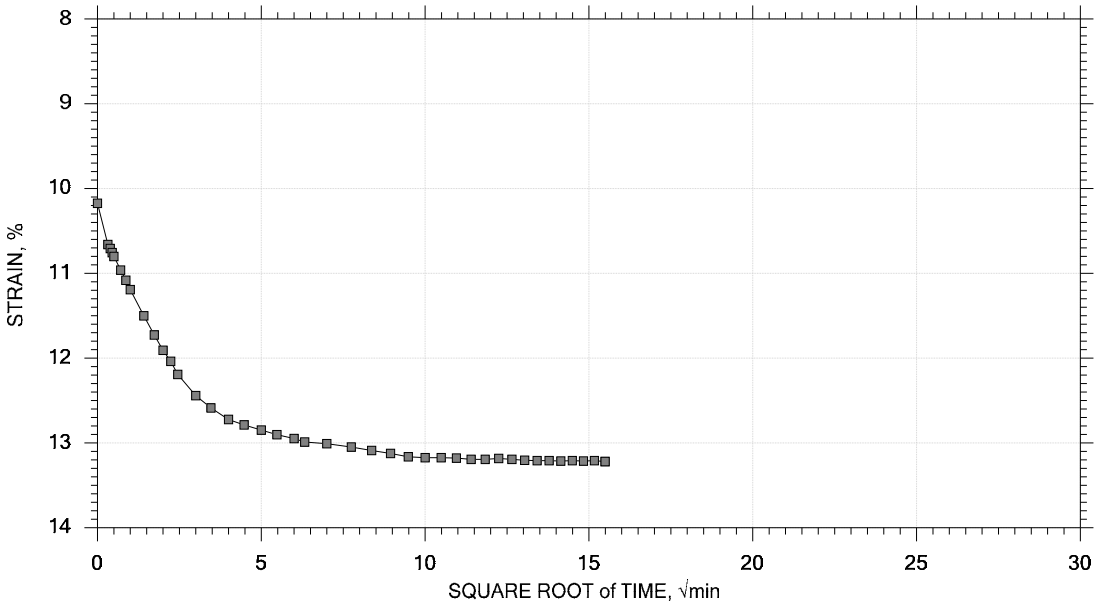
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 8 tsf





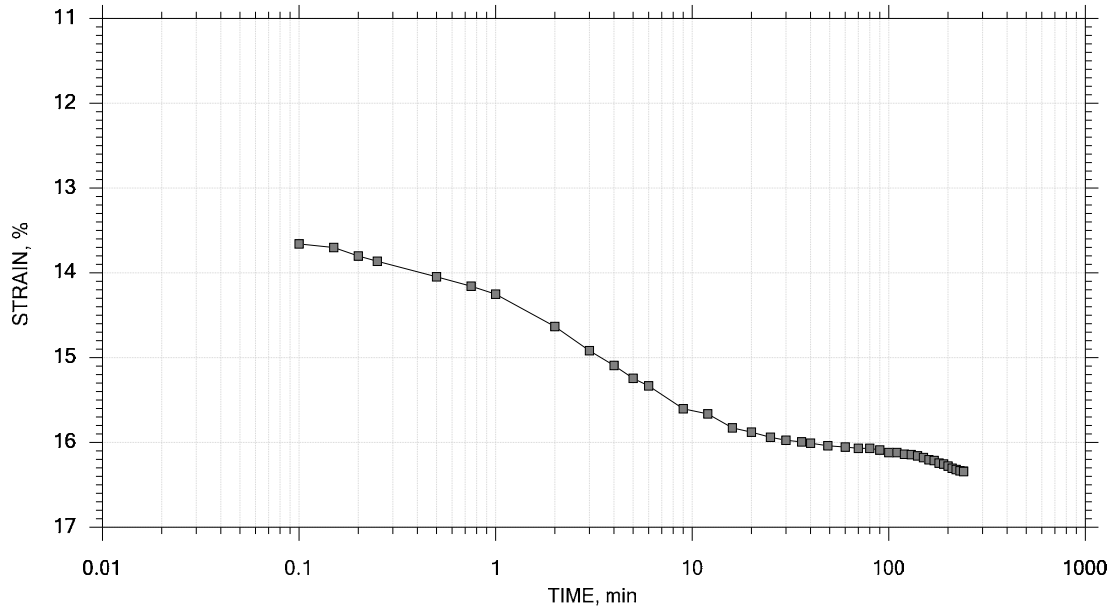
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

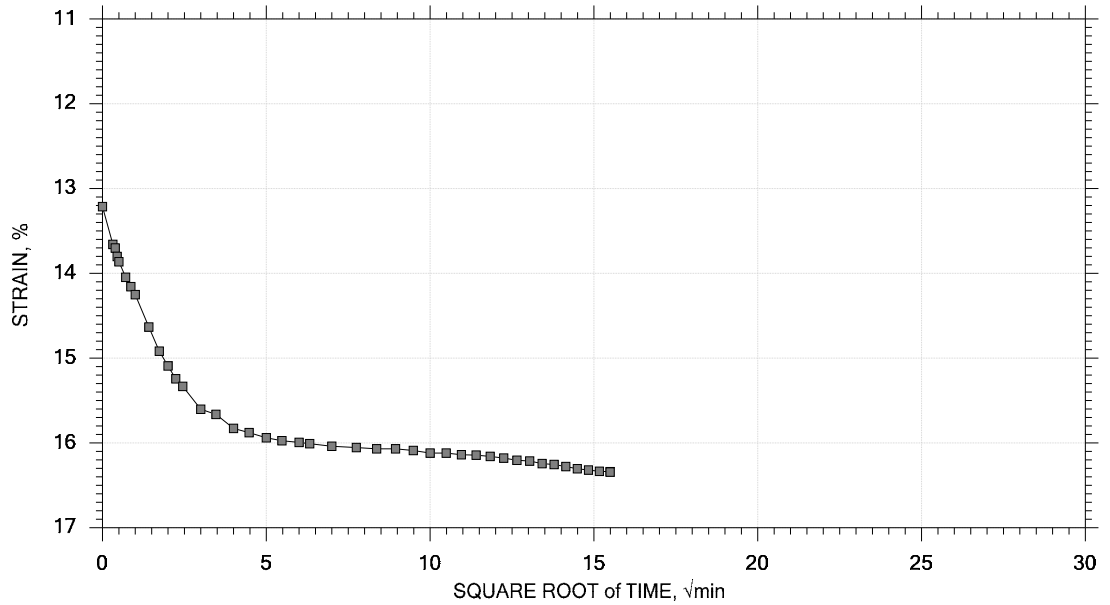
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 16 tsf





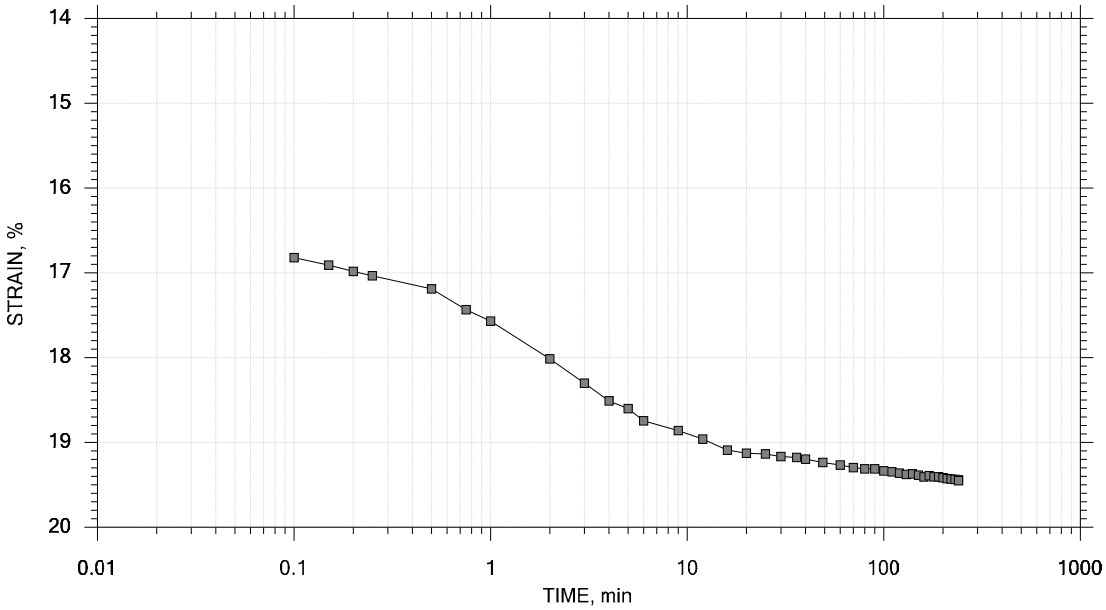
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

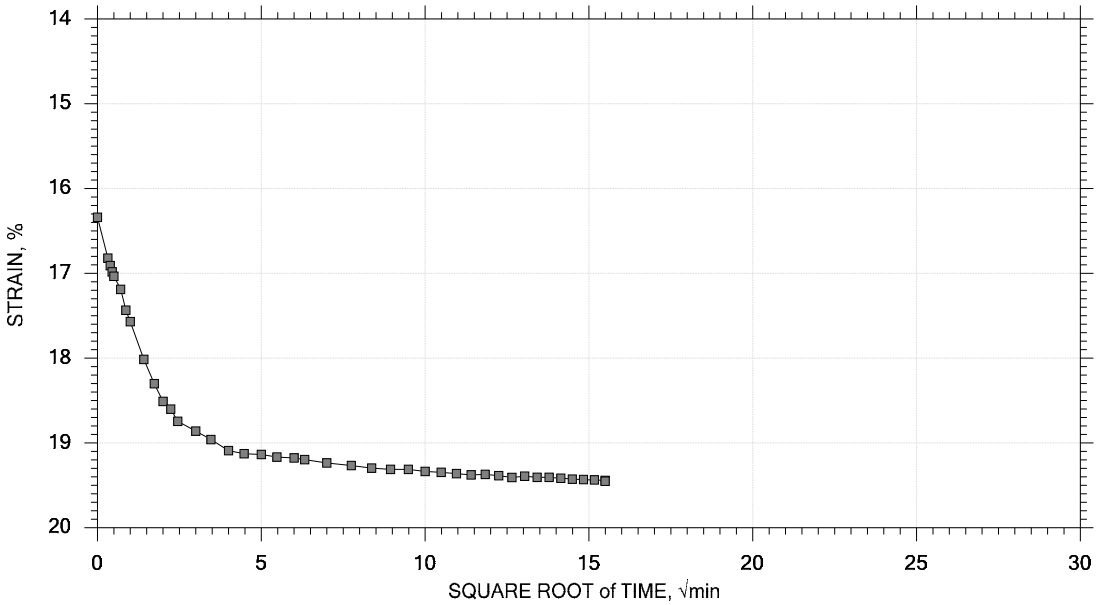
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 15

Stress: 32 tsf





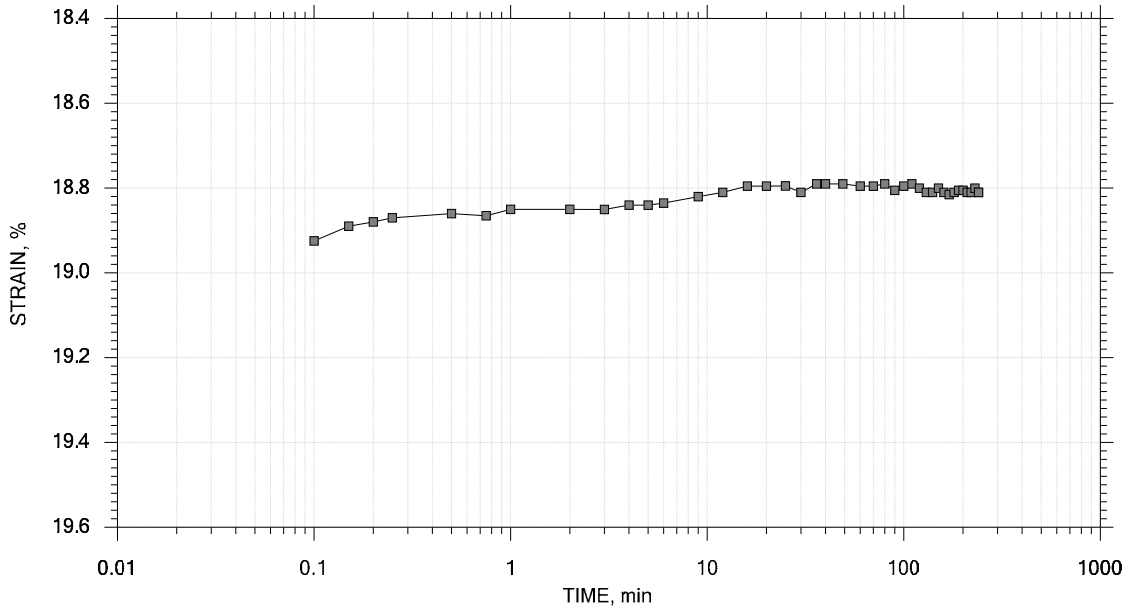
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

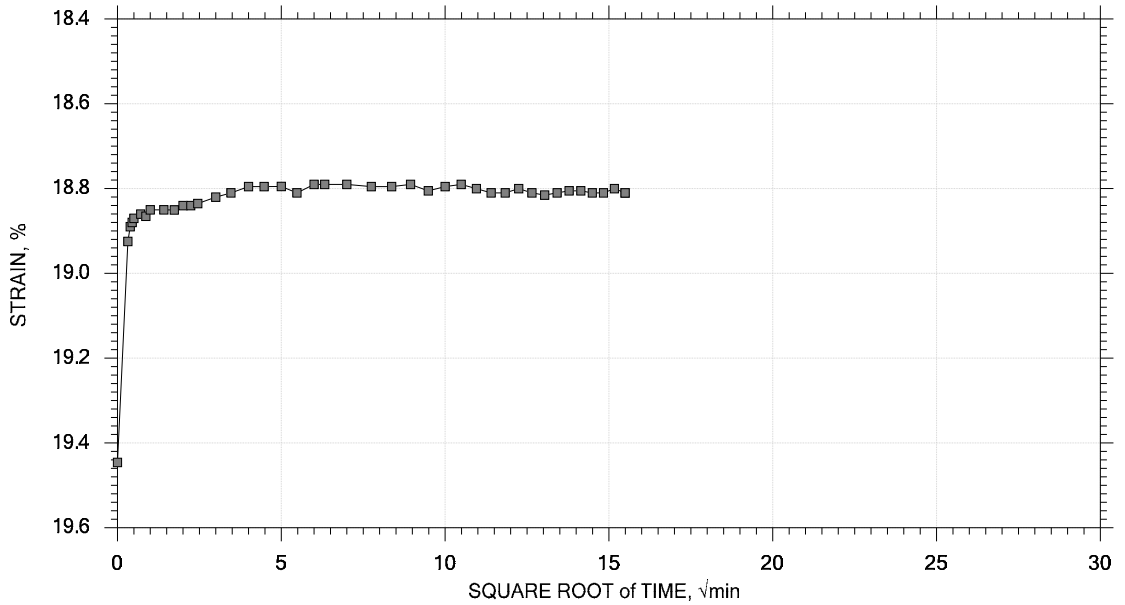
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 8 tsf





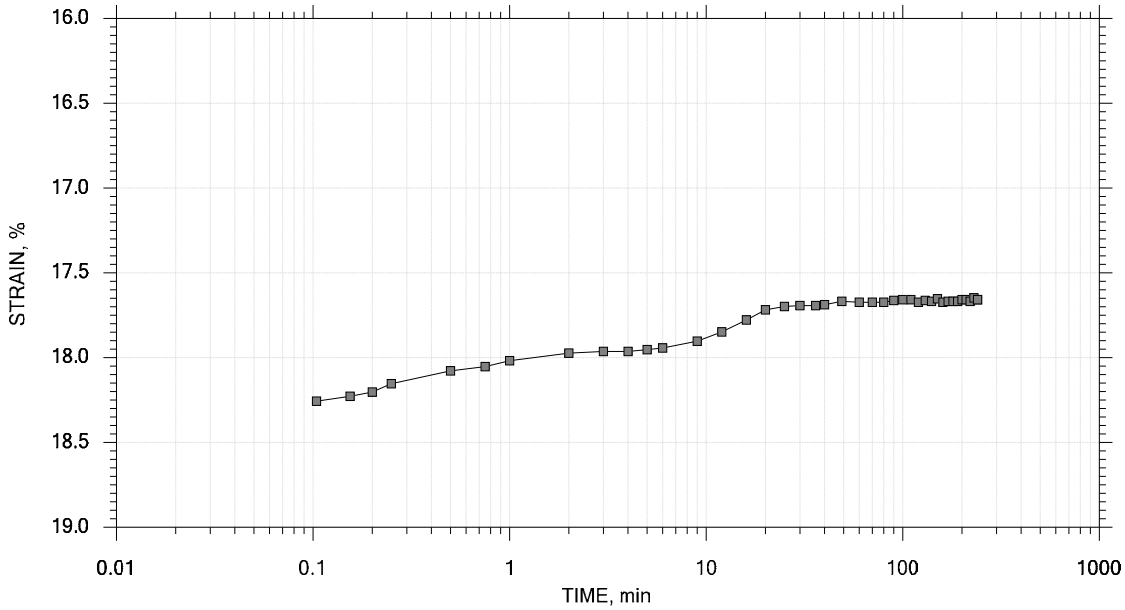
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

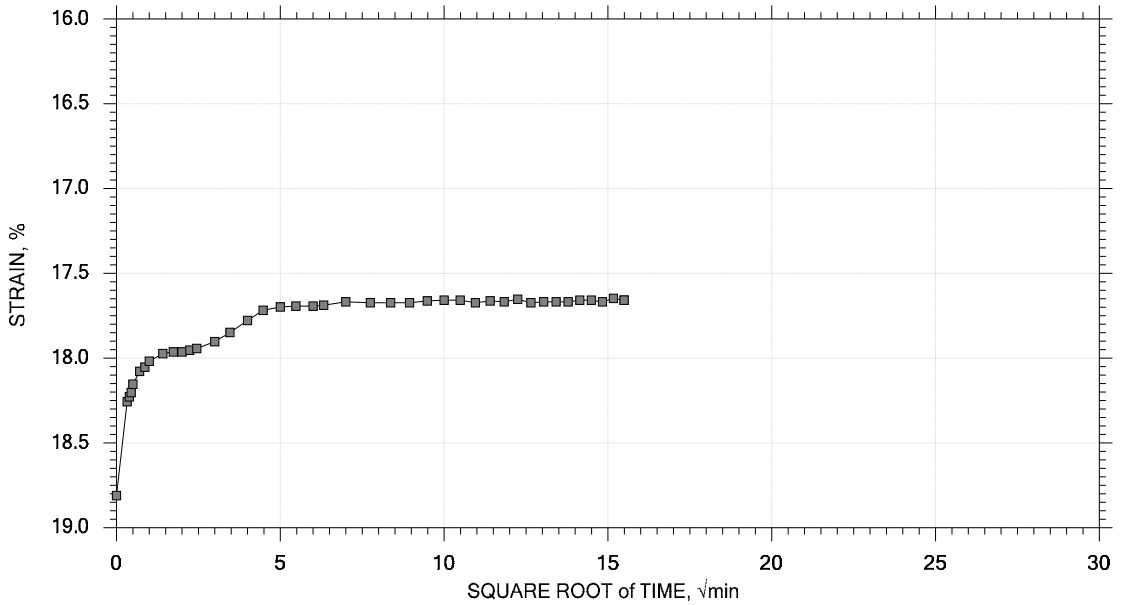
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2 tsf





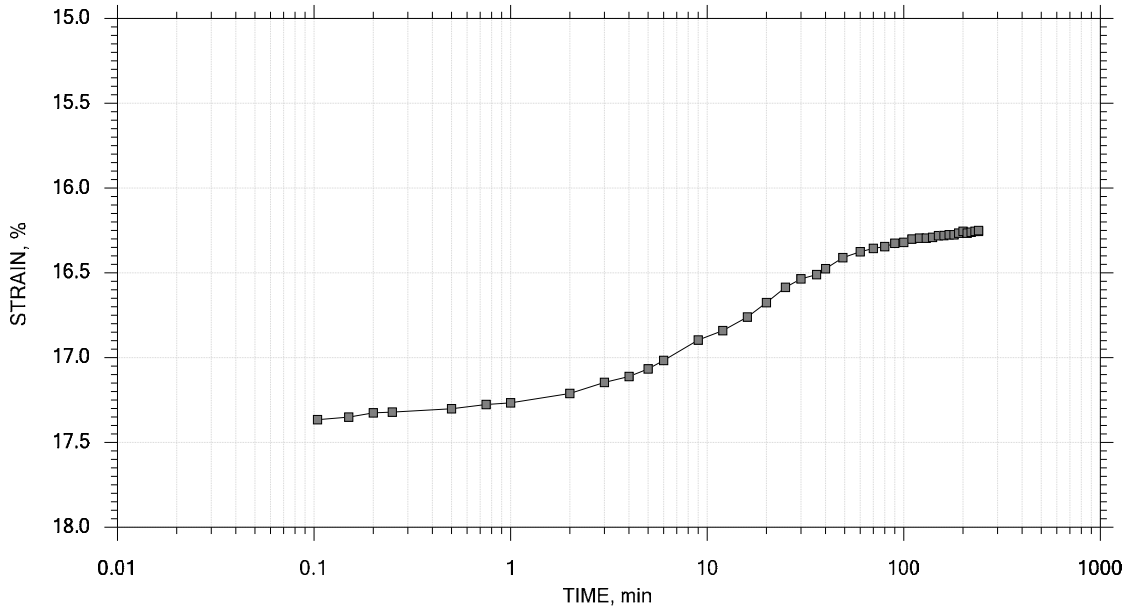
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

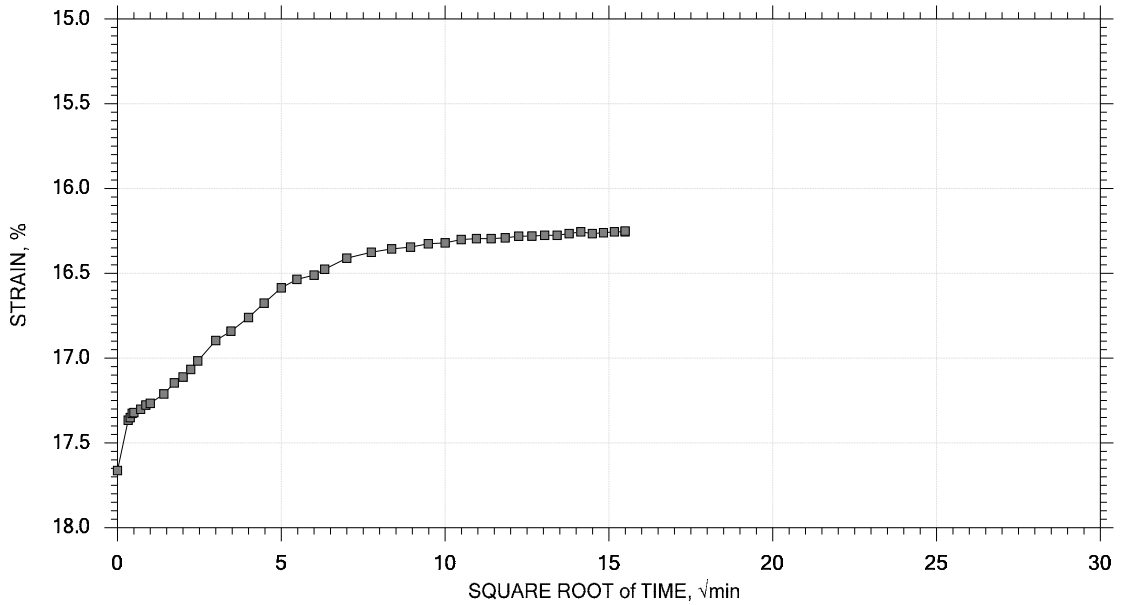
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 0.5 tsf





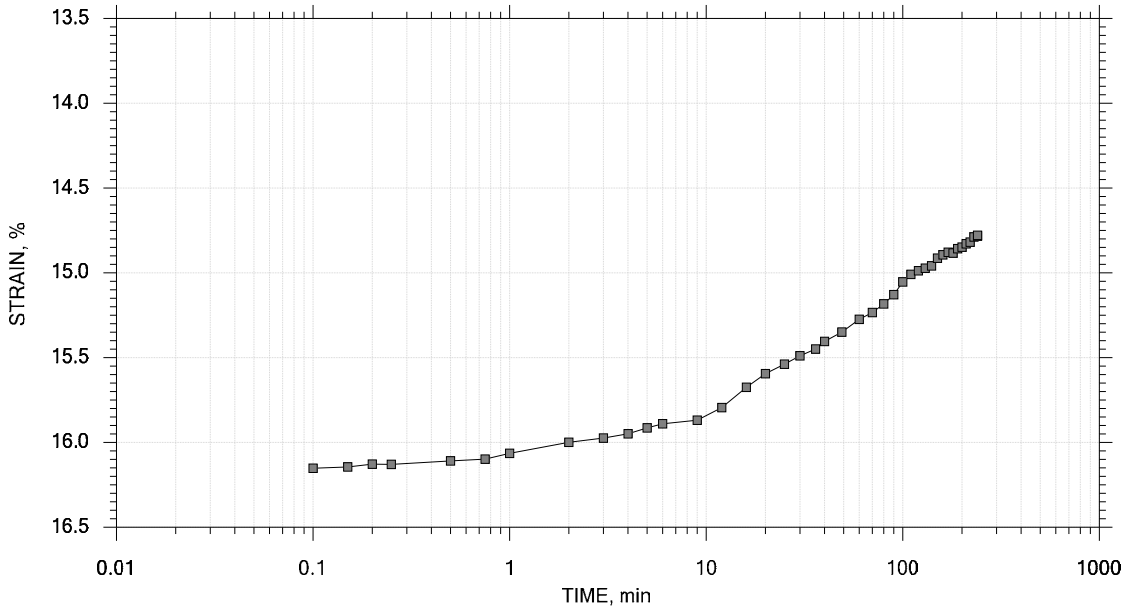
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

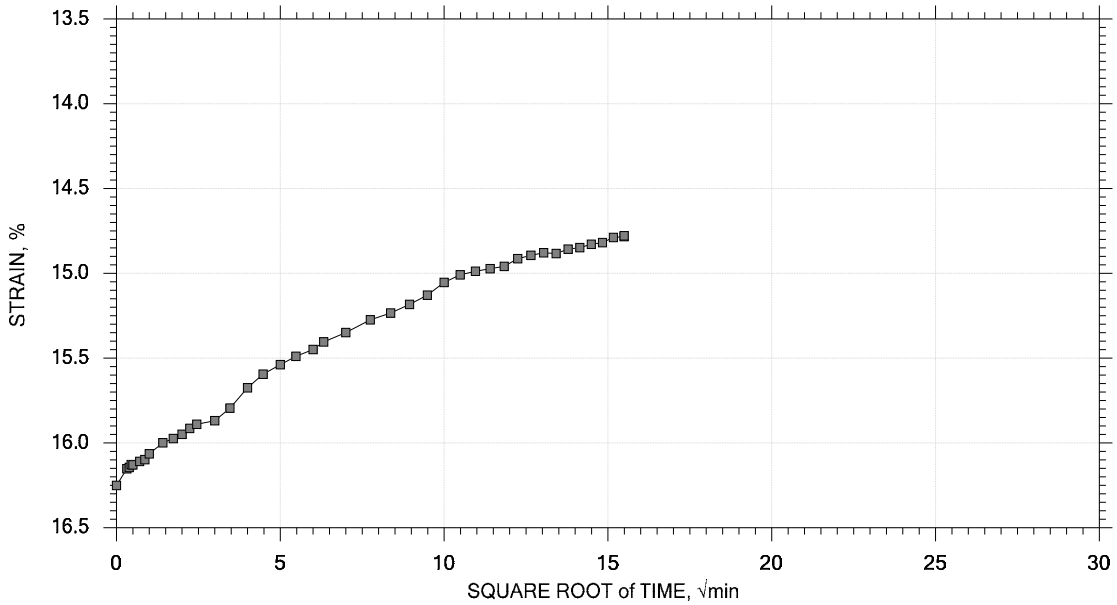
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 0.125 tsf





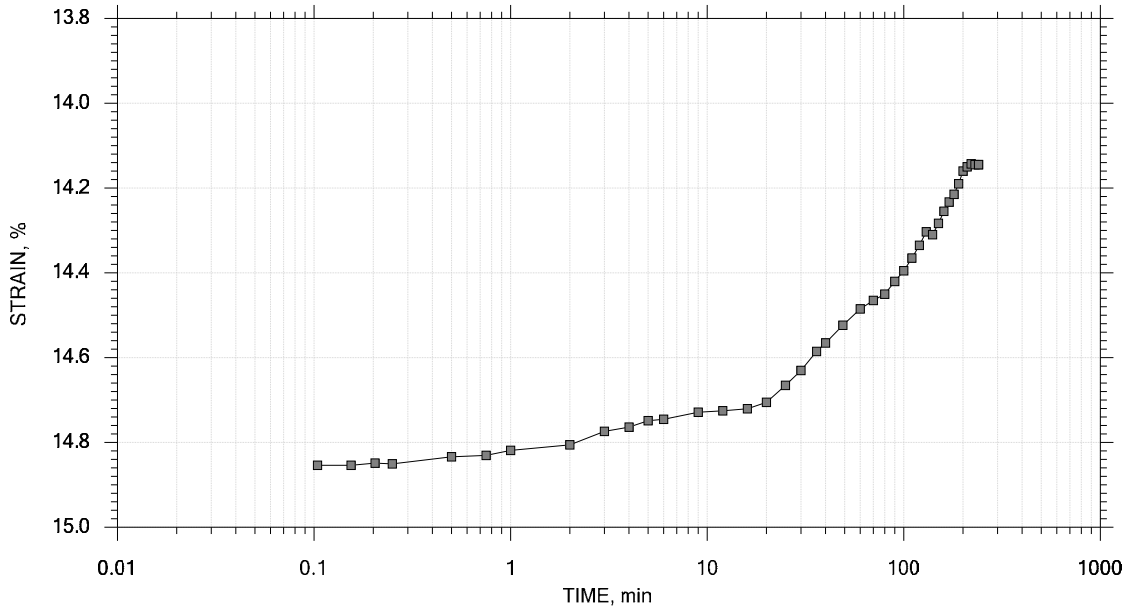
GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

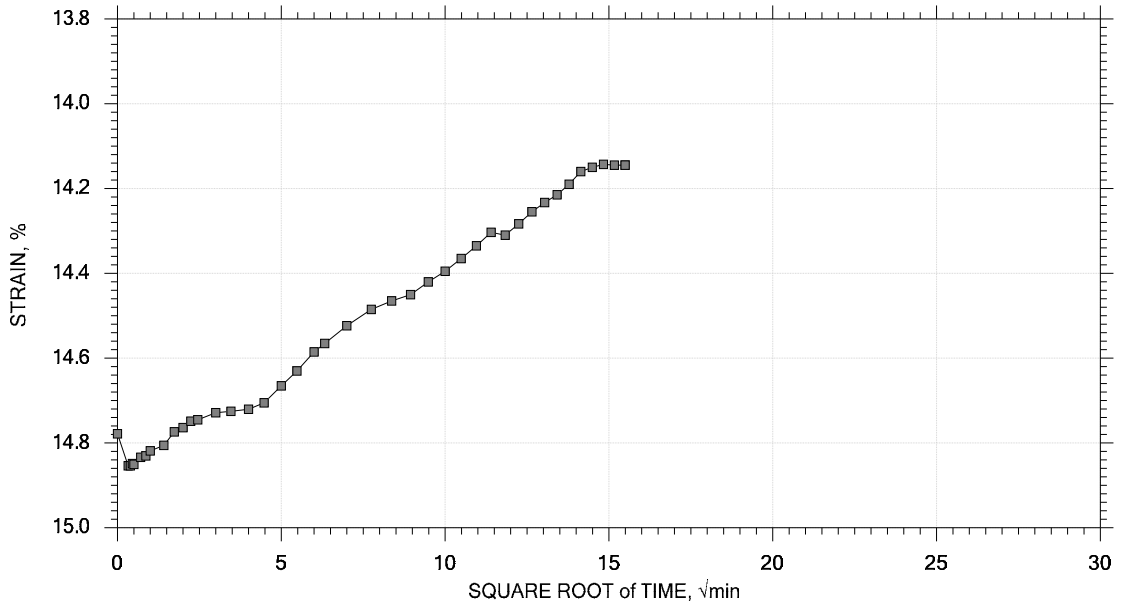
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

Stress: 0.0625 tsf

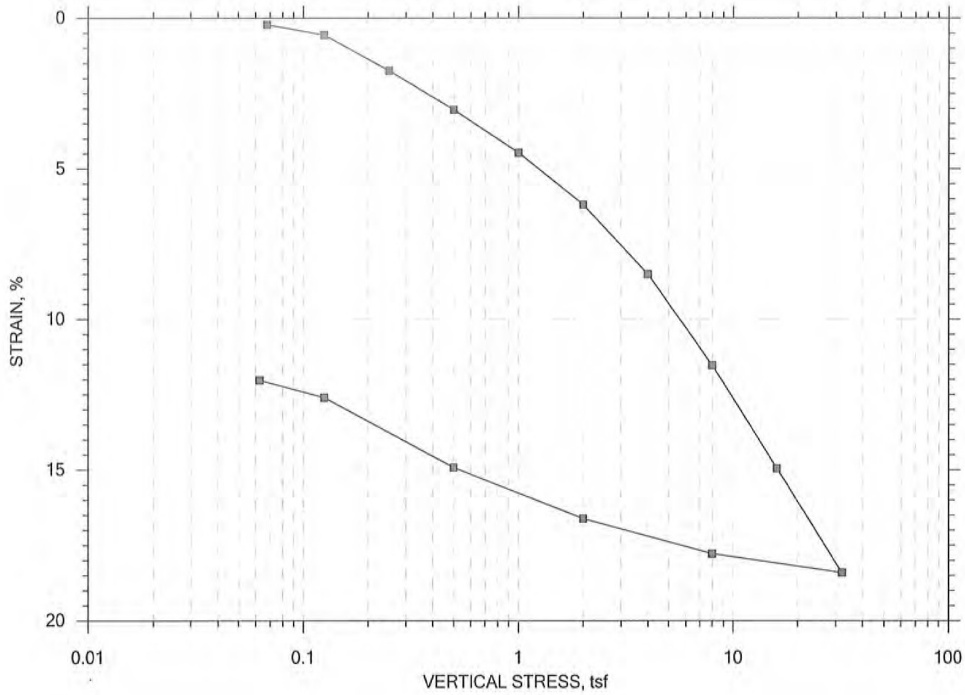


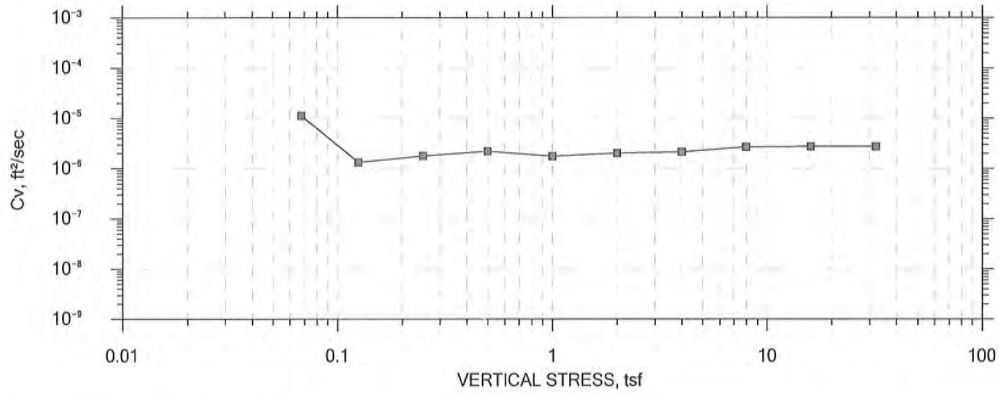


GeoTesting EXPRESS	Project: Beverly Middle School	Location: Beverly, MA	Project No.: GTX-303278
	Boring No.: BH-101	Tested By: md	Checked By: njh
	Sample No.: T3	Test Date: 06/09/15	Test No.: IP-1
	Depth: 41-43 ft	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: System S, Swell Pressure = 0.0670 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

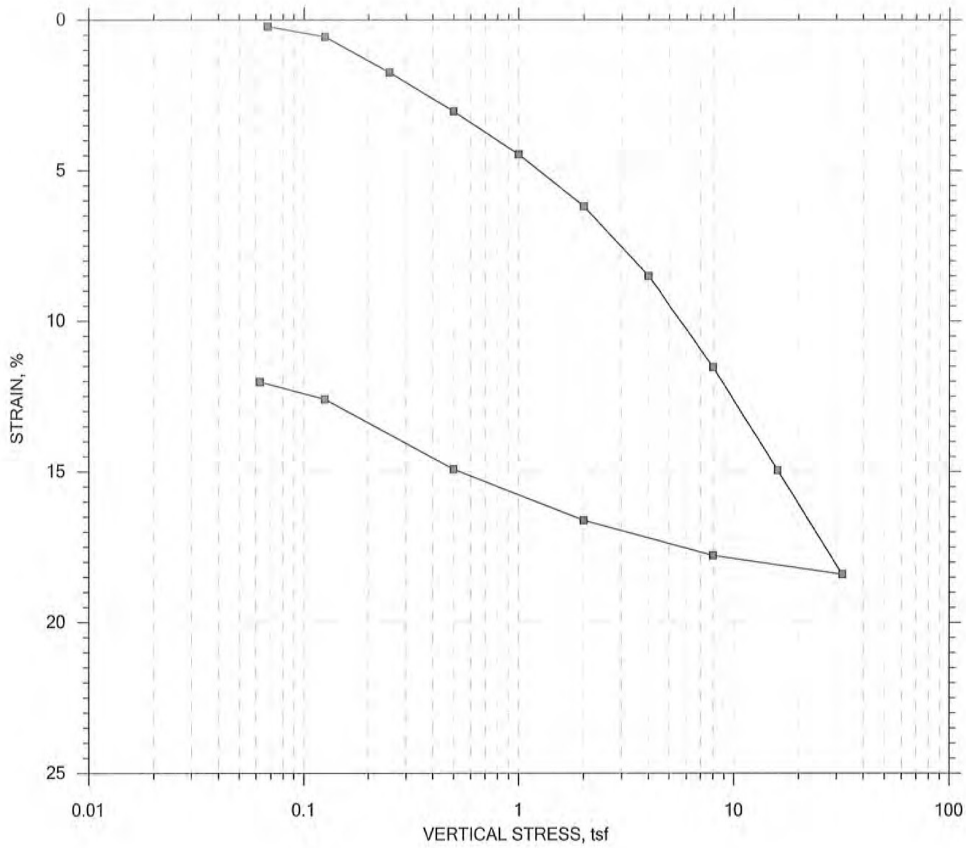




GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	28.35	21.95
Preconsolidation Stress: ---				Dry Unit Weight, pcf	96.93	107.7
Compression Ratio: ---				Saturation, %	99.88	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.79	0.61
LL: ---	PL: ---	PI: ---	GS: 2.78			

GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Prop. Middle School
Boring No.: B4
Sample No.: B4-U3-33'-3'
Test No.: IP-1

Location: Beverly, MA
Tested By: md
Test Date: 10/16/14
Sample Type: intact

Project No.: GTX-302429
Checked By: jdt
Depth: 33-35 ft
Elevation: ---

Soil Description: Moist, olive gray clay
Remarks: System E, Swell Pressure = 0.0677 tsf

Estimated Specific Gravity: 2.78
Initial Void Ratio: 0.788
Final Void Ratio: 0.609

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.90 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	15243	RING		14343
Wt. Container + Wet Soil, gm	225.82	270.95	262.95	159.23
Wt. Container + Dry Soil, gm	178.72	235.54	235.54	132.05
Wt. Container, gm	8.6900	110.64	110.64	8.2200
Wt. Dry Soil, gm	170.03	124.90	124.90	123.83
Water Content, %	27.70	28.35	21.95	21.95
Void Ratio	---	0.788	0.609	---
Degree of Saturation, %	---	99.88	100.00	---
Dry Unit Weight, pcf	---	96.930	107.70	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Prop. Middle School
Boring No.: B4
Sample No.: B4-U3-33'-3'
Test No.: IP-1

Location: Beverly, MA
Tested By: md
Test Date: 10/16/14
Sample Type: intact

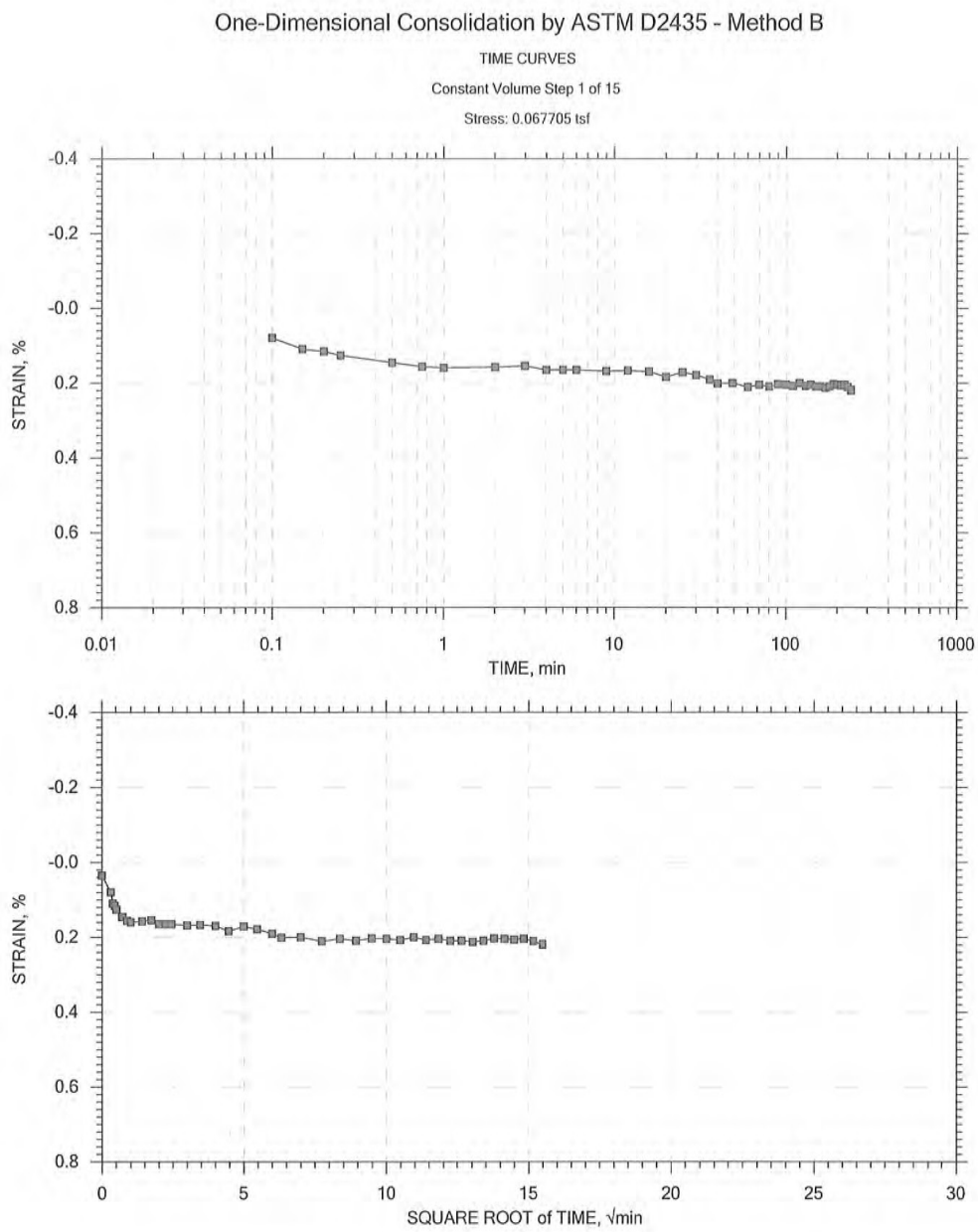
Project No.: GTX-302429
Checked By: jdt
Depth: 33-35 ft
Elevation: ---

Soil Description: Moist, olive gray clay
Remarks: System E, Swell Pressure = 0.0677 tsf

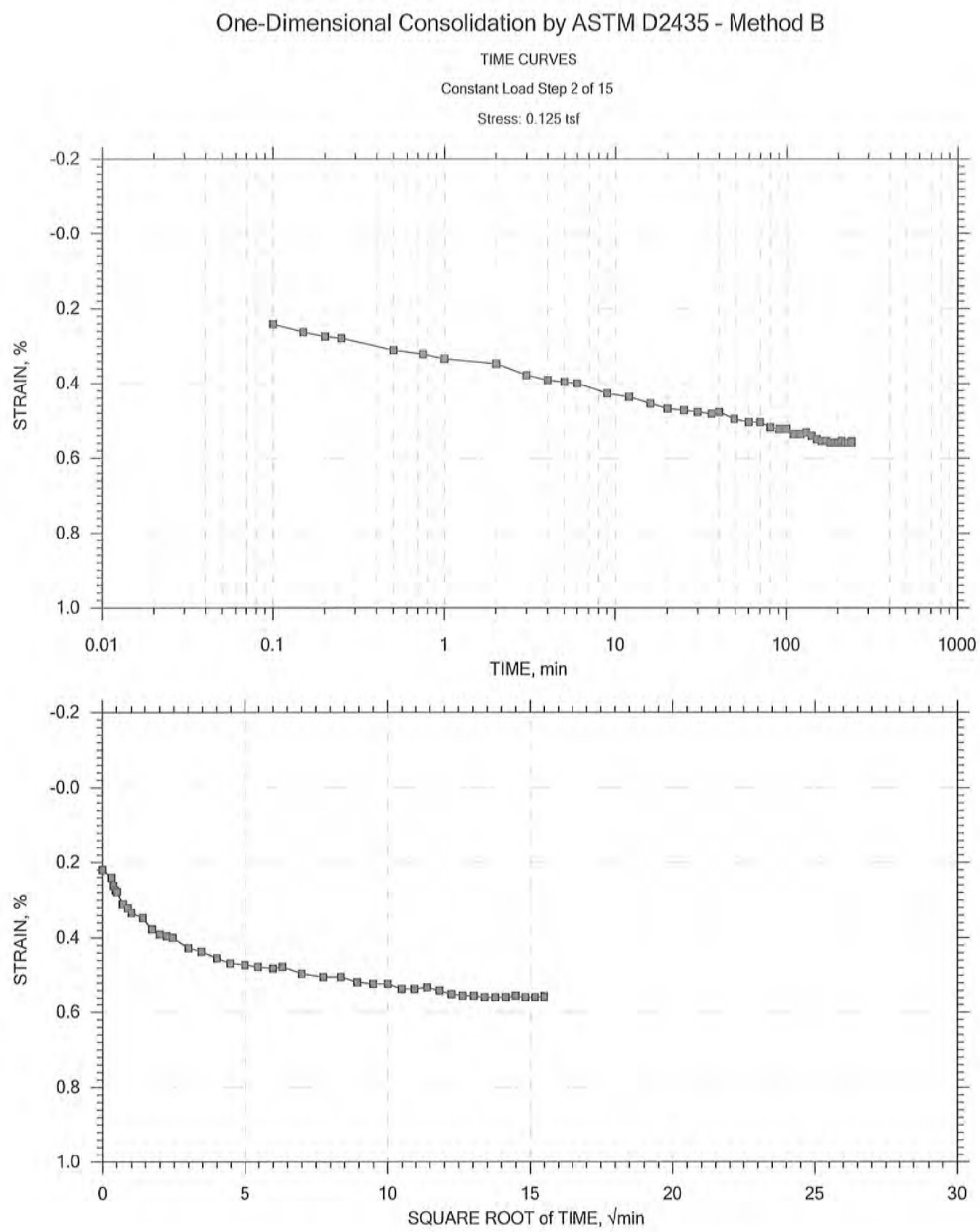
Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.0677	0.002179	0.784	0.218	4.003	6.12e-006	3.22e-002	5.31e-004
2	0.125	0.005587	0.778	0.559	21.651	1.12e-006	5.95e-002	1.80e-004
3	0.250	0.01740	0.757	1.74	15.893	1.51e-006	9.45e-002	3.84e-004
4	0.500	0.03039	0.734	3.04	9.048	2.58e-006	5.20e-002	3.62e-004
5	1.00	0.04465	0.708	4.46	10.236	2.22e-006	2.85e-002	1.71e-004
6	2.00	0.06191	0.678	6.19	11.098	1.98e-006	1.73e-002	9.23e-005
7	4.00	0.08507	0.636	8.51	8.523	2.47e-006	1.16e-002	7.72e-005
8	8.00	0.1153	0.582	11.5	7.847	2.53e-006	7.55e-003	5.16e-005
9	16.0	0.1495	0.521	14.9	6.018	3.07e-006	4.28e-003	3.54e-005
10	32.0	0.1840	0.459	18.4	5.251	3.24e-006	2.16e-003	1.89e-005
11	8.00	0.1778	0.470	17.8	0.821	2.00e-005	2.59e-004	1.40e-005
12	2.00	0.1661	0.491	16.6	9.989	1.68e-006	1.94e-003	8.80e-006
13	0.500	0.1492	0.521	14.9	21.489	8.10e-007	1.13e-002	2.47e-005
14	0.125	0.1260	0.563	12.6	61.547	2.97e-007	6.20e-002	4.96e-005
15	0.0625	0.1202	0.573	12.0	0.000	0.00e+000	9.25e-002	0.00e+000

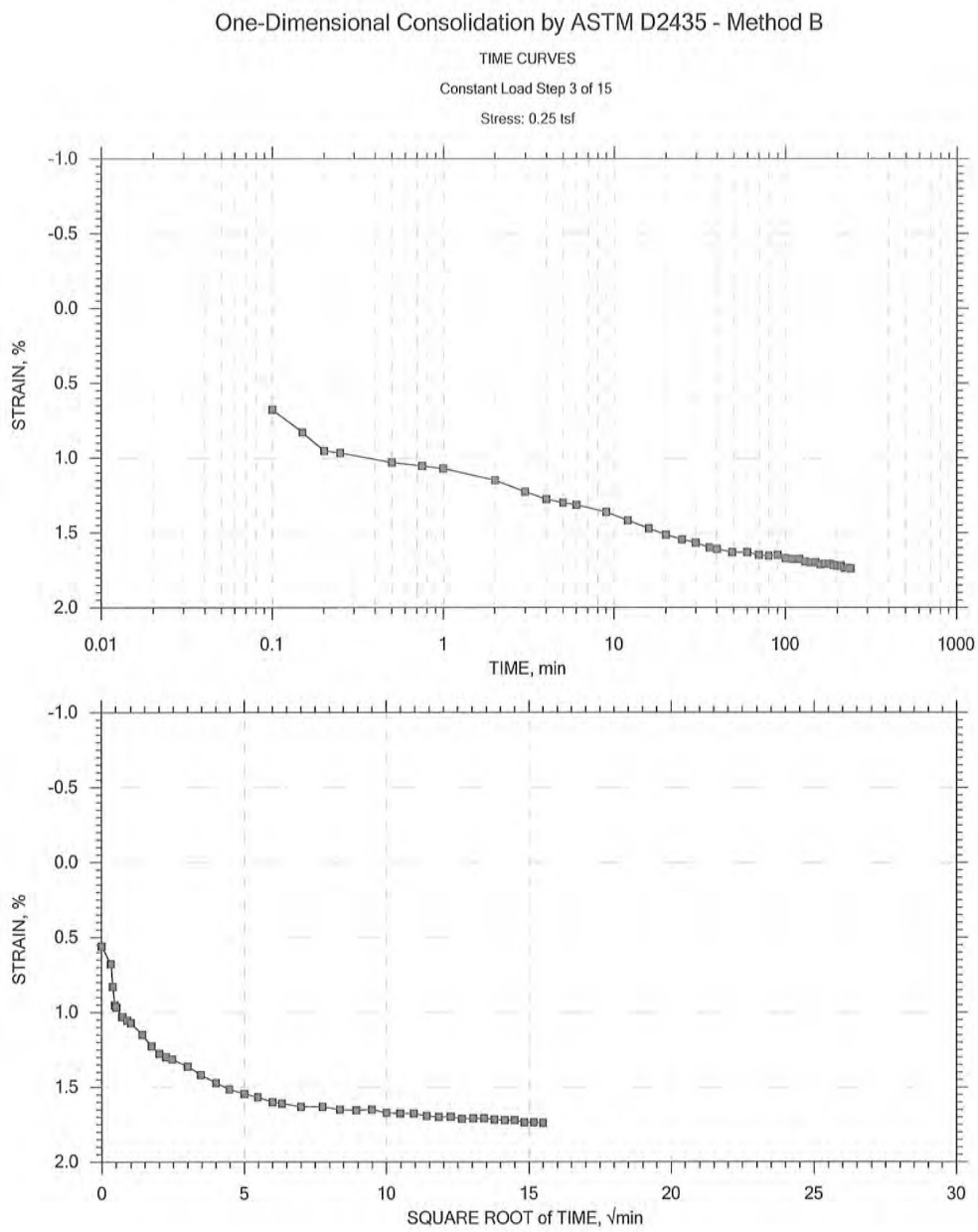
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.0677	0.002179	0.784	0.218	0.000	0.00e+000	3.22e-002	0.00e+000	0.00e+000
2	0.125	0.005587	0.778	0.559	0.000	0.00e+000	5.95e-002	0.00e+000	0.00e+000
3	0.250	0.01740	0.757	1.74	0.000	0.00e+000	9.45e-002	0.00e+000	0.00e+000
4	0.500	0.03039	0.734	3.04	2.851	1.90e-006	5.20e-002	2.67e-004	0.00e+000
5	1.00	0.04465	0.708	4.46	3.479	1.52e-006	2.85e-002	1.17e-004	0.00e+000
6	2.00	0.06191	0.678	6.19	2.385	2.14e-006	1.73e-002	9.97e-005	0.00e+000
7	4.00	0.08507	0.636	8.51	2.640	1.85e-006	1.16e-002	5.79e-005	0.00e+000
8	8.00	0.1153	0.582	11.5	1.769	2.61e-006	7.55e-003	5.31e-005	0.00e+000
9	16.0	0.1495	0.521	14.9	1.771	2.42e-006	4.28e-003	2.79e-005	0.00e+000
10	32.0	0.1840	0.459	18.4	1.722	2.30e-006	2.16e-003	1.34e-005	0.00e+000
11	8.00	0.1778	0.470	17.8	0.000	0.00e+000	2.59e-004	0.00e+000	0.00e+000
12	2.00	0.1661	0.491	16.6	0.000	0.00e+000	1.94e-003	0.00e+000	0.00e+000
13	0.500	0.1492	0.521	14.9	7.404	5.46e-007	1.13e-002	1.66e-005	0.00e+000
14	0.125	0.1260	0.563	12.6	0.000	0.00e+000	6.20e-002	0.00e+000	0.00e+000
15	0.0625	0.1202	0.573	12.0	0.000	0.00e+000	9.25e-002	0.00e+000	0.00e+000



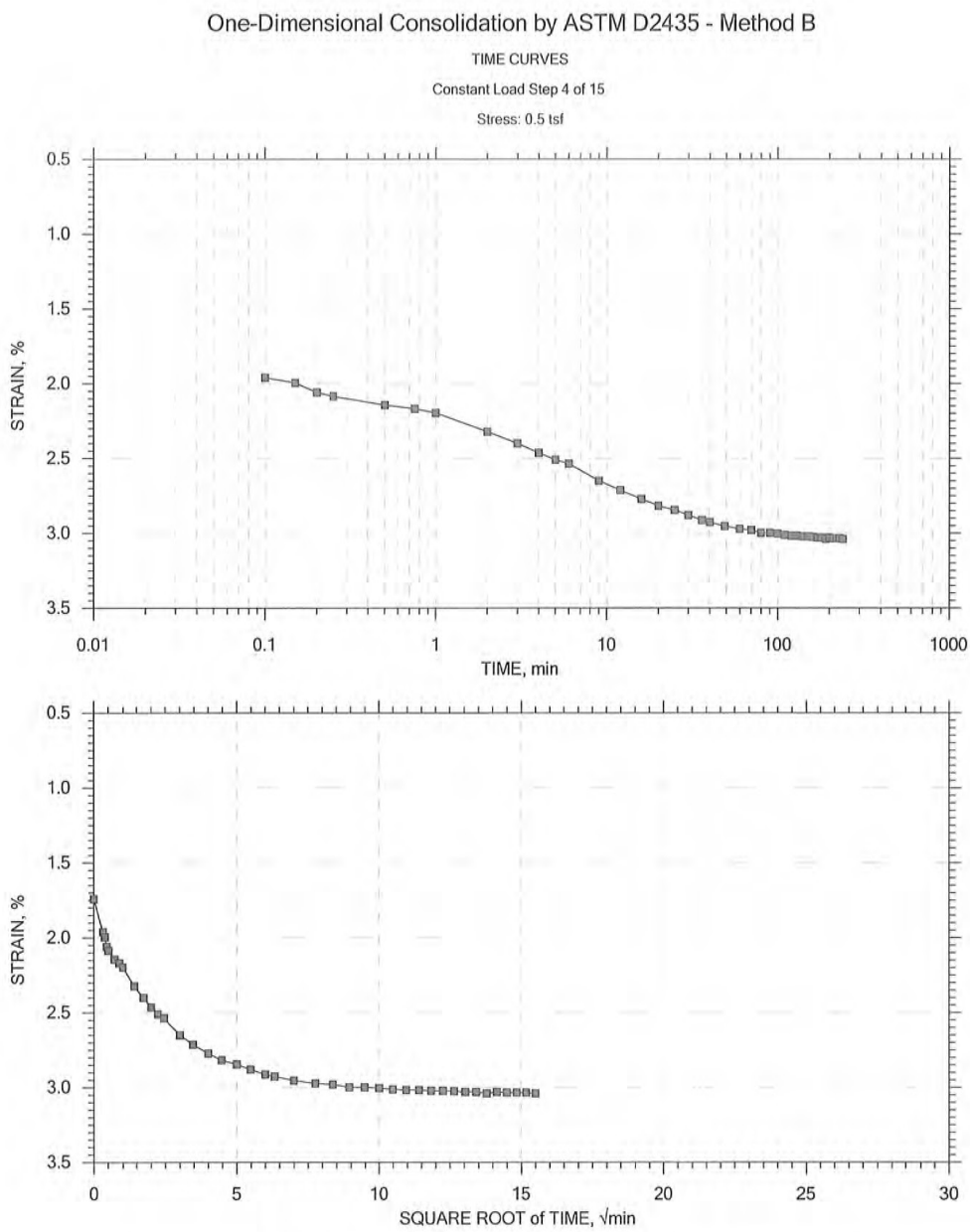
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



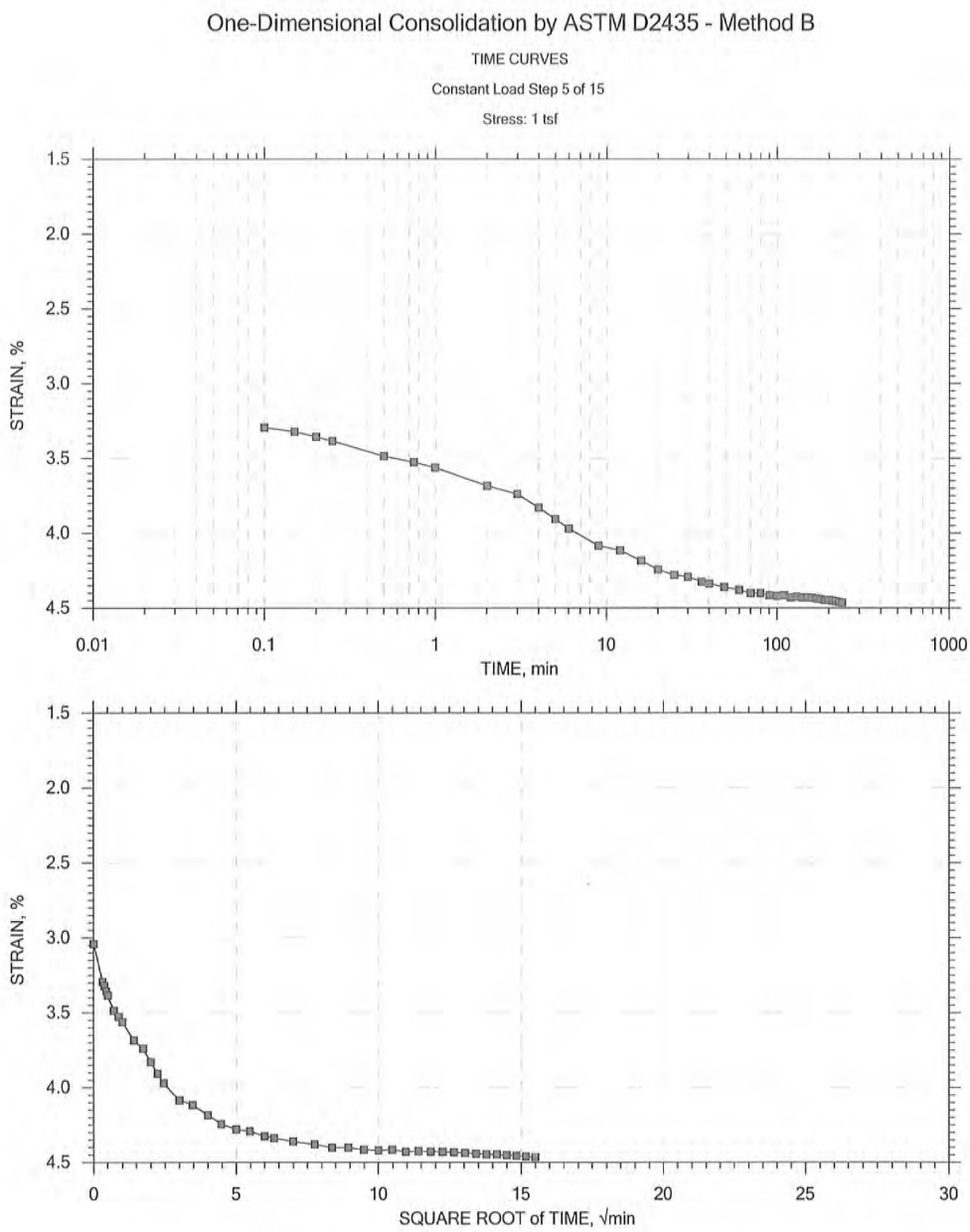
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



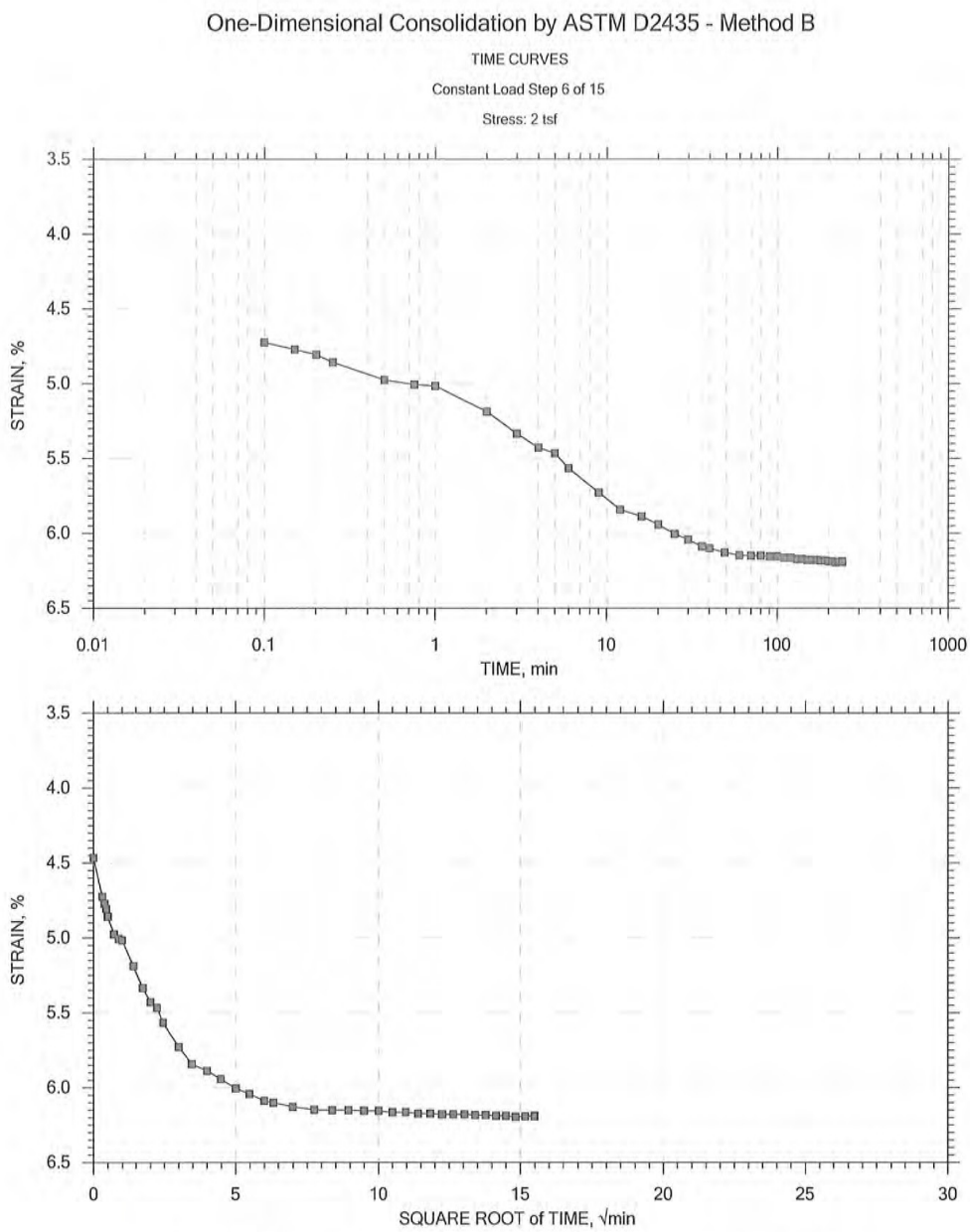
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



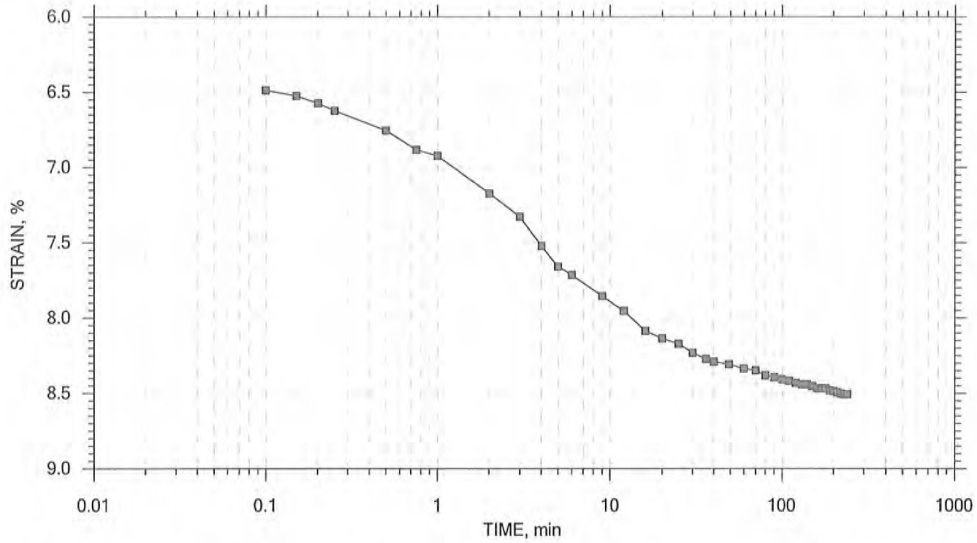
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		

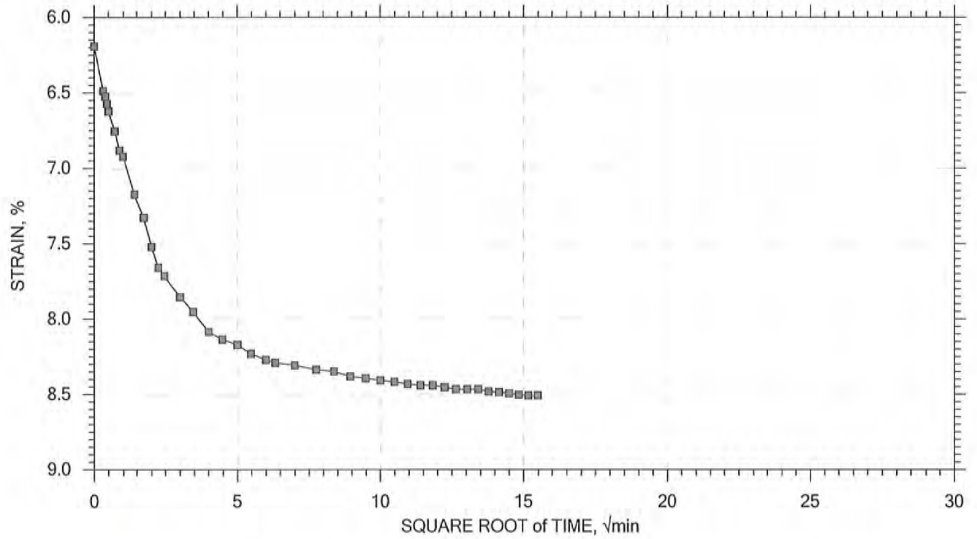
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

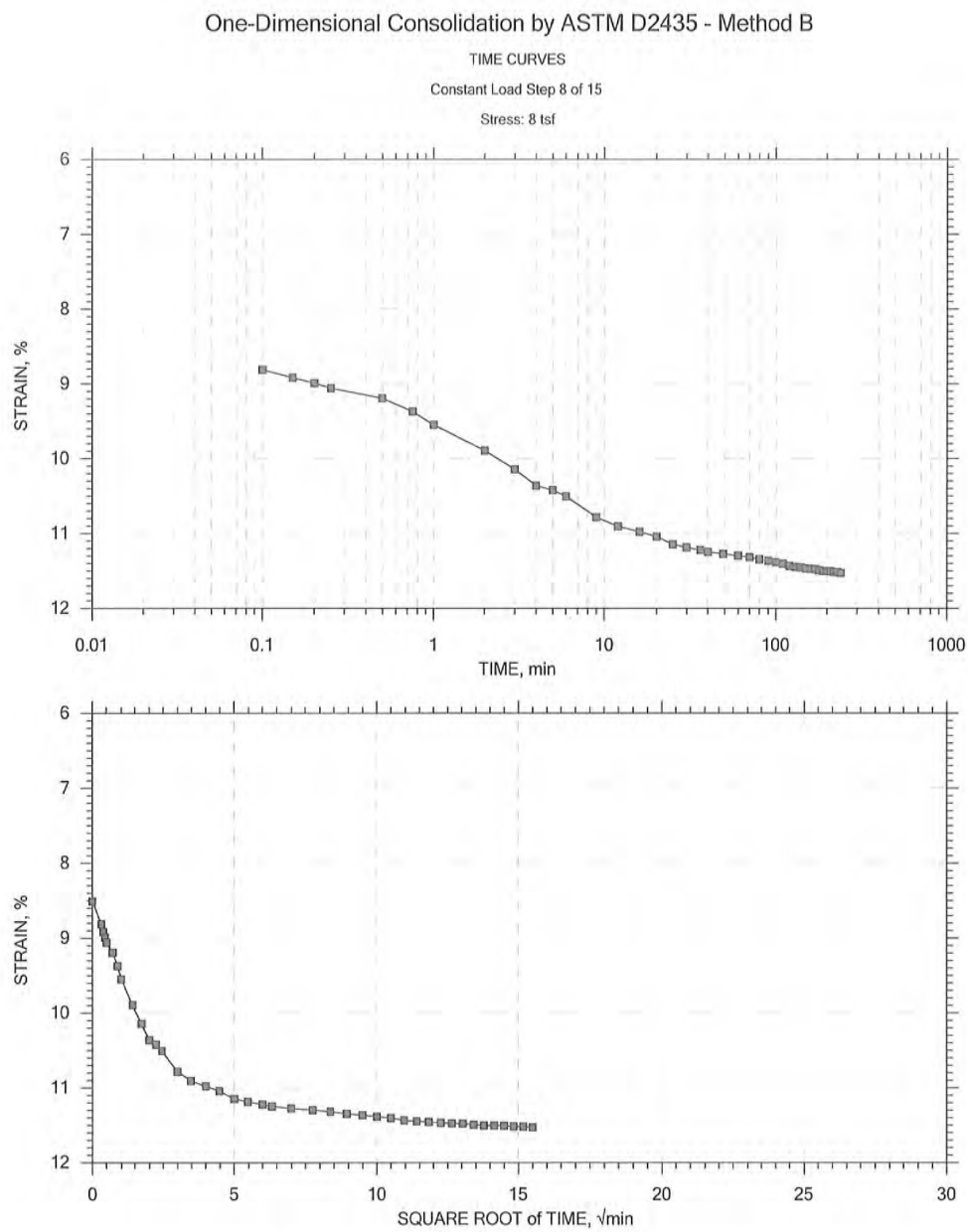
Constant Load Step 7 of 15

Stress: 4 tsf





GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



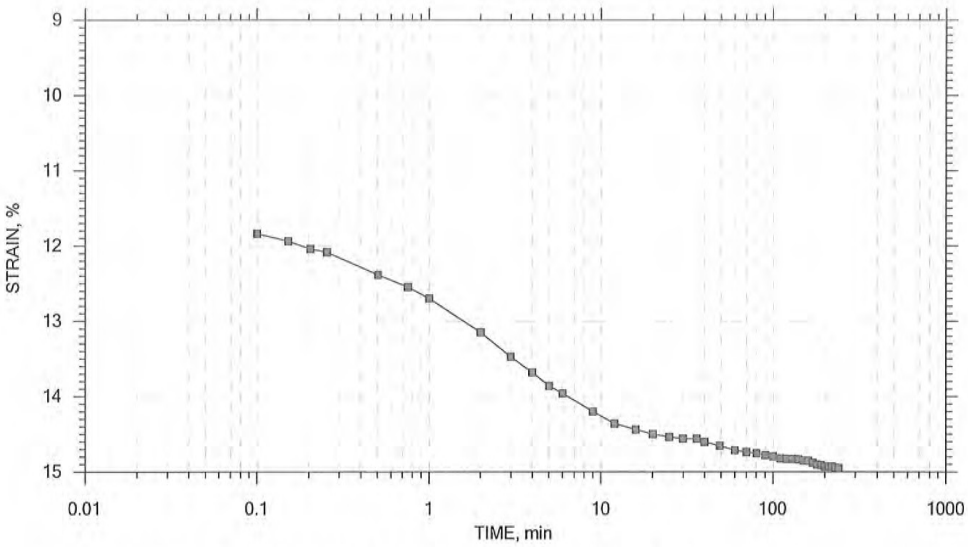
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		

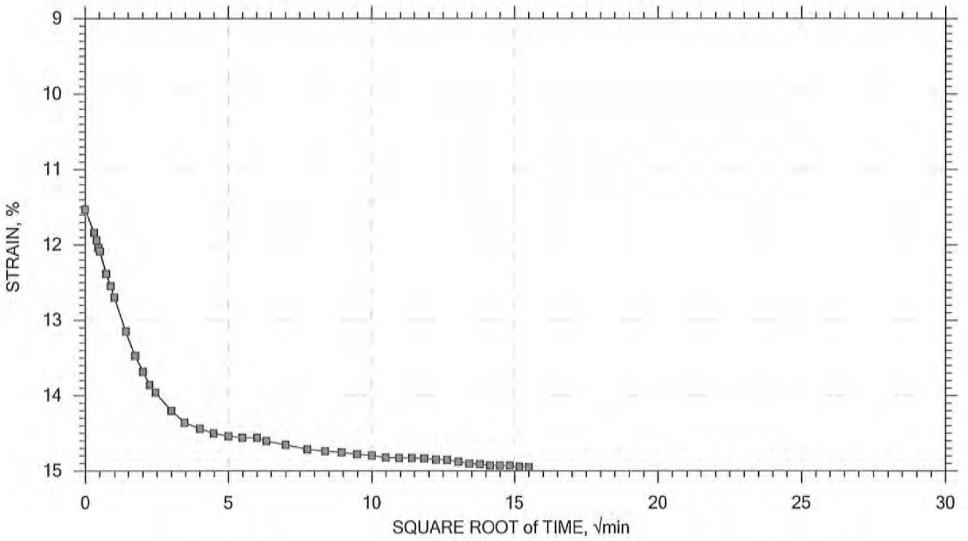
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

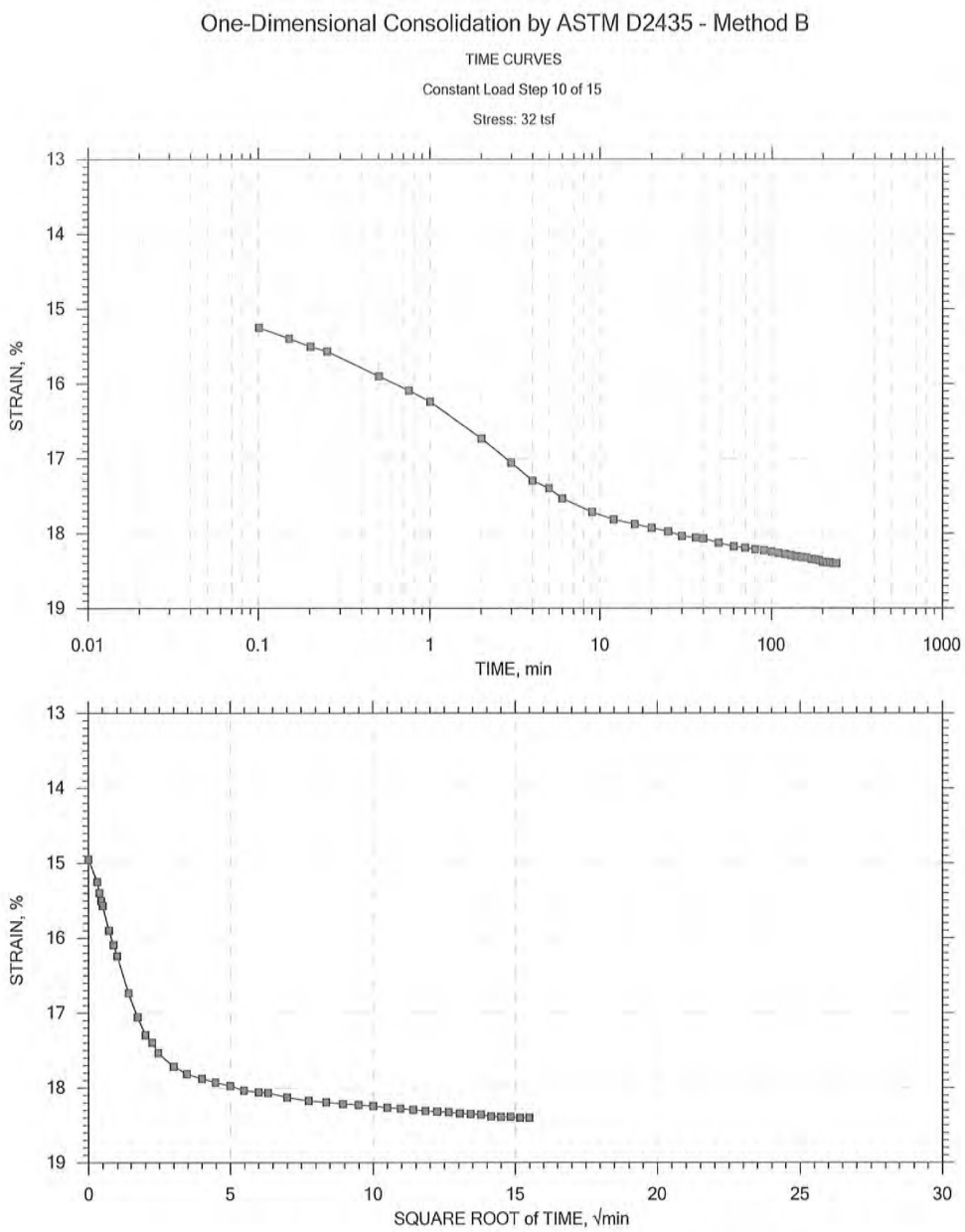
Constant Load Step 9 of 15

Stress: 16 tsf





GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



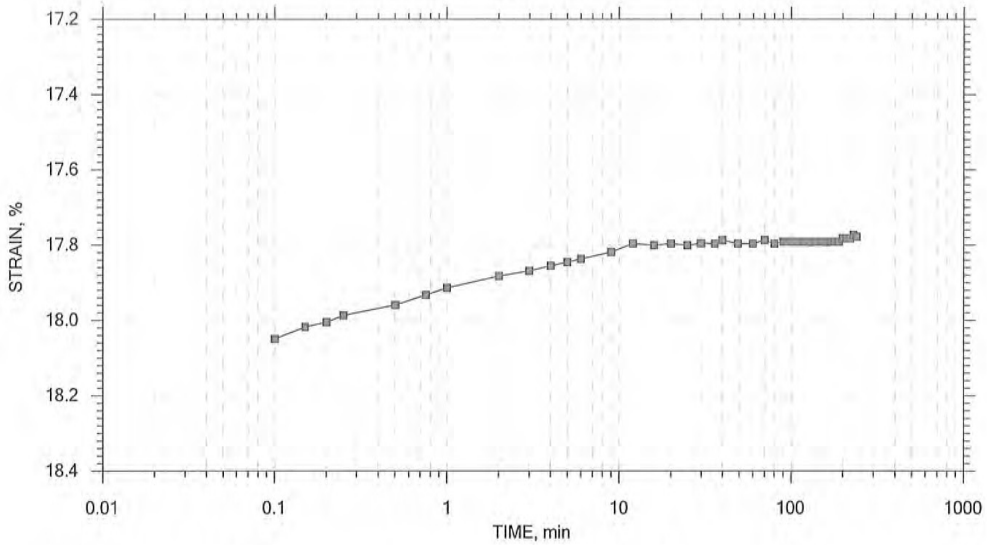
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		

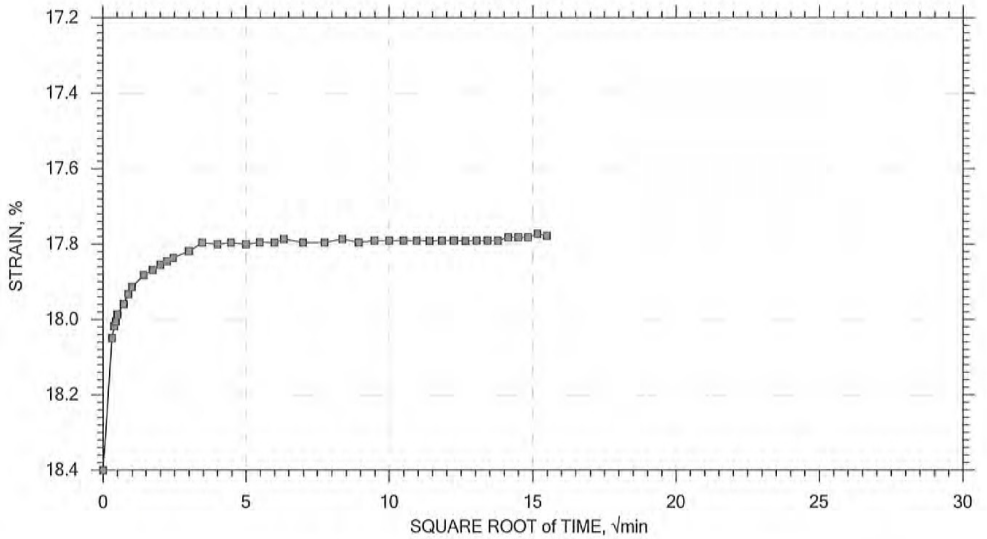
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

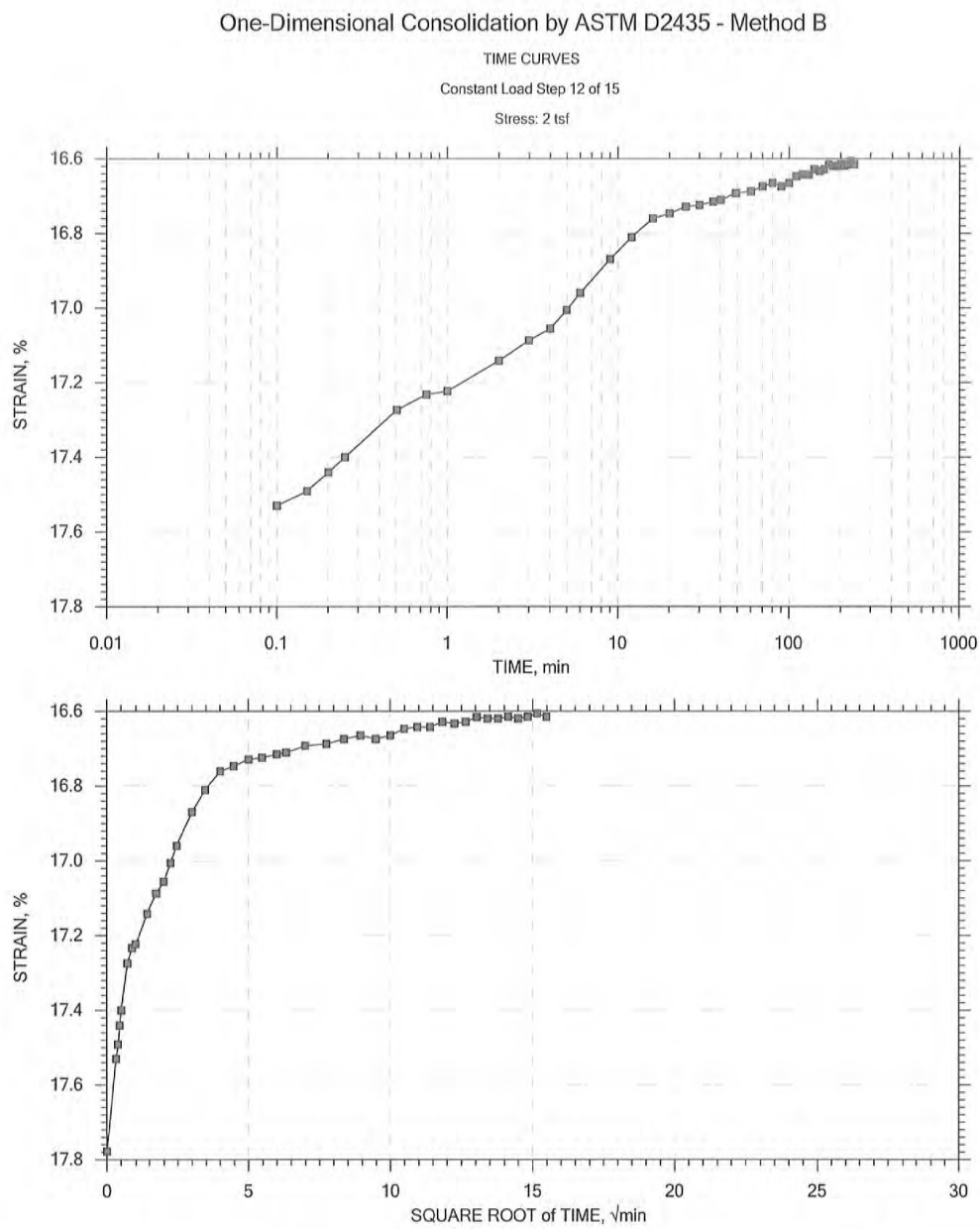
Constant Load Step 11 of 15

Stress: 8 tsf

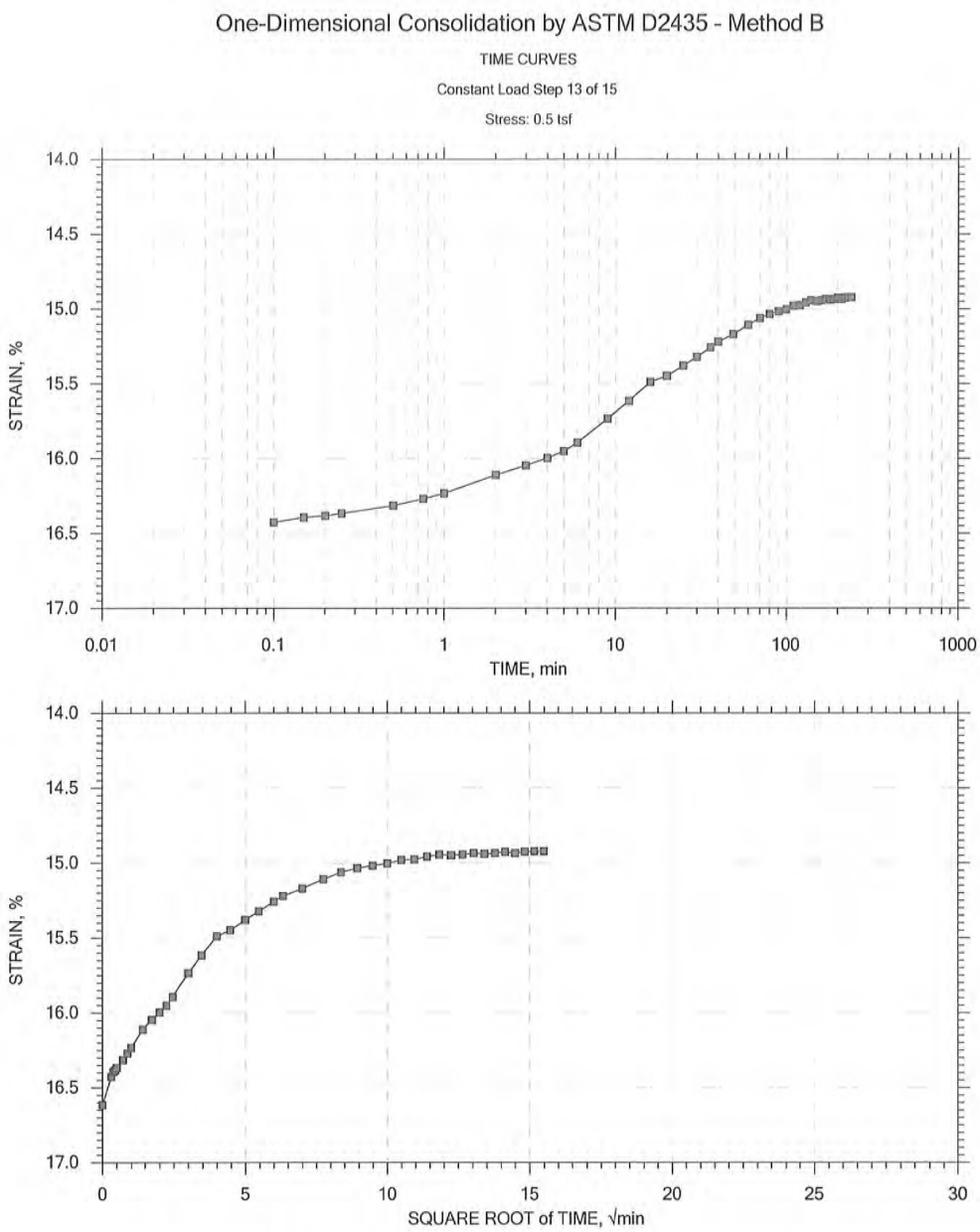




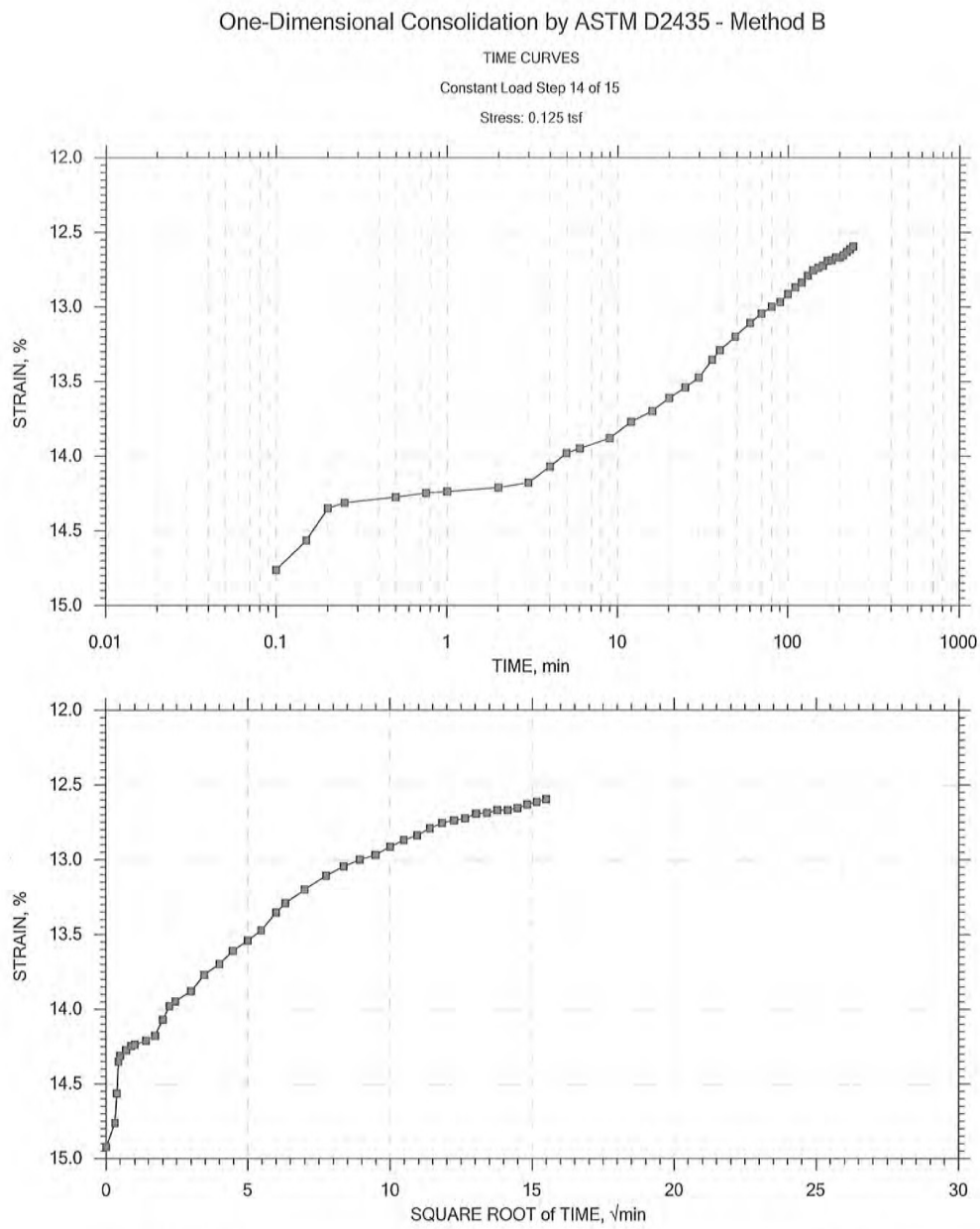
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		



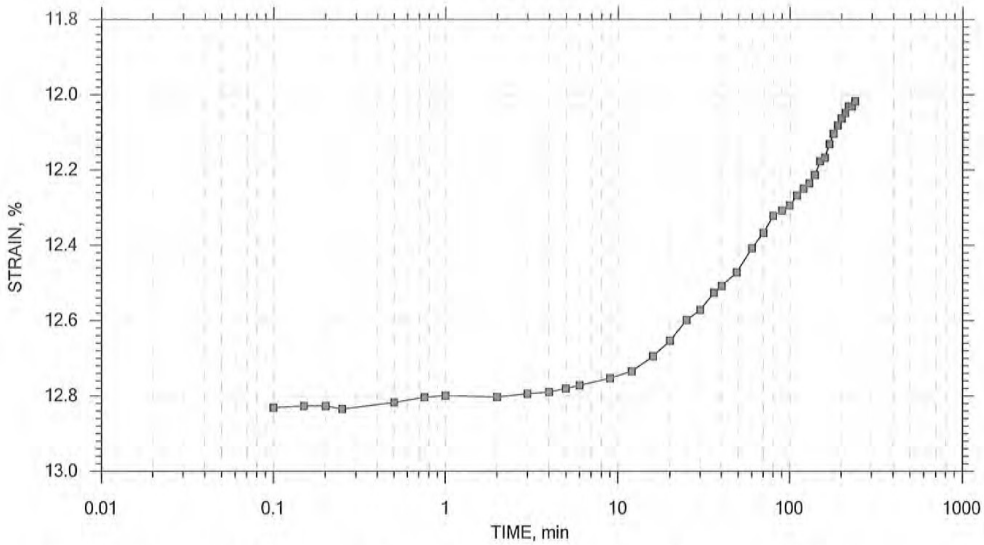
GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		

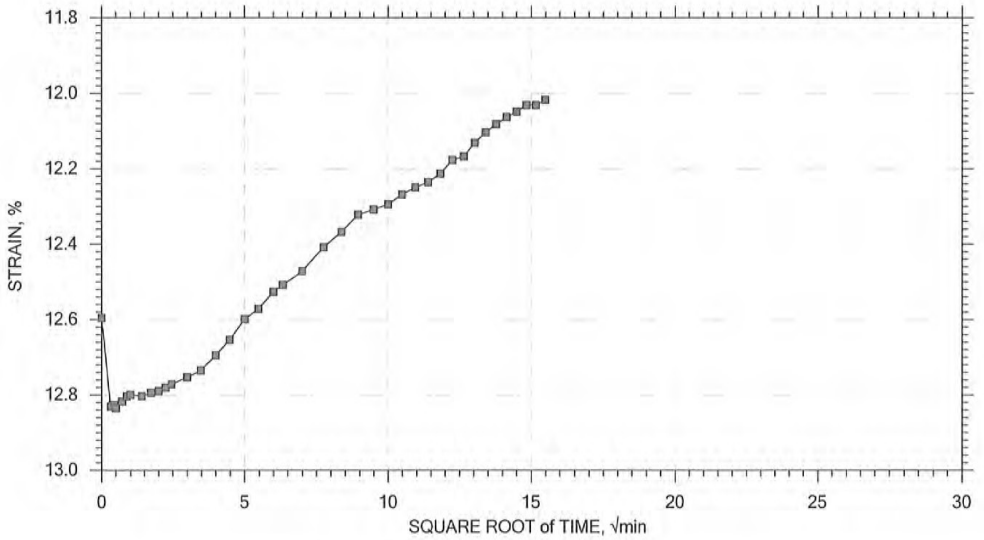
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

Stress: 0.0625 tsf





GeoTesting EXPRESS	Project: Prop. Middle School	Location: Beverly, MA	Project No.: GTX-302429
	Boring No.: B4	Tested By: md	Checked By: jdt
	Sample No.: B4-U3-33'-3'	Test Date: 10/16/14	Test No.: IP-1
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System E, Swell Pressure = 0.0677 tsf		

Code Analysis / ADA & MAAB Compliance

Code Analysis

SUMMARY

The building's code compliance and accessibility compliance reviews were performed by independent consultants as part of the Design Team. Cosentini Associates reviewed the schematic plans and specifications for the Beverly Middle School project. Several design meetings and phone conversations were held with the code consultant to specifically review the code analysis sheets included in the schematic drawing set. Design discussions focused on construction type, building height requirements, building area requirements, travel distances, stair enclosers, construction type, building use type, and occupancy loads and calculations. Kessler McGuinness & Associates, LLC prepared a detailed review of the Beverly Middle School site and building drawings for accessibility compliance for persons with disabilities.

BUILDING CODE ANALYSIS

The Beverly Middle School will be designed in accordance with 780 CMR, Massachusetts Building Code, 9th Edition, which references the 2015 International Building Code (IBC). The project construction timeline includes construction commencing in earnest in the Spring of 2016; therefore, we are anticipating the Board of Building Regulations and Standards' (BBRS) adoption of the 9th Edition prior to the Construction Manager at Risk (CM-R) applying for the full building permit. The building is also designed in accordance with the International Energy Conservation Code 2012 (IECC 2012) with Massachusetts amendments as the baseline energy code. The building will be Type IIA and Type IIB construction with square footages that comply with the allowable building height and area for this building type. The building will be fully equipped with a sprinkler system. Schematic plans and specifications have been reviewed by our code consultant, Cosentini Associates, and their Schematic Design review letter of compliance is included herein. Please refer to the following Code Analysis and Fire Safety Sheets in the Schematic Design submittal for more details: G0.01, G0.02, G0.03, G0.04 and G0.05.

CODE COMPLIANCE WITH ADA and MAAB

Kessler McGuinness & Associates, LLC reviewed the site and building drawings for the new Beverly Middle School. The review focused on compliance with ADA (Americans with Disabilities Act), specifically for compliance with 2010 ADA Standards for Accessible Design (ADAAG). The drawings were reviewed for compliance with 521 CMR MAAB (Massachusetts Architectural Access Board), which is a specialized section of the Massachusetts State Building Code enforced by the Massachusetts Access Board. Please refer to KMA's Compliance Letter, which is included herein, and which is based upon the Schematic Design drawings provided for their review.

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A TETRA TECH COMPANY

Fire and Code Consulting Engineers

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Smoke Control System Design
3rd Party Reviews

July 20, 2015

Troy Randall
AI3 Architects
526 Boston Post Road
Wayland, MA 01778

Re: **Beverly Middle School**
Code Analysis Review

Dear Mr. Randall,

Cosentini Associates has reviewed the drawings dated July 3, 2015 for the above referenced project. The drawings reviewed included the following:

Drawing G0.01, Code Analysis
Drawing G0.02, First Floor Fire Safety Plan
Drawing G0.03, Second Floor Fire Safety Plan
Drawing G0.04, Third Floor Fire Safety Plan
Drawing G0.05, Fourth Floor Fire Safety Plan

The drawings were reviewed for compliance with the major fire protection and life safety criteria of the applicable codes. In our opinion, the Beverly Middle School drawings reviewed (as noted above) are in compliance with the requirements of the Massachusetts State Building Code, Ninth Edition.

Sincerely,

COSENTINI ASSOCIATES, INC.
Code Consulting and Fire Engineering Services

Rockwood J. Edwards, PE | Vice President
Phone: 617-748-7800 | Fax: 617-748-7801 | Direct Dial: 617-748-0021
redwards@cosentini-ma.com

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Kessler McGuinness & Associates, LLC

1121 Washington St.
Newton, MA 02465

V/TTY 617.641.2802
FAX 617.641.2812

www.kmaccess.com
info@kmaccess.com

July 17, 2015

MEMO

To: Troy L. Randall, AIA, LEED AP BD+C, NCARB

From: Katie McGuinness

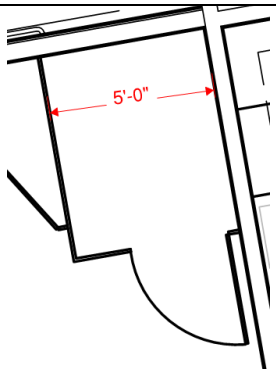
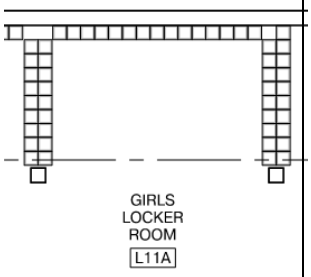
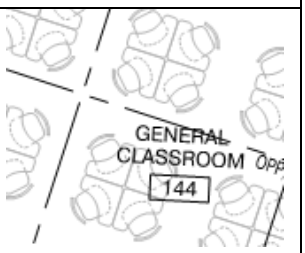
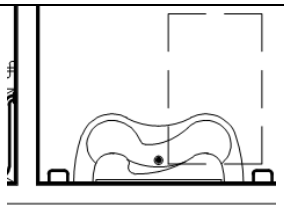
Re: Beverly Middle School
Beverly, MA

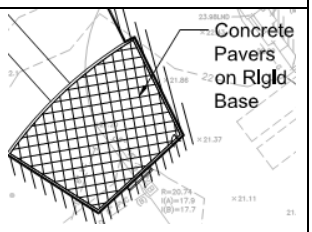
I have reviewed the Schematic Design Documents (dated July 3, 2015) of Beverly Middle School, for compliance with:

- ***The 2010 ADA Standards for Accessible Design***
- ***521 CMR: The Rules and Regulations of the Massachusetts Architectural Access Board***

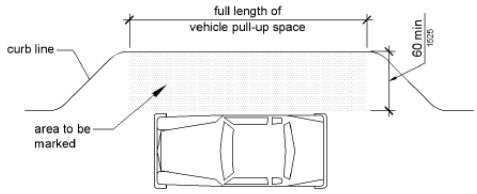
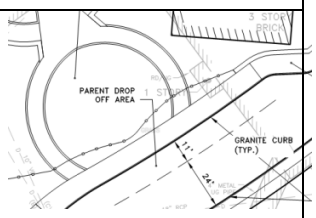
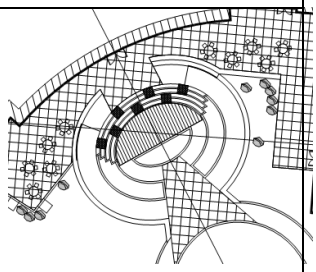
The plans were found to be in substantial compliance, with a few exceptions to be clarified or addressed as construction documents progress. The accessible design issues identified in the review[1] are listed on the following pages.

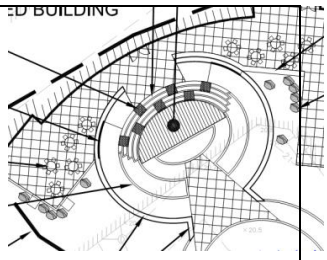
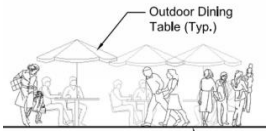
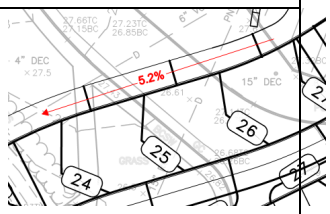
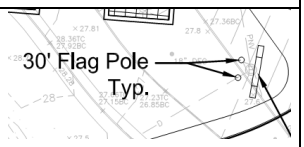
[1] The ADA is a complex civil rights law and 521 CMR is a specialized section of the Massachusetts Building Code. Their requirements are sometimes subject to interpretation by regulatory and/or judicial entities. They contain many concepts and terms, which have not yet been fully tested by actual experience or defined in the courts with respect to particular factual situations. The MAAB often interprets its regulations to require greater access than may be understood to be required from a plain reading of its regulations. This review was performed to the professional standard of care of consultants in the community for this type of work.

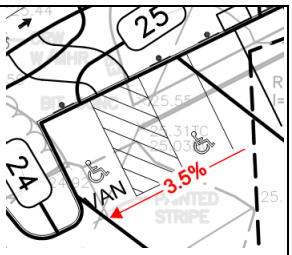
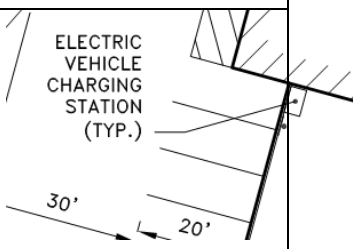
General Notes			
		Barrier	**Example**
1.	**GN -1**	Where required maneuvering space is designed to minimum dimensions there is no room for construction tolerances. For example, the application of tile to vertical surfaces could decrease the clear floor space below the minimum required. KMA recommends that this clear floor space be specified to address elements that typically reduce dimensions – e.g. baseboards, moldings, and tile applied to vertical surfaces and/or that 1"- 2" of additional clear space be provided. For example, current plans show the accessible stalls in multi-user toilet rooms at exactly 60" wide. In addition, when toilet rooms are designed to minimum standards, there is often no place for trash cans and dispensers to be installed without interfering with the required clear floor and maneuvering spaces. **Ai3 Response:** Construction tolerances will be provided.	
2.	**GN-2**	**Lockers** Confirm that a minimum 5% of student lockers have controls/hooks that are within reach range, 15"-48" AFF; have hardware that can be operated with a closed fist; and are evenly distributed. This includes hallway lockers and lockers within all P.E. areas. **Ai3 Response:** 5% of lockers are within accessible reach range	
3.	**GN-3**	**Tables/Desk/Lab Desks** Confirm at least 5%, and no less than one (1) of each type of table/desk within each space has minimum knee clearance of 27" AFF, 30" wide and 19" deep. **Ai3 Response:** 5%, and no fewer than 1, of each type of table/desk will have the minimum knee clearance	
4.	**GN-4**	**Boys/Girls Lavatories** Confirm minimum knee space/depth is provided. ADA 2010 Section 306.2.3 and 521 CMR 30.9.2 require a minimum 17" depth at 27" AFF below the lavatory to allow for knee clearance. **Ai3 Response:** Toilet rooms will have the minimum required space/depth.	

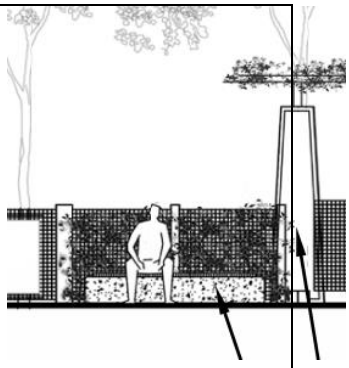
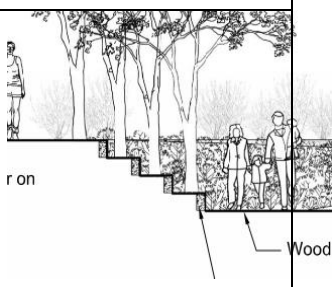
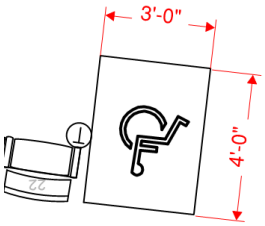
5.	**GN-5**	**Accessible Parking** • During different phases and temporary construction, confirm that the number of accessible parking spaces is not reduced. • Parking is in compliance but the distance from the various accessible parking spaces to the accessible entrances could be problematic. KMA recommends that if you cannot provide accessible parking closer at this time that you may want to identify a future location where parking could be added if requested. • Confirm locations of accessible parking spaces are placed near an accessible entrance. **PARE RESPONSE:** • As design progresses, the number of accessible parking spaces will be maintained through phased construction. • Pare will review the routes to accessible entrances and will review potential future locations for accessible parking if requested. • All Accessible parking spaces have been placed near accessible entrances.	No Image
6.	**GN-6**	**Egress** Confirm that there are accessible means of egress from all required EXITS (at the level of exit discharge) to a public r-o-w; or 100' from building; or with exterior areas of rescue assistance. (521 CMR 20.11) **PARE RESPONSE:** As design progresses, an accessible means of egress from all EXITS to a r-o-w; or 100' from building; or with exterior areas of rescue assistance will be included.	No Image
7.	**GN-7**	**Hardscape Materials** The landscape plans identify several types of material for ground covering. Ensure that there are smooth transitions between different materials and that if there is a level change, it is less than ½"and beveled. (521 CMR 20.10) **BDG RESPONSE:** All level changes between ground cover materials will have smooth transitions no more than ½" beveled.	

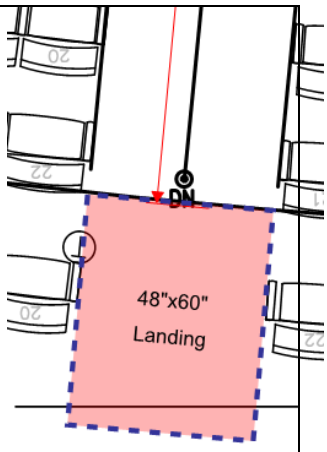
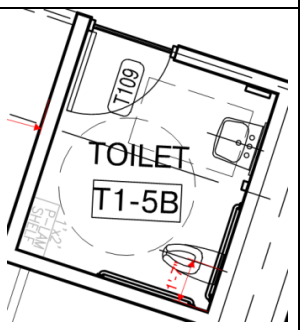
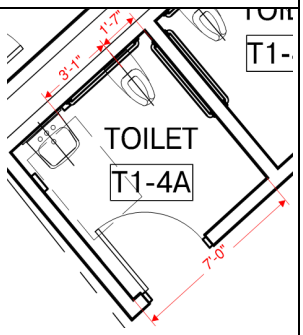
Beverly Middle School

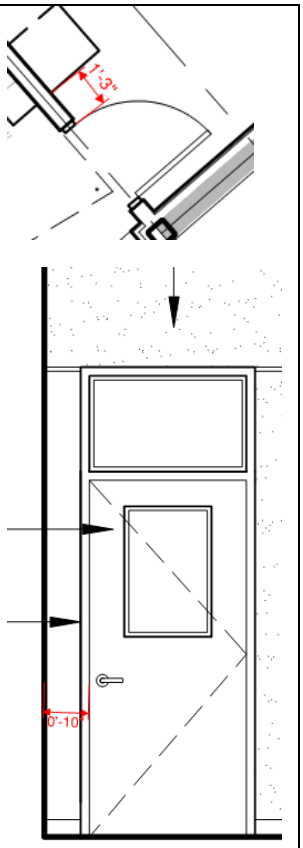
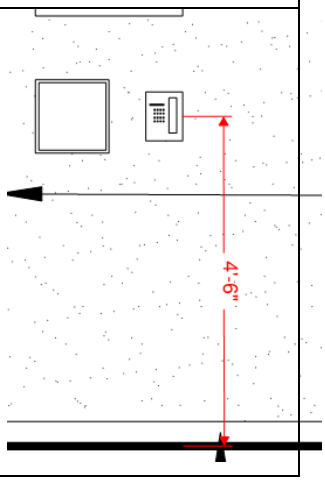
	Construction Documents		
	Sheet	**Barrier**	**Example**
8.	**C3.1**	**Drop Off** There is no identified accessible Drop Off Area on plans. Confirm the attached drawing shows the correct location for both of the Drop-Off Areas. • The 2010 ADA Standards (209.2 and 503.1) require one accessible drop-off in every continuous 100 linear feet of loading zone, or fraction thereof. Confirm. • From the grading plan, it appears as though the vehicular pull up space is at the same contiguous level. There is a dotted line beyond the vehicular route. Confirm this separates the drop-off area from the vehicular path. • Confirm detectable warning and/or bollards are provided to separate vehicular and pedestrian routes.  **PARE RESPONSE:** · Accessible drop-offs will be provided at the parent dropoff area and the bus dropoff area at a frequency of at least 1 in every 100 linear feet. · The dotted line is pavement striping intended to separate the dropoff area from the vehicular path · Detectable warning and/or bollards will be provided to separate vehicular and pedestrian routes	
9.	**LD1.0**	**Amphitheatre** Pathway at the amphitheater slope is not identified. Confirm slope will be maximum 5% running and 2% cross-slope. If in fact this is a ramp with a slope > 5%, then a variance request from the AAB will be required. (521 CMR 24.10) **BDG RESPONSE:** Pathways at the amphitheater slope are no more than 5% running & no more than 2% cross-slope.	

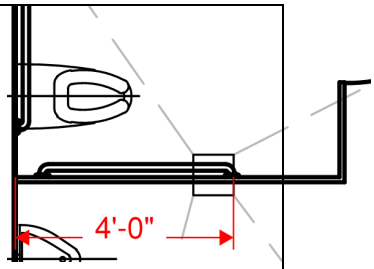
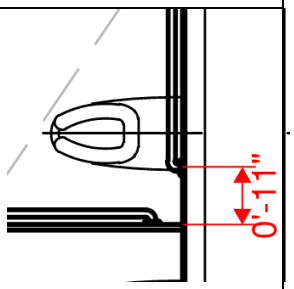
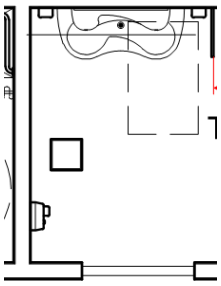
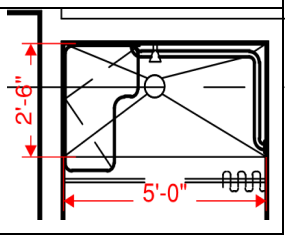
10.	**C3.1**	**Amphitheatre Seating** • Confirm integrated accessible wheelchair seating will be provided. • Confirm shoulder-to-shoulder alignment of accessible space and companion seat. • Confirm there is an accessible rout. **BDG RESPONSE:** · Integrated accessible wheelchair seating will be provided. · There will be shoulder-to-shoulder alignment of accessible space and companion seat. · The pathways to and from the amphitheater provide an accessible route to the lower level of the amphitheater.	
11.	**LD1.0**	**Outdoor Dining** Confirm that at least 5% but not less than one table, has adequate knee clearance of at least 27" high, 30" wide and extending at least 19"deep. (521 CMR 12.2.2) **BDG RESPONSE:** At least 5% of the tables in the outdoor dining areas will have adequate knee clearance of at least 27" high, 30" wide and extending at least 19th deep.	
12.	**C3.1**	**Exterior Pathways** Confirm that all sidewalks and walkways have slopes less than 5% and cross slopes less than 2%. Some sidewalks appear to have slopes greater than 5% @ 5.2%. **PARE RESPONSE:** All sidewalks and walkway will be designed to have running slopes less than 5% and cross slopes less than 2%. The sidewalk indicated is shown to have a slope of 4%.	
13.	**L1.0**	**Flagpole** Confirm accessible route to the flagpole. **BDG RESPONSE:** There is an accessible route to the flagpole from the entry plaza.	

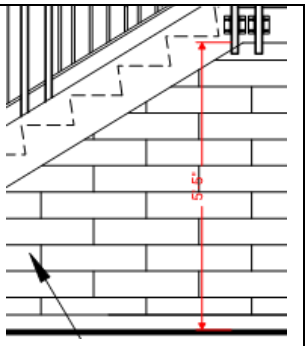
14.	**C3.1**	**Parking** Confirm that all designated accessible parking have slopes or cross-slopes less than 2%. Some accessible parking appears to have slope and cross-slope issues @ 3.5% slope. **PARE RESPONSE:** As design progresses, spot grades will be added indicating the grade at each corner of the designated accessible spaces, slope and cross slopes in these spaces will be refined to less than 2%.	
15.	**C2.0**	**Parking** The north west parking lot lacks the minimum required number of accessible parking spaces @ 1 space. See GN-5. **PARE RESPONSE:** 25 employee parking spaces are provided in the northwest parking area. For the 25 spaces, one accessible space is provided. The remainder of the spaces (48) are fleet parking spaces for school buses and vans. It is understood that under the exemption in section 208.1 "Parking spaces used exclusively for buses, trucks, other delivery vehicles, law enforcement vehicles, or vehicular impound shall not be required to comply with 208"	
16.	**C2.1**	**Parking** Confirm Electric Car charging station controls are: • Within reach range, • Operable • Have a 30" x 48" clear floor space and • Are on an accessible route. **PARE RESPONSE:** Electric Car charging station controls will be designed to be accessible.	

17.	**LD 1.0**	**Ornamental Bench** Confirm bench seat is between 17"-19" AFF **BDG RESPONSE:** Bench seat is between 17"-19" AFF.	
18.	**LD 1.0**	**Stone Veneer Wall** Stairs to outside dining lack handrails on both sides. **BDG RESPONSE:** Will be adjusted in the Design Development submission.	
19.	**A1.11**	**Auditorium 151A** • Wheelchair accessible seating lacks 60" long and 36" wide space. Accessible seating cannot interfere with an accessible route, 36" min. width, which also serves as a means of egress. • Confirm shoulder-to-shoulder alignment of accessible space and companion seat. The dimension is from the foot of the wheelchair space back 36" to the shoulder line. • The seating aisle ramp slope does not identify any slope. • Confirm signage for companion seating. • Confirm assistive listening device is installed and include corresponding identifying signage. **Ai3 Response:** Will be adjusted in the Design Development submission	

20.	**A1.11**	**Auditorium 151A** • If this is a ramp, then it lacks a 48" x 60" clear floor space at the top landings. • Confirm at least 1% of fixed seats have removable armrests and has corresponding identifying signage. **Ai3 Response:** Will be adjusted in the Design Development submission	
21.	**A1.12** **A1.14** **A1.22** **A1.32**	**Toilet Rooms T1-5B** The toilet is located greater than 18" from the side wall @19". This condition was found in the following rooms: Toilet Room T1-6B, T1-4A, T1-4B, T1-2B, T1-3B, T1-1, T2-5B, T2-6B, T2-4A, T2-4B, T3-4A, T3-4B, T3-5B, T3-6B **Ai3 Response:** The toilet centerline will be 18" from nearest sidewall.	
22.	**A1.12** **A1.22** **A1.32**	**Toilet Room T1-4A** • The toilet room is less than 90" wide @ 84". • The toilet is located less than 42" from the lavatory, measured from the centerline @ 37". This condition was found in the following rooms: Toilet Rooms T1-4B, T2-4A, T2-4B, T3-4A, T3-4B **Ai3 Response:** The toilet room will have the minimum clear floor space.	

23.	**A1.13** **A1.14** **A1.23** **A1.24** **A1.33** **A1.34** **A1.43** **A1.44**	**Classroom Doors** All the doors have less than 18" clear maneuvering space on the pull side @ 15". This condition was found in the following rooms: Therapeutic Learning 5/6 Grades 126, Sped SBI (Reading) 127,Sped SBI (Reading) 227,Sped SSP-5th Grade 121,Sped SSP-6th Grade 221, Assistant Principal AP1 120,Assistant Principal AP1 220, Sped Language Based-5th Grade 109,ELL-English Language Learners 108, Sped Language Based-6th Grade 209, Sped SBI (Math) 327,Sped Learning Center 7/8 326, SSP-7th Grade 321, Assistant Principal AP1 320,Sped Language Based-7th Grade 309,ELL-English Language Learners 308, Resource Room 427,Sped Therapeutic Learning 7/8 426, Sped SSP-8th Grade 421, Assistant Principal AP1 420, Sped Language Based-8th Grade 409, Reading Classroom 408 **Ai3 Response:** The doors will be adjusted to provide appropriate clearance. Will be adjusted in the Design Development submission.	
24.	**A9.01**	**Typical Classroom** The telephone is mounted greater than 48" AFF @ 54". **Ai3 Response:** The mounting height has been adjusted to 48"	

25.	**A1.00** **A1.12** **A1-14** **A1.22** **A1.24** **A1.32** **A1.34** **A1.42** **A1.44**	**Boys Toilet TL-4A** The side grab bar is located less than 54" from the interior corner @48". This condition was found in the following: Boys Toilet/TL-4AGirls Toilet Room TL-3A,Toilet Rooms TL-1, TL-2, TL3B, TL-4B, TL-5B, TL-6B, TL-4A, T1-2B, T1-3B, T1-4B, T1-1, T2-5B, T2-2B, T2-3B, T3-4A, T3-4B, T3-3A, T3-2B, T4-5B, T4-6 B, T4-4A, T4-4B, T4-3A, T4-3B, T2-6B, T2-4A, T2-4B, T2-1, T3-5B, T3-6B **Ai3 Response:** Grab bars will be located greater than 54" from the interior corner. Will be adjusted in the Design Development submission	
26.	**A1.00** **A1.12**	**Girls Toilet Room TL-3A** The rear grab bar is mounted greater than 6" from the interior corner @ 11". This condition was found in the following: Toilet Rooms TL-1, TL-2, TL-3B, TL-4A, TL-4B, TL-4A **Ai3 Response:** Grab bars will be located less than 6" from the interior corner. Will be adjusted in the Design Development submission	
27.	**A1.00**	**Toilets TL-5/TL-6** • The hand dryer is not within reach of the lavatory. • Confirm that the hand dryer does not protrude more than 4" into the circulation space. **Ai3 Response:** Hand dryer will be within reach of the lavatory and not protrude 4" into the circulation space. Will be adjusted in the Design Development submission	
28.	**A1.00**	**Boys Locker Room L08A/Girls Locker Room L11A** Confirm roll-in shower fits into an unfinished 30 x 60" space. **Ai3 Response:** An unfinished 30"x60" space will be provided for the roll-in shower.	

29.	**A9.05 Detail 3**	**Stairs at Student Dining** The stairs project < 80" into the circulation space. **Ai3 Response:** Will be adjusted in the Design Development submission	

Please call if you have any questions.

Utility and Soils Analysis

Utility and Soils Analysis

The existing conditions utility information was collected through site visits in October of 2014, communications with Roland Adams (Beverly GIS Manager), Gregory St. Louis (City Engineer) and Mike Collins (Commissioner of Public Services and Engineering) as well as data available through MassGIS, Beverly GIS online maps, National Grid Gas and Electric Maps and an on-the-ground survey performed by Welch Associates Land Surveyors, Inc. in May and June of 2015.

SEWER

Sanitary waste from the existing building is conveyed via gravity sewer line to a cross country sewer main. The line that services the building is a 10-inch VC line that exits the east side of the building and then connects to a 21" PVC sewer line which discharges to a 30" RCP sewer main in Balch Street. This is shown on plans entitled "Brimbal Avenue Interceptor Cross Country Balch Street to Cabot Street" dated November 1982 as prepared by Camp Dresser & McKee Inc. The 21" PVC sewer line flows via gravity from Cabot Street, along the east side of the site, towards Balch Street. Plans we obtained do not indicate the presence of an existing exterior grease trap.

During design, the capacity of the existing sewer line will need to be evaluated to determine if it can handle the increased use or the need to provide a connection to the 30" RC sewer main in Balch Street. Future development would require the replacement and/or removal of the VC sewer service, the installation of an appropriately sized PVC sewer service and the installation of an exterior grease trap to service cafeteria functions. The 21" PVC sewer line will be required to be maintained in future development conditions which will need to be considered during the design process.

WATER

Water mains are located in Cabot and Balch Street. They are 12-inch cast iron and 8-inch cast iron respectively. Fire hydrants are located on Cabot and Balch Streets as well as one onsite. The onsite hydrant is located on the east side of the property at approximately the mid-point of the soccer field. The water main for this hydrant is serviced via the Balch Street water main. Record City information indicates there is a 4-inch water service to the building which is off of Cabot Street. We understand that an existing irrigation system is located in the athletic fields and an irrigation control box was picked up by Welch Associates. However, information as to the pipe sizes and locations is unknown. We would recommend that record plans of the existing irrigation system and its components be provided if future development plans include the use of this system.

During design, a hydrant flow test will be required to determine available flow for fire suppression system design. Additionally, the need to relocate the existing service may need to be evaluated as well as the installation of an additional service for fire suppression.

DRAINAGE

Record drainage plans were not available at the City to review. However, Beverly GIS information and Welch Associates survey indicate drainage lines, direction of flow within the lines and pipe sizes. The existing onsite drainage system appears to consist mainly of conveyance via a closed drainage system. Additionally, the onsite closed drainage system acts as a conveyance system for stormwater being captured from portions of Cabot Street as well as the neighborhood to the west which consists of portions of Courtney Drive, Fitzgerald Way and some commercial properties.

The Cabot Street drainage system enters the site north of the building via an 18-inch RCP pipe and continues through the site going beneath the parking lot, the building and the athletic fields. The westerly neighborhood's drainage system enters from the west side of the site via a 24-inch RCP and continues beneath the wetlands and the athletic fields. There is one point of discharge for the drainage system which is located in the south side of the property towards Balch Street via a 24-inch RCP. The stormwater ultimately discharges south to the Shoe Pond Basin through the Cummings Center property. The Cummings Center property is located to the south of the site across Balch Street.

Drainage is collected from impervious and pervious surfaces via catch basins and conveyed via a closed drainage system to the discharge point. It appears that the stormwater system is receiving little treatment in regards to TSS removal. Portions of the existing on-site drainage system will likely be re-used in future development conditions. However, an evaluation of those portions may become necessary to confirm the integrity of them.

The portions of the existing drainage system that conveys stormwater from Cabot Street and the neighborhood to the west, as described above, will be required to be maintained through the site in future development conditions and may be required to be re-routed. This will need to be considered during the design process.

The future development drainage design will need to be re-designed to meet the Massachusetts Department of Environmental Protection stormwater standards, the City of Beverly Stormwater and Construction Site Management Ordinance and will require quantity and quality mitigation measures.

GAS

National Grid is the supplier of natural gas to the City of Beverly. There is a gas meter and valve at the west side of the existing building near the loading area and a 4" CI gas service coming in the front (north side) of the building. Future development options would require that the existing system be located and analyzed for capacity. Coordination should occur with National Grid regarding any service improvements.

ELECTRIC

National Grid is the supplier of electricity to the City of Beverly. Electricity is supplied below ground for the existing building. The service enters the building from the front (north side) and appears to be a three phase service. Future development options would require that the existing system be located, confirm if it is three phase and analyzed for capacity. Coordination should occur with National Grid regarding any service improvements.

Massing Study

Massing Study

The Schematic Design process for the Beverly Middle School included three-dimensional massing studies of the new school building, which are included herein. These studies identify how the new school facility will be integrated within the residential and commercial area, as well as how the four-story academic core of the building would break down in scale along Cabot Street with the use of the three-story main entry lobby, two-story administration/guidance program, 1 ½ story library, and single-story entry canopy seamlessly integrated within the building aesthetic. The 1 ½ story library also nicely anchors the exterior educational environment to the north and the gymnasium to the south. The three-dimensional evaluation also allowed the design team to blend the building program appropriately with the existing site topography, placing the building's main entrance at an appropriate elevation relative to Cabot Street and placing the gymnasium and locker areas one floor lower than the primary building entrance and at grade along the south side of the site. The site is bounded to the north by Cabot Street, to the west by a residential neighborhood, to the east by a residential neighborhood, and the south by a protected wetland, commercial property and Balch Street.

GRADE 5
RESPECT
BEVERLY MIDDLE SCHOOL

Building Systems Narratives

Sustainable Design Elements

BUILDING SUMMARY

The new Beverly Middle School will be 231,509 square feet designed for 1,395 students. The new school will contain a four-story academic classroom wing separated horizontally by grade level (academies) and further delineated by three academic neighborhoods per grade level. The school will also contain a 750-seat auditorium that can hold more than one-half of the student population. A state of the art Library Media Center will be located on the first floor adjacent to the main entry so that the daily activity can be seen as an active and vibrant part of the educational environment. There are a number of enhanced "smart building" systems included in the new school. The HVAC systems will automatically detect the number of occupants and adjust heating, tempered air, and ventilation systems based on occupant load. Facilitative Learning Centers within classrooms will include control panels where teachers can energize integrated technology tools such as interactive electronic whiteboards or LCD projectors, document scanners, and video broadcasting with the touch of a button. Hallways will include LCD screens and wireless data communication. The building's indoor/outdoor security monitoring system will allow staff to monitor the entire campus from a single control point, and strategically located fob entry systems will automatically register the faculty ID at key identification points throughout the building.

SUSTAINABLE DESIGN SUMMARY

The design team is working closely with the Beverly School District, School Building Committee, and City Officials to obtain the highest LEED rating possible. The design team is currently targeting a LEED Gold rating for the new middle school. The City and design team have also been working with representatives from National Grid and their "Integrated Design Path Incentives" program to maximize the project's energy efficiency incentive rebate points.

The sustainability begins with the building placement, building massing, and building orientation/organization on site. The proposed building is sited to accomplish many sustainable and educational goals:

- Minimize building footprint due to existing sub-surface site conditions (blue clay)
- Maximize natural daylighting
- Minimize solar exposure
- Minimize direct glare sunlight
- Minimize passive heat gain

The proposed building location, orientation and massing accomplished with the evaluation of the educational program and its vertically organized four-story organization, the placement of the academic neighborhoods facing north northwest, the gymnasium and auditorium facing south and the cafeteria (stacked vertically) facing south southeast with optimized

glazing area and light filtering and blocking devices integrated into the window system.

The new middle school will be constructed with a steel framing system, utilizing natural and synthetic wood finishes to accent the steel and exposing the structural frame and connections in selected areas as part of the educational expression of the structure. There are many sustainable attributes related to the use of steel and wood components, including (as examples):

- Low embodied energy
- Renewable
- Reusable & Recyclable

The new school is designed to ensure excellent indoor environmental quality. The new middle school, with the use of interior wood finishes and components, will result in spaces that have positive stress-reducing and health-related qualities, including greater concentration and creativity, as some studies have shown. The new school will feature improved ventilation systems which will monitor and manage air contaminants such as carbon dioxide and particulate matter, specifying less harmful materials, the ability to control systems, and will offer daylight and views which will increase productivity and test scores. Ductwork and all absorptive materials will be protected during construction to ensure that no mold or contamination is established in the building. The school will receive a full flush out after construction is complete and before occupancy. The new school will also feature enhanced acoustical design features in all classrooms for sound transmission and background noise levels. Sustainable aspects of the school are incorporated into the science curriculum such that the school will become a teaching tool. The data collected from the sustainable design features will be available at the teacher's workstation. This information will be accessible to the science department for inclusion into the curriculum.

The City is considering the incorporation of a 20,000 gallon gray water collection system that will save the district nearly 500,000 gallons of potable water each year. The building is designed to optimize energy usage and improve energy efficiency by a minimum of 20% over a base building designed to meet the 2015 International Building Code (IBC) and 2012 Energy Code. The new facility will be constructed with a minimum of 20% recycled materials, and 10% of all materials will be regional materials. The new Middle School site development is designed to promote responsible, innovative, and practical design strategies that are sensitive to wildlife, plants, and water and air quality. The site design addresses planting sustainable landscapes, managing storm water runoff, reducing heat island effects for roof surfaces, and eliminating light pollution. Sustainable site provisions include reducing emissions associated with transportation, as well as including provisions for bicycling, walking, carpool parking, and refueling/recharging facilities for alternative fuel/electric vehicles.

Building Systems Narratives

Building Structure

SUBSTRUCTURE

FOUNDATIONS

Base Foundation System

Based on the recommendations of the Geotechnical Engineer, the entire structure of the school will be supported on pile foundations. The columns of the proposed structure would bear on 4 ft.-0 in. deep reinforced concrete pile caps on structural steel piles, bearing on rock, with pile lengths averaging about 70 ft. in length (to be verified by the Geotechnical Engineer). The exterior walls will be supported on 5 ft.-0 in. deep grade beams spanning between pile caps with intermediate piles at 10 ft.-0 in. on center. Based on the recommended pile capacity of 50 tons, a typical interior column in the four story classroom wings would be supported on 8 ft.-0 in. x 8 ft.-0 in. x 4 ft.-0 in. deep pile caps on a four pile group and a typical exterior column would be supported on 8 ft.-0 in. x 8 ft.-0 in. x 4 ft.-0 in. deep pile caps on a three pile group. The columns supporting the long span structure of the single story gymnasium, cafeteria, music spaces and other ancillary spaces would be supported on 8 ft.-0 in. x 8 ft.-0 in. x 4 ft.-0 in. deep pile caps on three pile groups. In addition, the ground floor slab would be supported on single piles with a 2 ft.-0 in. x 2 ft.-0 in. x 2 ft.-0 in. deep pile caps spaced out approximately 15 ft.-0 in. (including interior and exterior pile caps supporting the columns.) All of the interior and exterior pile caps will be tied to the supported concrete slab.

Alternate Foundation System

The alternate foundation system that may be feasible as proposed by the Geotechnical Engineer is by improving the ground with rigid inclusions. The ground would be improved to support spread footings supported on soil with a bearing capacity of 2 tons per square foot. The columns would bear on reinforced concrete spread footings and the perimeter foundation walls would bear on continuous reinforced concrete strip footings extending at least 4 ft.-0 in. below grade. Using a recommended bearing capacity of the soil a typical interior column in the four story classroom wings would be supported on a 9ft.-0 in. x 9 ft.-0 in. x 24 in. deep concrete footing. A typical interior column in the cafeteria would be supported on an 8 ft.-0 in. x 8 ft.-0 in. x 24 in. deep concrete footing. The columns supporting the long span structure of the single story gymnasium and auditorium would be supported on 8 ft.-0 in. x 8 ft.-0 in. x 24 in. deep concrete footings. The media center and the main entrance lobby would be supported on 7 ft.-0 in. x 7 ft.-0 in. x 24 in deep concrete footings.

SLAB ON GRADE

Base Lowest Level Floor System

Based on the recommendations of the Geotechnical Engineer, the lowest level slab of the proposed structure would be a 12 in. thick reinforced concrete slab reinforced with 6 psf reinforcing over a vapor barrier on 2 in. thick rigid insulation on compacted granular structural fill supported on piles.

Alternate Lowest Level Floor System

Based on the recommendation of the Geotechnical Engineer the lowest level of the proposed building would be a 5 in. thick concrete slab on grade reinforced with welded wire fabric over a vapor barrier on 2" thick rigid insulation on 12 in. compacted granular structural fill and a base course of 12 in. of compacted gravel.

FLOOR CONSTRUCTION

Typical Floor Construction

A 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be 13 psf for the typical framing.

ROOF CONSTRUCTION

Typical Roof Construction

The roof construction would be galvanized, corrugated 3 in. deep, Type 'N' metal roof deck spanning between wide flanged steel beams and girders. At locations of roof supported mechanical equipment, a concrete slab will be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be 12 psf.

Low Roof Structure above the Kitchen, Mechanical Room and the Utility Areas

The roof would be a continuation of the adjacent second floor and would be similar to the typical floor construction of 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. This roof will be supporting the mechanical units. The units would be screened by a screen comprised of structural steel posts and beams. The weight of the structural steel is estimated to be 15 psf.

Gymnasium Roof Framing

The roof construction would be acoustic, galvanized, corrugated 3 in. deep, Type 'NA' metal roof deck spanning between wide flange steel beams supported on structural steel trusses. The weight of the steel trusses and structural steel framing is estimated to be 12 psf.

Auditorium Roof Framing

The roof construction would be galvanized, corrugated 3 in. deep, Type 'N' metal roof deck spanning between wide flange steel beams supported on structural steel trusses. The weight of the steel trusses and structural steel framing is estimated to be 12 psf. The weight of the structural steel framing supporting the roof and the rigging above the stage is estimated to be 15 psf.

Locker Rooms and Music Rooms Roof Structures

The roof construction would be similar to the typical roof construction and would be galvanized, corrugated 3 in. deep, Type 'N' metal roof deck spanning between wide flanged steel beams and girders. At locations of roof supported mechanical equipment, a concrete slab will be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be 12 psf.

VERTICAL FRAMING ELEMENTS

Columns

Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8 columns and the columns at the double story spaces at the Gymnasium, Auditorium and Lobby would be HSS 12 x 12.

Lateral Load-Resisting System

The proposed school structure would be divided into three parts separated by way of expansion joints. One part would comprise the Gymnasium/Auditorium, the Locker rooms and the Mechanical/Utility spaces; the second part of the structure is the portion that houses two of the three Academic wings and the Cafeteria; the third part would house one of the Academic wings, Lobby, Library/Media Center and the Administration spaces.

The lateral load resisting system for the structure housing the Gymnasium and the Auditorium spaces, would be comprised of reinforced masonry shear walls.

The typical lateral load resisting system for the other parts of the school would be concentric steel braced frames comprised of hollow structural steel sections.

Building Systems Narratives

Fire Protection

GENERAL

The Fire Protection systems shall be provided in accordance with NFPA #13, NFPA #14, the BOCA Fire Prevention Code and the latest Massachusetts State Building Code.

The fire protection system shall be a wet-pipe, combined sprinkler/standpipe system to which will protect all areas of the building. Each level of the building will be protected as a separate zone of fire protection.

The fire protection system shall commence from a new separate, designated fire water service. Where this service enters the building, a double check backflow preventer shall be provided. A wet-pipe alarm riser shall be provided immediately after the backflow preventer.

A standpipe system will be provided which will interconnect the sprinkler systems and have fire department connections, at the front and rear of the building.

The stairwells will have standpipes complete with fire hose valves with cabinets. Each floor of the building will be a separate sprinkler zone, being fed from a floor control valve connecting to the standpipe riser.

All sprinkler and standpipe piping 2-1/2" and larger in size shall be Schedule 10 steel pipe with rolled joints with victaulic fittings. All piping 2" and smaller shall be Schedule 40 steel pipe with 175 lb. screwed fittings.

All finished areas of the building, with hung ceilings, shall be protected by concealed piping with quick response, semi-recessed pendant sprinkler heads.

All unfinished areas of the building shall be protected with exposed piping having brass, upright sprinkler heads.

Sprinkler heads shall be omitted from the main electric room and emergency electric room, provided a two (2) hour fire rating is constructed. Side wall sprinklers will be provided in the MDF rooms.

Building Systems Narratives

Plumbing

GENERAL

The Plumbing Systems of the building shall be provided in accordance with Mass 248 CMR, the Massachusetts Fuel Gas and Plumbing Code and the latest Massachusetts State Building Code.

DOMESTIC WATER

Domestic water will be supplied to the building by a cement-lined, ductile iron water service fed from the municipal system. A backflow preventer and expansion tanks shall be provided immediately after the service enters the building.

Domestic water shall extend out to the building in a series of mains, risers and branches to all fixtures and equipment requiring same. Two (2) gas fired, high efficiency condensing-type, domestic hot water heaters, (one (1) for the classroom area and one (1) for the locker/shower area), will be provided. Both domestic hot water systems shall have recirculation piping with circulator pumps to return hot water from the most remote points of the hot water systems. The building will be provided with two (2) hot water piping systems; a 140° system to service the kitchen and 120° to serve the remainder of the building. Tempering valves will be provided to reduce the water temperature at all public lavatories to 110°F.

Cold, hot and hot water recirculation piping will run parallel to each other. All domestic water piping shall be of Type "L" copper with wrought copper fittings having press-fit connections. All water piping will be insulated with 1" thick, heavy density, fiberglass insulation having an all purpose jacket. All valves and fittings shall be insulated with pre-molded pipe enclosures packed with fiberglass insulation. Domestic water piping will be supported on trapeze type hangers where three (3) or more lines run together. Pipe will be supported individually on clevis type hangers. Twelve (12) inch long pipe saddles shall be provided between all supports and the insulated pipe.

All water closets and urinals will be supplied with recycled storm water from a separate designated system. This system shall commence from an exterior 20,000 gallon storage tank with 5 HP pump. The tank shall receive rain water from the school's roof and will discharge its overflow to the on-site storm water system. This system's pumps will discharge through a piping system that will enter into the mechanical room, where a back-up connection from the municipal water system, will be provided. The back-up municipal water system will have reduced pressure backflow preventers and connect to the reclaim water equipment skid. This interconnection between the city potable water system and the non-potable reclaim water system will have approval by the Massachusetts Department of Environmental Protection and the Massachusetts Board of State Examiners of Plumbing and Gas fitters. There will be a three way valve internal to the unit so that when there is insufficient water in the tank the system will automatically operate on municipal water. The piping beyond the back-up connection will be the same as outlined herein for cold water and will run parallel to that system in the building.

Wall hydrants shall be provided around the perimeter of the building at approximately 100-foot intervals.

Reduced pressure zone backflow preventers will be provided on the make-up water supply to the mechanical system on the hot and cold water supplies to the Science Areas and on the feeds to various equipment in the Kitchen.

SANITARY, WASTE, AND VENT

All sanitary system fixtures and equipment on all levels of the building shall flow by gravity from the building to the municipal system. The waste from the kitchen areas shall also flow by gravity, but shall run to a separate, exterior grease interceptor, before combining with the sanitary waste.

Interior DW&V piping above grade shall be service weight, cast iron pipe with "no hub" fittings or polyethylene PPR, for pipe 2" and smaller which may be Type "M" copper tubing with sweat joints.

Sanitary, waste and vent piping below grade and exterior to the building shall be service weight cast iron with hub joints having neoprene gaskets.

STORM SYSTEM

Drains shall be provided on all roof areas and they will be piped down through the building to below the slab, where they will be connected and distributed to either the recycled water tank or the storm water disposal system. All storm piping above slab shall be no-hub cast iron pipe, insulated with 1" thick, heavy density, fiberglass insulation. Storm pipe below the slab shall be hub type, service weight cast iron pipe with resilient rubber gaskets.

NATURAL GAS

Natural gas will be supplied to the school by a new gas service. The service will be sized to accommodate the needs of the heating, domestic water and cooking requirements of this building.

All gas piping within the building will be Schedule 40 steel pipe. Pipe 3-1/2" and larger will be welded; 3" pipe and smaller shall have screwed fittings.

ACID NEUTRALIZATION SYSTEM

A system will be provided to provide proper pH adjustment discharge into the building sanitary/waste system. The exact size of the system and type will be designed once the flow rate and chemical discharge ranges have been completed. System shall consist of acid resistant collection piping for waste and vent, possible pH mixing tank, and chemical tanks with metering pumps and chart recorder.

FIXTURES

All water closets, urinals and lavatories shall be of vitreous china and shall be white in color. All fixtures shall meet LEED Standards for water usage.

Water closets shall be wall-mounted units with elongated bowls and 1.28 gallon or less,

sensor-operated flush valves. Urinals shall be wall-mounted units with 0.125 gallon or less, sensor-operated flush valves. Showers shall have 1.5 GPM shower heads.

Lavatories shall have sensor type, metering faucets with individual hot and cold controls. The supplies and wastes of all handicapped lavatories shall be insulated with pre-formed insulation components.

All classroom sinks will be stainless steel, drop-in units with single lever, ADA approved faucets.

PLUMBING LIFE-CYCLE COST ESTIMATE

Pursuant to the requirements of MGL Chapter 149, Section 44M, the following schematic level life-cycle cost estimates have been prepared, which will define the cost associated with the installation and energy consumption related to the Plumbing systems in this particular school project. It should be noted that the following estimates are based on schematic level plans and system sizes and will most likely change as the project design develops more completely.

The construction costs were calculated using the latest edition of the RS Means Mechanical Cost Data book combined with the latest sub-bid results from similar projects. Energy costs were calculated with the aid of the latest version of the Hourly Analysis Program published by the Carrier Corporation, which utilized typical natural gas and electric rates published by the Energy Information Administration. Maintenance costs were also obtained from RS Means.

Summary of Costs for the Domestic Hot Water Systems:

- Plumbing Construction Cost: **$111,823.00**
- Plumbing Systems Annual Electric Energy Cost: **$2,132.00**
- Plumbing Systems Annual Gas Energy Cost: **$7,668.00**
- Plumbing Systems Annual Maintenance Cost: **$1,270.00**

Building Systems Narratives

HVAC

DESIGN CRITERIA

Interior environmental conditions will be based on Massachusetts Code 780 CMR 12 and ASHRAE Standard 55-2004.

Ventilation of spaces will be designed to meet or exceed the requirements of the latest edition of the Massachusetts State Building Code, the ICC International Mechanical Code and ASHRAE Standard 62-2007, Ventilation for Acceptable Indoor Air Quality.

The HVAC systems will be designed to meet the acoustical requirements of ANSI S12.60-2002. The American National Standards Institute developed this standard specification and design guideline to help eliminate acoustical problems in the design stage of a project. Essentially, the steady background noise level in core learning areas should not exceed an NC of 35.

HEATING SYSTEM

High efficiency, gas fired, condensing boilers will produce hot water to meet the heating needs of the school. Preliminary load calculations indicate that the school will need three (3) boilers each having a capacity of approximately 4,000 MBH. Each boiler will be sized to handle 33% of the peak heating load. The boilers will be manufactured by Cleaver-Brooks, model Clearfire or approved equal and will have a maximum efficiency of up to 99%. Exact size of boilers will be determined during the design phase of the project.

Due to the fact that the specified boilers do not have a minimum flow requirement, the boiler system will be piped in a primary configuration with the hot water reset schedule being maintained by the boilers. Each boiler will be furnished with an automatic two-way control valve to isolate the boiler when not firing.

Hot water will be circulated throughout the facility by individual hot water circulating pumps. The pumps will be designed to operate in a lead/lag configuration such that the lag pump shall automatically start should the lead pump fail. The lead/lag assignment shall be reversible through the automatic temperature control system. The speed of the pumps will be controlled by variable frequency drives (VFD). Exact size of pumps will be determined during the design phase of the project.

Radiant panels or fintube radiation will be installed throughout the perimeter spaces of this school to offset heat loss at the building's envelope. The radiant panels and fintube radiation also have the added benefit of operating at night during the unoccupied mode thereby eliminating the need for the rooftop units to operate to maintain a night set back set point.

Hot water systems will utilize 30% propylene glycol for added freeze protection.

As part of the base design the following spaces will be provided with air conditioning:

- Cafeteria.
- Administration area including Principal's Office, Assistant Principal's Office, School Psychologist's Office, Counselor's Office, Adjustment Counselor's Office, Pre-school Coordinator's Office, Nurse's Office and conference rooms.
- Teacher's planning/work rooms.
- Multipurpose rooms.
- Sped PT/OT spaces.
- Library/Media center.
- Music/performing arts areas.
- Computer classrooms.

Locker Rooms, kitchen, gymnasium, electric rooms, and shop areas will not be air-conditioned unless specifically directed by school department representatives.

Two (2) high efficiency electric air cooled chillers will be furnished to produce chilled water to meet the cooling needs of the classroom section of the school on a design day. The chillers will be furnished with variable frequency drives for increased energy efficiency. The chillers will be located outside at grade level. Exact chiller size to be determined. Specified chiller shall be compliant with ASHRAE 90.1. Based on preliminary cooling load calculations, it appears that each chiller shall have a capacity of 175 tons.

The chilled water system will be piped in a variable primary configuration. This will permit the use of two-way control valves and variable frequency drives while maintaining constant flow through the chiller as recommended by the chiller manufacturer.

Chilled water will be circulated throughout the facility by dedicated chilled water pumps. The chilled water pumps will be designed to operate in a lead/lag configuration such that the lag pump shall automatically start should the lead pump fail. The lead/lag pump assignment shall be reversible through the automatic temperature control system. The speed of the pumps will be controlled by VFD's. Exact size of pumps will be determined during the design phase.

Chilled water systems will utilize 30% propylene glycol for added freeze protection.

CLASSROOMS

Three (3) variable air volume (VAV) rooftop air handling units with energy recovery will supply tempered air to the classrooms through a system of ductwork, terminal boxes and ceiling diffusers. Essentially, the quantity of air supplied shall meet the heating and ventilating loads of the particular space. This air will also be cooled and dehumidified in the cooling season in order to provide noticeable relief from excessive temperature and humidity.

It is planned that there will be one (1) rooftop energy recovery unit per classroom wing.

Energy recovery rooftop units are an effective way of reducing the overall energy consumption of a building by recovering the heat of the air being exhausted from the school. The energy recovery rooftop units were furnished with the following components:

- Double-wall insulated casings.
- Supply and exhaust fans.
- MERV 13 air filters for superior indoor air quality.
- Energy recovery wheel.
- Hot water heating coil.
- Chilled water cooling coil to provide dehumidification and tempering during the warmer months of the school year.
- Variable frequency drives for supply and exhaust fans.

Space temperature will be maintained by either modulating the terminal box's air damper or hot water reheat coil control valve. During summer months, a discharge air temperature strategy will be implemented, which eliminates the need for hot water reheat in the summer.

Classrooms will also be furnished with perimeter radiant panels designed to offset envelope heat loss.

Space temperature will be sensed with remote space mounted sensors and controlled through the building management system.

Additional energy saving will be achieved by integrating occupancy sensors and space mounted CO2 sensors into the terminal box operation such that when the classrooms are unoccupied or CO2 levels are low, the terminal boxes will reset to a standby mode.

ADMINISTRATION/GUIDANCE/NURSE

These areas will be served by a dedicated variable air volume rooftop air handling unit designed to provide full air conditioning. Each office will have individual control of space temperature utilizing variable air volume terminal boxes with hot water reheat coils controlled by space mounted thermostats.

BAND/CHORAL

A dedicated variable air volume rooftop unit will supply conditioned air to these spaces through a system of ductwork, terminal boxes and ceiling diffusers.

Space temperature will be maintained by either modulating the terminal box's air damper or hot water reheat coil control valve.

Space temperature will be sensed with remote space mounted sensors and controlled through the building management system.

MEDIA CENTER

A dedicated variable air volume rooftop unit will supply conditioned air to the Media Center through a system of ductwork, terminal boxes and ceiling diffusers.

Space temperature will be maintained by either modulating the terminal box's air damper or hot water reheat coil control valve.

Space temperature will be sensed with remote space mounted sensors and controlled through the building management system.

GYMNASIUM

Each gymnasium will be furnished with a dedicated heating and ventilating rooftop unit. Air will be distributed throughout the space via ductwork and supply diffusers.

The heating and ventilating units will be fitted with a hot water coil only.

The rooftop units will utilize the demand controlled ventilation sequence of operation. This strategy permits the modulation of the outside air dampers and fan speed based on the level of CO2 in the space.

Space temperature will be sensed with remote space mounted sensors and controlled through the building management system.

CAFETERIA

A dedicated rooftop air-handling unit will handle the Cafeteria.

This unit will provide both heating and cooling. The rooftop unit will utilize the demand controlled ventilation sequence of operation. This strategy permits the modulation of the outside air dampers and fan speed based on the level of CO2 in the space.

Space temperature will be sensed with remote space mounted sensors and controlled through the building management system.

KITCHEN

The kitchen areas will be handled by a roof mounted, gas fired make-up air handling unit specifically designed to provide tempered air to the kitchen in order to offset the amount of air being exhausted through the kitchen hood.

The kitchen hood exhaust system shall be provided with a Mellink kitchen hood exhaust control system, which is designed to vary the speed of the kitchen hood exhaust fan in response to the intensity of the cooking operations taking place. Essentially, the fan will operate at higher speeds when higher heat and smoke producing cooking is taking place. The Mellink system will also modulate the outside air damper and fan speed of the make-up air unit.

AUDITORIUM

The HVAC needs of the auditorium will be accommodated by a dedicated rooftop air handling unit. The rooftop unit will be furnished with a hot water heating coil and chilled water cooling coil.

This unit will provide both heating and cooling. The rooftop unit will utilize the demand controlled ventilation sequence of operation. This strategy permits the modulation of the outside air dampers and fan speed based on the level of CO2 in the space.

Space temperature will be sensed with remote space mounted sensors and controlled through the building management system.

CONTROLS

Griffith & Vary, Inc. recommends this facility be furnished with a Building Management System. This system will feature full Digital Direct Controls (DDC). This system will be capable of controlling the following:

- Space temperature set point.
- Start and stop of all energy recovery rooftop units and air-handling units.
- Start and stop of chillers.
- Enable/Disable boilers.
- Start and stop of chilled water pumps.
- Start and stop of hot water pumps.
- Schedule occupied/unoccupied times for various spaces.
- Monitoring of supply and return temperatures for hot water and chilled water.
- Optimization of plant efficiency.
- Monitoring of mechanical equipment (fans, pumps, boilers, chiller, etc.) and indication of any alarms, which may result from equipment failures.

To save energy required to heat or cool outdoor air, carbon dioxide sensors will be employed in the gymnasium, auditorium, and cafeteria to allow a reduction of outdoor air during periods of low occupancy and motion sensors will also be utilized to allow closure of outdoor air dampers when assembly areas are unoccupied. Classrooms will also have occupancy sensors to modulate the terminal box volume control dampers as a means of saving energy during periods when the classrooms are unoccupied.

HVAC LIFE-CYCLE COST ESTIMATE

Pursuant to the requirements of MGL Chapter 149, Section 44M, the following schematic level life-cycle cost estimates have been prepared, which will define the cost associated with the installation and energy consumption related to the HVAC systems in this particular school project. It should be noted that the following estimates are based on schematic level plans and system sizes and will most likely change as the project design develops more completely.

The construction costs were calculated using the latest edition of the RS Means Mechanical Cost Data book combined with the latest sub-bid results from similar projects. Energy costs were calculated with the aid of the latest version of the Hourly Analysis Program published by the Carrier Corporation, which utilized typical natural gas and electric rates published by the Energy Information Administration. Maintenance costs were also obtained from RS Means.

Summary of Costs:

- HVAC Construction Cost: **$6,807,900.00**
- HVAC Systems Annual Electric Energy Cost: **$160,700.00**
- HVAC Systems Annual Gas Energy Cost: **$21,800.00**
- HVAC Systems Annual Maintenance Cost: **$6,500.00**

Building Systems Narratives

Electrical

ELECTRIC SERVICE

The building electric service will be served via a pad mounted transformer located on site and installed by the electric utility company. Primary service conduits in concrete duct bank will be provided from the electric utility pole to the transformer via electric utility co. standard manholes. Secondary service feeders and conduits in concrete duct bank will be provided from the transformer to the switchboard. The electric utility co. meter will be mounted on the transformer.

TELEPHONE SERVICE

Telephone service conduits will be provided from a utility pole to the building demarcation point (MDF Room).

FIRE ALARM SERVICE

The fire alarm system will call the Fire Department via radio master box and telephone dialer.

CABLE TV SERVICE

Cable TV service conduits will be provided from a utility pole to the building demarcation point (MDF Room).

POWER DISTRIBUTION

The switchboard will be located in the main electric room. Preliminary load calculations indicate that the switchboard will be rated at 4000 amperes, 277/480 volt, three phase, four wire. The main will be provided with a surge protection device. A switchboard distribution section will feed 277/480 volt panelboards and major Mechanical and Plumbing equipment. Dry-type transformers will be provided to distribute 120/208 volt power for branch circuit panelboards and the Kitchen panelboards. One of the kitchen panelboards will be provided with a shunt trip main circuit breaker which will trip if fire suppression under hoods in initiated, shutting down all circuits under hoods. Panelboards with surge protection devices for computers will be provided, fed from computer grade K-rated transformers. Zero sequence harmonic filters connected to the computer panelboards will be provided to reduce neutral currents.

EMERGENCY POWER SYSTEM

A diesel fuel generator with a sound attenuated, weatherproof enclosure will be provided on the site. Preliminary load calculations indicate that the generator will be rated at 750kW, 277/480 volt, three phase, four wire. The generator will supply emergency power automatically upon loss of normal power to emergency egress, exterior building mounted, Administration, Student Dining, Mechanical Room, Electric rooms, Kitchen, Student Dining, ganged Toilet rooms, Custodian, Teacher Dining, Receiving, Locker rooms, Nurse's suite, and Gymnasium lighting, elevators, heating system equipment, fire alarm control panel, telephone system, MDF

and IDF rooms, cooling for MDF and IDF rooms, and kitchen walk in cooler and freezer. Two ATS's will be provided to separate emergency from optional standby loads. The emergency ATS and associated emergency panelboards will be located in two hour rated closets with two hour rated feeders. The optional standby ATS and associated panelboards will be located in normal electric rooms.

FIRE ALARM

An addressable manual and automatic fire alarm system will be provided. The fire alarm control panel will be located in the main electric room or an area as so directed by the Fire Department. A remote annunciator panel will be provided in the Vestibule at the Main Lobby and where required by the Fire Department. A map of the entire building will be framed and mounted adjacent to the annunciator. A keyed box will be provided outside the Fire Department entries. Manual pull stations will be located within five feet (5') of each egress door and at the entrance to each Stair. Additional pull stations will be provided as required by Code. Heat detectors will be provided at the top of the elevator shaft and any other areas not provided with protection by the fire suppression system. Smoke detectors will be provided in the Corridors, in Stairs at each floor level, in the Elevator Machine Room, and at all elevator landings for early detection of smoke for recall. All devices including tamper, flow, pressure switches, and PIV, associated with the fire suppression system will be connected to the fire alarm system. Audio/visual appliances will be provided in the Corridors, Classrooms and all large areas such as the Auditorium, Gymnasium, Student Dining, and Media Center. Visual devices will be provided in Toilet and Conference rooms. Mechanical equipment will be shut down by the fire alarm system as required by Code.

LIGHTING

Interior:

In general, highly efficient LED lighting fixtures and lamps will be provided throughout the building. Lighting levels will be in accordance with I.E.S. (Illuminating Engineering Society of North America) recommendations and the Massachusetts State Building Code energy requirements. Classrooms will be provided with direct/indirect, pendant mounted lighting fixtures. Office areas and Conference rooms will be provided with volumetric lighting fixtures. The Gymnasium will be provided with high bay lighting fixtures. Storage, Mechanical, and Electrical rooms will be provided with strip lighting fixtures. The Main Lobby, Media Center, and Student Dining will be provided with decorative lighting, probably luminous bowls, down lights, and wall sconces. The Kitchen and Locker rooms will be provided with gasketed wet location lighting fixtures. The Auditorium will be provided with surface cylinders, recessed down lights, step lighting, and wall sconces. The Stairs will be provided with wall sconces. Corridors will be provided with prismatic lens troffers. Down lights will be provided at various locations. The Stage will be provided with theatrical lighting fixtures and a dimming system. The dimming system will be connected to the fire alarm system bringing the house lights to full brightness upon initiation of fire alarm system. Edge lit exit signs will be provided at all egress doors and at additional locations as required to identify exit discharge routes. Vandal resistant exit signs will be provided in the Gymnasium.

Exterior:

Wall and pole mounted site lighting fixtures will be LED type.

SWITCHING

Lighting fixtures in rooms less than 900 square feet, will be controlled primarily by room occupancy sensors and local low voltage override switches. Lighting fixtures nearest to the exterior walls with windows in Classrooms will be provided with 0-10 volt dimming and will be controlled by daylight sensors. Larger areas not controlled by occupancy sensors and exterior lighting will be controlled through lighting relay panels and low voltage override switches as tied to EMS for scheduling. Digital timer switches will be provided in Storage and Custodial rooms.

DEVICES

General convenience receptacles will be located throughout the building as required. Receptacles provided in Toilet rooms, near sinks, the Kitchen, and outdoors will be provided with ground fault protection. Circuiting will be provided to Kitchen, Mechanical, and Plumbing equipment, and miscellaneous loads as required.

LIGHTNING PROTECTION

The building will be provided with a lightning protection system made up of air terminals on the roof with downlead conductors to ground.

BI-DIRECTIONAL AMPLIFIER SYSTEM

A bi-directional amplifier with coaxial cabling above accessible ceilings will be provided to amplify Fire Department and Police frequencies to ensure that there are no “dead” spots in the building for communication within building.

TECHNOLOGY SYSTEMS BACK BOX AND CONDUIT SYSTEM

A telephone/data/video/security/clock/speaker conduit system consisting of empty back boxes and conduit with pull strings to above accessible ceilings will be provided for technology. Cable tray will be provided above the Corridor ceilings and MDF and IDF rooms for low voltage wiring.

PV SYSTEM CONDUIT SYSTEM

An empty conduit system with pull strings will be provided for the PV system consisting of photovoltaic panels and an inverter. Conduits will be provided from the switchboard to an exterior mounted disconnect switch for shutting down the PV system if need be. Conduits will also be provided from the exterior disconnect switch to the inverter and from the inverter to the banks of photovoltaic panels.

Building Systems Narratives

Information Technology

The technology labs will be capable of accommodating an entire class of students (28). Network access in the technology labs will be hard wired. Wireless access points will be installed. Labs will contain the same equipment as a classroom. Science labs shall have 14 wired data outlets and wireless access points installed.

271000 STRUCTURED CABLING

The new network design will support a 10GHZ backbone over single mode and multi-mode fiber and up to 10G over Category 6A to the desktop.

Twelve (12) pairs of single mode fiber and twelve (12) pairs of multi mode fiber will be provided from the MDF to each IDF, to be utilized for data, voice, security systems, etc.

Cat 6A cabling will be provided for data, voice, CCTV, and wireless access points (four data drops at each wireless access point location). Wireless access point outlet placements are intended to provide the capability for complete wireless coverage throughout the school.

Each teacher location will be wired with 5 data ports.

Category 6A cabling will be provided for the owner provided phone system (support for Voice over IP). One of the data ports in the classroom will be used for the Phone.

272100 NETWORK SWITCHES

Network electronics (switches) shall be provided for every data, CCTV and voice port wired, plus 2 ports of every WAP faceplate. All ports shall be Power Over Ethernet. Switches shall be proprietary HP ProCurve to ensure compatibility with existing district infrastructure.

272133 WIRELESS ACCESS POINTS

3x3 Wireless access points, and a controller if applicable, will be provided, one access point in each classroom, and three in each large group space. Office suites shall also have an access point. Access points may shall be proprietary, Bluesocket, to ensure compatibility with existing district infrastructure.

273000 VOICE COMMUNICATIONS EQUIPMENT

The phone system shall be provided and installed by the owner. The building shall be cabled to support a voice over IP phone system using Cat 6A.

274000 AUDIO-VISUAL COMMUNICATIONS

Video and audio presentation equipment (wall mounted wide format LED ultra short throw projector, 8' marker board, voice lift system with amplifier, and up to 4 ceiling speakers) will be permanently installed in classrooms, labs and designated rooms. The PC/laptop in each classroom shall be provided by the owner. 25 presentation cameras will be provided for use in the school.

The Auditorium shall have a theater level presentation and performance sound system. A 10,000 lumen projector shall be included. An assistive listening system shall be provided. Wired and wireless microphones shall be provided. A recording system shall be provided.

Local sound systems and projection shall be provided in each of the two Cafés (5/6 & 7/8) and Gym. These spaces shall also contain assisted listening systems and wired and wireless microphone systems.

Portable recording systems and microphones shall be provided in band and chorus rooms.

274100 INTERACTIVE EQUIPMENT

An interactive slate/tablet shall be provided at all designated IWB locations (classrooms, conference rooms and Academic team rooms/maker spaces).

275000 DISTRIBUTED COMMUNICATIONS AND MONITORING

A public address system shall be provided. Clocks synchronized with a master clock shall be provided in every classroom and conference room, and where designated on the drawings. The PA system shall be integrated with the owner provided phone system to allow the use of the phone system for paging within the building.

277000 VIDEO DISTRIBUTION SYSTEM

A high definition, 1080p, IPTV system with set top boxes in every classroom, or equivalent, shall be provided. TVs with set top boxes shall be provided at designated locations. Coax shall not be run for video distribution purposes within the school. The capability and devices necessary to broadcast three (3) high definition "live" video streams to the IPTV system from any data port within the school shall be provided. A video on demand system shall be provided. An encoder shall be provided in the auditorium to display the local camera as a channel on the IPTV system. Digital signage shall be included. A mini-headend with 4 DVD players and an encoding station shall be included in the media center.

281300 ACCESS CONTROL

An access control system shall be provided. The system may be proprietary to ensure compatibility with district infrastructure and to leverage the district's existing enterprise solution. Card readers shall be located as designated on the drawings. The system shall integrate with the CCTV system if possible. Every exterior door shall have door contacts and a request to exit device. Interior doors shall also contain door contacts, card readers and a request to exit device. The main entry shall be equipped with a video entry system. Panic buttons shall be provided as designated on the drawings.

281600 INTRUSION DETECTION

Intrusion detection system and related components shall be provided. Every first floor room with a window shall have a motion sensor. Motion sensors shall also be placed within the hallways and in vestibules to help partition the building into zones for afterhours use of the facility.

282300 VIDEO SURVEILLANCE

An indoor/outdoor CCTV system (IP based) will be provided. The system may be proprietary to ensure compatibility with the district's CCTV servers and to leverage the district's existing enterprise solution. Coverage shall include hallways, stairwells, building perimeter, and parking. Other areas, such as the gym, auditorium, café, and admin area shall be included.

Sustainable Building Design Guideline Documents

Designer Certification Letter

June 15, 2015

Massachusetts School Building Authority (MSBA)
40 Broad Street
Suite 500
Boston, MA 02109
ATTN: Caulen Finch, Project Manager

Re: LEED v4 for Schools Project Checklist
Beverly Middle School – Beverly, MA

Dear Caulen,

Ai3 Architects hereby acknowledges that Beverly Middle School identified a goal of 2% additional reimbursement from the MSBA High Efficiency Green School Program. As the District's Project Architect, I have submitted a draft version of the completed LEED v4 for Schools checklist showing 61 attempted points and 11 possible points, which will meet, at a minimum, LEED Silver certification.

To the best of our ability and to the extent of the information we have produced and researched during the Schematic Design phase, the scope of work for this project will include the construction elements and performance tasks to achieve this goal. All subsequent documents including the project specifications, schematic design drawings, and cost estimates will match the scope of work indicated in the submitted scorecard.

Sincerely,

Troy L. Randall, AIA, LEED AP BD+C
Principal, Ai3 Architects LLC

526 Boston Post Road Wayland, MA 01778 P 508.358.0790 F 508.358.0791 www.ai3architects.com

Sustainable Building Design Guideline Documents

Sustainable Building Design Guideline Scorecard

LEED v4 for BD+C: Schools
Project Checklist

Project Name: Beverly Middle School
Date: 06.15.2015

Y	?	N			
	1		Credit	Integrative Process	1

7	1	0		**Location and Transportation**	**15**
		X	Credit	LEED for Neighborhood Development Location	15
		X	Credit	Sensitive Land Protection	1
		X	Credit	High Priority Site	2
4			Credit	Surrounding Density and Diverse Uses	5
2			Credit	Access to Quality Transit	4
1			Credit	Bicycle Facilities	1
		X	Credit	Reduced Parking Footprint	1
	1		Credit	Green Vehicles	1

7	1	0		**Sustainable Sites**	**12**
Y			Prereq	Construction Activity Pollution Prevention	Required
Y			Prereq	Environmental Site Assessment	Required
1			Credit	Site Assessment	1
2			Credit	Site Development - Protect or Restore Habitat	2
1			Credit	Open Space	1
2			Credit	Rainwater Management	3
		X	Credit	Heat Island Reduction	2
	1		Credit	Light Pollution Reduction	1
		X	Credit	Site Master Plan	1
1			Credit	Joint Use of Facilities	1

7	0	0		**Water Efficiency**	**12**
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2			Credit	Outdoor Water Use Reduction	2
4			Credit	Indoor Water Use Reduction	7
		X	Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

19	3	0		**Energy and Atmosphere**	**31**
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
5			Credit	Enhanced Commissioning	6
8	2		Credit	Optimize Energy Performance	16
1			Credit	Advanced Energy Metering	1
2			Credit	Demand Response	2
2			Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
	1		Credit	Green Power and Carbon Offsets	2

5	3	0		**Materials and Resources**	**13**
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
1	1		Credit	Building Life-Cycle Impact Reduction	5
1			Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

10	1	0		**Indoor Environmental Quality**	**16**
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
Y			Prereq	Minimum Acoustic Performance	Required
1			Credit	Enhanced Indoor Air Quality Strategies	2
2			Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
		X	Credit	Thermal Comfort	1
1	1		Credit	Interior Lighting	2
1			Credit	Daylight	3
1			Credit	Quality Views	1
1			Credit	Acoustic Performance	1

2	1	0		**Innovation**	**6**
1	1		Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

4	0	0		**Regional Priority**	**4**
1			Credit	Regional Priority: LT Surrounding Density and Diverse Uses	1
1			Credit	Regional Priority: WE Outdoor Water Use Reduction	1
1			Credit	Regional Priority: EA Optimized Energy Performance	1
1			Credit	Regional Priority: EA Renewable Energy Production	1

61	11	0	**TOTALS**	Possible Points:	**110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Room Data Sheets

Room Data Sheets

STEAM ACADEMIC SUPPORT, ACADEMIC TEAM ROOM & INTEGRATED PRODUCTION LAB:

FUNCTIONAL DATA

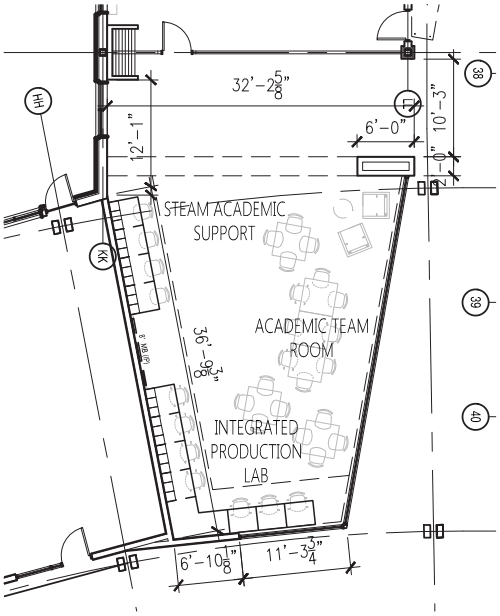
Description:	Academic team room, STEAM academic support, integrated academic production lab/maker space
Quantity:	12
Users:	1 Teacher and 28 students

SPATIAL DATA

Floor Area:	1340 Net Square Feet
Ceiling Height:	12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and deck
Doors:	Solid core flush wood doors with transom glazing
Windows:	Insulated, hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	Two (2) ADA accessible sinks
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/Indirect pendant light fixtures, task lighting work stations, task lighting at white board locations, speciality lighting
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



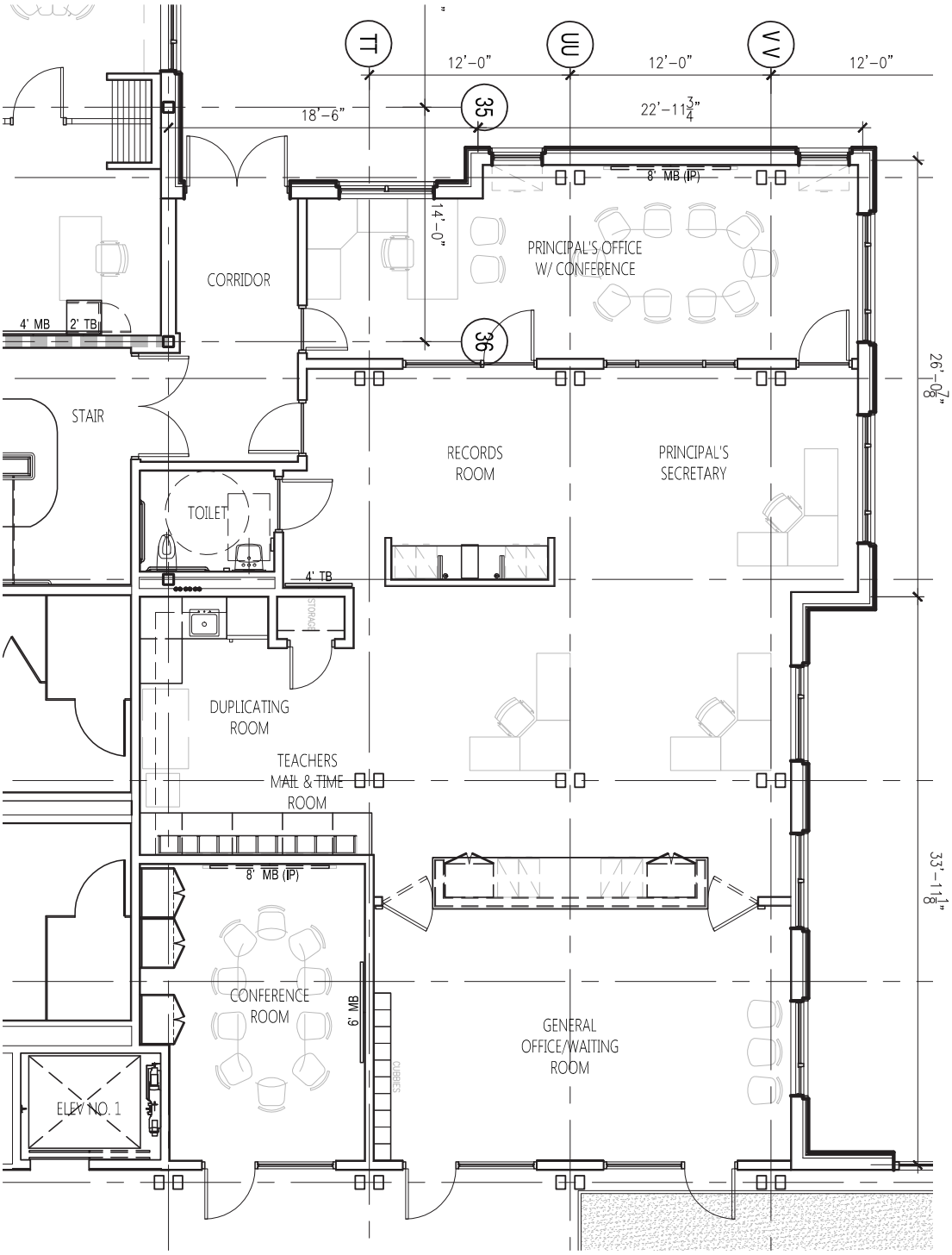
ORGANIZATIONAL DATA

Location:	On all floors, centrally located between academic neighborhoods
Adjacencies:	Located adjacent to the neighborhoods with one wall of each academic team room operable, yielding access to a general classroom
Orientation:	All academic team rooms have one (1) west facing window

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- 30" deep, 30" high built-in work surface - Built-in, open shelving above work surface
Specialties:	- One (1) 8'-0" wide, interactive white board
Furniture:	- Six (6) work tables with stools; chairs for Eleven (11) work stations; soft seating
Technology Equipment:	- LCD/Data projector - Interactive white board infrastructure

ADMINISTRATION:



ADMINISTRATION:

FUNCTIONAL DATA

Description:	Administrative offices, duplicating station, conference rooms, administration storage
Quantity:	1 principal office with conference room, 1 conference room, 1 waiting area, 3 personel workspaces, 1 duplicating station, 1 kitchenette, mailroom
Users:	Administrative Staff

SPATIAL DATA

Floor Area:	2140 Net Square Feet
Ceiling Height:	12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete, ceramic tile, carpet
Walls:	Painted gypsum wallboard, epoxy paint at toilet room
Ceiling:	Acoustical clouds suspended in exposed structural ceiling
Doors:	Solid core flush wood doors with adjacent sidelight glazing, solid core wood flush doors
Windows:	Insulated, hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	One (1) accessible lavatory; one (1) accessible toilet fixture; one (1) accessible counter-top sink; plumbing connection to domestic refrigerator/freezer and under counter ice machine
Fire Protection:	Fully sprinklered fire protection system
Electrical:	Connections to various appliances, copiers, and printers
Lighting:	Direct/Indirect pendant light fixtures, specialty lighting fixtures
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers

ORGANIZATIONAL DATA

Location:	Located on the first floor at the main entry lobby within the "public space" core of the school
Adjacencies:	Adjacent to the primary entry, the Library/Media Center, and 5/6 student dining
Orientation:	Oriented to the north and east along Cabot Street

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Built-in, 24" deep, solid wood base cabinets - Continuous built-in, solid wood cabinets about base cabinets and work surfaces - +/- 125 built-in solid wood mail slots installed above solid wood base cabinets - Two (2) solid wood built-in facilitators technology cabinets - One (1) built-in, solid wood, administration reception desk - One (1) built-in, solid wood, workstation - 24" deep work surfaces
Specialties:	- Two (2) 8'-0" wide white boards; one (1) 6'-0" wide white board; one (1) 6'-0" wide tack board; one (1) 4'-0" wide tack board; copiers; shredders; printers; fax machines; under counter ice machine; various appliances
Furniture:	- Work station style desks with chairs; standard desks with chairs; principal's desk with chair; conference tables with chairs; horizontal and lateral filing cabinets; book shelves; end-tables; chairs
Technology Equipment:	- Interactive LCD/Data projector - Presentation camera - Amplified voice system with two (2) microphones and two (2) ceiling speakers at dual locations

ART CLASSROOMS:

FUNCTIONAL DATA

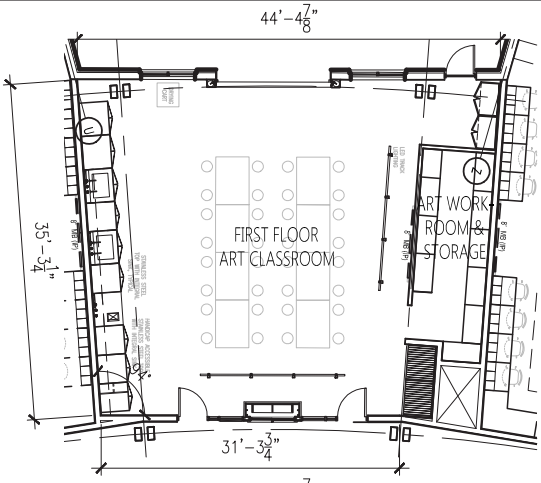
Description: Art Classroom
Quantity: 2
Users: 1 Teacher, 32 Students

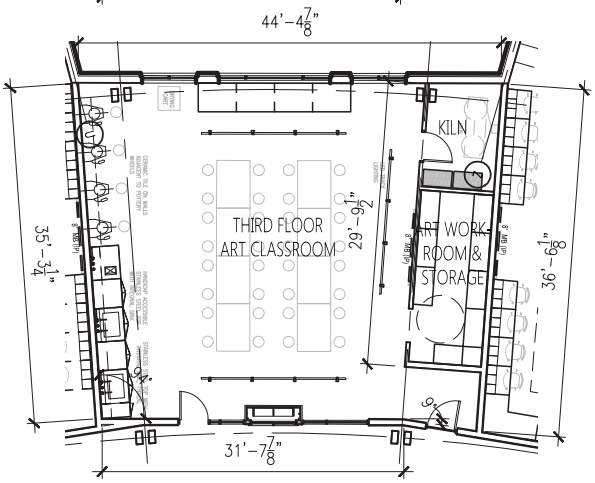
SPATIAL DATA

Floor Area: 1250 Net Square Feet each
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard, ceramic tile
Ceiling: Exposed structure and deck
Doors: Solid core flush wood doors with adjacent sidelight glazing, overhead door at first floor
Windows: Insulated, hopper style, operable aluminum windows
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: Two (2) stainless steel deep art sinks and one (1) accessible stainless steel art sink. Hot and cold water available at all sinks. Sediment traps at all sinks.
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures, task lighting at teaching wall, task lighting at tack board locations, speciality lighting
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers





ORGANIZATIONAL DATA

Location: On first floor and third floors, centrally located between academic neighborhoods
Adjacencies: Located adjacent to the neighborhood Academic Team Rooms

Orientation: Both art classrooms face north

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

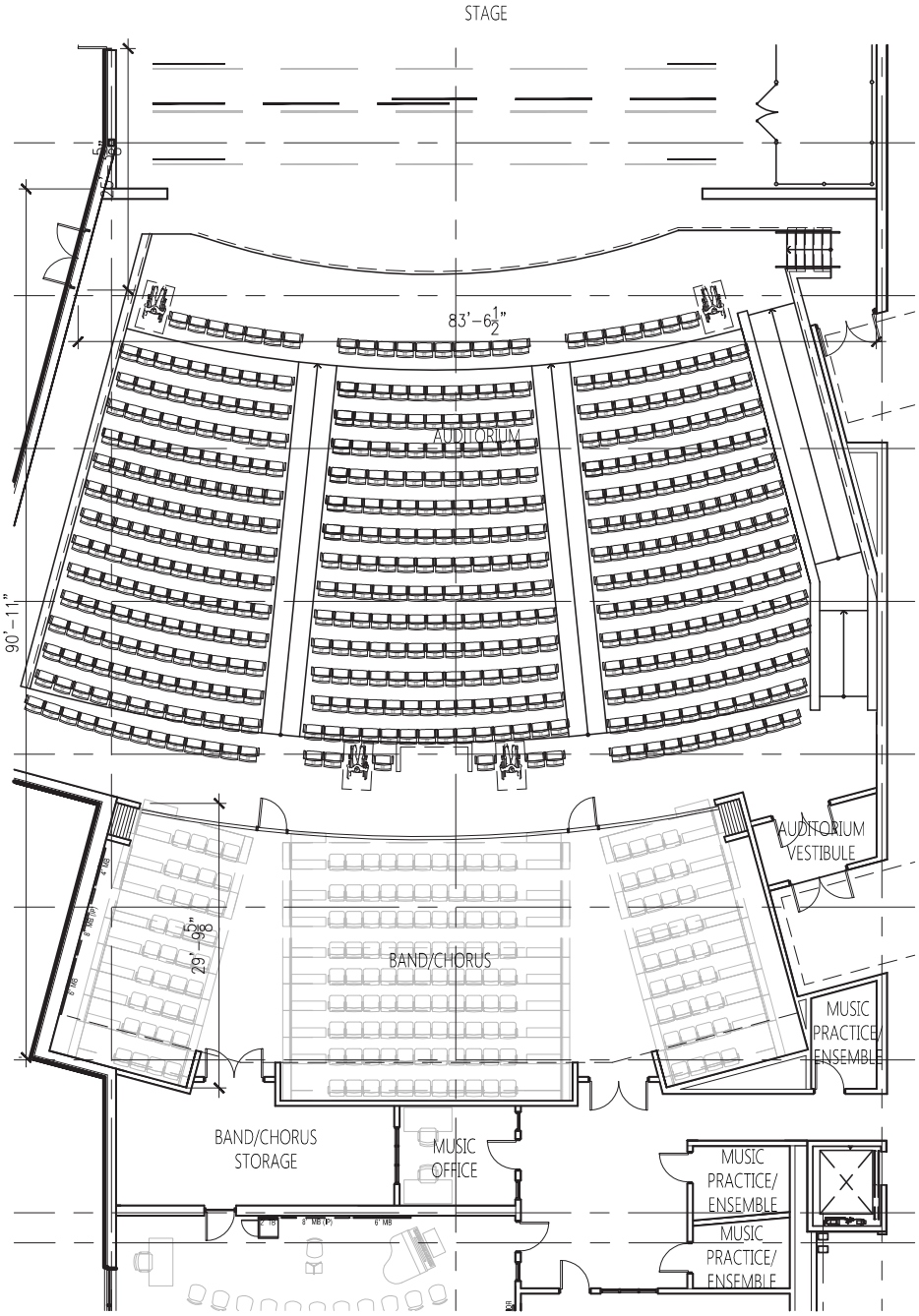
Casework/Cabinetry:
- Built-in, 36" deep, base cabinets located at the art sink wall.
- Built-in, 12" deep, wall cabinets above the base cabinets.
- Six (6) portfolio storage units.
- Two (2) 42" wide, 24" deep, 72" high built-in storage cabinets
- Solid wood, built-in facilitators technology cabinet at teacher's station
- 36" deep, solid wood base cabinets at art work room
- Built-in, 12" deep, wall cabinets above base cabinets in art work room
- Built-in, open shelving in art work room

Specialties:
- One (1) 4'-0" wide, white board; Two (2) 8'-0" wide, tack board; Five (5) 4'-0" wide, tack board; One (1) 8'-0" wide, interactive white board

Furniture:
- Eight (8) work tables with four (4) stools each; one (1) teacher desk with chair; one (1) printing press; one (1) drying rack

Technology Equipment:
- LCD/Data projector
- Interactive white board infrastructure
- Presentation camera
- Amplified voice system with two (2) microphones and four (4) ceiling speakers

AUDITORIUM, STAGE, BAND & CHORUS:



AUDITORIUM, STAGE, BAND & CHORUS:

FUNCTIONAL DATA

Description:	Seating and performance observation for approximately 550 students, staff, public, etc.
Quantity:	1
Users:	Seating for approximately 550 occupants

SPATIAL DATA

Floor Area:	5700 Net Square Feet of Auditorium space with 1600 Net Square Feet of Stage space
Ceiling Height:	± 24'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Carpet and Architectural polished stained concrete; Laminated floor at stage
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and deck; acoustical clouds
Doors:	Solid core flush wood doors
Windows:	N/A
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	N/A
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Performance lighting; dimming house lighting
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, performance sound, assisted listening system

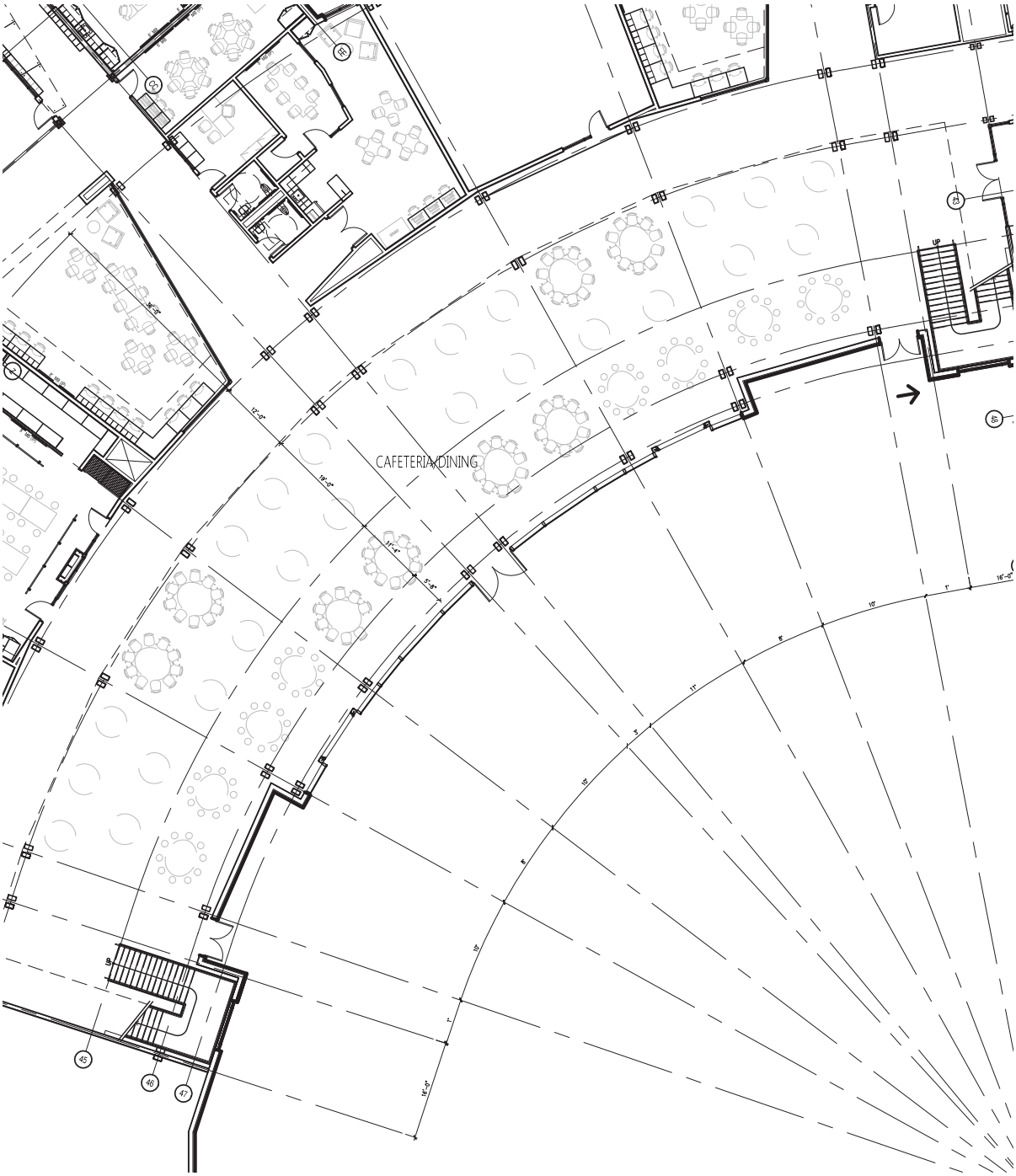
ORGANIZATIONAL DATA

Location:	On a half-level above the first floor, within the "Public Space" zone of the school
Adjacencies:	Adjacent to secondary public entry and gymnasium
Orientation:	The length of the Auditorium will be oriented slightly off of a North-South axis

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Solid wood, built-in sound and lighting control station
Specialties:	- Wall panels, acoustical baffles, railings
Furniture:	- Fixed seating, fabric covered chairs
Technology Equipment:	- LCD/Data projector - 48 channel sound board - Wired and wireless microphones - Video recording cameras - Audio output to T.V. control room

CAFETERIA/DINING:



CAFETERIA/DINING:

FUNCTIONAL DATA

Description:	Dining areas for 5-6 grade students and 7-8 grade students
Quantity:	2
Users:	Seating for approximately 350 occupants each

SPATIAL DATA

Floor Area:	10,463 Net Square Feet per Cafeteria (two spaces combined)
Ceiling Height:	24'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Architectural polished concrete
Walls:	Painted gypsum wallboard
Ceiling:	Exposed heavy timber and steel structure and wood deck
Doors:	Solid core flush wood doors with adjacent sidelight glazing, two (2) overhead doors at first floor to the Outdoor Learning environment
Windows:	Two-story aluminum storefront system
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, wall mounted radiant panels at exterior wall
Plumbing:	Accessible drinking fountains
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/indirect pendant lighting; specialty accent lighing
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, performance sound, assisted listening system

ORGANIZATIONAL DATA

Location:	Located on the first floor, off the main corridor, for grades 5-6 and the third floor for grades 7-8
Adjacencies:	Adjacent to the main lobby, kitchen, and outdoor learning space
Orientation:	Oriented along the main circulation spine of the building, with a two-story storefront along the southeast; southeast facing curtainwall will include appropriate light filtering and/or blocking devices

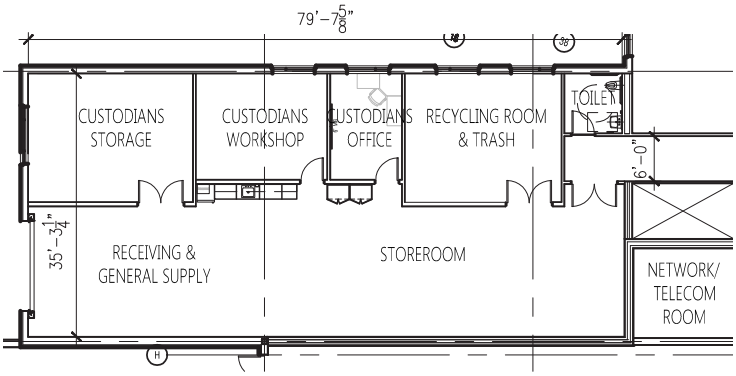
FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	N/A
Specialties:	- Two (2) 12'-0" wide white boards per cafeteria; two (2) 6'-0" wide white boards
Furniture:	- Fourty (40) student dining tables with eight (8)- ten (10) seats each/ trash/recycling recptacles
Technology Equipment:	- LCD/Data projector - Audio output to T.V. control room

CUSTODIAL & MAINTENANCE:

FUNCTIONAL DATA

Description: Recycling and trash room, storeroom, receiving and general supply, custodian office, custodian workshop, custodian storage
Quantity: 1
Users: Custodial staff



SPATIAL DATA

Floor Area: 2820 Net Square Feet
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and deck; acoustical ceiling tile in office
Doors: Flush hollow metal doors, solid core wood doors, overhead door
Windows: Insulated, hopper style, operable aluminum windows
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: One (1) sink; one (1) domesic refrigerator/freezer; one (1) domestic washer
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures, task lighting
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers

ORGANIZATIONAL DATA

Location: Located on first floor along the main corridor
Adjacencies: Located adjacent to the kitchen and in between the cafeteria and "Public Space" zone

Orientation: There are windows on the north and west walls of Custodial & Maintenance

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

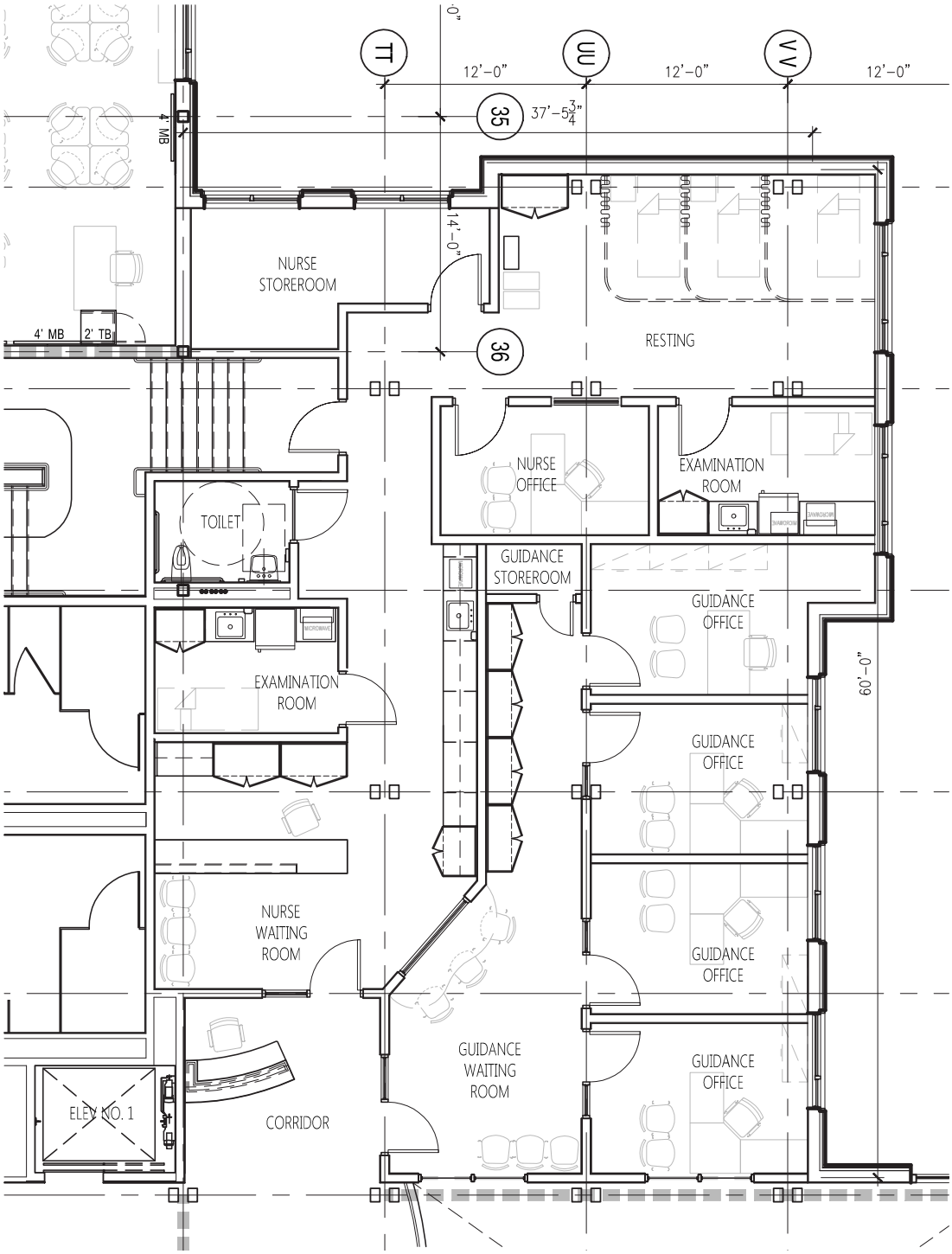
Casework/Cabinetry:
- Built-in, 24" deep, solid wood base cabinets
- Built-in, 12" deep, solid wood wall cabinets above base cabinets
- One (1) built-in, 30" wide, 24" deep, 72" tall storage cabinet

Specialties:
- One (1) 6'-0" wide, white board

Furniture:
- Lockers, work tables, desk, heavy duty storage rack systems, recycling and trash storage bins, flammable cabinet, vertical filing cabinets, domestic washer and dryer

Technology Equipment: N/A

GUIDANCE & MEDICAL:



GUIDANCE & MEDICAL:

FUNCTIONAL DATA

Description:	Guidance offices, guidance/nurse storage, student work area, nurse office, resting areas, exam rooms
Quantity:	Guidance: 4 offices Nurse: 1 office, 2 exam rooms, 1 toilet, 1 storage room
Users:	Guidance staff, nurse

SPATIAL DATA

Floor Area:	2242 Net Square Feet
Ceiling Height:	12'-0"

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete, Carpet, Ceramic Tile
Walls:	Painted gypsum wallboard, epoxy paint at toilet room
Ceiling:	Acoustical clouds suspended in exposed structural ceiling
Doors:	Solid core flush wood doors with adjacent sidelight glazing, solid core wood flush doors
Windows:	Insulated, hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	One (1) accessible lavatory; one (1) accessible toilet fixture; two (2) accessible counter-top sinks; plumbing connection to domestic refrigerator/freezer and under counter ice machine
Fire Protection:	Fully sprinklered fire protection system
Electrical:	Connections to various appliances
Lighting:	Direct/Indirect pendant light fixtures, specialty lighting fixtures
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers

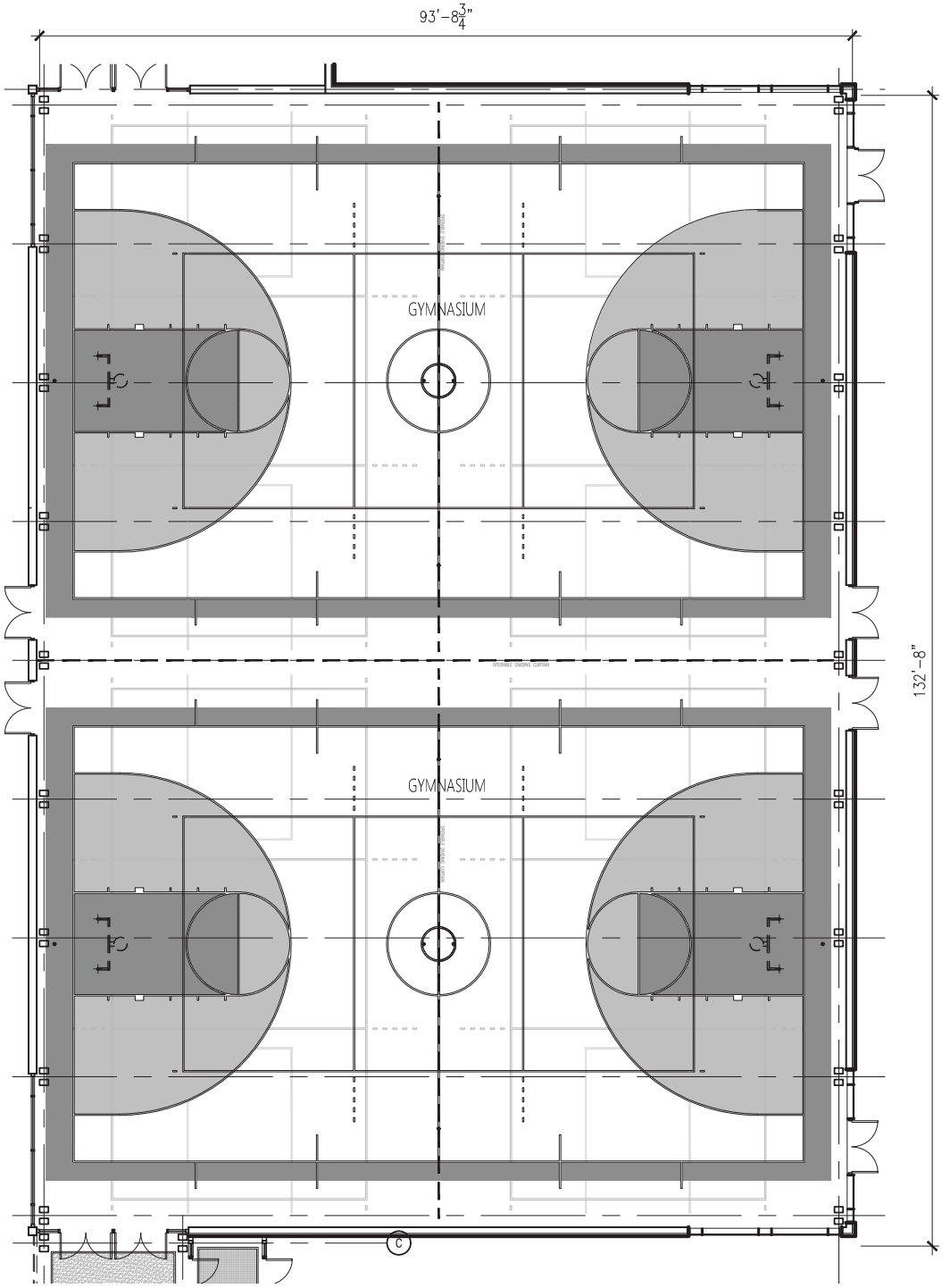
ORGANIZATIONAL DATA

Location:	Located on the second floor at the main entry lobby within the "public space" core of the school
Adjacencies:	Adjacent to Stair 2 for easy access to the exterior
Orientation:	Oriented to the north and east along Cabot Street

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Built-in, 24" deep, solid wood base cabinets - Continuous built-in, solid wood cabinets about base cabinets and work surfaces - One (1) built-in, solid wood, reception desk - 24" deep work surfaces
Specialties:	- Eight (8) 4'-0" wide white boards; copiers; shredders; printers; fax machines; various appliances
Furniture:	- Work station style desks with chairs; horizontal and lateral filing cabinets; book shelves; end-tables; chairs
Technology Equipment:	- Interactive LCD/Data projector - Presentation camera - Amplified voice system with two (2) microphones and two (2) ceiling speakers at dual locations

GYMNASIUMS:



GYMNASIUM:

FUNCTIONAL DATA

Description:	Seating, performance, and athletic space for students, staff, public, etc.
Quantity:	Two (2) full size courts, four (4) teaching stations
Users:	Bleacher seating for approximately 200 students

SPATIAL DATA

Floor Area:	12,000 Net Square Feet
Ceiling Height:	Min. 25'-0" sloped

MATERIALS/FINISHES DATA

Floors:	Wood athletic flooring
Walls:	Painted abuse resistant gypsum wallboard, wall pads
Ceiling:	Exposed structure and decking
Doors:	Solid core flush wood doors
Windows:	N/A
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	N/A
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	High bay LED pendant fixtures
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers

ORGANIZATIONAL DATA

Location:	Located on lower floor at the secondary entry lobby
Adjacencies:	Adjacent to locker rooms and gym storage rooms
Orientation:	The gymnasium with orientate to the east, east facing windows will include appropriate light shading/blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	N/A
Specialties:	- Acoustical protective wall panels, re wall pads, bleachers, gym equipment, operable dividing curtain, basketball backstops
Furniture:	N/A
Technology Equipment:	- Wired and wireless microphones - LCD Projector - Audio output to T.V. control room

HEALTH CLASSROOM & SELF-CONTAINED SPED:

FUNCTIONAL DATA

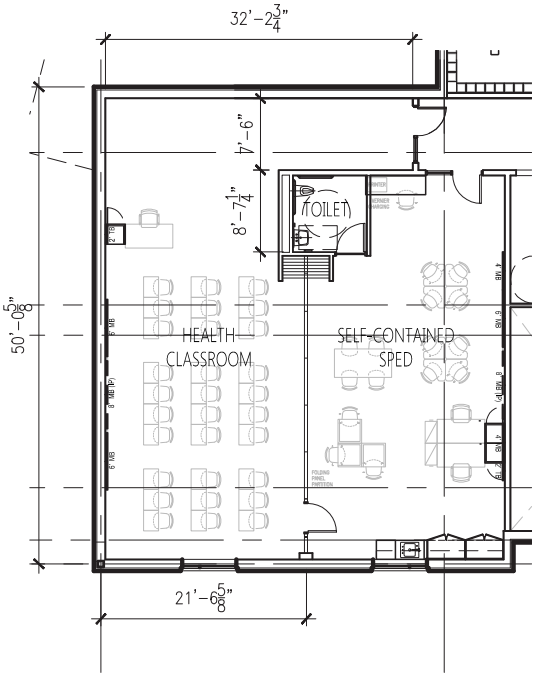
Description:	Health classroom and self-contained SPED classroom
Quantity:	1 health classroom, 1 self-contained SPED room
Users:	1 Teacher, 30 Students

SPATIAL DATA

Floor Area:	Health Classroom: 840 Net Square Feet Self-contained SPED: 800 Net Square Feet SPED Toilet: 60 Net Square Feet
Ceiling Height:	12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and deck
Doors:	Solid core flush wood doors with adjacent sidelight glazing, overhead door at first floor
Windows:	Insulated, hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	One (1) accessible lavatories, one (1) accessible toilet fixtures
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/Indirect pendant light fixtures, task lighting at teaching wall, task lighting at tack board locations, speciality lighting
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location:	Located on the lower floor near the secondary entry
Adjacencies:	Located adjacent to the gymnasiums
Orientation:	The Health and Self-Contained SPED rooms are oriented to the south; south facing windows will include appropriate light shading/blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Solid wood, built-in facilitators technology cabinet at teacher's station
Specialties:	- Two (2) 6'-0" wide white boards, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities in Health - Two (2) 4'-0" wide white boards, one (1) 6'-0" white board, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities in Self-Contained SPED
Furniture:	- 30 student desks with one (1) chair each, one (1) teacher desk with chair
Technology Equipment:	- LCD/Data projector - Interactive white board infrastructure - Presentation camera - Amplified voice system with 2 microphones and 4 ceiling speakers

GUIDANCE INSTRUCTIONAL COACHES (MATH/LITERACY):

FUNCTIONAL DATA

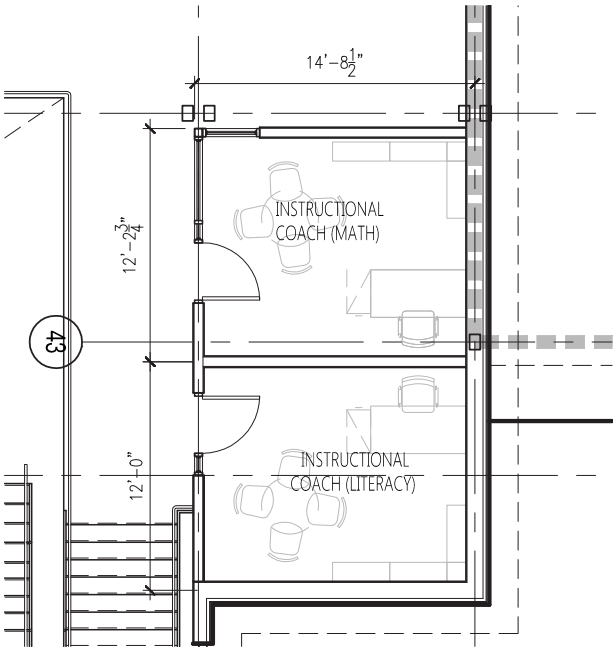
Description:	Guidance instructional coach offices for math and literacy
Quantity:	2
Users:	1 Coach each

SPATIAL DATA

Floor Area:	150 Net Square Feet each
Ceiling Height:	12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Carpet
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and decking
Doors:	Solid core flush wood doors with sidelight glazing
Windows:	Insulated, project out hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	N/A
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location:	Located on the fourth floor off the main corridor
Adjacencies:	Adjacent to the main corridor balcony overlooking the 7-8 Cafeteria
Orientation:	The Instructional Coach offices will be oriented to the southeast to make use of daylighting possibilities; south and east facing windows will include appropriate light filtering and/or blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	N/A
Specialties:	- One (1) 8'-0" wide white boards
Furniture:	- One (1) teacher desk with chair, small work table with chairs
Technology Equipment:	- LCD/Data projector - Interactive white board infrastructure - Presentation camera - Amplified voice system with two (2) microphones and four (4) ceiling speakers

KITCHEN:

FUNCTIONAL DATA

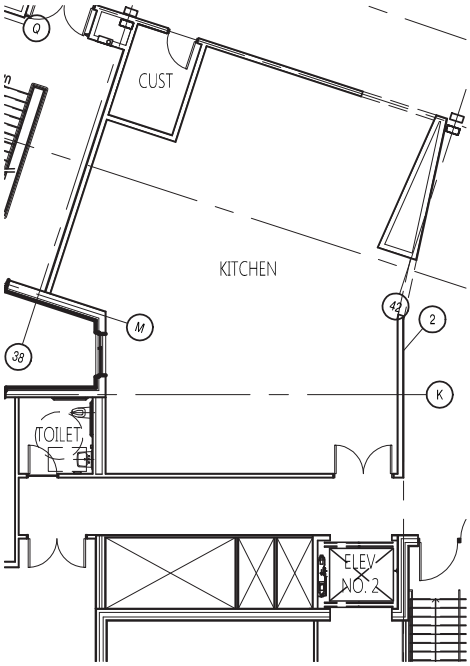
Description:	Kitchen and food services for student dining
Quantity:	1 kitchen 1 warming kitchen
Users:	Dining students and kitchen staff

SPATIAL DATA

Floor Area:	1800 Net Square Feet
Ceiling Height:	12'-0"

MATERIALS/FINISHES DATA

Floors:	Quarry tile in kitchen/food prep
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and deck
Doors:	Solid core flush wood doors with transom glazing
Windows:	Insulated, hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	Connections to various kitchen/food prep applicances
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/Indirect pendant light fixtures
Communications:	Telephone, internet access, wireless access, PA speakers



ORGANIZATIONAL DATA

Location:	Located at the end of the main corridor
Adjacencies:	Located across from the cafeterias and adjacent to custodial/maintenance program
Orientation:	The kitchen will have a north facing window and may be exposed to borrowed light from the cafeterias

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	N/A
Specialties:	N/A
Furniture:	N/A
Technology Equipment:	N/A

TYPICAL LANGUAGE BASED & ELL CLASSROOMS:

FUNCTIONAL DATA

Description: Special education language based learning and ELL - English Language Learners classrooms

Quantity: 4 Language Based Learning classrooms
2 ELL

Users: For grades 5-8

SPATIAL DATA

Floor Area: Language Based: 425 Net Square Feet each
ELL Classrooms: 425 Net Square Feet each

Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Carpet

Walls: Painted gypsum wallboard

Ceiling: Exposed structure and decking

Doors: Solid core flush wood doors with transom glazing

Windows: Insulated, project out hopper style, operable aluminum windows

HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall

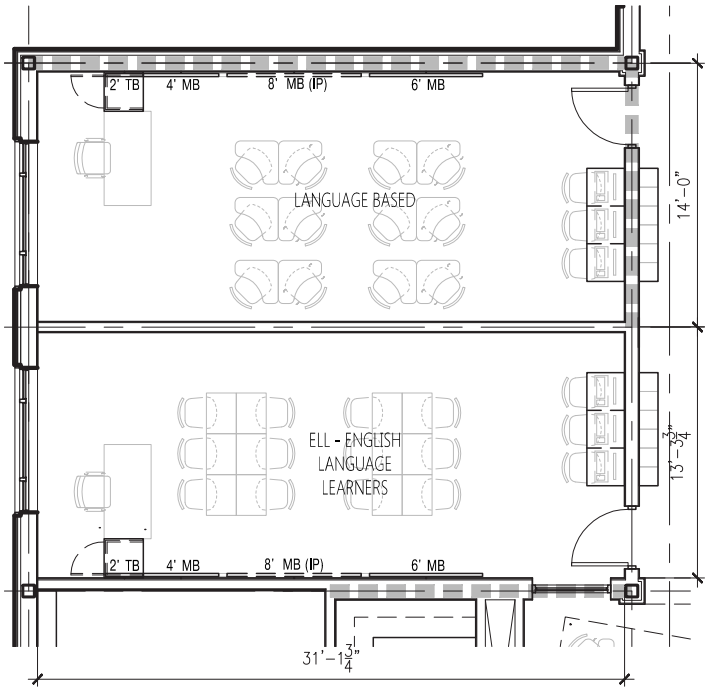
Plumbing: N/A

Fire Protection: Fully sprinklered fire protection system

Electrical: N/A

Lighting: Direct/Indirect pendant light fixtures, task lighting at teaching wall

Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location: The Language Based Learning classrooms are located on all floors at the end of the first academic neighborhood; ELL for grades 5/6 and grades 7/8 are located on the first and third floors respectively

Adjacencies: Throughout the floors, SBI classrooms and Therapeutic Learning are located across from the Learning Center, a small inclusion room, and Reading Resources

Orientation: Oriented with a window on the northeast wall of each classroom

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry: - Solid wood, built-in facilitators technology cabinet at each teacher's station

Specialties: - Per classroom: Two (2) 6'-0" wide white boards, two (2) 4'-0" wide white boards, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities
- Two (2), additional, 6'-0" wide white boards in ELL classrooms

Furniture: - 12 student desks with chairs, 1 teacher desk with chair; 3 computer work stations with chairs

Technology Equipment: - LCD/Data projector
- Interactive white board infrastructure
- Presentation camera
- Amplified voice system with two (2) microphones and four (4) ceiling speakers

LOCKER ROOMS, STORAGE, & HEALTH INSTRUCTOR OFFICES:

FUNCTIONAL DATA

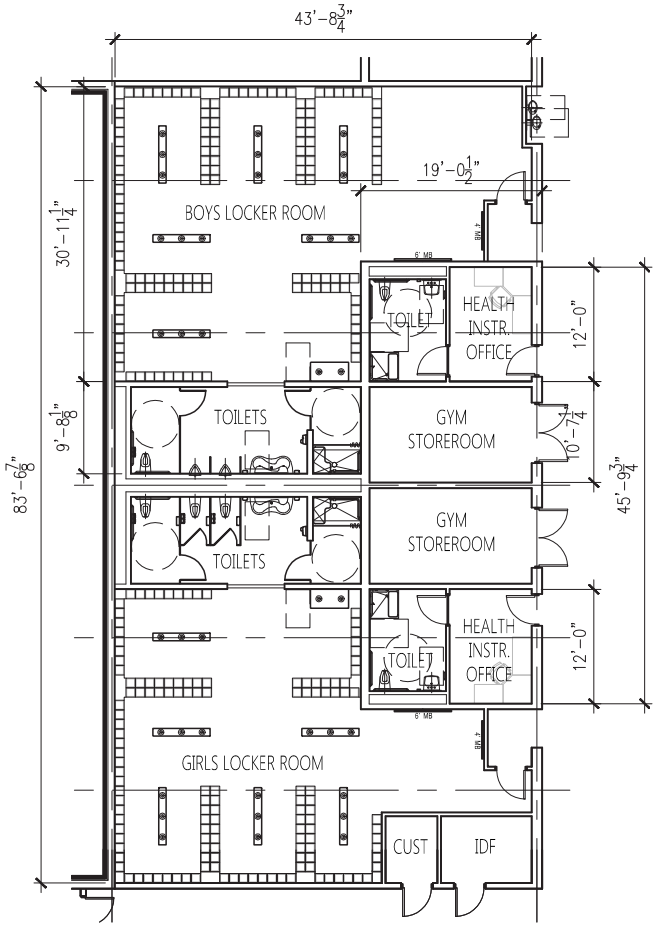
Description: Locker rooms for sport education and activity; Health instructor offices
Quantity: 1 boys, 1 girls; 2 Storage rooms; 2 offices
Users: students and visiting school teams; staff

SPATIAL DATA

Floor Area: Locker Rooms: 1300 Net Square Feet each
Offices: 250 Net Square Feet each
Storage: 150 Net Square Feet each
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and decking
Doors: Solid core flush wood doors with transom glazing
Windows: N/A
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: Each Locker Room: Accessible lavatories, three (3) toilet/urinal fixtures, one (1) accessible shower
Each Health Instructor Office: One (1) accessible lavatories, one (1) accessible toilet fixtures, one (1) accessible showers
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



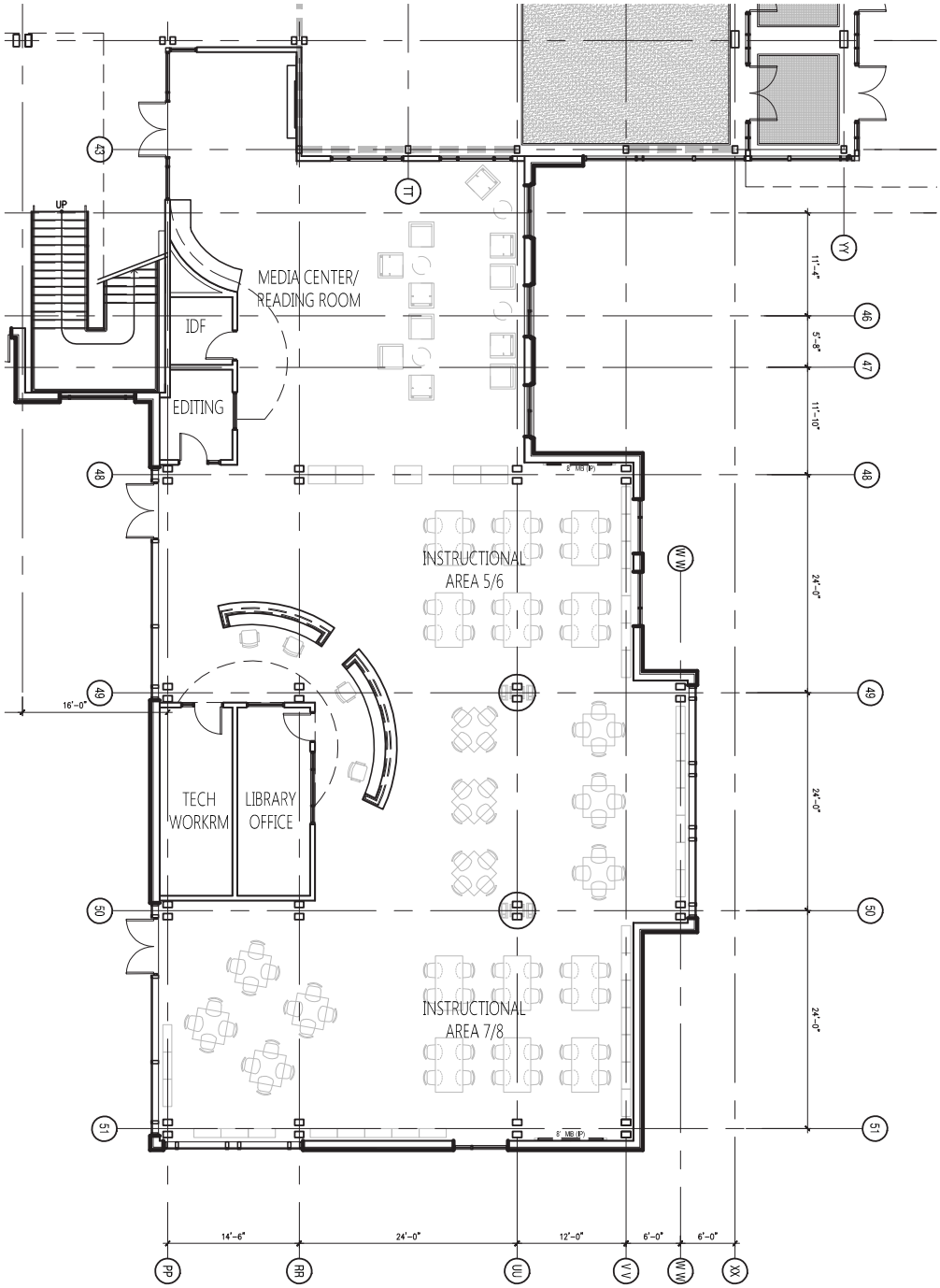
ORGANIZATIONAL DATA

Location: On the lower floor
Adjacencies: Adjacent to Gym Storage rooms and Gymnasiums
Orientation: Oriented east-west

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry: N/A
Specialties: - One (1) 6'-0" white board and one (1) 4'-0" white board per locker room
Furniture: - Benches in locker rooms; work station style desks with chair in each health instructor office
Technology Equipment: - Wireless connection in health instructor offices

MEDIA CENTER:



MEDIA CENTER & READING ROOM:

FUNCTIONAL DATA

Description: Instructional areas for grades 5/6 and 7/8, research areas, adjoining tech workroom and library office
Quantity: 1
Users: Seating for approximately 120 students, faculty, and staff

SPATIAL DATA

Floor Area: Media Center - 8401 Net Square Feet total
Editing Room - 76 Net Square Feet
Technology Workroom - 166 Net Square Feet
Library Office - 166 Net Square Feet
Ceiling Height: 12'-0" and 18'-0"

MATERIALS/FINISHES DATA

Floors: Rolled carpet
Walls: Painted gypsum wallboard, natural wood panelling
Ceiling: Suspended acoustical ceiling panels, exposed structure (steel and timber frame), and wood planking
Doors: Solid core flush wood doors with adjacent sidelight glazing
Windows: Insulated, aluminum windows; storefront
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation
Plumbing: Accessible counter-top sink in tech workroom
Fire Protection: Fully sprinklered fire protection system
Electrical: Power for various appliances including printers, copiers, and floor boxes for centrally located computers
Lighting: Direct/Indirect pendant light fixtures, task lighting at teaching wall, specialty accent lighting fixtures
Communications: Telephone, digital clock, internet access, PA speakers, distributed sound system, assisted listening system

ORGANIZATIONAL DATA

Location: Located on the first floor within the "public space" core of the school
Adjacencies: Adjacent to the main entry lobby and 5/6 cafeteria

Orientation: Oriented with exterior windows facing east, west, and south. Daylighting will be controlled with the use of sun shading and light filtering devices.

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:
- Built-in, 24" deep, solid wood base cabinets
- Built-in, solid wood reception desk and tech support desk
- Built-in solid wood work surfaces
- Built-in 12" deep,wall cabinets above base cabinets
- Built-in research stations
- Built-in book shelving
- Solid wood, built-in facilitators technology cabinet at teaching wall

Specialties:
- Two (2) 8'-0" wide interactive projector white boards

Furniture:
- Two (2) teacher desks with chairs; computer research stations with chairs; rectangular tables with chairs; round table with charis; soft seating; end tables; book shelving; display shelving; laptop carts; round end table; vertical filing cabinets; work station chairs

Technology Equipment:
- Interactive LCD/Data projector
- Presentation camera
- Amplified voice system with two (2) microphones and two (2) ceiling speakers

SPED OPPORTUNITY ROOM 5-8 & SMALL GROUP SEMINAR:

FUNCTIONAL DATA

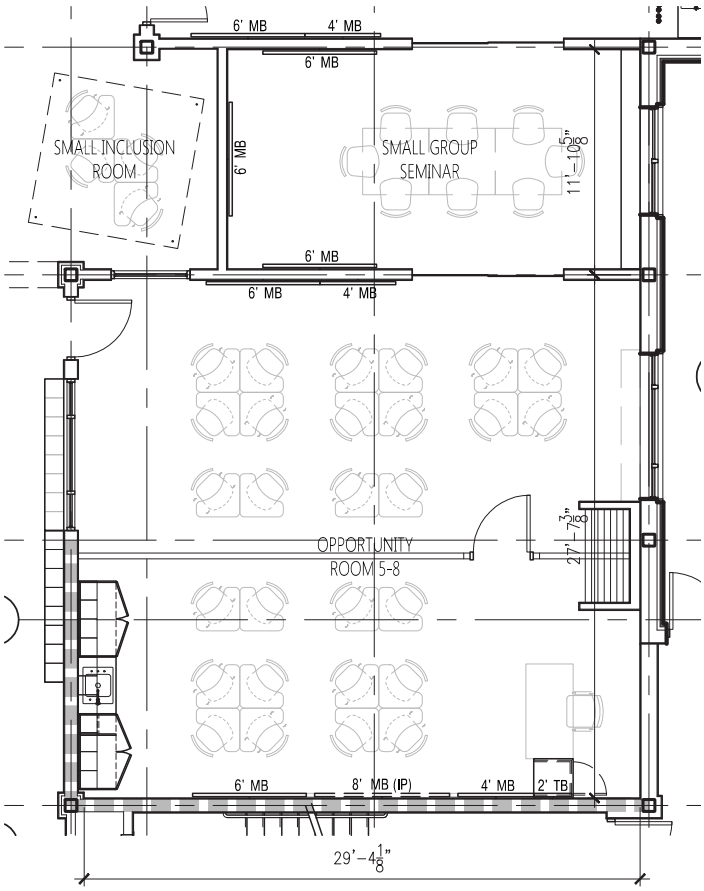
Description:	SPED space for students that need support with social and pragmatic skills
Quantity:	1 SPED Opportunity Room 12 Small Group Seminars
Users:	Opportunity Room: 1 Teacher, 28 Students Small Group/Reading: 8 Students

SPATIAL DATA

Floor Area:	Opportunity Room: 425 Net Square Feet Small Group Seminar: 215 Net Square Feet
Ceiling Height:	12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete, Carpet
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and decking
Doors:	Solid core flush wood doors with transom and sidelight glazing
Windows:	Insulated, project out hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	One (1) ADA accessible sink
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location:	The Opportunity Room is located on the first floor at the beginning of the first academic neighborhoods; the Small Group/Seminar rooms are located on all floors within each of the academic neighborhoods
Adjacencies:	General classrooms, small inclusion rooms
Orientation:	Oriented with windows on the northeast wall of each room

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Two (2) built-in, 48" wide, 24" deep, 72" high storage cabinets - Solid wood, built-in facilitators technology cabinet at teacher's station - Built-in, solid wood open shelving above 72" high storage cabinets - Two (2) built-in, 24" wide, 24" deep solid wood base cabinets with countertop - Built-in, solid wood, open shelving
Specialties:	- Two (2) 6'-0" wide white boards, two (2) 4'-0" wide white boards, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities in the Opportunity Room - Three (3) 6'-0" wide white boards in Small Group Seminar
Furniture:	- 28 student desks with one (1) chair each, one (1) teacher desk with chair; table and chairs for 8 students
Technology Equipment:	- LCD/Data projector - Interactive white board infrastructure - Presentation camera - Amplified voice system with two (2) microphones and four (4) ceiling speakers

TYPICAL STRATEGIES BASED LEARNING & THERAPEUTIC LEARNING:

FUNCTIONAL DATA

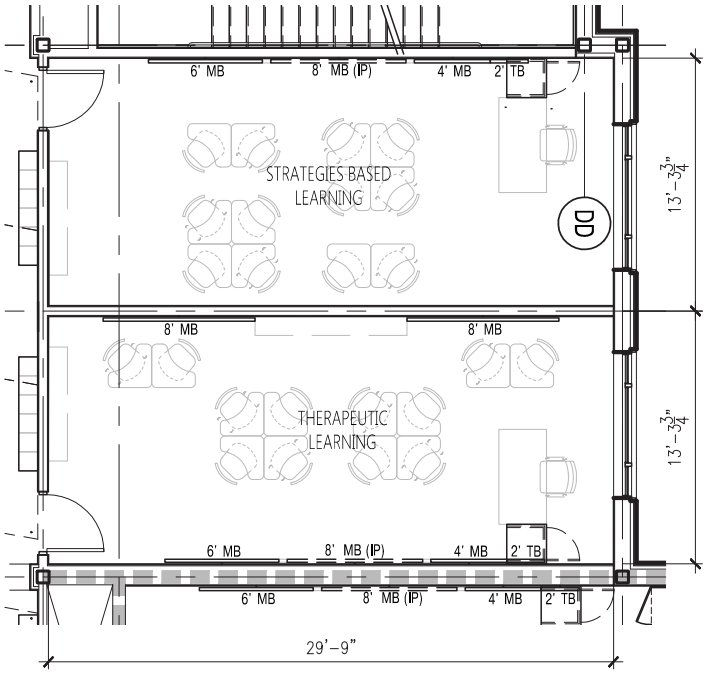
Description:	Special education strategies based learning classroom and therapeutic learning classroom
Quantity:	4 Strategies Based Learning classrooms 2 Therapeutic Learning classrooms
Users:	For grades 5-8

SPATIAL DATA

Floor Area:	425 Net Square Feet each
Ceiling Height:	12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete, carpet
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and decking
Doors:	Solid core flush wood doors with transom glazing
Windows:	Insulated, project out hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	N/A
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location:	The SBI classrooms are located on the first, second, and third/fourth floors at the end of the middle academic neighborhood; Therapeutic Learning for grades 5/6 and grades 7/8 are located on the second and fourth floors respectively
Adjacencies:	Throughout the floors, SBI classrooms and Therapeutic Learning are located across from the Learning Center, a small inclusion room, and Reading Resources
Orientation:	Oriented with a window on the northeast wall of each classroom

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Solid wood, built-in facilitators technology cabinet at each teacher's station - Built-in, solid wood, open shelving
Specialties:	- Per classroom: Two (2) 6'-0" wide white boards, two (2) 4'-0" wide white boards, one (1) 2'-0" wide tack board; One (1) 8'-0" wide white board with interactive projector capabilities - Two (2), additional, 8'-0" wide white boards in Therapeutic Learning classrooms
Furniture:	- 12 student desks with chairs, 1 teacher desk with chair
Technology Equipment:	- LCD/Data projector - Interactive white board infrastructure - Presentation camera - Amplified voice system with two (2) microphones and four (4) ceiling speakers

SCIENCE CLASSROOM/LAB 5/6 GRADES:

FUNCTIONAL DATA

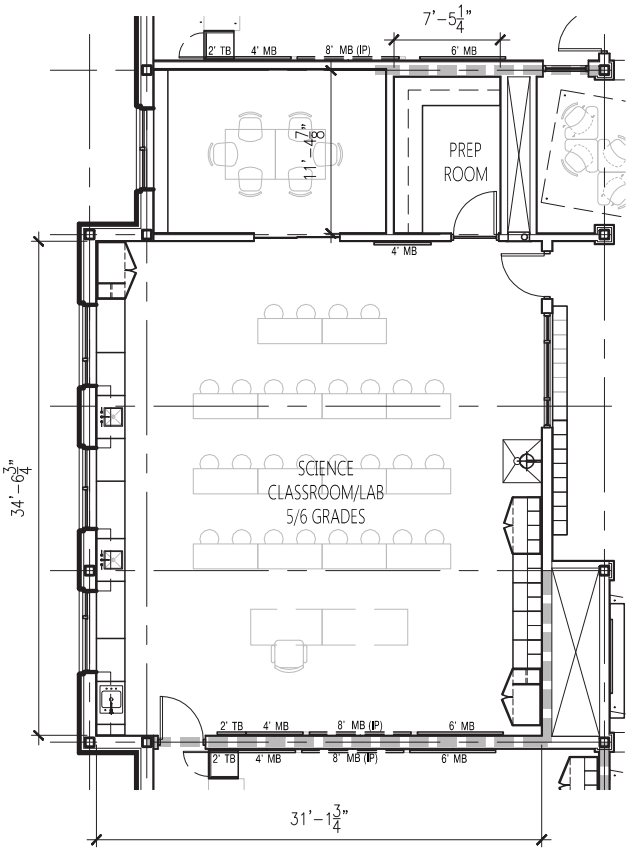
Description:	General science instructional lab/classroom for grades 5 and 6; prep room attached
Quantity:	6
Users:	1 Teacher, 28 Students

SPATIAL DATA

Floor Area:	1025 Net Square Feet
Ceiling Height:	12'-0"

MATERIALS/FINISHES DATA

Floors:	Architectural polished stainted concrete
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and decking
Doors:	Solid core flush wood doors with transom glazing
Windows:	Insulated, project out hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	Eyewash station, emergency shower station, two (2) lab sinks, one (1) accessible lab sink; science sinks include cold water, air, and/or vacuum
Fire Protection:	Fully sprinklered fire protection system
Electrical:	Power supply for various appliances drop down supply for demonstration table
Lighting:	Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location:	On the first and second floors, centrally located within each of the academic neighborhoods
Adjacencies:	Small group reading, small inclusion area, science prep room
Orientation:	Classrooms will be oriented to all four cardinal directions to make use of day lighting possibilities. South, east, and west facing windows will include appropriate light filtering and/or blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Three (3) built-in, 48" wide, 24" deep, 72" high storage cabinets - Solid wood, built-in facilitators technology cabinet at teacher's station - Built-in, solid wood open shelving above 72" high storage cabinets - Four (4) built-in, 24" wide, 24" deep solid wood base cabinets with epoxy countertop - Six (6) built-in, 36" wide, 24" deep solid wood base cabinets with epoxy countertop - Three (3) built-in, 48" wide, 24" deep solid wood base cabinets with epoxy countertop
Specialties (Each Lab):	- Two (2) 6'-0" wide white boards, two (2) 4'-0" wide white boards, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities
Furniture:	- Twelve (12) mobile student lab tables with 2 stools each; 1 teacher's desk with chair; 1 mobile teacher's demonstration table
Technology Equipment:	- LCD/Data interactive projector or interactive white board infrastructure - Presentation camera - Amplified voice system with two (2) microphones and four (4) ceiling speakers - Twelve (12) wired student data drops

SCIENCE CLASSROOM/LAB 7/8 GRADES:

FUNCTIONAL DATA

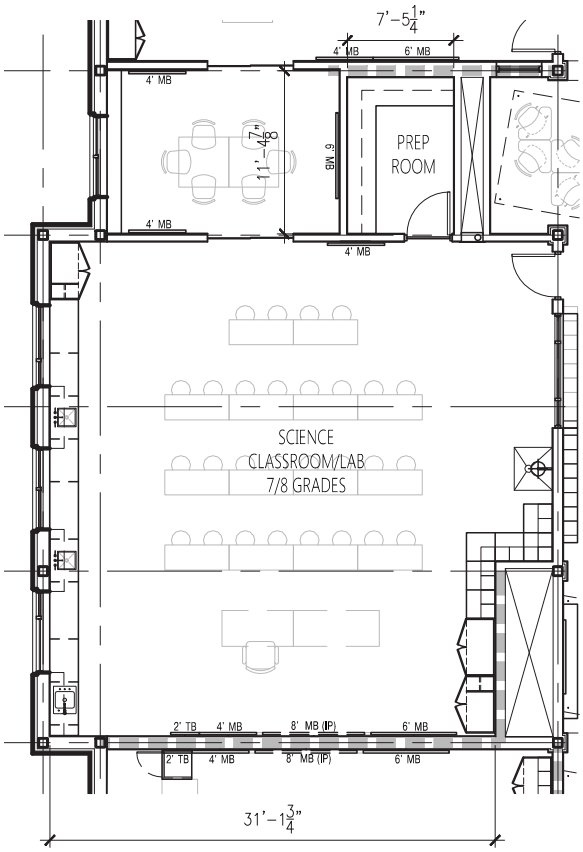
Description:	General science instructional lab/classroom for grades 7 and 8; prep room attached
Quantity:	6
Users:	1 Teacher, 28 Students

SPATIAL DATA

Floor Area:	1200 Net Square Feet
Ceiling Height:	12'-0"

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete
Walls:	Painted gypsum wallboard
Ceiling:	Exposed structure and decking
Doors:	Solid core flush wood doors with transom glazing
Windows:	Insulated, project out hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	Eyewash station, emergency shower station, two (2) lab sinks, one (1) accessible lab sink; science sinks include cold water, gas, air, and/or vacuum
Fire Protection:	Fully sprinklered fire protection system
Electrical:	Power supply for various appliances drop down supply for demonstration table
Lighting:	Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications:	Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location:	On the third and fourth floors, centrally located within each of the academic neighborhoods
Adjacencies:	Small group reading, small inclusion area, science prep room
Orientation:	Classrooms will be oriented to all four cardinal directions to make use of day lighting possibilities. South, east, and west facing windows will include appropriate light filtering and/or blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Three (3) built-in, 48" wide, 24" deep, 72" high storage cabinets - Solid wood, built-in facilitators technology cabinet at teacher's station - Built-in, solid wood open shelving above 72" high storage cabinets - Four (4) built-in, 24" wide, 24" deep solid wood base cabinets with epoxy countertop - Six (6) built-in, 36" wide, 24" deep solid wood base cabinets with epoxy countertop - Three (3) built-in, 48" wide, 24" deep solid wood base cabinets with epoxy countertop
Specialties (Each Lab):	- Two (2) 6'-0" wide white boards, two (2) 4'-0" wide white boards, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities
Furniture:	- Twelve (12) mobile student lab tables with 2 stools each; 1 teacher's desk with chair; 1 mobile teacher's demonstration table
Technology Equipment:	- LCD/Data interactive projector or interactive white board infrastructure - Presentation camera - Amplified voice system with two (2) microphones and four (4) ceiling speakers - Twelve (12) wired student data drops

SET DESIGN & CONSTRUCTION APPLICATIONS LAB & MIDI LAB:

FUNCTIONAL DATA

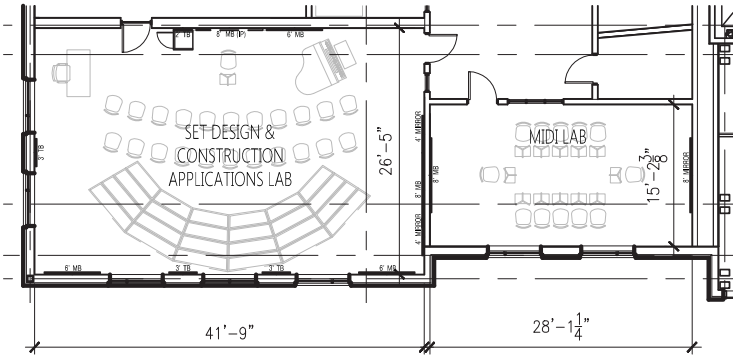
Description: Set design and digital lab
Quantity: 1
Users: 1 Teacher, 28 Students

SPATIAL DATA

Floor Area: 1080 Net Square Feet in Set Design
491 Net Square Feet in MIDI Lab
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and decking
Doors: Solid core flush wood doors with transom glazing; overhead door
Windows: Insulated, project out hopper style, operable aluminum windows
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: N/A
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures, track lighting
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location: On the first floor
Adjacencies: Adjacent to the Auditorium
Orientation: Oriented to the south; south and west facing windows will have appropriate light filtering and/or blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry: - Solid wood, built-in facilitators technology cabinet at each teacher's station
Specialties: - Three (3) 6'-0" wide white boards, one (1) 2'-0" wide tack board, three (3) 3'-0" wide tack boards, one (1) 8'-0" wide white board, one (1) 8'-0" wide white board with interactive projector capabilities, two (2) 4'-0" wide mirrors in Set Design; one (1) 8'-0" wide white board, one (1) 8'-0" wide mirror in MIDI Lab
Furniture: - Flexible chairs, teacher's desk with chair
Technology Equipment: - LCD/Data projector
- Interactive white board infrastructure
- Presentation camera
- Amplified voice system with two (2) microphones and four (4) ceiling speakers

SMALL INCLUSION ROOM & SMALL GROUP ROOM/READING:

FUNCTIONAL DATA

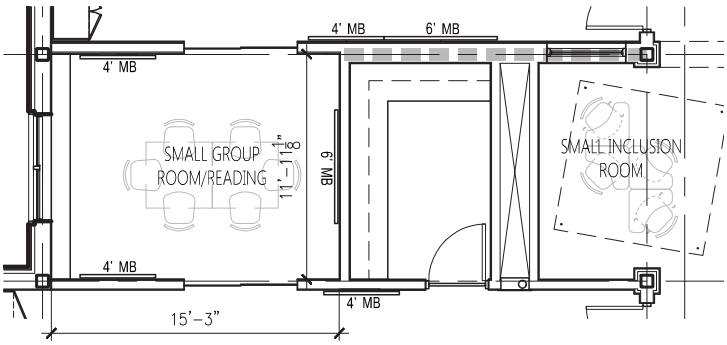
Description:	Small Inclusion Room and Small Group Room/Reading
Quantity:	24 Small Inclusion Rooms 12 Small Group Seminar Rooms
Users:	6/4 Students

SPATIAL DATA

Floor Area:	Small Inclusion Room: 75 Net Square Feet Small Group Seminar: 175 Net Square Feet
Ceiling Height:	12'-0"

MATERIALS/FINISHES DATA

Floors:	Architectural polished stained concrete
Walls:	Painted gypsum wallboard
Ceiling:	Acoustical ceiling tiles
Doors:	Sliding glass doors
Windows:	Insulated, hopper style, operable aluminum windows
HVAC:	Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing:	N/A
Fire Protection:	Fully sprinklered fire protection system
Electrical:	N/A
Lighting:	Direct/Indirect pendant light fixtures
Communications:	Telephone, internet access, wireless access, PA speakers



ORGANIZATIONAL DATA

Location:	Located within each academic neighborhood on all floors between general instructional classrooms and science classrooms
Adjacencies:	Located adjacent to instructional classrooms
Orientation:	Classrooms will be oriented to all four cardinal direction to make use of day lighting possibilities. South, east, and west facing windows will include appropriate light filtering and/or blocking devices.

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:	- Built-in, solid wood, open shelf, storage along exterior wall below exterior windows
Specialties:	- One (1) 6'-0" white board and two (2) 4'-0" white boards in Small Group/Reading, One (1) 6'-0" white board in Small Inclusion Rooms
Furniture:	- Tables and chairs to seat 6 students in Small Group Seminar, workspaces to seat 4 students in Small Inclusion Rooms
Technology Equipment:	- LCD TV - Two (2) Ceiling Speakers - Amplified voice system with two (2) microphones and four (4) ceiling speakers

ATTAIN (AUTISM) 5-8 GRADES:

FUNCTIONAL DATA

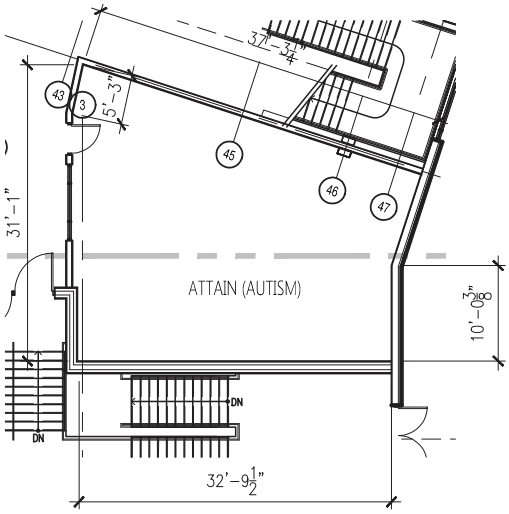
Description: Special education classroom
Quantity: 1
Users: For grades 5-8

SPATIAL DATA

Floor Area: 1200 Net Square Feet
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and decking
Doors: Solid core flush wood doors with transom glazing
Windows: Insulated, project out hopper style, operable aluminum windows
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: N/A
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location: Located on the first floor
Adjacencies: Located next to the 5th and 6th grade cafeteria

Orientation: The Attain (autism) classroom will be oriented to the east; east facing windows will include appropriate light filtering and/or blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry: - N/A
Specialties: - N/A
Furniture: - N/A
Technology Equipment: - N/A

SPED MEETING ROOM:

FUNCTIONAL DATA

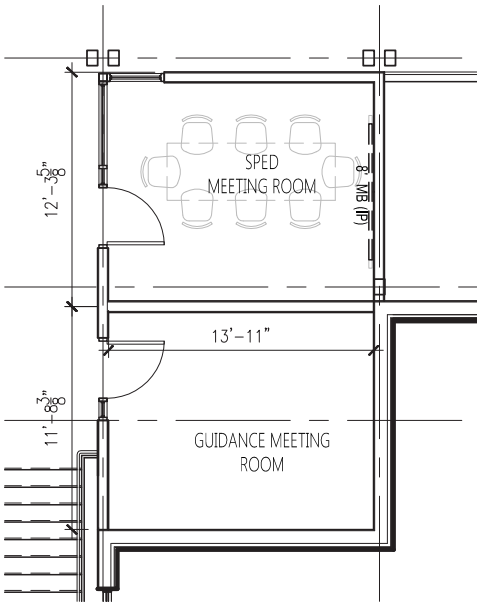
Description: Special education meeting room
Quantity: 1
Users: For grades 5-8

SPATIAL DATA

Floor Area: 175 Net Square Feet
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and decking
Doors: Solid core flush wood doors with sidelight glazing
Windows: N/A
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: N/A
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location: Located on the second floor adjacent to the main lobby at the first floor
Adjacencies: Located next to the guidance meeting room

Orientation: The SPED meeting room will be oriented to the southeast

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry: N/A
Specialties: - Two (2) 6'-0" white boards; One (1) 8'-0" white board
Furniture: - Conference table with chairs
Technology Equipment: - LCD/Data projector
- Interactive LCD/Data infrastructure
- Presentation camera
- Amplified voice system with two (2) microphones and four (4) ceiling speakers

SPED STUDENT SUPPORT PROGRAM (SSP):

FUNCTIONAL DATA

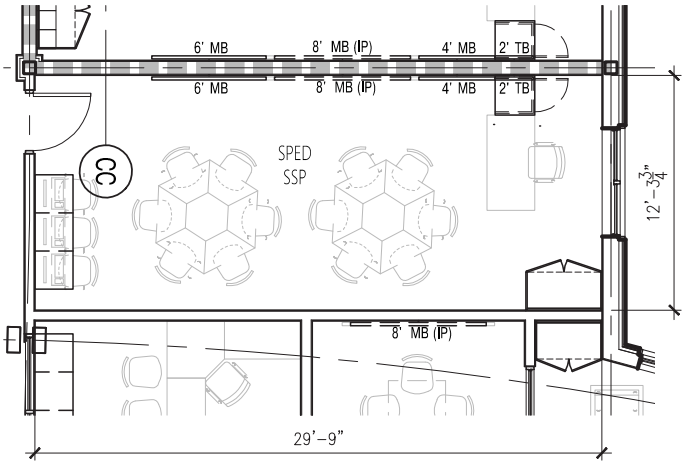
Description: Special education classroom
Quantity: 4
Users: For grades 5-8

SPATIAL DATA

Floor Area: 425 Net Square Feet
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and decking
Doors: Solid core flush wood doors with transom glazing
Windows: Insulated, project out hopper style, operable aluminum windows
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: N/A
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location: Located on all floors between the main corridor and middle academic neighborhood
Adjacencies: Located next to the assistant principal's office and across from an academic team room

Orientation: Each SPED SSP will have one northeast facing window

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:
- Solid wood, built-in facilitators technology cabinet at teacher's station
- One (1) 48" wide, 24" deep, 72" tall storage cabinet

Specialties:
- Two (2) 6'-0" wide white boards, two (2) 4'-0" wide white boards, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities

Furniture:
- 12 trapezoid style student desks with chairs, 1 teacher desk with chair, 3 computer stations with chairs

Technology Equipment:
- LCD/Data projector
- Interactive white board infrastructure
- Presentation camera
- Amplified voice system with two (2) microphones and four (4) ceiling speakers

TEACHER COLLABORATION, WORK ROOM, & STAFF LUNCH:

FUNCTIONAL DATA

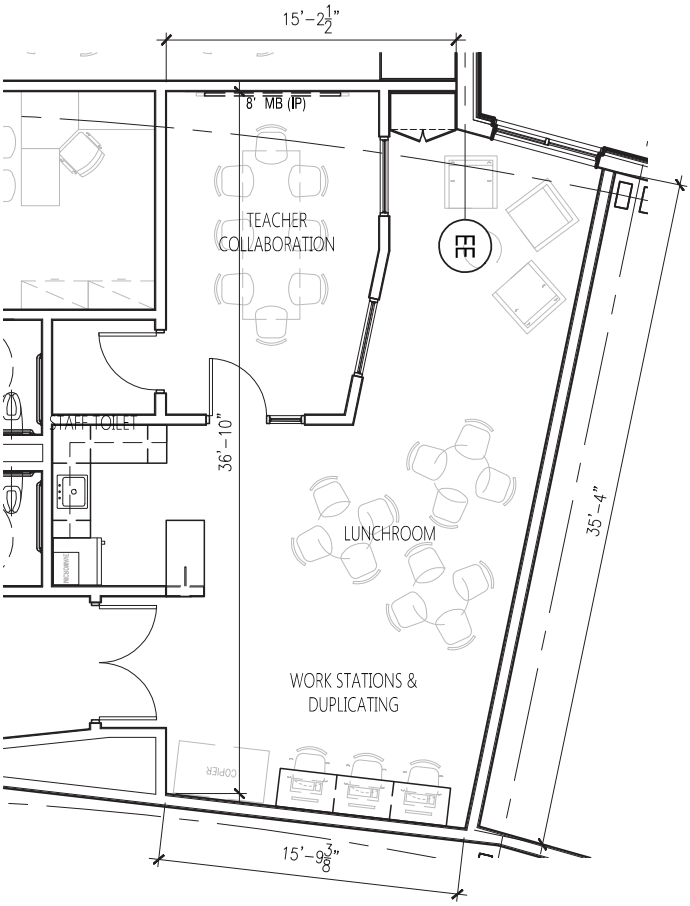
Description: Faculty planning, conference, and lunch room
Quantity: 4
Users: Facuty and staff

SPATIAL DATA

Floor Area: 848 Net Square Feet
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and decking
Doors: Solid core flush wood doors with transom glazing
Windows: Insulated, project out hopper style, operable aluminum windows
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: One (1) accessible sink, plumbing connection for domestic refrigerator/freezer
Fire Protection: Fully sprinklered fire protection system
Electrical: 1 copy machine
Lighting: Direct/Indirect pendant light fixtures, task lighting
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location: On all floors, centrally located between academic neighborhoods
Adjacencies: Adjacent to assistant principal's office and Technology Applications classrooms

Orientation: Oriented with one window on the north facing wall

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:
- Two (2) built-in, 26" wide, 24" deep solid wood base cabinets with countertop
- Two (2) built-in, 36" wide, 30" deep solid wood base cabinets with countertop
- Built-in countertop with open shelving above

Specialties:
- Three (3) 6'-0" wide white boards

Furniture:
- 1 conference table with chairs, work station chairs, soft seating and tables

Technology Equipment:
- LCD/Data projector
- Interactive white board infrastructure
- Presentation camera
- Amplified voice system with two (2) microphones and four (4) ceiling speakers

TYPICAL GENERAL CLASSROOM:

FUNCTIONAL DATA

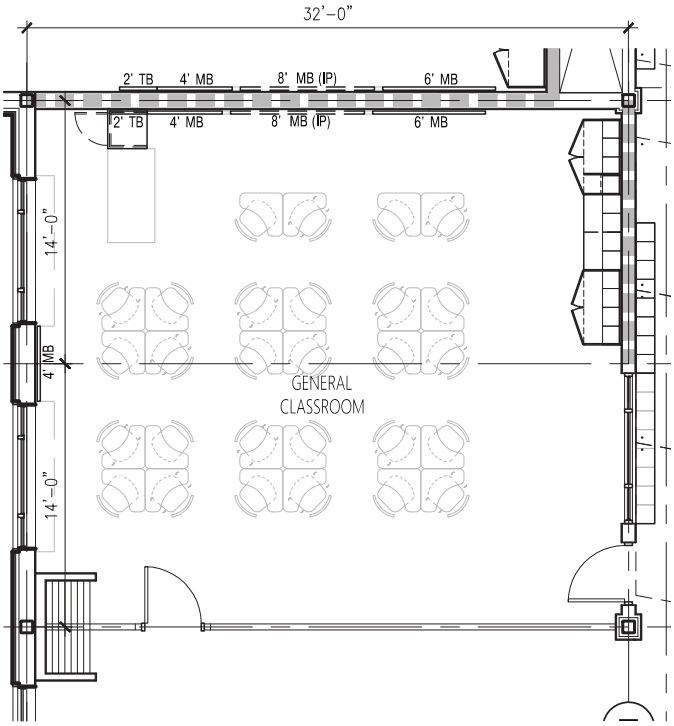
Description: General Instructional Classroom
Quantity: For grades 5-8
Users: 1 Teacher, 28 Students

SPATIAL DATA

Floor Area: 850 Net Square Feet each and/or
1025 Net Sqaure Feet each in large classrooms
Ceiling Height: 12'-0" Exposed structure

MATERIALS/FINISHES DATA

Floors: Architectural polished stained concrete
Walls: Painted gypsum wallboard
Ceiling: Exposed structure and decking
Doors: Solid core flush wood doors with transom glazing
Windows: Insulated, project out hopper style, operable aluminum windows
HVAC: Forced air, ceiling diffused air conditioning, heating and ventilation, ceiling mounted radiant panels at exterior wall
Plumbing: One (1) sink in each classroom for grades 5 and 6 (ADA accessible)
Fire Protection: Fully sprinklered fire protection system
Electrical: N/A
Lighting: Direct/Indirect pendant light fixtures, task lighting at teaching wall
Communications: Telephone, digital clock, internet access, wireless access, CATV/School broadcasts, PA speakers



ORGANIZATIONAL DATA

Location: On all floors within each of the academic neighborhoods
Adjacencies: Small group reading, small inclusion area, academic team rooms

Orientation: Classrooms will be oriented to all four cardinal directions to make use of day lighting possibilities. South, east, and west facing windows will include appropriate light filtering and/or blocking devices

FURNITURE, FURNISHINGS AND EQUIPMENT DATA

Casework/Cabinetry:
- Two (2) built-in, 48" wide, 24" deep, 72" high storage cabinets
- Solid wood, built-in facilitators technology cabinet at teacher's station
- Built-in, solid wood open shelving above 72" high storage cabinets
- Two (2) built-in, 24" wide, 24" deep solid wood base cabinets with countertop

Specialties:
- Two (2) 6'-0" wide white boards, two (2) 4'-0" wide white boards, one (1) 2'-0" wide tack board, One (1) 8'-0" wide white board with interactive projector capabilities

Furniture:
- 28 student desks with one (1) chair each, one (1) teacher desk with chair

Technology Equipment:
- LCD/Data projector
- Interactive white board or projector infrastructure
- Presentation camera
- Amplified voice system with two (2) microphones and four (4) ceiling speakers

Proposed Construction Methodology

Proposed Construction Methodology

The City of Beverly identified the need to eliminate severe overcrowding as a key priority in the Statement of Interest associated with the New Beverly Middle School. In an effort to address and resolve severe overcrowding in a timely fashion the initial project schedule was developed to accommodate opening the facility to students at the start of the 2018 academic year. During the Feasibility Study it became clear that the preferred option required constructing a portion of the new middle school within the footprint of the existing Memorial Building. The OPM and the Designer evaluated using both the Design-Bid-Build (DBB) and Construction Manager At Risk (CMR) delivery methods. The CMR delivery method due to the ability to prepare and issue "early packages" was determined to be most advantageous for this particular project. In order to complete the project on schedule required abating and demolishing the existing Memorial Building at the very beginning of 2016. In the overall project schedule Design Development is expected to complete in late 2015. The sequential nature of the DBB delivery method cannot support the project schedule. The advantages of using CMR for this project include turning the project over for occupancy at the earliest possible time and avoiding additional escalation of a much later completion date under the DBB delivery method. In addition, the project team recommended that the Construction Manager be brought on as early as possible and in time to prepare one of the independent schematic design estimates and participate in developing the overall project budget.

On January 20, 2015 the Application to Proceed with Construction Management at Risk was submitted to the Massachusetts Office of the Inspector General. On February 23, 2015, the Office of the Inspector General issued their letter approving use of the Construction Manager at Risk delivery method for the New Beverly Middle School Project.

The project team followed the highly prescriptive process for selecting a construction manager. The process culminated with the selection of Agostini Bacon as the Construction Manager at Risk for the New Beverly Middle School Project. The project team confirms the cost estimates, proposed project schedule, estimated reimbursement rate, and Total Project Budget Spreadsheet reflect the selected construction delivery method.

Anticipated Reimbursement Rate with Incentive Points

Anticipated Reimbursement Rate with Incentive Points

MSBA Reimbursement Rate Calculation

APPENDIX 4E

New Beverly Middle School

MSBA Reimbursement Rate Calculation	
Base Points	31.00
Income Factor	5.68
Property Wealth Factor	14.74
Poverty factor	0.00
	0.00
Subtotal: Reimbursement Rate Before Incentives	**51.42**
Incentive Points	
Maintenance Points (0-2)	1.77
CM @ Risk (0-1)	1.00
Newly Formed Regional School District (0-6)	0.00
Major Reconstruction or Reno/Reuse (0-2)	0.00
Overlay Zoning 40R & 40S(0-1)	0.00
Overlay Zoning 100 units or 50 % of units for 1, 2 or 3 family structures (0-0.5)	0.00
Energy Efficiency - "Green Schools" (0-2)	2.00
Model Schools(5)	0.00
Total Incentive Points	**4.77**
MSBA Reimbursement Rate	**56.19**

Total Project Budget

Total Project Budget

Total Project Budget

City of Beverly New Beverly Middle School **School Building Committee Reviewed on:** **7/28/2015**

Total Project Budget: All costs associated with the project are subject to 963 CMR 2.16(5)	Estimated Budget	Scope Items Excluded from the Estimated Basis of Maximum Facilities Grant or Otherwise Ineligible	Estimated Basis of Maximum Total Facilities Grant[1]	Estimated Maximum Total Facilities Grant[1]
Feasibility Study Agreement				
OPM Feasibility Study	$275,000	$0	$275,000	
A&E Feasibility Study	$925,000	$0	$925,000	
Environmental & Site	$175,000	$0	$175,000	
Other	$125,000	$0	$125,000	
Feasibility Study Agreement Subtotal	**$1,500,000**	**$0**	**$1,500,000**	**$0**
Administration				
Legal Fees	$25,000	$0	$25,000	**$0**
Owner's Project Manager				
Design Development	$123,000	$0	$123,000	
Construction Contract Documents	$281,000	$0	$281,000	
Bidding	$135,000	$0	$135,000	
Construction Contract Administration	$2,376,400	$0	$2,376,400	
Closeout	$72,659	$0	$72,659	
Extra Services	$200,000	$0	$200,000	
Reimbursable & Other Services	$75,000	$0	$75,000	
Cost Estimates	$150,000	$0	$150,000	
Advertising	$5,000	$0	$5,000	
Permitting	$50,000	$0	$50,000	
Owner's Insurance	$0	$0	$0	
Other Administrative Costs	$150,000	$0	$150,000	
Administration Subtotal	**$3,643,059**	**$0**	**$3,643,059**	**$0**
Architecture and Engineering				
Basic Services				
Design Development	$2,405,416	$0	$2,405,416	
Construction Contract Documents	$3,372,520	$0	$3,372,520	
Bidding	$174,615	$0	$174,615	
Construction Contract Administration	$1,340,210	$0	$1,340,210	
Closeout	$128,410	$0	$128,410	
Other Basic Services		$0	$0	
Basic Services Subtotal	**$7,421,171**	**$0**	**$7,421,171**	
Reimbursable Services				
Construction Testing	$0	$0	$0	
Printing (over minimum)	$75,000	$0	$75,000	
Other Reimbursable Costs	$100,000	$0	$100,000	
Hazardous Materials	$200,000	$0	$200,000	
Geotech & Geo-Env.	$250,000	$0	$250,000	
Site Survey	$45,000	$0	$45,000	
Wetlands	$37,500	$0	$37,500	
Traffic Studies	$24,500	$0	$24,500	
Architectural/Engineering Subtotal	**$8,153,171**	**$0**	**$8,153,171**	**$0**
CM & Risk Preconstruction Services				
Pre-Construction Services	$192,064	**$0**	$192,064	**$0**
Site Acquisition				
Land / Building Purchase	$0	$0	$0	
Appraisal Fees	$0	$0	$0	
Recording fees	$0	$0	$0	
Site Acquisition Subtotal	**$0**	**$0**	**$0**	**$0**
Construction Costs				
SUBSTRUCTURE				
Foundations	$8,661,726	$0		
Basement Construction	$0	$0		
SHELL	$0			

Total Project Budget

City of Beverly New Beverly Middle School **School Building Committee Reviewed on:** **7/28/2015**

Total Project Budget: All costs associated with the project are subject to 963 CMR 2.16(5)	Estimated Budget	Scope Items Excluded from the Estimated Basis of Maximum Facilities Grant or Otherwise Ineligible	Estimated Basis of Maximum Total Facilities Grant[1]	Estimated Maximum Total Facilities Grant[1]
SuperStructure	$8,055,454	$0		
Exterior Closure	$8,798,120	$0		
Exterior Walls		$0		
Exterior Windows		$0		
Exterior Doors		$0		
Roofing	$1,727,670	$0		
INTERIORS	$0			
Interior Construction	$7,459,477	$0		
Staircases	$0	$0		
Interior Finishes	$3,442,232	$0		
SERVICES	$0			
Conveying Systems	$430,000	$0		
Plumbing	$3,008,324	$0		
HVAC	$8,137,370	$0		
Fire Protection	$951,036	$0		
Electrical	$8,542,653	$0		
EQUIPMENT & FURNISHINGS	$0			
Equipment	$1,285,974	$0		
Furnishings	$2,290,884	$0		
SPECIAL CONSTRUCTION & DEMOLITION				
Special Construction	$35,000	$0		
Existing Building Demolition	$632,500	$0		
In-Bldg. Hazardous Material Abatement	$1,735,000	$0		
Asbestos Cont'g Floor Mat'l Abatement	$0	$0		
Other Hazardous Material Abatement		$0		
BUILDING SITEWORK				
Site Preparation	$1,776,765	$0		
Site Improvements	$2,344,492	$0		
Site Civil / Mechanical Utilities	$1,214,424	$0		
Site Electrical Utilities	$656,040	$0		
Other Site Construction	$202,677	$0		
Scope Excluded Site Cost		$0		
Construction Trades Subtotal	$71,387,818	$0		
Contingencies (Design and Pricing)	$6,747,967	$0		
D/B/B Sub-Contractor Bonds	$394,405	$0		
D/B/B Insurance	$765,062	$0		
D/B/B General Conditions	$5,118,342	$0		
D/B/B Overhead & Profit	$1,038,829	$0		
GMP Insurance	$0	$0		
GMP Fee	$1,623,316	$0		
GMP Contingency	$0	$0		
Escalation to Mid-Point of Construction	$3,053,693	$0		
Overall Excluded Construction Cost		$0		
Construction Budget	**$90,129,432**	**$0**	**$90,129,432**	**$0**
Alternates				
Ineligible Work Included in the Base Project	$0	$0	$0	
Alternates Included in the Total Project Budget	$0	$0	$0	
Alternates Excluded from the Total Project Budget	$0		$0	
Subtotal to be Included in Total Project Budget	**$0**	**$0**	**$0**	**$0**
Miscellaneous Project Costs				
Utility Company Fees	$50,000	$0	$50,000	
Testing Services	$150,000	$0	$150,000	
Swing Space / Modulars		$0	$0	

Total Project Budget

City of Beverly New Beverly Middle School **School Building Committee Reviewed on:** **7/28/2015**

Total Project Budget: All costs associated with the project are subject to 963 CMR 2.16(5)	Estimated Budget	Scope Items Excluded from the Estimated Basis of Maximum Facilities Grant or Otherwise Ineligible	Estimated Basis of Maximum Total Facilities Grant[1]	Estimated Maximum Total Facilities Grant[1]
Other Project Costs (Mailing & Moving)	$100,000	$0	$100,000	
Misc. Project Costs Subtotal	**$300,000**	**$0**	**$300,000**	**$0**
Furnishings and Equipment				
Furnishings	$837,000	$0	$837,000	
Equipment	$837,000	$0	$837,000	
Computer Equipment	$1,674,000	$0	$1,674,000	
FF&E Subtotal	**$3,348,000**	**$0**	**$3,348,000**	**$0**
Soft Costs that exceed 20% of Construction Cost		$0		
Project Budget	**$107,265,726**	**$0**	**$107,265,726**	**$0**

Board Authorization	
Design Enrollment	1,395
Total Building Gross Floor Area (GSF)	231,509
Total Project Budget (excluding Contingencies)	$107,265,726
Scope Items Excluded or Otherwise Ineligible	$0
Third Party Funding (Ineligible)	$0
Estimated Basis of Maximum Total Facilities Grant[1]	$107,265,726
Reimbursement Rate	56.19%
Est. Max. Total Facilities Grant (before recovery)[1]	$0
Cost Recovery [2]	$0
Estimated Maximum Total Facilities Grant[1]	$0

Construction Contingency[3]	$2,703,883
Ineligible Construction Contingency[3]	$0
"Potentially Eligible" Construction Contingency[3]	$0
Owner's Contingency[3]	$1,000,000
Ineligible Owner's Contingency[3]	$0
"Potentially Eligible" Owner's Contingency[3]	$1,000,000
Total Potentially Eligible Contingency[3]	$0
Reimbursement Rate	56.19%
Potential Additional Contingency Grant Funds[3]	$0
Maximum Total Facilities Grant	$0
Total Project Budget	$110,969,609

51.42	Reimbursement Rate Before Incentive Points
4.77	Total Incentive Points
56.19%	MSBA Reimbursement Rate

NOTES

This template was prepared by the MSBA as a tool to assist Districts and consultants in understanding MSBA policies and practices regarding potential impact on the MSBA's calculation of a potential Basis of Total Facilities Grant and potential Total Maximum Facilities Grant. This template does not contain a final, exhaustive list of all evaluations which the MSBA may use in determining whether items are eligible for reimbursement by the MSBA. The MSBA will perform an independent analysis based on a review of information and estimates provided by the District for the proposed school project that may or may not agree with the estimates generated by the District using this template.

1. Does not include any potentially eligible contingency funds and is subject to review and audit by the MSBA.

2. The proposed demolition of the _____ School is expected to result in the MSBA recovering a portion of state funds previously paid to the District for the ____ project at the existing facilities completed in ___. The MSBA will perform an independent analysis based on a review of information and estimates provided by the District for the proposed school project that may or may not agree with the estimated cost recovery generated by the District and its consultants using this template.

3. Pursuant to Section 3.20 of the Project Funding Agreement and the applicable policies and guidelines of the Authority, any project costs associated with the reallocation or transfer of funds from either the Owner's contingency or the Construction contingency to other budget line items shall be subject to review by the Authority to determine whether any such costs are eligible for reimbursement by the Authority. All costs are subject to review and audit by the MSBA.

Designer's Construction Cost Estimate

Designer's Construction Cost Estimate

Schematic Design Estimate

Beverly Public Schools
Middle School

Beverly, MA

PM&C LLC
20 Downer Ave, Suite 1C
Hingham, MA 02043
(T) 781-740-8007
(F) 781-740-1012

Prepared for:

Architecture Involution LLC

July 24, 2015

PM&C

Beverly Public Schools
Middle School
Beverly, MA

24-Jul-15

Schematic Design Estimate

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Gross Floor Area	$/sf	Estimated Construction Cost
NEW MIDDLE SCHOOL				
Construct New Middle School - Trade Costs	Jul-16	231,509	$271.25	$62,797,822
Building Demolition - Main Building: including existing piles		103,000	$8.00	$824,000
Allowance for HazMat removals at existing building per UEC estimate				$1,735,000
Sitework - Trade Costs	Jul-16			$6,100,730
SUBTOTAL TRADE COSTS BUILDING and SITEWORK		231,509	$308.66	$71,457,552
Design and Estimating Contingency	10.0%			$7,145,755
Escalation Allowance	3.0%			$2,143,727
Subtotal				$80,747,034
General Conditions				$3,379,133
General Requirements	2.0%			$1,614,941
Insurances - Builders Risk				$250,316
Insurances				$361,747
Bond				$347,212
Fee	1.8%			$1,453,447
Permit				NIC
CM Contingency	2.0%			$1,614,941
TOTAL OF ALL CONSTRUCTION ESCALATED TO MID-POINT OF CONSTRUCTION		**231,509**	**$387.75**	**$89,768,771**

PM&C

Beverly Public Schools
Middle School
Beverly, MA

24-Jul-15

Schematic Design Estimate

[1] HazMat costs are provided by UEC

[2] Costs are based on C. 149a CM at Risk

This Schematic cost estimate was produced from drawings and specifications and other documentation prepared by Ai3 Architects and their design team dated July 3rd 2015.

This estimate includes all direct construction costs, CM's overhead and profit and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be public bidding under Chapter 149a CMr of the Massachusetts General Laws to pre-qualified construction managers, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

- All professional fees and insurance
- Building Permit costs
- Land acquisition, feasibility, and financing costs
- All Furnishings, Fixtures and Equipment
- Items identified in the design as Not In Contract (NIC)
- Items identified in the design as by others
- Owner supplied and/or installed items (e.g. draperies, furniture and equipment)
- Rock excavation; special foundations (unless indicated by design engineers)
- Utility company back charges, including work required off-site
- Work to City streets and sidewalks, (except as noted in this estimate)
- Construction or occupancy phasing or off hours' work, (except as noted in this estimate)

PM&C

Beverly Public Schools 24-Jul-15

Middle School
Beverly, MA

Schematic Design Estimate GFA 231,509

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
NEW MIDDLE SCHOOL						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$2,794,698			
	A1020	Special Foundations	$2,017,630			
	A1030	Lowest Floor Construction	$2,031,546	**$6,843,874**	$29.56	10.9%
A20	**BASEMENT CONSTRUCTION**					
	A2010	Basement Excavation	$407,184			
	A2020	Basement Walls	$469,225	**$876,409**	$3.79	1.4%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$5,552,336			
	B1020	Roof Construction	$2,730,370	**$8,282,706**	$35.78	13.2%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$4,717,152			
	B2020	Windows	$3,281,598			
	B2030	Exterior Doors	$178,389	**$8,177,139**	$35.32	13.0%
B30	**ROOFING**					
	B3010	Roof Coverings	$1,457,473			
	B3020	Roof Openings	$121,200	**$1,578,673**	$6.82	2.5%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$4,628,290			
	C1020	Interior Doors	$788,150			
	C1030	Specialties/Millwork	$2,174,487	**$7,590,927**	$32.79	12.1%
C20	**STAIRCASES**					
	C2010	Stair Construction	$848,000			
	C2020	Stair Finishes	$248,600	**$1,096,600**	$4.74	1.7%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$1,495,760			
	C3020	Floor Finishes	$2,036,670			
	C3030	Ceiling Finishes	$1,353,151	**$4,885,581**	$21.10	7.8%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$444,625	**$444,625**	$1.92	0.7%

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CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
NEW MIDDLE SCHOOL						
D20	**PLUMBING**					
	D20	Plumbing	$2,782,175	**$2,782,175**	$12.02	4.4%
D30	**HVAC**					
	D30	HVAC	$7,488,557	**$7,488,557**	$32.35	11.9%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$861,358	**$861,358**	$3.72	1.4%
D50	**ELECTRICAL**					
	D5010	Service & Distribution	$2,112,759			
	D5020	Lighting & Power	$2,801,259			
	D5030	Communication & Security Systems	$3,328,588			
	D5040	Other Electrical Systems	$235,000	**$8,477,606**	$36.62	13.5%
E10	**EQUIPMENT**					
	E10	Equipment	$1,285,115	**$1,285,115**	$5.55	2.0%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$1,981,127			
	E2020	Movable Furnishings	NIC	**$1,981,127**	$8.56	3.2%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$145,350	**$145,350**	$0.63	0.2%
F20	**HAZMAT REMOVALS**					
	F2010	Building Elements Demolition	$0			
	F2020	Hazardous Components Abatement	$0	**$0**	$0.00	0.0%
TOTAL DIRECT COST (Trade Costs)				**$62,797,822**	$271.25	100.0%

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
NEW MIDDLE SCHOOL							
	GROSS FLOOR AREA CALCULATION						
	Basement	25,706					
	First Floor	78,455					
	Second Floor	43,652					
	Third Floor	43,968					
	Fourth Floor	39,728					
	TOTAL GROSS FLOOR AREA (GFA)				**231,509**	***sf***	
A10	***FOUNDATIONS***						
A1010	**STANDARD FOUNDATIONS**						
	Perimeter grade beam; 5'-0" deep x 3'-0" wide						
	Excavation	**3,985**	cy	9.00	35,865		
	Store on site for reuse	**3,985**	cy	8.00	31,880		
	Backfill with selected material	**2,590**	cy	6.50	16,835		
	Formwork	**14,346**	sf	12.00	172,152		
	Re-bar	**167,400**	lbs	1.20	200,880		
	Concrete material; 3,000 psi	**1,395**	cy	120.00	167,400		
	Placing concrete	**1,395**	cy	40.00	55,800		
	Interior Grade Beams						
	Allowance for interior grade beams	**78,455**	sf	8.00	627,640		
	Pile Cap PC1, 5'-2" x 5'-2" x 1'-8"						
	Excavation	**424**	cy	15.00	6,360		
	Store on site for reuse	**424**	cy	8.00	3,392		
	Backfill with selected material	**365**	cy	13.00	4,745		
	Formwork	**1,174**	sf	11.00	12,914		
	Re-bar	**5,900**	lbs	1.20	7,080		
	Concrete material; 3,000 psi	**59**	cy	120.00	7,080		
	Placing concrete	**59**	cy	50.00	2,950		
	Pile Cap PC3, 8'-6" x 7'-0" x 4'-0"						
	Excavation	**1,711**	cy	15.00	25,665		
	Store on site for reuse	**1,711**	cy	8.00	13,688		
	Backfill with selected material	**934**	cy	13.00	12,142		
	Formwork	**10,416**	sf	11.00	114,576		
	Re-bar	**77,700**	lbs	1.20	93,240		
	Concrete material; 3,000 psi	**777**	cy	120.00	93,240		
	Placing concrete	**777**	cy	50.00	38,850		
	Pile Cap PC4, 9'-0" x 9'-0" x 4'-0"						
	Excavation	**3,655**	cy	15.00	54,825		
	Store on site for reuse	**3,655**	cy	8.00	29,240		
	Backfill with selected material	**1,815**	cy	13.00	23,595		
	Formwork	**21,024**	sf	11.00	231,264		
	Re-bar	**184,000**	lbs	1.20	220,800		
	Concrete material; 3,000 psi	**1,840**	cy	120.00	220,800		
	Placing concrete	**1,840**	cy	50.00	92,000		
	Miscellaneous						
	Piers/pilasters	**156**	cy	650.00	101,400		
	Set anchor bolts grout plates; supplied by others	**1,056**	loc	25.00	26,400		
	Site stairs against and integrated with building	**1**	loc	50,000.00	50,000		

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	NEW MIDDLE SCHOOL							
52		Perimeter drain				NIC		
53		SUBTOTAL					2,794,698	
54								
55	**A1020**	**SPECIAL FOUNDATIONS**						
56		Piling mobilization	**1**	ls	65,000.00	65,000		
57		Load test	**1**	ls	45,000.00	45,000		
58		Vibration monitoring	**1**	ls	35,000.00	35,000		
59		Store surplus material on site	**2,181**	cy	14.00	30,534		
60		Predrilling				NIC		
61		Pile cut offs	**1**	sf	30,000.00	30,000		
62		Precast concrete piles, 16" x 16", spliced, av. 60'	**34,848**	vlf	52.00	1,812,096		
63		SUBTOTAL					2,017,630	
64								
65	**A1030**	**LOWEST FLOOR CONSTRUCTION**						
66		New Structural Slab, 12" thick	*78,455*	*sf*		-		
67		Gravel fill, 8"	**1,947**	cy	28.00	54,516		
68		Rigid insulation	**78,455**	sf	2.00	156,910		
69		Vapor barrier	**78,455**	sf	0.65	50,996		
70		Compact existing sub-grade	**78,455**	sf	0.50	39,228		
71		Formwork	**2,391**	lf	12.00	28,692		
72		Rebar, 6#/SF	**470,730**	lbs	1.20	564,876		
73		Concrete - 12" thick; 4,000 psi	**3,051**	cy	125.00	381,375		
74		Premium for additional rebar at pile caps	**1**	ls	50,000.00	50,000		
75		Placing concrete	**3,051**	cy	45.00	137,295		
76		Finishing and curing concrete	**78,455**	sf	3.00	235,365		
77		Barrier 1 moisture mitigation	**3,051**	cy	65.00	198,315		
78		Elevator Pit						
79		Excavation for elevator pit	**252**	cy	14.00	3,528		
80		Remove off site	**252**	cy	17.37	4,377		
81		Backfill with gravel	**12**	cy	28.00	336		
82		Elevator pit walls						
83		formwork	**1,440**	sf	9.06	13,046		
84		reinforcement	**2,160**	lbs	1.00	2,160		
85		Concrete material; 3,000 psi	**18**	cy	120.00	2,160		
86		placing concrete in walls	**18**	cy	40.00	720		
87		Slab						
88		formwork	**180**	sf	9.06	1,631		
89		reinforcement	**900**	lbs	1.00	900		
90		concrete material in slab	**18**	cy	120.00	2,160		
91		placing concrete in slab; 3,000 psi	**18**	cy	40.00	720		
92		Miscellaneous						
93		Polymer modified Cement waterproofing to elevator pit	**1,020**	sf	12.00	12,240		
94		Neutralization pit	**1**	loc	4,000.00	4,000		
95		Grease interceptor pit	**1**	loc	2,500.00	2,500		
96		Loading dock	**1**	ls	35,000.00	35,000		
97		Equipment pads	**500**	sf	7.00	3,500		
98		Premium for stepped floor at auditorium	**3,000**	sf	15.00	45,000		
99		SUBTOTAL					2,031,546	
100								
101		***TOTAL - FOUNDATIONS***						**$6,843,874**
102								

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
NEW MIDDLE SCHOOL							
103							
104	***A20 BASEMENT CONSTRUCTION***						
105							
106	**A2010 BASEMENT EXCAVATION**						
107	Excavation	**10,007**	cy	14.00	140,098		
108	Over excavation	**2,547**	cy	14.00	35,658		
109	Remove off site	**12,554**	cy	16.00	200,864		
110	Backfill with excavated material	**2,547**	cy	12.00	30,564		
111	SUBTOTAL					407,184	
112							
113	**A2020 BASEMENT WALLS**						
114	Perimeter footing at retaining wall; 5'-0" wide x 2'-0" deep						
115	Excavation	**635**	cy	9.00	5,715		
116	Store on site for reuse	**635**	cy	8.00	5,080		
117	Backfill with selected material	**487**	cy	6.50	3,166		
118	Formwork	**1,524**	sf	12.00	18,288		
119	Re-bar	**17,760**	lbs	1.20	21,312		
120	Concrete material; 3,000 psi	**148**	cy	120.00	17,760		
121	Placing concrete	**148**	cy	40.00	5,920		
122	Foundation retaining wall; 24" thick						
123	Formwork	**14,478**	sf	14.00	202,692		
124	Re-bar	**36,195**	lbs	1.20	43,434		
125	Concrete material; 3,000 psi	**563**	cy	120.00	67,560		
126	Placing concrete	**563**	cy	40.00	22,520		
127	Waterproofing foundation wall and footing	**7,239**	sf	7.00	50,673		
128	Insulation to foundation walls; 2" thick	**1,524**	sf	1.85	2,819		
129	Form shelf	**381**	lf	6.00	2,286		
130	SUBTOTAL					469,225	
131							
132	***TOTAL - BASEMENT CONSTRUCTION***						**$876,409**
133							
134							
135	***B10 SUPERSTRUCTURE***						
136		13.53	lbs/sf		-		
137	**B1010 FLOOR CONSTRUCTION**	1,566	tns		-		
138	Floor Structure - Steel:						
139	Beams/columns/bracing ; w-sections at auditorium 15 #sf	**176**	tns	3,300.00	580,800		
140	Beams/columns/bracing ; w-sections at classroom section 10 #sf	**679**	tns	3,300.00	2,240,700		
141	Premium for HSS	**214**	tns	200.00	42,800		
142	Beams/columns/bracing ; w-sections mics	**154**	tns	3,300.00	508,200		
143	Shear studs	**19,382**	ea	6.00	116,292		
144	Floor Structure						
145	Metal floor decking; 2", 18 gage	**155,054**	sf	4.00	620,216		
146	Mesh reinforcement in concrete topping	**178,312**	sf	0.90	160,481		
147	Concrete topping to metal decking, 5 1/4" thick; Light weight	**2,638**	cy	140.00	369,320		
148	Placing concrete topping	**155,054**	sf	2.00	310,108		
149	Concrete to risers at Auditorium/lecture	**267**	cy	600.00	160,200		
150	Moisture Mitigation; admixture	**2,638**	cy	40.00	NIC		
151							

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
NEW MIDDLE SCHOOL							
	Miscellaneous						
	Rebar at slab edges	**15,000**	lbs	1.00	15,000		
	Firestopping at floor penetrations	**3**	floors	2,500.00	7,500		
	Fire stopping at slab edges	**2,772**	lf	4.00	11,088		
	Additional labor at sloped slab in auditorium	**2,100**	sf	6.00	12,600		
	Concrete steps to auditorium	**52**	lfr	75.00	3,900		
	Miscellaneous fire stopping	**1**	ls	20,000.00	20,000		
	Relieving angles	**4705**	lf	55.00	Incl in Structure		
	Base plates	**10,560**	lbs	1.75	18,480		
	Expansion joint at floor decks	**1,455**	lf	25.00	36,375		
	Moment connections allowance	**10**	ea	500.00	5,000		
	Supply anchor bolts installed by others	**264**	ea	12.00	3,168		
	Allowance for fireproofing to beams and columns only; assumed intumescent	**155,054**	sf	2.00	310,108		
	SUBTOTAL					5,552,336	
B1020	**ROOF CONSTRUCTION**						
	Roof Structure - Steel:						
	Beams/columns/bracing ; 10 #psf	**362**	tns	3,300.00	1,194,600		
	Beams/columns/bracing ; 12 #psf at auditorium	**90**	tns	3,300.00	297,000		
	Beams/columns/bracing ; 15 #psf at auditorium	**33**	tns	3,300.00	108,900		
	Premium for HSS	**121**	tns	200.00	24,200		
	Beams/columns/bracing ; w-sections mics	**72**	tns	3,300.00	237,600		
	Roof Structure						
	Metal roof decking; 1 1/2, 20 gage galv., type B	**59,415**	sf	3.00	178,245		
	Metal roof decking; 3"	**19,040**	sf	6.50	123,760		
	Miscellaneous						
	Support framing to roof screen ; HSS galvanized	**13**	tns	3,800.00	49,400		
	Fireproofing to beams and deck	**59,415**	sf	3.00	178,245		
	Concrete slab for Roof	**19,040**	sf	9.00	171,360		
	Angle framing at roof details				Incl in Structure		
	Canopy frame allowance	**3,000**	sf	35.00	105,000		
	Canopy frame at loading dock	**800**	sf	20.00	16,000		
	Frame to roof overhang	**452**	sf	30.00	13,560		
	Moment connections allowance	**50**	ea	350.00	17,500		
	Chiller dunnage	**1**	ls	15,000.00	15,000		
	SUBTOTAL					2,730,370	
	TOTAL - SUPERSTRUCTURE						**$8,282,706**
B20	***EXTERIOR CLOSURE***						
B2010	**EXTERIOR WALLS**	*64,168*	*sf*		-		
	Interior skin						
	8" metal stud back-up	**64,168**	sf	9.50	609,596		
	GWB to inside of exterior wall	**64,168**	sf	2.60	166,837		
	Nail base insulation	**64,168**	sf	6.50	417,092		
	Air/Vapor barrier to exterior walls, fluid applied	**64,168**	sf	6.00	385,008		
	1.5" spray foam insulation	**64,168**	sf	2.50	160,420		
	Exterior skin						

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		NEW MIDDLE SCHOOL						
205		Aluminum siding	**48,046**	sf	41.00	1,969,886		
206		Fiber cement panel siding	**12,654**	sf	22.00	278,388		
207		Natural stone veneer	**3,468**	sf	60.00	208,080		
208		Misc Trim						
209		Concrete plinth to timber brackets at main entry	**3**	loc	1,500.00	4,500		
210		Glue Lam timber brackets : including misc metals	**6**	loc	3,500.00	21,000		
211		Precast trim and custom pieces						
212		Precast sills /water table	**1,027**	lf	90.00	92,430		
213		Miscellaneous						
214		Aluminum reveal btwn aluminum and fiber cement	**1**	ls	15,000.00	15,000		
215		Expansion joint at walls	**387**	lf	25.00	9,675		
216		Louvered equipment enclosure, prefinished louvered aluminum (12' high)	**113**	lf	350.00	39,550		
217		Paint to exterior exposed steel	**1**	ls	25,000.00	25,000		
218		Logo signs/banners	**1**	ls	20,000.00	20,000		
219		Scaffold/lifts to exterior walls	**98,230**	sf	3.00	294,690		
220		SUBTOTAL					4,717,152	
221								
222	**B2020**	**WINDOWS**	*34,062*			-		
223		Aluminum windows	**26,024**	sf	80.00	2,081,920		
224		Aluminum CW	**8,038**	sf	105.00	843,990		
225		Sun shade	**1,790**	lf	120.00	214,800		
226		Louvers allowance	**200**	sf	55.00	11,000		
227		Air/Vapor barrier at window & louver openings	**10,391**	lf	5.00	51,955		
228		Backer rod & sealant at window & louver openings	**10,391**	lf	3.50	36,369		
229		Wood blocking at window openings	**10,391**	lf	4.00	41,564		
230		SUBTOTAL					3,281,598	
231								
232	**B2030**	**EXTERIOR DOORS**						
233		Hollow metal doors, frames and HW						
234		Single leaf	**3**	ea	1,600.00	4,800		
235		Double leaf	**4**	pr	3,200.00	12,800		
236		Exterior Doors - Aluminum						
237		3'-0" x 7'-0" w/ glazed panels	**2**	ea	4,000.00	8,000		
238		6'-0" x 7'-0" w/ glazed panels	**16**	pr	8,000.00	128,000		
239		Miscellaneous						
240		Overhead door 8' x 13'- electrically operated	**3**	ea	6,760.00	20,280		
241		Backer rod & sealant to exterior doors	**501**	lf	5.00	2,505		
242		Wood blocking at door openings	**501**	lf	4.00	2,004		
243		SUBTOTAL					178,389	
244								
245		***TOTAL - EXTERIOR CLOSURE***						**$8,177,139**
246								
247								
248	***B30***	***ROOFING***						
249								
250	**B3010**	**ROOF COVERINGS**						
251		Flat Roofing:						
252		White EPDM roof membrane mechanically fastened with 6" insulation	**82,378**	sf	12.50	1,029,725		
253		Membrane roof walkway pads	**4,119**	sf	5.00	20,595		
254		Miscellaneous Roofing						
255		Roof to wall flashings	**1,238**	lf	25.00	30,950		

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NEW MIDDLE SCHOOL							
	Factory fabricated fascia trim/roof edge	**3,978**	lf	18.00	71,604		
	Air/Vapor barrier at roof edges	**3,978**	lf	8.00	31,824		
	Roof expansion joints	**485**	lf	50.00	24,250		
	Wood blocking at expansion joints and roof edges	**485**	ls	25.00	12,125		
	Canopies; roofing allowance	**3,000**	sf	25.00	75,000		
	Canopies; soffits; assumed aluminum panel	**3,000**	sf	50.50	151,500		
	Roof ladders	**6**	loc	1,650.00	9,900		
	SUBTOTAL					1,457,473	
B3020	**ROOF OPENINGS**						
	Skylight allowance	**1**	ls	90,000.00	90,000		
	Elevator PH and vent	**3**	ea	3,000.00	9,000		
	Smoke hatches	**3**	ea	3,900.00	11,700		
	Roof hatches and ladder	**3**	ea	3,500.00	10,500		
	SUBTOTAL					121,200	
	TOTAL - ROOFING						**$1,578,673**
C10	***INTERIOR CONSTRUCTION***						
C1010	**PARTITIONS**						
	CMU Partitions						
	Elevator Shaft walls - 2 hr rated	**3,780**	sf	24.00	90,720		
	8" CMU, lower floor	**4,574**	sf	18.50	84,619		
	6" CMU , lower floor	**3,704**	sf	16.50	61,116		
	4" CMU , lower floor bathroom chase wall	**806**	sf	16.25	13,098		
	GWB Partitions						
	3 5/8" metal studs, 1 layer 5/8" GWB b/s, 3-1/2" mineral wool insulation (typical)	**31,777**	sf	7.75	246,272		
	2 rows 3 5/8" MS, 1 layers 5/8" type X gwb b/s, 3-1/2" mineral wool insulation (corridor)	**66,735**	sf	14.50	967,658		
	6' MS, 2 layers 5/8" type X gwb b/s, 3-1/2" mineral wool insulation (classroom)	**45,687**	sf	15.00	685,305		
	Stair partitions: 6" ms w' 2 layers gwb b/s: insulated	**16,121**	sf	15.00	241,815		
	Bathroom chase wall	**5,597**	sf	6.50	36,381		
	Furred Wall	**16,134**	sf	7.75	125,039		
	Shaft Wall	**18,332**	sf	13.00	238,316		
	GWB to knee walls at auditorium, reception and library desk	**851**	sf	12.50	10,638		
	Sealants & caulking at partitions	**168,411**	sf	0.25	42,103		
	Support framing for Operable glass partition	**372**	lf	120.00	44,640		
	Operable glass partition	**4,687**	sf	180.00	843,660		
	Lintels	**1**	ls	5,000.00	5,000		
	Seismic Clips at the tops of all CMU interior partitions	**255**	loc	120.00	30,600		
	Glazing at academic team room , 1/A9.04	**4,337**	sf	65.00	281,905		
	Interior HM windows	**4,771**	sf	65.00	310,115		
	Interior Aluminum windows at science classroom	**464**	sf	75.00	34,800		
	Interior HM glazed storefronts	**1,077**	sf	60.00	64,620		
	Interior HM glazed storefronts at gym	**1,743**	sf	60.00	104,580		
	Aluminum vestibule storefront, 2/A9.03	**134**	sf	85.00	11,390		
	Aluminum reveal	**5,390**	lf	10.00	53,900		

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		NEW MIDDLE SCHOOL						
305		SUBTOTAL					4,628,290	
306								
307	**C1020**	**INTERIOR DOORS**						
308		Door, Frames, Hardware - Wood Veneer Doors						
309		Single leaf	**235**	ea	1,500.00	352,500		
310		Double leaf	**40**	pr	2,700.00	108,000		
311		Premium for transoms (glazing and frame)	**249**	ea	500.00	124,500		
312		Glazed aluminum @ vestibule (double)	**3**	pr	4,400.00	13,200		
313		Glazed aluminum @ vestibule (single)	**1**	ea	3,200.00	3,200		
314		Door, Frames, Hardware - Hollow Metal Doors						
315		Double leaf	**1**	pr	2,900.00	2,900		
316		Single leaf	**9**	ea	1,500.00	13,500		
317		Sliding glass door at small group	**22**	ea	3,200.00	70,400		
318		Stainless steel overhead coiling door at servery; electrically operated	**2**	loc	4,000.00	8,000		
319		Coiling grill at servery; electrically operated	**2**	loc	3,000.00	6,000		
320		Premium for gasketed door frames	**6**	loc	400.00	2,400		
321		Premium for glass doors at glass partitions	**20**	loc	1,500	30,000		
322		Glazing at borrowed lights and door frames				With borrowed lights		
323		Paint doors and frames	**315**	ea	110.00	34,650		
324		Sealants & caulking	**315**	ea	60.00	18,900		
325		SUBTOTAL					788,150	
326								
327	**C1030**	**SPECIALTIES / MILLWORK**						
328		*Toilet Partitions*						
329		ADA	**21**	ea	1,323.00	27,783		
330		Standard	**29**	ea	823.00	23,867		
331		Urinal screens	**20**	ea	392.00	7,840		
332		Changing cubicles at girls locker	**13**	ea	1,200.00	15,600		
333		Premolded shower bases; HC	**4**	ea	1,400.00	5,600		
334		Miscellaneous support at toilet partitions	**50**	loc	150.00	7,500		
335		*Toilet Accessories*						
336		Gang bathrooms	**21**	rms	2,500.00	52,500		
337		Individual bathrooms	**24**	rms	600.00	14,400		
338		Custodian closet	**9**	rms	500.00	4,500		
339		Folding Shower Seats	**4**	ea	250.00	1,000		
340		Shower curtains	**4**	ea	100.00	400		
341								
342		Metal catwalk to auditorium; including stairs	**1**	ls	60,000.00	60,000		
343		Wood trim panels; 1,2/A9.04	**1,122**	sf	55.00	61,710		
344		*Auditorium*						
345		Wood sliding glass door at control room in Auditorium; 14'-2" wide x 8'-0" high	**1**	ea	5,500.00	5,500		
346		Support framing for auditorium lighting	**1**	ls	5,000.00	5,000		
347		Stair construction at Auditorium stage	**66**	lfr	90.00	5,940		
348		*Library/Media Center*						
349		Wood trim & shelving at library	**213**	lf	220.00	46,860		
350		Tiered seating in library, circular	**25**	lf	250.00	6,250		
351		Allowance for library computer tables and bookcases	**1**	ls	50,000.00	50,000		
352		*5/6 Student Dining*						
353		Wood trim	**115**	lf	42.00	4,830		
354		Misc. trim	**1**	ls	4,000.00	4,000		
355		Signage	**1**	ls	8,000.00	8,000		
356		Crown molding	**132**	lf	35.00	4,620		
357		Recycling Center	**22**	lf	400.00	8,800		

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GFA 231,509

	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		NEW MIDDLE SCHOOL						
358		*7/8 Student Dining*						
359		Wood trim	**231**	lf	42.00	9,702		
360		Misc. trim	**1**	ls	5,000.00	5,000		
361		Signage	**1**	ls	10,000.00	10,000		
362		Crown molding	**89**	lf	35.00	3,115		
363		Recycling Center	**22**	lf	400.00	8,800		
364		*Band practice*						
365		Sound panels	**250**	sf	45.00	11,250		
366		Instrument storage	**1**	ls	20,000.00	20,000		
367		*Gym/Athletics*						
368		Signage/graphics	**1**	ls	20,000.00	20,000		
369		Admin desk allowance	**25**	lf	400.00	10,000		
370		Library circulation desk	**33**	lf	500.00	16,500		
371		HS Guidance reception desk allowance	**25**	lf	400.00	10,000		
372		Career center desk allowance	**25**	lf	400.00	10,000		
373								
374		*Visual display boards*						
375		Marker Boards	**11,012**	sf	22.00	242,264		
376		Marker Boards to halls	**288**	sf	34.00	9,792		
377		Tack Boards	**1,235**	sf	20.00	24,700		
378		Tack board strip above marker boards: 12"	**776**	lf	12.00	9,312		
379		8' IWB	**117**	loc	5,400.00	w/ electrical		
380		Backer panels in electrical closets	**1**	ls	1,000.00	1,000		
381		Support to projection screens	**1**	ls	2,000.00	2,000		
382		SS lockable time capsule	**1**	ea	1,500.00	1,500		
383		Supports for stage lighting	**1**	ls	10,000.00	10,000		
384		Elevator support framing	**1**	ls	2,500.00	2,500		
385		Expansion joint cover assemblies	**1**	ls	25,000.00	25,000		
386		Metal corridor lockers; single tier				NIC		
387		Open face lockers in locker room single tier				NIC		
388		Bench with cubbies underneath, in corridor	**502**	lf	320.00	160,640		
389		1' x 1' cubbies, 4 high, in corridor	**575**	lf	300.00	172,500		
390		Concrete base at lockers	**1**	ls	12,000.00	12,000		
391		15' wide x 24" high Metal gym lockers; double tier	**334**	opn	220.00	73,480		
392		Lockers @ Kitchen	**10**	opn	240.00	2,400		
393		Lockers @ Custodian	**6**	opn	240.00	1,440		
394		Locker room benches	**48**	lf	150.00	7,200		
395		Fire extinguisher cabinets	**160**	ea	350.00	56,000		
396		Handrails at auditorium	**84**	lf	55.00	4,620		
397		Guardrails at auditorium	**52**	lf	175.00	9,100		
398		Guardrails at floor openings to below	**545**	lf	220.00	119,900		
399		Emergency key cabinets	**1**	ls	500.00	500		
400		Room signage	**315**	loc	150.00	47,250		
401		Decorative signage	**1**	ls	35,000.00	35,000		
402		Stenciling at wing entry	**12**	loc	500.00	6,000		
403		Signage at library	**1**	ls	2,500.00	2,500		
404		Building directory	**2**	ea	1,000.00	2,000		
405		Exterior signage	**1**	ls	10,000.00	10,000		
406		Dedication plaque	**1**	ea	1,400.00	1,400		
407		Miscellaneous sealants & caulking	**231,509**	gsf	1.40	324,113		
408		Misc metals	**231,509**	sf	1.00	231,509		
409		SUBTOTAL					2,174,487	
410								
411		***TOTAL - INTERIOR CONSTRUCTION***						**$7,590,927**

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
NEW MIDDLE SCHOOL							
412							
413							
414	***C20 STAIRCASES***						
415							
416	**C2010 STAIR CONSTRUCTION**						
417	Monumental stairs to cafeteria's	**8**	flt	35,000.00	280,000		
418	Egress stairs	**22**	flt	22,000.00	484,000		
419	Concrete fill to stairs	**30**	flt	2,800.00	84,000		
420	SUBTOTAL					848,000	
421							
422	**C2020 STAIR FINISHES**						
423	High performance coating to stairs including all railings etc.	**30**	flt	2,500.00	75,000		
424	Stair finish to monumental stairs	**1,400**	lfr	25.00	35,000		
425	Rubber base; stairs	**3,300**	lf	3.00	9,900		
426	Rubber tile at stairs - landings	**7,700**	sf	9.00	69,300		
427	Rubber tile at stairs - treads & risers	**3,300**	lft	18.00	59,400		
428	SUBTOTAL					248,600	
429							
430	***TOTAL - STAIRCASES***						**$1,096,600**
431							
432							
433	***C30 INTERIOR FINISHES***						
434							
435	**C3010 WALL FINISHES**						
436	Paint to GWB walls	**259,656**	sf	0.90	233,690		
437	Ceramic wall tile toilet rooms; full height at wet wall, wainscoting elsewhere	**13,005**	sf	22.00	286,110		
438	Ceramic wall tile in custodian rooms	**540**	sf	16.00	8,640		
439	Wood paneling and trim at auditorium including railings, pilasters etc.	**1**	ls	175,000.00	175,000		
440	Stain, paint to wood trim and panels	**1**	ls	15,000.00	15,000		
441	Wood chair rail at porcelain hall wainscoting	**1,900**	lf	15.00	28,500		
442	*Library/Media Center*						
443	Misc. wood trim & molding at library	**1**	ls	25,000.00	25,000		
444	Wood Paneling in library	**350**	sf	60.00	21,000		
445	Wood trim @ chair rail band at library	**250**	lf	42.00	10,500		
446	*5/6 Student Dining*						
447	Sound absorption panels	**150**	sf	22.00	3,300		
448	*7/8 Student Dining*						
449	Sound absorption panels	**150**	sf	22.00	3,300		
450	*Lobby*						
451	Wood trim and paneling to lobby	**1**	ls	80,000.00	80,000		
452	*Gym/Athletics*						
453	Sound absorption panels @ gym	**1,500**	sf	22.00	33,000		
454	Misc sound panels throughout	**1**	ls	25,000.00	25,000		
455	Porcelain wall tile to corridors, 3' high	**4,116**	sf	23.00	94,668		
456	Porcelain wall tile to cafeteria, 3' high	**1,584**	sf	23.00	36,432		
457	Porcelain tile to walls at stairs	**16,940**	sf	23.00	389,620		
458	FRP to kitchen	**3,000**	sf	9.00	27,000		
459	SUBTOTAL					1,495,760	
460							
461	**C3020 FLOOR FINISHES**						

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	NEW MIDDLE SCHOOL							
462		Architectural stained concrete floor; including protection during construction	**160,028**	sf	8.00	1,280,224		
463		Wood base to gym and PE alternatives	**634**	lf	9.00	5,706		
464		Wood strip flooring to stage	**1,657**	sf	8.00	13,256		
465		Oak T&G wood strip flooring to stairs at stage	**48**	lfr	25.00	1,200		
466		Gymnasium wood flooring	**12,261**	sf	16.00	196,176		
467		Carpet to floors; auditorium	**3,023**	sf	5.00	15,115		
468		Carpet to floors; selected classrooms & offices	**25,285**	sf	5.00	126,425		
469		Epoxy floors	**3,947**	sf	11.00	43,417		
470		Epoxy base	**412**	lf	18.00	7,416		
471		Quarry tile to floors	**2,918**	sf	18.00	52,524		
472		Quarry tile base	**519**	lf	14.00	7,266		
473		Ceramic mosaic tiles to floors; toilets & showers	**6,943**	sf	21.00	145,803		
474		Ceramic tile base	**2,601**	lf	12.00	31,212		
475		Marble thresholds	**24**	loc	250.00	6,000		
476		Rubber cove base	**35,600**	lf	2.80	99,680		
477		Painted concrete floor at mech rooms	**3,500**	sf	1.50	5,250		
478		SUBTOTAL					2,036,670	
479								
480	**C3030**	**CEILING FINISHES**						
481		GWB soffits; allowance	**1**	ls	50,000.00	50,000		
482		ACT 1 at music rooms 2x4	**416**	sf	4.50	1,872		
483		Acoustical clouds in Auditorium	**1,895**	sf	70.00	132,650		
484		Suspended wood ceiling cloud	**3,991**	sf	35.00	139,685		
485		ACT to classroom spaces	**213,632**	sf	4.50	961,344		
486		Paint exposed steel structure	**19,040**	sf	2.50	47,600		
487		Misc finish to ceilings	**1**	ls	20,000.00	20,000		
488		SUBTOTAL					1,353,151	
489								
490		***TOTAL - INTERIOR FINISHES***						**$4,885,581**
491								
492								
493	***D10***	***CONVEYING SYSTEMS***						
494								
495	**D1010**	**ELEVATOR**						
496		Passenger elevator, 2 stop, 1 opening; 3500 lbs; 120 fpm	**1**	ea	80,000.00	80,000		
497		Passenger elevator, 4 stop, 1 opening; 3500 lbs; 120 fpm	**1**	ea	160,000.00	160,000		
498		Passenger elevator, 5 stop, 1 opening; 3500 lbs; 120 fpm	**1**	ea	200,000.00	200,000		
499		6 x 4 x 3/8 angle to elevator pit	**30**	lf	25.00	750		
500		Pit ladders	**3**	ea	650.00	1,950		
501		Sill angles	**77**	lf	25.00	1,925		
502		SUBTOTAL					444,625	
503								
504		***TOTAL - CONVEYING SYSTEMS***						**$444,625**
505								
506								
507	***D20***	***PLUMBING***						
508								
509	**D20**	**PLUMBING, GENERALLY**						
510		Equipment						

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		NEW MIDDLE SCHOOL						
511		Gas fired hot water heater	**2**	ea	12,000.00	24,000		
512		Water meter assembly	**1**	ea	4,500.00	4,500		
513		Connection to gas meter	**1**	ea	1,050.00	1,050		
514		Reduce pressure backflow preventer	**1**	ea	3,080.00	3,080		
515		Expansion tank	**2**	ea	3,080.00	6,160		
516		Hot water circulator pump assembly	**2**	ea	1,200.00	2,400		
517		Hot water building pump	**1**	ea	2,000.00	2,000		
518		Hot water kitchen pump	**1**	ea	1,000.00	1,000		
519		Mixing valve	**1**	ea	4,400.00	4,400		
520		Recycled storm water system	**1**	ls	125,000.00	125,000		
521		Miscellaneous plumbing equipment	**231,509**	sf	0.80	185,207		
522		Plumbing Fixtures						
523		Water closet	**58**	ea	1,200.00	69,600		
524		Lavatory	**58**	ea	900.00	52,200		
525		Molded two bowl lavatory	**2**	ea	1,500.00	3,000		
526		Urinal	**14**	ea	1,500.00	21,000		
527		Shower with valve and drain	**2**	ea	1,000.00	2,000		
528		Mop sink	**9**	ea	950.00	8,550		
529		Water cooler	**14**	ea	3,800.00	53,200		
530		Miscellaneous plumbing fixtures	**231,509**	sf	0.30	69,453		
531		Domestic Water Piping						
532		Copper pipe type L with fittings & hangers	**231,509**	sf	2.50	578,773		
533		Valves & accessories	**1**	ls	125,000.00	125,000		
534		Pipe insulation						
535		Pipe insulation	**231,509**	sf	1.50	347,264		
536		Sanitary Waste And Vent Piping						
537		Cast iron pipe with fittings & hangers	**231,509**	sf	2.25	520,895		
538		Acid Neutralization Piping						
539		Polypropylene pipe with fittings & hangers	**231,509**	sf	0.35	81,028		
540		Storm Drainage, Hubless Cast Iron Piping						
541		Cast iron pipe with fittings & hangers	**231,509**	sf	0.85	196,783		
542		Natural Gas Piping						
543		Natural gas pipe with fittings & hangers	**231,509**	sf	0.75	173,632		
544		Valves & accessories	**1**	ls	25,000.00	25,000		
545		Miscellaneous						
546		Coordination & management	**1**	ls	50,000.00	50,000		
547		Coring, sleeves & fire stopping	**1**	ls	10,000.00	10,000		
548		Testing and sterilization	**1**	ls	8,000.00	8,000		
549		Fees & permits	**1**	ls	28,000.00	28,000		
550		SUBTOTAL					2,782,175	
551								
552		***TOTAL - PLUMBING***						**$2,782,175**
553								
554	***D30***	***HVAC***						
555								
556	**D30**	**HVAC, GENERALLY**						
557		Heating Equipment						
558		Gas fired HW condensing boiler 4000 MBH	**3**	ea	48,000.00	144,000		
559		Miscellaneous heating equipment	**231,509**	sf	1.25	289,386		
560		Cooling Equipment						
561		Air cooled chiller 175 Ton	**2**	ea	183,750.00	367,500		
562		Miscellaneous cooling equipment	**231,509**	sf	0.25	57,877		
563		Pumps						
564		Hot water pump with VFD	**2**	ea	8,000.00	16,000		

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		NEW MIDDLE SCHOOL						
565		Chilled water pump with VFD	**2**	ea	10,000.00	20,000		
566		Air distribution						
567		Air Handling Unit						
568		RTU with hot water, chilled water coil & ERW (classroom wings)	**3**	ea	250,000.00	750,000		
569		RTU with hot water & chilled water coil (administration, band, media)	**3**	ea	75,000.00	225,000		
570		RTU with hot water & chilled water coil demand control ventilation with CO2 control (auditorium)	**1**	ea	120,000.00	120,000		
571		RTU with hot water & chilled water coil demand control ventilation with CO2 control (cafeteria)	**1**	ea	105,000.00	105,000		
572		HVU with hot water coil (gym)	**1**	ea	63,000.00	63,000		
573		MUA unit gas fired (kitchen)	**1**	ea	25,000.00	25,000		
574		Miscellaneous air distribution equipment	**231,509**	sf	1.25	289,386		
575		Exhaust fan						
576		Exhaust fans	**231,509**	sf	0.25	57,877		
577		Sheet metal & Accessories						
578		Galvanized ductwork with fittings & hangers	**173,000**	lbs	9.00	1,557,000		
579		Duct insulation	**104,000**	sf	3.50	364,000		
580		Miscellaneous sheet metal accessories	**231,509**	sf	1.00	231,509		
581		Piping						
582		Hot Water Piping						
583		Hot water piping with fittings & hangers	**231,509**	sf	3.00	694,527		
584		Valves & accessories	**1**	ls	170,000.00	170,000		
585		Chilled Water Piping						
586		Chilled water piping with fittings & hangers	**231,509**	sf	0.60	138,905		
587		Valves & accessories	**1**	ls	30,000.00	30,000		
588		Refrigerant Piping						
589		Refrigerant piping with fittings & hangers	**231,509**	sf	0.12	27,781		
590		Valves & accessories	**1**	ls	7,000.00	7,000		
591		Condensate Drain Piping						
592		Condensate drain piping with fittings & hangers	**231,509**	sf	0.15	34,726		
593		Piping Insulation						
594		Piping insulation	**231,509**	sf	1.35	312,537		
595		Controls (DDC)						
596		Automatic temperature controls	**231,509**	sf	4.50	1,041,791		
597		Balancing						
598		System testing & balancing	**231,509**	sf	0.50	115,755		
599		Miscellaneous						
600		Coordination & management	**1**	ls	125,000.00	125,000		
601		Commissioning support	**1**	ls	40,000.00	40,000		
602		Coring, sleeves & fire stopping	**1**	ls	15,000.00	15,000		
603		Equipment start-up and inspection	**1**	ls	3,000.00	3,000		
604		Rigging & equipment rental	**1**	ls	20,000.00	20,000		
605		Vibration & seismic restraints	**1**	ls	30,000.00	30,000		
606		SUBTOTAL					7,488,557	
607								
608		***TOTAL - HVAC***						**$7,488,557**
609								
610								
611	***D40***	***FIRE PROTECTION***						
612								
613	**D40**	**FIRE PROTECTION, GENERALLY**						
614		Double check valve assembly	**1**	ea	8,500.00	8,500		

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		NEW MIDDLE SCHOOL						
615		Wet alarm check valve assembly	**1**	ea	4,000.00	4,000		
616		Siamese connection	**2**	ea	1,500.00	3,000		
617		Zone control valve stations	**4**	ea	2,000.00	8,000		
618		Fire hose valve with cabinet	**17**	ea	1,000.00	17,000		
619		Sprinkler head	**1,780**	ea	75.00	133,500		
620		Branch pipe with fittings & hangers	**21,370**	lf	18.00	384,660		
621		Main pipe with fittings & hangers	**7,123**	lf	26.00	185,198		
622		Standpipe with fittings & hangers	**2,300**	lf	30.00	69,000		
623		Miscellaneous valves & accessories	**1**	ls	10,000.00	10,000		
624		Miscellaneous						
625		Coordination & management	**1**	ls	16,000.00	16,000		
626		Hydraulic calculations	**1**	ls	4,000.00	4,000		
627		Coring, sleeves & fire stopping	**1**	ls	10,000.00	10,000		
628		Fees & permits	**1**	ls	8,500.00	8,500		
629		SUBTOTAL					861,358	
630								
631		***TOTAL - FIRE PROTECTION***						**$861,358**
632								
633								
634	***D50***	***ELECTRICAL***						
635								
636	**D5010**	**SERVICE & DISTRIBUTION**						
637		**Gear & Distribution**						
638		Normal Power						
639		4000A 480/277V switchboard	**1**	ea	200,000.00	200,000		
640		Allowance for associated panelboards, transformers, feeders, etc.	**231,509**	sf	4.75	1,099,668		
641		Emergency power						
642		750kW diesel fueled WP enclosed generator	**1**	ls	250,000.00	250,000		
643		Allowance for ATS's	**1**	ls	11,000.00	11,000		
644		Allowance for associated panelboards, transformers, feeders, etc.	**231,509**	sf	1.25	289,386		
645		UPS System						
646		Allowance for UPS system	**1**	ea	25,000.00	25,000		
647		Equipment Wiring						
648		Allowance for misc mechanical equipment feeds & connections	**231,509**	sf	0.50	115,755		
649		Elevator feed and connection	**3**	ea	4,000.00	12,000		
650		Elevator cab power feed and connection	**3**	ea	1,200.00	3,600		
651		RTU feed and connection	**8**	ea	4,500.00	36,000		
652		MAU feed and connection	**1**	ea	3,500.00	3,500		
653		HVU feed and connection	**1**	ea	4,500.00	4,500		
654		Boiler feed and connections	**3**	ea	1,500.00	4,500		
655		Pump feed and connections	**6**	ea	1,500.00	9,000		
656		Exhaust fans feed and connections	**1**	ls	10,000.00	10,000		
657		DDC controls feed and connection only	**1**	ea	450.00	450		
658		VFD's connection only	**4**	ea	850.00	3,400		
659		Kitchen equipment feed and connections	**1**	ls	25,000.00	25,000		
660		Allowance for empty conduits for PV system	**1**	ls	10,000.00	10,000		
661		SUBTOTAL					2,112,759	
662								
663	**D5020**	**LIGHTING & POWER**						
664		Lighting & Branch Power						

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		NEW MIDDLE SCHOOL						
665		Allowance for light fixtures	**231,509**	sf	5.50	1,273,300		
666		Lighting Control						
667		Allowance for lighting controls	**231,509**	sf	1.00	231,509		
668		Branch devices				-		
669		Allowance for branch power receptacles	**231,509**	sf	0.60	138,905		
670		Allowance for lighting and branch power circuitry assumes exposed ceilings	**231,509**	sf	5.00	1,157,545		
671		SUBTOTAL					2,801,259	
672								
673	**D5030**	**COMMUNICATION & SECURITY SYSTEMS**						
674		Voice & Data						
675		Allowance for voice & data system inc. wiring, devices, racks, patch panels, assumes 2,500 ports	**231,509**	sf	1.00	231,509		
676		Network switches assumes 2,500 ports	**1**	ls	25,000.00	25,000		
677		PBX by owner				NIC		
678		IPTV Video Distribution System	**1**	ls	350,000.00	350,000		
679		Wireless access points	**1**	ls	125,000.00	125,000		
680		Rough in with conduit, cable tray and backboxes	**231,509**	sf	1.20	277,811		
681		Fire Alarm						
682		Control panel	**1**	ea	15,000.00	15,000		
683		Graphic annunciator	**1**	ea	4,500.00	4,500		
684		Beacon	**1**	ea	225.00	225		
685		Master box	**1**	ea	4,000.00	4,000		
686		Initiating and reporting devices (allow)	**800**	ea	140.00	112,000		
687		Modules	**30**	ea	140.00	4,200		
688		Device box	**830**	ea	27.00	22,410		
689		Circuitry	**30,000**	lf	7.00	210,000		
690		Programming and testing	**1**	ls	5,000.00	5,000		
691		Bi-Directional Amplifier System						
692		Bi-Directional Amplifier System	**1**	ls	70,000.00	70,000		
693		Master Clock System						
694		Allowance for wireless clock system and PA	**231,509**	sf	1.10	254,660		
695		Assisted Listening System						
696		Assisted Listening System - Gymnasium	**2**	ea	5,000.00	10,000		
697		Assisted Listening System - Cafeteria	**2**	ls	5,000.00	10,000		
698		Assisted Listening System - Auditorium	**1**	ls	5,000.00	5,000		
699		Sound System						
700		Gymnasium sound system	**2**	ea	25,000.00	50,000		
701		Cafeteria sound system	**2**	ea	25,000.00	50,000		
702		Audio Visual Systems						
703		Classroom interactive AV equipment & installation including white board, short throw projector and assisted listening system	**1**	ls	600,000.00	600,000		
704		Auditorium rigging equipment				**See Equipment**		
705		Theatrical dimming system equipment & installation	**1**	ls	200,000.00	**See Equipment**		
706		Auditorium performance lighting rough-in and power	**1**	ls	100,000.00	100,000		
707		Allowance for Auditorium AV system	**1**	ls	125,000.00	125,000		
708		Auditorium AV rough-in and power	**1**	ls	50,000.00	50,000		
709		Gymnasium Equipment						
710		Scoreboard with controls and shot clock & wireless controller, allow	**2**	ea	12,000.00	24,000		
711		Shot Clock with remote control station, allow	**2**	ea	3,500.00	7,000		
712		Other misc. gymnasium equipment	**1**	ls	7,500.00	7,500		

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NEW MIDDLE SCHOOL							
	Security System						
	Allowance for security system	**231,509**	sf	2.50	578,773		
	SUBTOTAL					3,328,588	
D5040	**OTHER ELECTRICAL SYSTEMS**						
	Miscellaneous						
	Grounding & bonding	**1**	ls	30,000.00	30,000		
	Seismic restraints	**1**	ls	10,000.00	10,000		
	Lightning protection system, allow	**1**	sf	70,000.00	70,000		
	Temp power and lights	**1**	ls	125,000.00	125,000		
	Permits and fees	**1**	ls	200,000.00	Waived		
	SUBTOTAL					235,000	
	TOTAL - ELECTRICAL						**$8,477,606**
E10	***EQUIPMENT***						
E10	**EQUIPMENT, GENERALLY**						
	Food service equipment	**1**	ls	450,000.00	450,000		
	Theater & stage equipment including stage curtains & rigging	**1**	ls	150,000.00	150,000		
	Theatrical lighting	**1**	ls	150,000.00	150,000		
	Auditorium AV systems	**1**	ls	125,000.00	w/ electrical		
	Cubicle curtain & track	**6**	loc	500.00	3,000		
	Projection screen; gymnasium	**1**	ea	9,000.00	9,000		
	Projection screen; stage proscenium	**1**	ea	9,000.00	9,000		
	Projection screen; cafeteria	**1**	ea	2,200.00	2,200		
	TV Display	**12**	ea	1,200.00	14,400		
	Gym dividing curtain	**4,887**	sf	16.00	78,192		
	Wall pads to gym	**1,020**	sf	9.63	9,823		
	Fold up basketball stops, electric	**12**	ea	7,800.00	93,600		
	Telescoping bleachers; fixed	**1,000**	seat	120.00	120,000		
	Mat hoist gym	**4**	ea	8,000.00	32,000		
	Folding mats	**1**	ls	5,000.00	5,000		
	Volley ball standards	**1**	ls	1,500.00	1,500		
	Kiln	**2**	ea	3,000.00	6,000		
	Science classrooms equipment; fume hood allowance	**2**	ea	8,200.00	16,400		
	Science classrooms equipment; other equipment	**1**	ls	100,000.00	100,000		
	Residential appliances	**1**	ls	35,000.00	35,000		
	SUBTOTAL					1,285,115	
	TOTAL - EQUIPMENT						**$1,285,115**
E20	***FURNISHINGS***						
E2010	**FIXED FURNISHINGS**						
	Recessed entry mats	**696**	sf	50.00	34,800		
	Walk off mats	**696**	sf	15.00	10,440		
	Roller blinds to windows	**34,062**	sf	6.00	204,372		
	Auditorium seating	**463**	seat	280.00	129,640		
	Display case at art	**20**	lf	400.00	8,000		
	Display case at cafeteria	**2**	loc	15,000.00	30,000		
	Window sill	**1,869**	lf	30.00	56,070		
	Custom wood notice boards (15 locations)	**225**	sf	60.00	13,500		

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		NEW MIDDLE SCHOOL						
768		***Classroom Casework and specialties***						
769		Instructional area Book shelving	**114**	lf	120.00	13,680		
770		Counter work station with radius edge	**33**	lf	275.00	9,075		
771		**Art Classrooms/Lab**						
772		base cabinets, 36" w/ ss countertop	**47**	lf	500.00	23,500		
773		wall cabinets	**47**	lf	190.00	8,930		
774		art display @ hall	**12**	lf	600.00	7,200		
775		portfolio storage units	**2**	ea	900.00	1,800		
776		**Academic team room**						
777		base cabinets	**556**	lf	350.00	194,600		
778		open shelving	**276**	lf	150.00	41,400		
779		**Art storage**						
780		wall cabinets	**376**	lf	190.00	71,440		
781		**Therapeutic learning /ssp 5th /6th grade**						
782		wall cabinets	**92**	lf	190.00	17,480		
783		**Typical Classroom**		*rms*				
784		base cabinets	**230**	lf	350.00	80,500		
785		tall shelf- 7' high	**264**	lf	190.00	50,160		
786		wall cabinets	**172**	lf	190.00	32,680		
787		built in technology cabinets	**172**	loc	1,500.00	258,000		
788		tall storage	**86**	loc	1,200.00	103,200		
789		class flg	**43**	loc	150.00	6,450		
790		**MS Science Classroom 5-6**		*rms*				
791		wall cabinets	**10**	lf	260.00	2,600		
792		Base cabinet w/ epoxy resin counter tops	**18**	lf	420.00	7,560		
793		tall storage	**3**	loc	1,200.00	3,600		
794		class flg	**6**	loc	250.00	1,500		
795		**MS Science Classroom 7-8**		*rms*				
796		wall cabinets	**10**	lf	260.00	2,600		
797		Base cabinet w/ epoxy resin counter tops	**18**	lf	420.00	7,560		
798		tall storage	**3**	loc	1,200.00	3,600		
799		class flg	**6**	loc	250.00	1,500		
800		**MS Science Classroom prep**	**9**	*rms*				
801		wall cabinets	**162**	lf	260.00	42,120		
802		Base cabinet w/ epoxy resin counter tops	**162**	lf	420.00	68,040		
803		**Teacher collaboration and staff lunch**						
804		wall cabinets	**104**	ea	260.00	27,040		
805		Base cabinets and counters	**62**	lf	420.00	26,040		
806		**Nurse waiting**						
807		tall storage	**3**	ea	1,200.00	3,600		
808		base cabinets	**22**	lf	350.00	7,700		
809		**Nurse/Exam/Resting**						
810		base cabinets	**34**	lf	350.00	11,900		
811		wall cabinets	**15**	lf	190.00	2,850		
812		tall storage	**8**	ea	1,200.00	9,600		
813		medicine cab	**2**	ea	500.00	1,000		
814		**General Offices/Mail/Duplicating**						
815		Mail cubbies	**4**	ea	7,500.00	30,000		
816		base cabinets	**20**	lf	350.00	7,000		
817		wall hung work counter	**8**	lf	150.00	1,200		
818		wall cabinets	**8**	lf	190.00	1,520		
819		**Allowances for rooms with casework not shown**						
820		Sped ot/pt	**430**	sf	35.00	15,050		
821		Health instructor office :L3 +l2	**550**	sf	35.00	19,250		
822		Midi Lab	**469**	sf	35.00	16,415		
823		Set design and construction application lab	**1,062**	sf	35.00	37,170		

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		NEW MIDDLE SCHOOL						
824		Recycling room/trash	**414**	sf	35.00	14,490		
825		Sped attain	**958**	sf	35.00	33,530		
826		Technology applications and production lab	**316**	sf	35.00	11,060		
827		Principals and principals conference	**362**	sf	35.00	12,670		
828		speech testing	**196**	sf	35.00	6,860		
829		Research room	**551**	sf	35.00	19,285		
830		Small group reading rooms	**2,400**	sf	35.00	84,000		
831		Sped resource x2	**820**	sf	35.00	28,700		
832		Sped conference room	**160**	sf	35.00	5,600		
833		SUBTOTAL					1,981,127	
834								
835	**E2020**	**MOVABLE FURNISHINGS**						
836		All movable furnishings to be provided and installed by owner						
837		SUBTOTAL					NIC	
838								
839		***TOTAL - FURNISHINGS***						**$1,981,127**
840								
841								
842	***F10***	***SPECIAL CONSTRUCTION***						
843								
844	**F10**	**SPECIAL CONSTRUCTION**						
845		Bus building prefabricated building	**1,530**	sf	95.00	145,350		
846		SUBTOTAL					$145,350	
847								
848		***TOTAL - SPECIAL CONSTRUCTION***						**$145,350**
849								
850								
851	***F20***	***SELECTIVE BUILDING DEMOLITION***						
852								
853	**F2010**	**BUILDING ELEMENTS DEMOLITION**						
854		See main summary for demolition of existing buildings						
855		SUBTOTAL						
856								
857	**F2020**	**HAZARDOUS COMPONENTS ABATEMENT**						
858		Removal of Asbestos Containing Materials in existing building - Included in Summary						
859		SUBTOTAL						
860								
861		***TOTAL - SELECTIVE BUILDING DEMOLITION***						

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK							
G	***SITEWORK***						
G10	**SITE PREPARATION & DEMOLITION**						
	Site Demolitions and Relocations						
	Site construction fence	**4,430**	lf	11.00	48,730		
	Pavement/curbing removal - grind up asphalt to reuse	**57,900**	sf	1.00	57,900		
	Remove and dispose concrete sidewalk	**8,338**	sf	1.25	10,423		
	Demolish existing buildings				Summary		
	Remove and dispose of fencing	**1**	ls	5,000.00	5,000		
	Remove and reset stone memorial	**1**	ea	1,500.00	1,500		
	Sawcut existing pavement	**713**	lf	6.00	4,278		
	Tree removal	**60**	ea	750.00	45,000		
	Misc Tree Protection	**1**	ls	2,500.00	2,500		
	Remove hydrant	**1**	ls	350.00	350		
	Cap existing waterline	**1**	ls	1,000.00	1,000		
	Cut and cap existing utilities	**8**	loc	1,000.00	8,000		
	Remove and dispose of existing drainage structures and utilities	**1**	ls	20,000.00	20,000		
	Miscellaneous demolition	**1**	ls	50,000.00	50,000		
	SUBTOTAL					254,681	
	Site Earthwork						
	Construction entrances/wheel washes (allowance)	**2**	loc	12,000.00	24,000		
	Strip topsoil, store on site for reuse	**19,604**	cy	8.00	156,832		
	Cut/fill	**34,484**	cy	6.00	206,904		
	Fine grading	**60,151**	sy	0.50	30,076		
	Silt fence/erosion control	**3,000**	lf	12.00	36,000		
	Erosion Control monitoring & maintenance	**1**	ls	10,000.00	10,000		
	Hazardous Waste Remediation						
	Abandon oil tanks in place	**2**	ea	5,000.00	10,000		
	SUBTOTAL					473,812	
G20	**SITE IMPROVEMENTS**						
	Roadways and Parking Lots						
	Bituminous concrete paving	*186,899*			-		
	gravel base; 12" thick	**6,922**	cy	32.00	221,504		
	bituminous concrete; 4" thick	**20,767**	sy	26.00	539,942		
	6"x18" granite curb	**7,787**	lf	32.00	249,184		
	Single solid lines, 4" thick	**344**	space	25.00	8,600		
	Wheelchair Parking	**13**	space	75.00	975		
	Crosswalk Hatching	**2**	loc	900.00	1,800		
	Other road markings	**1**	ls	7,500.00	7,500		
	HC curb cuts	**10**	loc	350.00	3,500		
	Stone veneer wall, precast entrance sign	**1**	ls	30,000.00	30,000		
	New traffic signs	**1**	ls	10,000.00	10,000		
	Raised Crosswalk						
	Concrete pavers						
	Precast concrete pavers	**1,282**	sf	16.00	20,512		
	gravel base; 8" thick	**32**	cy	32.00	1,024		
	concrete base; 8" thick	**1,282**	sf	9.00	11,538		
	6"x18" granite curb	**477**	lf	32.00	15,264		
	Precast Concrete pavers						
	Concrete pavers						
	Precast concrete pavers	**18,720**	sf	16.00	299,520		
	gravel base; 8" thick	**465**	cy	32.00	14,880		

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		SITEWORK						
58		concrete base; 6" thick	**18,720**	sf	6.00	112,320		
59		granite banding	**1,210**	lf	35.00	42,350		
60		Pedestrian paving						
61		Concrete paving	*24,762*			-		
62		gravel base; 12" thick	**953**	cy	32.00	30,496		
63		concrete; 4" thick	**24,762**	sf	6.50	160,953		
64		concrete pad; 6" thick	**970**	sf	9.00	8,730		
65								
66		Bituminous concrete paving	*6,800*			-		
67		gravel base; 12" thick	**322**	cy	32.00	10,304		
68		bituminous concrete bike lane	**756**	sy	24.00	18,144		
69		bituminous concrete walkway	**211**	sy	24.00	5,064		
70		Site Improvements						
71		Bicycle racks	**22**	ea	600.00	13,200		
72		Flag pole	**2**	loc	7,500.00	15,000		
73		Ornamental trash/recycling receptacles	**10**	ea	800.00	8,000		
74		Outdoor dining table and chairs	**10**	ea	2,000.00	20,000		
75		Ornamental handrails	**30**	lf	250.00	7,500		
76		12' chain-link fence	**950**	lf	45.00	42,750		
77		12' chain-link fence gates - double	**1**	ea	2,400.00	2,400		
78		Wood decking	**500**	sf	35.00	17,500		
79		Stone veneer wall	**235**	lf	585.00	137,475		
80		Stone veneer wall / wood bench	**118**	lf	625.00	73,750		
81		Stone veneer amphitheater seating wood capped concrete	**231**	lf	360.00	83,160		
82		Segmental block retaining walls	**4,158**	sf	38.00	158,004		
83		Fence w/ segmental block retaining walls	**405**	lf	65.00	26,325		
84		Ornamental green screen fence	**150**	lf	220.00	33,000		
84		Ornamental green screen columns with custom art pan	**4**	ea	4,000.00	16,000		
85		Ornamental green screen fence - gates	**2**	pr	2,400.00	4,800		
86								
87		*Athletic Fields*						
88		Gravel base - assumed 12" thick	**4,677**	cy	32.00	149,664		
89		Soil mix; reuse amended soil from on-site spoils	**4,455**	cy	20.00	89,100		
90		Seeding	**120,274**	sf	0.25	30,069		
91		Scoreboard	**1**	ea	8,000.00	8,000		
92		Soccer goals (movable)	**4**	pr	2,500.00	10,000		
93		Allowance for concrete retaining wall at west elevation zone 1 : 6' high	**25**	lf	495.00	12,375		
94		Allowance for stone veneer retaining wall at east elevation zone 1/2 : 4' high	**15**	lf	650.00	9,750		
95		Allowance for new concrete walk to plaza area from zone1/2 door	**1,000**	sf	9.00	9,000		
96		Miscellaneous site improvements	**1**	ls	50,000.00	50,000		
97		Landscaping & Plantings:						
98		Spread existing amended topsoil @ seeded areas	**6,728**	cy	20.00	134,560		
99		Wetland restoration	**2,638**	sf	6.00	15,828		
100		New seeded areas - L&S	**179,018**	sf	0.15	26,853		
101		Boulders	**28**	ea	250.00	7,000		
102		Ornamental tree grate	**7**	ea	1,400.00	9,800		
103		*Trees*						
104		Large deciduous	**46**	ea	1,250.00	57,500		
105		Deciduous ornamental	**72**	ea	1,000.00	72,000		
106		Large evergreen	**84**	ea	1,000.00	84,000		
107		Shrub areas	**721**	sf	27.50	19,828		

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	SITEWORK							
108		Ornamental grasses	**4,371**	sf	6.00	26,226		
109		Allowance for irrigation at fields	**120,274**	sf	1.50	180,411		
110		SUBTOTAL					3,484,932	
111								
112	**G30**	**CIVIL MECHANICAL UTILITIES**						
113		Water supply						
114		New fire DI piping; 8"	**1,808**	lf	75.00	135,600		
115		New fire DI piping; 8"	**100**	lf	75.00	7,500		
116		New DI piping; 6"	**78**	lf	55.00	4,290		
117		New DI piping; 4"	**317**	lf	45.00	14,265		
118		New copper piping; 2"	**57**	lf	35.00	1,995		
119		New fire hydrant	**8**	loc	2,600.00	20,800		
120		FD connection	**1**	loc	2,000.00	2,000		
121		Gate valves	**16**	loc	750.00	12,000		
122		Connect to existing line (Wet Taps)	**3**	loc	3,000.00	9,000		
123		Sanitary sewer						
124		6" SDR- 35 PVC sewer	**723**	lf	45.00	32,535		
125		SMH	**6**	ea	3,200.00	19,200		
126		Connect to existing	**1**	loc	1,500.00	1,500		
127		6,000 gal grease trap	**1**	loc	12,000.00	12,000		
128		Storm Sewer						
129		OCS	**2**	ea	5,000.00	10,000		
130		WQS	**4**	ea	14,000.00	56,000		
131		Manhole	**43**	loc	3,600.00	154,800		
132		Connect to existing line	**5**	loc	2,500.00	12,500		
133		Catch basins	**47**	loc	3,200.00	150,400		
134		Area drains	**4**	loc	2,600.00	10,400		
135		24" HDPE	**637**	lf	35.00	22,295		
136		18" HDPE	**935**	lf	30.00	28,050		
137		15" HDPE	**170**	lf	27.50	4,675		
138		12" HDPE	**3,731**	lf	25.00	93,275		
139		Roof drain	**105**	lf	25.00	2,625		
140		Roof leader connection	**3**	ea	350.00	1,050		
141		Underground retention; precast chambers	**16,900**	sf	35.00	591,500		
142		Gas service						
143		E&B trench for new lines, pipe and install by utilities						
144		New gas service	**704**	lf	25.00	17,600		
145		SUBTOTAL					1,427,855	
146								

PM&C

Beverly Public Schools
Middle School
Beverly, MA

24-Jul-15

Schematic Design Estimate

	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	SITEWORK							
147	**G40**	**SITE ELECTRICAL**						
148		Site Electrical & Communications						
149		Utility						
150		Pole riser	**1**	ea	1,200.00	1,200		
151		Utility co. charges (allow)	**1**	ls	30,000.00	30,000		
152		Padmount transformer	**1**	ea		By Utility co.		
153		Transformer pad	**1**	ea	2,500.00	2,500		
154		Primary ductbank 2-5"PVC conduits concrete encased	**150**	lf	145.00	21,750		
155		4000A secondary ductbank concrete encased	**50**	lf	1,120.00	56,000		
156		Electrical charging stations	**6**	loc	5,000.00	30,000		
157		Communication						
158		4-4" PVC conduits concrete encased (allow)	**200**	lf	140.00	28,000		
159		Site Lighting						
160		Site lighting and circuitry (allow)	**1**	ls	250,000.00	250,000		
161		Site Security				-		
162		Cameras and circuitry	**1**	ls	40,000.00	40,000		
163		SUBTOTAL					459,450	
164								
165								
166		**SUBTOTAL SITE DEVELOPMENT**						**$6,100,730**

OPM's Construction Cost Estimate

OPM's Construction Cost Estimate

New Beverly Middle School

City of Beverly, Massachusetts

Beverly Public Schools

MSBA PROJECT NUMBER: 201300300305

Reconciled SCHEMATIC Estimate

July 27, 2015

Beverly Public Schools
502 Cabot Street
Beverly, MA 01915

SD ESTIMATE

HEERY

Heery International, Inc.

A group of professional service practices

Telephone 202 463 8200 Fax 202 463 8264

OFFICES NATIONWIDE

HEERY

Heery International, Inc.

MSBA PROJECT NUMBER: 201300300305

Estimator: **RH, GR, SS, EA, AC**
Checked by: **G. Ridgely**
Project Manager: **M. Lydon**

BID PACK:	General
PHASE:	SD
DOCUMENTS DATE:	7/3/2015
ESTIMATE DATE:	7/22/2015
REVISION DATE:	7/27/2015

PROJECT:	**New Beverly Middle School** **Beverly, MA**
OWNER:	City of Beverly, Massachusetts
ARCHITECT:	Ai3 Architects
INTERIOR DESIGNER:	Ai3 Architects
ENGINEERS:	

BUILDINGS AREA:				**231,509**	**S.F.**
TOTAL CONSTRUCTION COST:	**$**	**90,091,134**	**$**	**389.15**	**/S.F.**

			Base plus Alt (s)		
Alt#1: Rainwater Harvesting System	**$**	**312,107.11**	**$**	**90,403,241**	
			$	**390.50**	**/SF**

HEERY

Heery International, Inc.

PROJECT: **New Beverly Middle School**
Beverly, MA

Project No: **1409500**
Bid Pack: **General**
Date: **7/27/2015**
Phase: **SD**
Estimator: **RH, GR, SS, EA, AC**
SF: **231509**

UNIFORMAT SUMMARY - LEVEL 1

	Heery Estimate	Per SF	%
A SUBSTRUCTURE	$8,661,726	$37.41	9.28%
B SHELL	$18,729,836	$80.90	20.06%
C INTERIORS	$10,901,708	$47.09	11.68%
D SERVICES	$20,882,874	$90.20	22.37%
E EQUIPMENT & FURNISHINGS	$3,576,858	$15.45	3.83%
F SPECIAL CONSTRUCTION & DEMOLITION	$2,402,500	$10.38	2.57%
G BUILDING SITEWORK	$6,194,398	$26.76	6.64%
TOTAL DIRECT COST	**$71,349,900**	**$308.19**	**76.43%**
Z GENERAL			
Z10 GENERAL CONDITIONS/REQUIREMENTS	*$5,118,342*	$22.11	5.48%
Z70 TAXES, PERMITS, INSURANCE & BONDS			
Z7030 Insurance	*$764,682*	$3.30	0.82%
Z7050 Building Risk	*$1,038,829*	$4.49	1.11%
Z7070 Bond Fees	*$394,405*	$1.70	0.42%
Z90 FEES AND CONTINGENCIES			
Z9030 Overhead & Profit	*$1,623,316*	$7.01	1.74%
TOTAL DIRECT COST W/OUT CONTINGENCIES	**$80,289,474**	**$346.81**	**86.01%**
Z9050.10 Design Contingencies	*$6,747,967*	$29.15	7.23%
Z9050.50 Escalation Contingencies	*$3,053,693*	$13.19	3.27%
TOTAL CONSTRUCTION COST	**$90,091,134**	**$389.15**	**96.51%**

HEERY

Heery International, Inc.

PROJECT: **New Beverly Middle School**
Beverly, MA

Project No: **1409500**
Bid Pack: **General**
Date: **7/27/2015**
Phase: **SD**
Estimator: **RH, GR, SS, EA, AC**
SF: **231509**

UNIFORMAT SUMMARY - LEVEL 2

			Heery Estimate	Per SF	%
A	**SUBSTRUCTURE**				
	A10	FOUNDATIONS	$6,688,648	$28.89	7.17%
	A20	SUBGRADE ENCLOSURES	$322,721	$1.39	0.35%
	A40	SLABS-ON-GRADE	$1,488,132	$6.43	1.59%
	A60	WATER AND GAS MITIGATION	$0	$0.00	0.00%
	A90	SUBSTRUCTURE RELATED ACTIVITIES	$162,225	$0.70	0.17%
B	**SHELL**				
	B10	SUPERSTRUCTURE	$8,204,046	$35.44	8.79%
	B20	EXTERIOR VERTICAL ENCLOSURES	$8,798,120	$38.00	9.42%
	B30	EXTERIOR HORIZONTAL ENCLOSURES	$1,727,670	$7.46	1.85%
C	**INTERIORS**				
	C10	INTERIOR CONSTRUCTION	$7,459,477	$32.22	7.99%
	C20	INTERIOR FINISHES	$3,442,232	$14.87	3.69%
D	**SERVICES**				
	D10	CONVEYING	$475,000	$2.05	0.51%
	D20	PLUMBING	$3,008,324	$12.99	3.22%
	D30	HVAC	$8,137,370	$35.15	8.72%
	D40	FIRE PROTECTION	$951,036	$4.11	1.02%
	D50	ELECTRICAL	$5,359,194	$23.15	5.74%
	D60	COMMUNICATIONS	$1,982,861	$8.56	2.12%
	D70	ELECTRONIC SAFETY AND SECURITY	$969,089	$4.19	1.04%
	D80	INTEGRATED AUTOMATION	$0	$0.00	0.00%
E	**EQUIPMENT & FURNISHINGS**				
	E10	EQUIPMENT	$1,285,974	$5.55	1.38%
	E20	FURNISHINGS	$2,290,884	$9.90	2.45%
F	**SPECIAL CONSTRUCTION & DEMOLITION**				
	F10	SPECIAL CONSTRUCTION	$35,000	$0.15	0.04%
	F20	FACILITY REMEDIATION	$1,735,000	$7.49	1.86%
	F30	DEMOLITION	$632,500	$2.73	0.68%
G	**BUILDING SITEWORK**				
	G10	SITE PREPARATION	$1,776,765	$7.67	1.90%
	G20	SITE IMPROVEMENTS	$2,344,492	$10.13	2.51%
	G30	LIQUID AND GAS SITE UTILITIES	$1,214,424	$5.25	1.30%
	G40	ELECTRICAL SITE IMPROVEMENTS	$656,040	$2.83	0.70%
	G50	SITE COMMUNICATIONS	$202,677	$0.88	0.22%
	G90	MISCELLANEOUS SITE CONSTRUCTION	$0	$0.00	0.00%
	TOTAL DIRECT COST		**$71,349,900**	**$308.19**	**76.43%**
Z	**GENERAL**				
	Z10	GENERAL CONDITIONS/REQUIREMENTS	$5,118,342	$22.11	5.48%
	Z70	TAXES, PERMITS, INSURANCE & BONDS			
		Z7030 Insurance	$764,682	$3.30	0.82%
		Z7050 Building Permit Costs	$1,038,829	$4.49	1.11%
		Z7070 Bond Fees	$394,405	$1.70	0.42%
	Z90	FEES AND CONTINGENCIES			
		Z9030 Overhead & Profit	$1,623,316	$7.01	1.74%
	TOTAL DIRECT COST W/OUT CONTINGENCIES		**$80,289,474**	**$346.81**	**86.01%**
		Z9050.10 Design Contingencies	$6,747,967	$29.15	7.23%
		Z9050.50 Escalation Contingencies	$3,053,693	$13.19	3.27%
	TOTAL CONSTRUCTION COST		**$90,091,134**	**$389.15**	**96.51%**

PROJECT: **New Beverly Middle School** Phase: **SD**

Breakdown			Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
A	STRUCTURE							
	1		**A10 - FOUNDATIONS**					
	2							
	3		033000 CAST IN PLACE CONCRETE					
	4		PILE CAPS	2,000	CY	750.00	1,500,000	A1010.30
	5		FOUNDATION PERIM. WALL	616	CY	750.00	462,000	A1010.10
	6							A1010.10
	7							
	8		072100 THERMAL INSULATION					
	9		2" RIGID FOUND INSUL.@ PERIMETER FND WALLS	13,859	SF	2.50	34,648	A1010.10
	10						----------	
	11						1,996,648	
	12							
	13		A1020 SPECIAL FOUNDATIONS					
	14		PILES	79,800	VLF	40.00	3,192,000	A1020.20
	15		GRADE BEAMS	1,500	CY	1,000.00	1,500,000	A1020.80
	16						----------	
	17						4,692,000	
	18							
	19		**TOTAL A10 - FOUNDATIONS**	**$28.89**	**/COST PER SF**		**6,688,648**	
	20							
	21		**A20 - SUBGRADE ENCLOSURES**					
	22							
	23		A2010 WALLS FOR SUBGRADE ENCLOSURE					
	24						----------	
	25						0	
	26							
	27		A2020 BASEMENT WALLS					
	28		CONC. BASEMENT WALL	323	CY	998.00	322,721	A2010.10
	29						----------	
	30						322,721	
	31							
	32		**TOTAL A20 - SUBGRADE ENCLOSURES (BSMT CONSTRUCTION)**	**$1.39**	**/COST PER SF**		**322,721**	
	33							
	34		**A40 - SLABS ON GRADE**					
	35							
	36		**A4010 STANDARD SLABS ON GRADE**					
	37		033000 CAST IN PLACE CONCRETE					
	38							
	39		12" STRUCTURAL SLAB ON GRADE	94,456	SF	10.00	944,560	A4010.10
	40		12" COMPACTED FILL	94,456	SF	1.50	141,684	A4010.10
	44		THICKENED SLAB @ INTERIOR CMU	106	CY	150.00	15,908	A4010.10
	45							
	46		TOTAL SOG AREA	94,456	SF		----------	
	47						1,102,152	
	48							
	49		**A4020 STRUCTURAL SLABS ON GRADE**					
	50							
	51		**A4030 SLAB TRENCHES**					
	52							
	53		**A4040 PITS AND BASES**					
	54		033000 CAST IN PLACE CONCRETE					
	55		ELEVATOR PIT	21	CY	900.00	18,900	A4040.01
	56		ACID NEUTRALIZATION PIT	11	CY	900.00	9,900	A4040.01
	57		GREASE TRAP PIT					
	58		STAGE PIT					
	59						----------	
	60						28,800	
	61							
	62							
	63		**A4090 SLABS ON GRADE SUPPLEMENTARY COMPONENTS**					
	64							
	65		070002 DAMPPROOF, WATERPROOF & JOINT SEALANTS*					

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
66		ELEV. PIT WATERPROOFING	3	EA	3,750.00	11,250	A4090.30
67		ACID NEUTRALIZATION PIT WPG	1	LS	4,000.00	4,000	A4090.30
68		2" RIGID SLAB INSUL.	94,456	SF	3.00	283,368	A4090.10
69							
70							
71							
72		072616 BELOW GRADE VAPOR RETARDERS					
73		BELOW SLAB VAPOR BARRIER	94,456	SF	0.62	58,563	A4090.20
74							
75						---	
76						357,181	
77							
78		**TOTAL A40 - SLABS ON GRADE**	**$6.43**	**/COST PER SF**		**1,488,132**	
79							
80		**A60 - WATER AND GAS MITIGATION**		N/A			
81							
82		A6010 BUILDING SUBDRAINAGE					
83							
84		FOUNDATION DRAIN		NIC			
85		*EXCLUDES UNDERSLAB DRAINANGE		NIC			
86						---	
87						0	
88							
89		A6020 OFF GASSING MITIGATION					
90						0	
91						---	
92						0	
93							
94		**TOTAL A60 WATER AND GAS MITIGATION**	**$0.00**	**/COST PER SF**		**0**	
95							
96		**A90 - SUBSTRUCTURE RELATED ACTIVITIES**					
97							
98		**A9010 SUBSTRUCTURE EXCAVATION**					
99		**UNSUITABLE SOIL:**					
100							
101							
102							
103							
104							
105							
106		**BUILDING:**					
107							
108		STRUCTURAL FILL - REUSE ON SITE MAT'L	8,000	CY	14.00	112,000	A9010.10
109		UNDERSLAB PLUMBING AND ELECTRICAL	1	LS	50,000.00	50,000	A9010.10
110							
111						---	
112						162,000	
113							
114		**A9020 CONSTRUCTION DEWATERING**					
115							
116		CONSTRUCTION PUMPS AND DEWATERING		LS		0	
117						---	
118						0	
119							
120		**A9030 EXCAVATION SUPPORT**					
121		SHEETING AND SHORING	1	LS	225.00	225	A9030.10
122						---	
123						225	
124							
125		A9040 SOIL TREATMENT					
126						---	
127						0	
128							
129		**TOTAL A90 - SUBSTRUCTURE RELATED ACTIVITIES**	**$0.70**	**/COST PER SF**		**162,225**	
130							

New Beverly Middle School SD Estimate

	Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
	131							
B	SHELL							
	132		**B10 SUPERSTRUCTURE**					
	133		**B1010 FLOOR STRUCTURE**	0	TONS			
	134							
	135		051200 STRUCTURAL STEEL FRAMING					
	136		CLASSROOM 10 LBS PER SF		TONS	3,200.00	0	B1010.10
	137						0	B1010.10
	138		033000 CAST IN PLACE CONCRETE					
	139		CONCRETE DECK FILL AT	231,509	SF	2.50	578,773	B1010.20
	141		CONCRETE SLAB ON WOOD DECK		SF	4.87	0	B1010.20
	142							
	143		053100 STEEL DECK					
	144		COMPOSITE METAL DECK	231,509	SF	2.84	657,486	B1010.20
	145							
	146							
	147		078000 FIRESTOPPING					
	148		FIRESTOPPING	231,509	SF	0.35	81,028	B1010.20
	149							
	150		078100 APPLIED FIREPROOFING					
	151							
	152		SPRAY ON FIREPROOFING FRAME & DECK		SF	1.75	0	B1010.20
	153		INTUMESCENT FIRE PROOFING@ COLUMNS		LS	25,000.00	0	B1010.20
	154							
	155		061813 GLUE LAMINATE FRAMING					
	156		GLUE LAMINATE FRAMING CLASSROOM WING		SF FL	7.50	0	B1010.20
	157		GLUE LAMINATE FRAMING @CAFETERIA		SF FL	5.00	0	B1010.20
	158		PLANKING/PLYWOOD @CAFETERIA		SF FL	5.00	0	B1010.20
	159		SWITCH FROM GLUE LAM TO STEEL STRUCTURE	1,200	TONS	3,500.00	4,200,000	B1010.20
	160						----------	
	161						5,517,286	
	162							
	163		**B1020 ROOF CONSTRUCTION**	0	TONS			
	164							
	165		051200 STRUCTURAL STEEL FRAMING					
	166		LIBRARY ROOF STRUCTURE 5LBS		TONS	3,200.00	0	B1020.10
	167		CAFETERIA ROOF STRUCTURE 15LBS		TONS	3,200.00	0	B1020.10
	168		MAIN LOBBY ROOF STRUCTURE 7LBS		TONS	3,200.00	0	B1020.10
	169		AUDITORIUM 15 LBS		TONS	3,200.00	0	B1020.10
	170		CLASSROOM WING 10LF PER SF		TONS	3,200.00	0	B1020.10
	171							
	172		033000 CAST IN PLACE CONCRETE					
	173		CONCRETE DECK FILL CLASSROOM WING		SF	4.87	0	B1020.20
	174							
	175		053100 STEEL DECK					
	176		R1 1 1/2" X 20 GA TYP. ROOF DECK AT CLASSROOM WING		SF	2.63	0	B1020.20
	177		ACOUSTICAL ROOF DECK		SF	6.35	0	B1020.20
	178		TOTAL ROOF DECK AREA		SF			
	179							
	180		078100 APPLIED FIREPROOFING					
	181		SPRAY ON FIREPROOFING FRAME & DECK		LS	100,000.00	0	B1020.20
	182							
	183		**06813 GLUE LAMINATE CONSTRUCTION**					
	184		STEEL	231,509	SF	10.00	2,315,090	B1020.10
	185		GLUE LAMINATE AT GYM		SF	10.00	0	B1020.10
	186		PLANKING/PLYWOOD @CAFE/LIBRARY/MAIN LOBBY		SF	5.00	0	B1020.10
	187		GLUE LAMINATE AT CAFETERIA/LIBRARY/MAIN LOBBY WING		SF	5.00	0	B1020.10
	188						----------	
	189						2,315,090	
	190							
	191		**B1080 STAIRS**					
	192							
	193		033000 CAST IN PLACE CONCRETE					

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
194							
195							
196		055000 METAL FABRICATIONS					
197		AUD./STAGE CATWALKS ALLOWANCE	607	SF	35.00	21,245	B1080.70
198		AUD./STAGE CATWALKS RAILINGS ALLOWANCE	300	LF	55.00	16,500	B1080.70
199		METAL PAN STAIRS W/FILL	425	RSR	754.00	320,450	B1080.10
200		RAILINGS @ LOADING DOCK RAMP ALLOWANCE	95	LF	55.00	5,225	B1080.70
201		LADDERS ALLOWANCE	110	LF	75.00	8,250	B1080.80
202							
203						----------	
204						371,670	
205							
206		**TOTAL B10 SUPERSTRUCTURE**	**$35.44**	**/COST PER SF**		**8,204,046**	
207							
208		**B20 - EXTERIOR VERTICAL ENCLOSURES**					
209							
210		B2010 EXTERIOR WALLS					
211							
212		042000 UNIT MASONRY					
213							
214		DRYWALL BACKUP ON EXTERIOR WALLS	65,419	SF	9.35	611,668	B2010.30
215		FLASHING	1	LS	40,000.00	40,000	B2010.10
216		STAGING	1	LS	100,000.00	100,000	B2010.10
217		PRECAST CONCRETE WATER TABLE	850	SF	45.00	38,250	B2010.10
218		NATURAL STONE VENEER	3,429	SF	60.00	205,740	B2010.10
219		PRECAST CONCRETE WALL PANELS	12,365	SF	40.00	494,600	B2010.10
220							
221		**054000 COLD FORMED METAL FRAMING**					
222		EXTERIOR WALL: 5/8 GYPSUM					
223		18 GA. STUD @ TYPICAL WALL	65,419	SF	6.25	408,869	B2010.30
224		1/2" DENS GLASS WALL	65,419	SF	2.44	159,622	B2010.30
225							
226							
227		072726 FLUID APPLIED MEMBRANE AIR BARRIER					
228							
229		SPRAY-ON AIR & VAPOR BARRIER	65,419	SF	6.03	394,477	B2010.10
230							
231		072100 THERMAL INSULATION					
232							
233		INSULATION	65,419	SF	2.60	170,089	B2010.10
234							
235		092900 GYPSUM BOARD					
236							
237		074243 COMPOSITE WALL PANEL					
238							
239		METAL SOFFIT PANEL ALLOWANCE	1	LS	50,000.00	50,000	B3080.20
240		ALUMINUM SIDING	49,625	SF	52.00	2,580,500	B2010.10
241							
242		MECHANICAL EQUIPMENT SCREEN	1,086	SF	80.00	86,880	B2010.60
243						----------	
244						5,340,695	
245							
246		**B2020 EXTERIOR WINDOWS**					
247							
248		061053 MISCELLANEOUS ROUGH CARPENTRY					
249							
250		BLOCKING	1	LS	25,000.00	25,000	B2020.20
251							
252		070002 DAMPPROOF., WATERPROOF & JOINT SEALANTS*					
253							
254		CAULKING ALLOWANCE	1	LS	100,000.00	100,000	B2020.20
255							
256		072726 FLUID APPLIED MEMBRANE AIR BARRIER					
257							
258		FLASHING	1	LS	50,000.00	50,000	B2020.20

New Beverly Middle School SD Estimate

	Breakdown	Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
259							
260		080001 ALUMINUM WINDOWS*					
261		ALUM. UNIT WINDOW	18,625	SF	75.00	1,396,875	B2020.20
262		ALUM. STOREFRONT W/ SPANDREL/CUTRAINWALL	16,140	SF	110.00	1,775,400	B2020.30
263						---	
264						3,347,275	
265							
266		**B2050 EXTERIOR DOORS AND GRILLES**					
267							
268		080001 ALUMINUM WINDOWS*					
269							
270		ALUMINUM STORFRONT SINGLE	4	EA	3,800.00	15,200	B2050.10
271		ALUMINUM STORFRONT DOUBLE	8	EA	7,650.00	61,200	B2050.10
272		OVERHEAD FOLDING DOORS	3	EA	5,000.00	15,000	B2050.10
273							
274		081113 HOLLOW METAL DOORS AND FRAMES					
275		INSULATED HM DOORS COMPLETE:					
276							
277		DOUBLE	18	EA	2,000.00	36,000	B2050.10
278		SINGLE	7	EA	1,500.00	10,500	B2050.10
279		ROOF ACCESS - SGL	2	EA	1,750.00	3,500	B2050.20
280		OVERHEAD DOOR 6 x 9'4"	1	EA	6,000.00	6,000	B2050.30
281							
282		0871000 DOOR HARDWARE					
283							
284		FINISH HDW SET - EXT. DOOR:					
285		INCLUDED ABOVE					
286							
287							
288						---	
289						147,400	
290							
291		**B2070 EXTERIOR LOUVERS AND VENTS**					
292							
293		089000 LOUVERS AND VENTS					
294							
295		ALUM LOUVERS ALLOWANCE	1	LS	7,500.00	7,500	B2070.10
296						---	
297						7,500	
298							
299		**B2080 EXTERIOR WALL APPURTENANCES**					
300							
301		108233 EXTERIOR SUN CONTROL	175	LF	30.00	5,250	B2080.10
302							
303						---	
304						5,250	
305							
306		B2090 EXTERIOR WALL SPECIALTIES					
307						---	
308						0	
309							
310		**TOTAL B20 - EXTERIOR VERTICAL ENCLOSURES**	**$38.00**	**/COST PER SF**		**8,798,120**	
311							
312		**B30 - EXTERIOR HORIZONTAL ENCLOSURES**					
313							
314		**B3010 ROOFING**					
315							
316		06100 ROUGH CARPENTRY ALLOWANCE					
317							
318		TYP. EDGE BLOCKING (3 BF/LF)	3,509	BF	3.20	11,227	B3020.10
319		BASE FLASHING BLOCKING (3 BF/LF)	5,316	BF	3.20	17,011	B3020.10
320		SCREEN, HATCH, SKYLIGHT AND EQUIP BLOCKING ALLOWANCE	1	LS	8,000.00	8,000	B3020.10
321							
322		070001 ROOFING					
323		FULLY ADHEARED WHITE	99,235	SF	11.00	1,091,585	B3010.50

New Beverly Middle School — SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
324		1/2" UNDERLAYMENT "DENS DECK"	99,235	SF	2.00	198,470	B3010.50
325		POLY VAPOR BARRIER	99,235	SF	0.35	34,732	B3010.50
326		MEMBRANE FLASHING	1	LS	50,000.00	50,000	B3010.50
327		WALKWAY PADS ALLOWANCE	1,000	SF	5.50	5,500	B3020.30
328		TAPERED INSULATION ALLOWANCE	5,000	SF	2.68	13,400	B3010.50
329							
330		ALUMINUM TRIM & FLASHING:					
331		FLASHING AND GRAVEL STOP	5,316	LF	30.00	159,480	B3010.90
332		EXP JT ASSEMBLIES	1	LS	25,000.00	25,000	B3010.90
333							
334						----------	
335						1,614,406	
336							
337							
338		**B3020 ROOF APPURTENANCES**					
339							
340							
341		SNOW GUARDS	492	LF	25.00	12,300	B3020.70
342		DOWNSPOUT	16	EA	750.00	12,000	B3020.70
343		GUTTER	150	LF	35.00	5,250	B3020.70
344							
345		ROOF DRAIN		w/Div. 22			
346						----------	
347						29,550	
348							
349		B3040 TRAFFIC BEARING HORIZONTAL ENCLOSURES					
350						----------	
351						0	
352							
353		**B3060 HORIZONTAL OPENINGS**					
354							
355							
356							
357		ELEVATOR HOIST VENT	3	EA	1,738.00	5,214	B3060.50
358		HEAT AND SMOKE VENT	3	EA	9,500.00	28,500	B3060.50
359							
360		086000 SKYLIGHT					
361						----------	
362						33,714	
363							
364		**B3080 OVERHEAD EXTERIOR ENCLOSURES**					
365						0	
366							
367						----------	
368						0	
369							
370		**TOTAL B30 EXTERIOR HORIZONTAL ENCLOSURES**	**$7.46**	**/COST PER SF**		**1,727,670**	
371							
372							
C	**INTERIORS**						
373		**C10 - INTERIOR CONSTRUCTION**					
374		**C1010 INTERIOR PARTITIONS**					
375		042000 UNIT MASONRY					
376		6" CMU	1,073	SF	15.00	16,095	C1010.10
377		8" CMU	19,738	SF	17.00	335,546	C1010.10
378							
379		061000 FINISH CARPENTRY					
380							
381		INTERIOR BLOCKING	231,509	GSF	0.25	57,877	C1010.10
382		MISC. ROUGH CARPENTRY	231,509	GSF	0.50	115,755	C1010.10
383		PLYWOOD	2,864	SF	2.00	5,728	C1010.10
384							
385		070002 DAMPPROOF, WATERPROOF & JOINT SEALANTS*					
386							

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
387		JOINT SEALANTS	231,509	GSF	0.25	57,877	C1010.10
388							
389							
390		078000 FIRESTOPPING					
391							
392		FIRESTOPPING	500	EA	127.40	63,700	C1010.10
393							
394		079500 EXPANSION CONTROL					
395							
396		EXPANSION JOINTS	1	LS	25,000.00	25,000	C1010.10
397							
398							
399		083520 FOLDING GLASS DOORS					
400							
401		SLIDING GLASS WALL 8' X8'-9"	2,660	SF	120.00	319,200	C1010.20
402							
403		092000 GYPSUM BOARD ASSEMBLIES					
404		5/8" DW W/ 3-5/8" MS	13,689	SF	10.07	137,848	C1010.10
405		5/8" DW W/ 3-5/8" MS, 3-1/2" INSL.	9,381	SF	11.57	108,538	C1010.10
406		5/8" DW (2) W/ 3-5/8" , MS 3-1/2"INSL.	28,040	SF	12.57	352,463	C1010.10
407		5/8" DW W/ 6" MS	19,667	SF	11.07	217,714	C1010.10
408		5/8" DW W/ 6" MS, 6" INSL.	18,518	SF	12.07	223,512	C1010.10
409		5/8" DW (2) W/ 6" MS, 6" INSL.	3,118	SF	13.07	40,752	C1010.10
410		5/8" DW (2) W/ 8" MS, 8" INSL.	4,270	SF	14.07	60,079	C1010.10
411		CHASE WALL					
412		5/8" DW W/2-1/2" MS	197	SF	7.10	1,399	C1010.10
413		5/8" DW W/3-5/8" MS	11,050	SF	9.25	102,213	C1010.10
414		5/8" DW W/3-5/8" MS, 3-1/2 INSL.	10,128	SF	10.75	108,876	C1010.10
415		5/8" DW (2) W/3-5/8" MS, 3-1/2 INSL.	18,513	SF	11.75	217,528	C1010.10
416		5/8" DW W/6" MS	8,107	SF	8.10	65,667	C1010.10
417		5/8" DW W/6" MS, 6" INSL.	15,864	SF	9.60	152,294	C1010.10
418		5/8" DW (2) W/6" MS, 6" INSL.	471	SF	10.60	4,993	C1010.10
419		8" STEEL STUD 5/8 SUBSTRATE	2,981	SF	7.00	20,867	C1010.10
420		DOUBLE STUD PARTITIONS					
421		5/8 DW(2), 3-5/8: MS (2), 3-1/2" INSL. (2)	13,206	SF	12.10	159,793	C1010.10
422		SHAFTWALL PARTITIONS					
423		5/8" DW, 1" SW, 4" MS	7,510	SF	10.57	79,381	C1010.10
424		5/8" DW, 1" SW, 4" MS, 3-1/2" INSL.	1,696	SF	12.10	20,522	C1010.10
425		5/8" DW (2), 1" SW, 4" MS, 3-1/2" INSL.	11,075	SF	13.10	145,083	C1010.10
426		5/8" DW (2), 1" SW, 6" MS, 3-1/2" INSL.	6,261	SF	14.10	88,280	C1010.10
427		CEMENT BOARD AT CWT (TOILET/SHW)	9,210	SF	1.25	11,513	C1010.10
428							
429		099100 PAINTING*					
430							
431		102238 OPERABLE PANEL PARTITIONS					
432		FOLDING PARTITIONS AT CLASSROOMS	272	LF	90.00	24,480	C1010.50
433							
434		081113 HOLLOW METAL DOORS AND FRAMES					
435							
436		INTERIOR H.M WINDOWS, SIDELITES AND TRANSOMS (INCL. GLASS):					
437		DOOR FRAME GLAZING	3,698	SF	56.10	207,458	C1010.20
438							
439		080001 ALUMINUM WINDOWS*					
440							
441		INTERIOR ALUM. STOREFRONT					
442		TRANSACTION WINDOW (BULLETPROOF FILM)	210	SF	125.00	26,250	C1010.20
443		ACCADEMIC CORRIDOR ASSUMED 10'	4,730	SF	100.00	473,000	C1010.20
444		INTERIOR ELEVATIONS	4,037	SF	100.00	403,700	C1010.20
445		OTHER H.M. GLAZING ASSUMED 5'	450	SF	80.00	36,000	C1010.20
446						----------	
447						4,486,978	
448							
449							
450		**C1020 INTERIOR WINDOWS**					
451							

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
452		INTERIOR FIXED WINDOWS				0	C1020.20
453							
454		incl. w/ windows, sidelites and transoms				----------	
455						0	
456							
457							
458		**C1030 INTERIOR DOORS**					
459							
460		081113 HOLLOW METAL DOORS AND FRAMES					
461							
462		HM DOORS COMPLETE:					
463		HOLLOW METAL DOORS SINGLE	172	EA	1,700.00	292,400	C1030.10
464		TYPE F HOLLOW METAL DOORS DOUBLE	19	PR	2,500.00	47,500	C1030.10
465							
466		081400 WOOD DOORS					
467							
468		DOOR TYPE (INCL. GLAZING):					
469		WOOD SINGLE	51	EA	1,675.00	85,425	C1030.10
470		TYPE F WOOD DOUBLE	22	EA	2,675.00	58,850	C1030.10
471							
472		083113 ACCESS DOORS AND FRAMES					
473							
474		ACCESS PANELS ALLOWANCE	1	LS	25,000.00	25,000	C1030.80
475							
476		087100 DOOR HARDWARE					
477							
478		INCLUDED WITH DOORS					
479							
480		080001 ALUMINUM WINDOWS*					
481							
482		INTERIOR ALUM. DOOR, FRAME, HDW, GLASS & GLAZING:					
483		STOREFRONT DOOR DOUBLE	3	PR	10,000.00	30,000	C1030.10
484		STOREFRONT DOOR SINGLE	2	EA	4,000.00	8,000	C1030.20
485							
486		099100 PAINTING*					
487							
488		INCLUDED WITH DOOR				0	
489						----------	
490						547,175	
491							
492							
493		**C1040 INTERIOR GRILLES AND GATES**					
494							
495		093300 SPECIAL GRILLES & DOORS					
496							
497		OVERHEAD COILING DOORS	1	LS	25,000.00	25,000	C1040.10
498						----------	
499						25,000	
500							
501		C1060 RAISED FLOOR CONSTRUCTION					
502							
503		117900 MISCELLANEOUS EQUIPMENT					
504							
505						----------	
506						0	
507							
508		**C1070 SUSPENDED CEILING CONSTRUCTION**					
509							
510		092900 GYPSUM BOARD ASSEMBLIES					
511							
512		SPECIALTY CEILINGS:					
513		AUDITORIUM	5,500	SF	25.00	137,500	C1070.50
514							
515		GYPSUM DRYWALL ASSEMBLIES:					
516		DRYWALL CEILING	1,258	SF	10.73	13,498	C1070.20

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
517		OPERABLE PARTITION SOFFIT	1,830	LF	75.00	137,250	C1070.20
518		DRYWALL SOFFIT ALLOWANCE	1	LS	25,000.00	25,000	C1070.20
519		WOOD CEILING/CLOUDS	788	SF	15.00	11,820	C1070.50
520							
521		095113 ACOUSTICAL PANEL CEILING					
522		ACOUSTICAL CEILING ALLOWANCE	210,000	SF	4.75	997,500	C1070.10
523						----------	
524						1,322,568	
525							
526		**C1090 INTERIOR SPECIALTIES**					
527							
528		033000 CAST IN PLACE CONCRETE					
529							
530		055000 METAL FABRICATIONS*					
531							
532		WALL RAIL	300	LF	85.00	25,500	C1090.10
533		UPGRADE ALLOWANCE AT STAIR ONE	72	LF	225.00	16,200	C1090.10
534		POST SUPPORTED RAIL W/WOOD HANDRAIL @ curved café	535	LF	200.00	107,000	C1090.10
535		MISC. RAIL AT AUDITORIUM /RAMP	165	LF	150.00	24,750	C1090.10
536		STRUCTURAL SUPPORT AT GYM EQUIPMENT	1	LS	5,000.00	5,000	C1090.90
537							
538		BUILDING LETTER	19	EA	315.00	5,985	C1090.20
539		BUILDING DIRECTORY - ALLOW	1	EA	5,000.00	5,000	C1090.20
540		GRAPHICS AT WING CORRIDOR/STUDENT DINING	12	EA	5,000.00	60,000	C1090.20
541		MISC. INT. SIGNAGE WAYFINDING	1	LS	2,500.00	2,500	C1090.20
542		INTERIOR MOUNTED LETTERS	4	EA	5,000.00	20,000	C1090.20
543		DOOR SIGNAGE	264	EA	150.00	39,600	C1090.20
544		SPECIAL SIGN AT TOILET ROOMS	10	EA	200.00	2,000	C1090.20
545							
546		102113 TOILET COMPARTMENTS					
547		SOLID PLASTIC TOILET PARTITIONS:					
548		STD. PARTITION	28	EA	1,245.00	34,860	C1090.40
549		HC PARTITION	20	EA	1,300.00	26,000	C1090.40
550		URINAL SCREEN	20	EA	415.00	8,300	C1090.40
551							
552		102600 WALL AND DOOR PROTECTION					
553							
554		WALL & CORNER GUARDS - ALLOW	20	EA	225.74	4,515	C1090.35
555							
556		102800 TOILET BATH AND LAUNDRY ACCESSORIES					
557							
558		ADA SHWR SEAT	2	EA	406.02	812	C1090.40
559		SHWR GRAB BAR	4	EA	76.50	306	C1090.40
560		SHWR ROD & CURTAIN	2	EA	56.64	113	C1090.40
561		TOWEL HOOK	2	EA	35.61	71	C1090.40
562		PAPER TOWEL DISPENSER	48	EA	135.00	6,480	C1090.40
563		TOILET TISSUE DISPENSER	78	EA	55.40	4,321	C1090.40
564		GRAB BARS	66	EA	95.00	6,270	C1090.40
565		SOAP DISPENSER	32	EA	63.23	2,023	C1090.40
566		MIRROR	66	EA	258.52	17,062	C1090.40
567		SANITARY NAPKIN DISPOSAL	24	EA	300.55	7,213	C1090.40
568		JANITOR SHELF AND MOP HOLDER	4	EA	95.26	381	C1090.40
569		COAT HOOK ALLOWANCE	50	EA	25.00	1,250	C1090.40
570		CLASSROOM ACCESSORIES:					
571		SOAP DISPENSER	61	EA	35.00	2,135	C1090.40
572		PAPER TOWEL DISPENSER	61	EA	135.00	8,235	C1090.40
573							
574		105113 METAL LOCKERS					
575		LOCKER VIBRATION CLIPS	1,236	EA	16.00	19,776	C1090.25
576		STUDENT LOCKER	1,072	EA	250.00	268,000	C1090.25
577		PE LOCKER	164	EA	300.00	49,200	C1090.25
578		LOCKER RM BENCH-ALLOWANCE	250	LF	57.40	14,350	C1090.25
579		KITCHEN/CUSTODIAL SINGLE-ALLOWANCE	40	EA	250.00	10,000	C1090.25
580							
581		101100 VISUAL DISPLAY SURFACES					

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
582							
583		MARKERBOARDS -	11,412	SF	18.00	205,416	C1090.20
584		TACKBOARDS	728	SF	10.00	7,280	C1090.20
585		RAIL	2,985	LF	10.00	29,850	C1090.20
586							
587		115300 LABORATORY EQUIPMENT					
588							
589		EMERGENCY EYE WASH STATION	12	EA	2,500.00	30,000	C1090.60
590							
591						---	
592						1,077,755	
593							
594							
595		**TOTAL C10 - INTERIOR CONSTRUCTION**	**$32.22**	**/COST PER SF**		**7,459,477**	
596							
597							
598							
599		**C20 - INTERIOR FINISHES**					
600							
601		**C2010 WALL FINISHES**					
602							
603		042000 UNIT MASONRY*					
604							
605							
606		VESTIBULE:					
607		4" BRICK	1,124	SF	30.00	33,720	C2010.50
608							
609							
610		062000 INTERIOR FINISH CARPENTRY					
611							
612		HARDWOOD WALL PANEL ALLOWANCE	5,363	SF	40.00	214,520	C2010.20
613							
614							
615		STAGE CASED OPENING	80	LF	100.00	8,000	C2010.20
616							
617		FRP PANEL ALLOWANCE	2,222	SF	12.00	26,664	C2010.80
618							
619							
620		093000 TILING					
621							
622		CERAMIC WALL TILE	16,314	SF	21.00	342,594	C2010.10
623		PORCELAIN WALL TILE ALLOWANCE	1,067	SF	22.00	23,470	C2010.10
624							
625		098433 SOUND ABSORBING WALL UNITS					
626							
627							
628		SOUND REFLECTIVE PANEL ALLOWANCE	5,000	SF	20.00	100,000	C2010.80
629							
630							
631		099000 PAINTING					
632		INTERIOR PAINTING- WALLS	231,509	GSF	1.25	289,386	C2010.70
633		EPOXY RESINOUS COATING SYSTEM	3,690	SF	7.75	28,598	C2010.70
634						---	
635						1,066,951	
636							
637		**C2020 INTERIOR FABRICATIONS**					
638							
639		**C2030 FLOORING**					
640							
641		093000 TILING					
642							
643		CERAMIC FLOOR TILE:					
644		CERAMIC TILE 2 X 2	6,934	SF	21.00	145,614	C2030.20
645		CERAMIC WALL BASE	2,719	LF	22.00	59,818	C2030.20
646							

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
647		QUARRY TILE FLOOR:					
648		QUARRY TILE	2,996	SF	18.00	53,928	C2030.20
649		QUARRY BASE	556	SF	19.00	10,564	C2030.20
650							
651		PORCELAIN FLOOR TILE:					
652		PORCELAIN C4, C6		SF	15.93	0	C2030.20
653		PORCELAIN TYPE 8 BASE		LF	11.50	0	C2030.20
654		PORCELAIN C5, C7		SF	16.50	0	C2030.20
655		PORCELAIN BASE		LF	18.00	0	C2030.20
656							
657		096500 RESILIENT FLOORING					
658							
659		STATIC CONTROL RESILIENT FLOORING	941	SF	11.00	10,351	C2030.50
660							
661		RUBBER TILE:					
662		RUBBER TILE				0	C2030.50
663							
664		VCT :					
665		VCT		SF	3.65	0	C2030.50
666		VENTED RUBBER BASE				0	C2030.50
667		RUBBER BASE	18,286	LF	3.48	63,635	C2030.50
668							
669		096400 WOOD FLOORING					
670							
671		STAGE	1,694	SF	6.50	11,011	C2030.45
672							
673		WOOD BASE	911	LF	17.32	15,779	C2030.45
674							
675		096466 WOOD ATHLETIC FLOORING					
676							
677		WOOD ATHLETIC FLOORING	12,673	SF	15.00	190,095	C2030.80
678							
679		096723 RESINOUS FLOORING					
680							
681		EPOXY FLOORING	1,056	SF	12.04	12,714	C2030.70
682							
683		096813 CARPETING					
684		SHEET CARPET:					
685							
686		CARPET TILE:					
687		CARPET TILE	2,780	SY	40.00	111,218	C2030.75
688							
689		124800 ENTRANCE FLOOR MATS					
690							
691		ENTRY GRILLE	163	SF	35.00	5,705	C2030.85
692		ENTRY MAT	529	SF	25.00	13,225	C2030.85
693							
694							
695		CONCRETE SEALER	917	SF	0.83	761	C2030.10
696		POLISHED CONCRETE STAINED	179,503	SF	8.50	1,525,776	C2030.10
697							
698						----------	
699						2,230,193	
700							
701							
702		**C2040 STAIR FINISHES**					
703							
704		096500 RESILIENT FLOORING					
705							
706		STAIR :					
707		RUBBER TREADS AND RISERS	2,550	LFR	19.74	50,337	C2040.50
708		STAIR NOSING	2,550	LF	25.00	63,750	C2040.50
709		097000 TERRAZZO					
710							
711							

New Beverly Middle School — SD Estimate

	Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
	712		062000 INTERIOR FINISH CARPENTRY					
	713							
	714		AUDITORIUM WOOD STAIRS	2	FLT	3,000.00	6,000	C2030.45
	715							
	716							
	717		099100 PAINTING					
	718							
	719		inc. above					
	720						----------	
	721						120,087	
	722							
	723							
	724		**C2050 CEILING FINISHES**					
	725		MISC. OTHER.	1	LS	25,000.00	25,000	C2050.70
	726							
	727							
	728						----------	
	729						25,000	
	730							
	731							
	732		C2090 INTERIOR FINISH SCHEDULES					
	733						----------	
	734						0	
	735							
	736							
	737		**TOTAL C20 - INTERIOR FINISHES**	**$14.87**	**/COST PER SF**		**3,442,232**	
	738							
	739							
D	**SERVICES**							
	740		**D10 - CONVEYING**					
	741		142400 HYDRAULIC ELEVATORS*					
	742		PASSENGER ELEVATOR 5 stop	1	EA	200,000.00	200,000	D1010.10
	743		PASSENGER ELEVATOR 4 stop	1	EA	150,000.00	175,000	D1010.10
	744		PASSENGER ELEVATOR 2 stop	1	EA	80,000.00	100,000	D1010.10
	745						----------	
	746						475,000	
	747							
	748		D1020 HORIZONTAL CONVEYING					
	749						----------	
	750						0	
	751							
	752		D1050 MATERIAL HANDLING					
	753						----------	
	754						0	
	755							
	756		D1080 OPERABLE ACCESS SYSTEMS					
	757						----------	
	758						0	
	759							
	760		**TOTAL D10 - CONVEYING**	**$2.05**	**/COST PER SF**		**475,000**	
	761						0	
	762		**D20 - PLUMBING**					
	763							
	764		D2000 GENERAL DESIGN CONSIDERATIONS					
	765						----------	
	766						0	
	767		**D2010 DOMESTIC WATER DISTRIBUTION**					
	768							
	769		**FIXTURES:**					
	770		WATER CLOSET	78	EA	1,850.00	144,300	D2010.60
	771		URINAL	28	EA	1,490.00	41,720	D2010.60
	773		LAVATORIES+SINK	62	EA	1,200.00	74,400	D2010.60
	775		LAV WALL MTD THREE STATION LAVATORY BRADLEY-general narrative page 38	16	EA	4,500.00	72,000	D2010.60

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
781		LAB SINKS TRIM ONLY & CONNECT_labs sink_counted on drawings	33	EA	650.00	21,450	D2010.60
782		SHOWER	2	EA	975.00	1,950	D2010.60
784		ELECTRIC WATER COOLER	17	EA	3,600.00	60,016	D2010.60
786		EMERGENCY EYE WASH SCIENCE CLASSROOM (counted on drawings)	12	EA	4,375.00	52,500	D2010.60
789		DRINKING FOUNTAIN	14	EA	2,000.00	28,000	D2010.60
790		MR-1 MOP RECEPTOR	6	EA	925.00	5,931	D2010.60
791		FIXTURE CONNECTIONS	268	EA	300.00	80,425	D2010.60
792		COMMISIONING COORDINATION	1	LS	6,411.93	6,412	D2010.60
793							
794		**ROUGH IN:**					
795		ES/EW-1 & 2 EYE WASH/SHW	12	EA	500.00	6,000	D2010.60
796		SCIENCE CLASS ROOM SINK IN SCIENCE CASEWORK	33	EA	450.00	14,850	D2010.60
797		KITCHEN EQUIPMENT CONNECTIONS	69	EA	300.00	20,775	D2010.60
798		FUME HOOD	5	EA	750.00	3,847	D2010.60
799		HOSE BIBB	13	EA	175.00	2,244	D2010.60
800		WALL HYDRANT-narrative page 4_every 100 foot intervals	26	EA	1,125.00	29,441	D2010.60
801		DUPLEX GAS TURRET	33	EA	385.00	12,705	D2010.60
804		CLOTHES WASHER CONNECTION	1	EA	350.00	350	D2010.60
805							
806		**WATER HEATER:**					
807		CLASSROOM AREA-1 LOCKERS (PAGE 3 HVAC NARRATIVE)	2	EA	83,355.04	166,710	D2010.90
809		EXPANSION TANK 25 GAL	2	EA	1,500.00	3,000	D2010.90
810		6" DBL WALL FLUE CPVC	128	LF	75.00	9,618	D2010.90
811		6" DBL WALL FLUE CPVC	128	LF	75.00	9,618	D2010.90
812		ROOF CAP	2	EA	1,000.00	2,000	D2010.90
813							
814							
815		CP CIRCULATION PUMPS -1 FOR EACH HOT WATER HEATER	2	EA	2,500.00	5,000	D2010.90
816		BALANCING VALVES	19	EA	1,350.00	25,968	D2010.90
817							
818							
819		**MIXING VALVES:**					
820		MV-1 - MASTER	1	EA	4,500.00	4,500	D2010.90
822		MV-3	10	EA	550.00	5,642	D2010.90
823		PRV	1	EA	2,500.00	3,206	D2010.90
824		4" BFP	3	EA	1,500.00	3,847	D2010.20
825		2" RPBP	3	EA	1,600.00	4,104	D2010.20
826		2.5" RPBP IRRIGATION SYSTEM @ FIELDS	1	EA	1,600.00	1,600	D2010.20
827		1" 1 /2" RPBP	3	EA	700.00	1,795	D2010.20
828		1" 1 /4" RPBP	1	EA	650.00	650	D2010.20
829		WASHING MACHINE BOX	3	EA	325.00	834	D2010.20
830		WATER SERVICE AND EQUIPMENT	1	LS	7,500.00	7,500	D2010.20
831							
832							
833		**COPPER WATER LINES:**					
834		**PIPPING:**					
835		1/2" DOMESTIC WATER COPPER	3,783	LF	14.35	54,287	D2010.40
836		3/4" DOMESTIC WATER COPPER	2,404	LF	18.15	43,641	D2010.40
837		1" DOMESTIC WATER COPPER	2,116	LF	22.00	46,551	D2010.40
838		1 1/4" DOMESTIC WATER COPPER	2,235	LF	26.00	58,115	D2010.40
839		1 1/2" DOMESTIC WATER COPPER	2,035	LF	31.50	64,107	D2010.40
840		2" DOMESTIC WATER COPPER	1,893	LF	43.50	82,337	D2010.40
841		2.5" DOMESTIC WATER COPPER	321	LF	60.00	19,236	D2010.40
842		3" DOMESTIC WATER COPPER	118	LF	76.00	8,966	D2010.40
843		4" DOMESTIC WATER COPPER	96	LF	122.00	11,734	D2010.40
844		6" DOMESTIC WATER COPPER	38	LF	297.00	11,426	D2010.40
845		Accessories&Fittings Domestic water systems	1	LS	80,079.89	80,080	D2010.40
846		1/2" UTP DOMESTIC WATER COPPER UNDERGROUND	519	LF	35.00	18,178	D2010.40
848		3/4" PCW &PHW & PHWC COPPER	340	LF	18.15	6,168	D2060.30
849		1" PCW &PHW & PHWC COPPER	212	LF	22.00	4,655	D2060.30
851		1.5" PCW &PHW & PHWC COPPER	205	LF	31.50	6,463	D2060.30
852		2" PCW &PHW & PHWC COPPER	171	LF	43.50	7,419	D2060.30
853		2.5" PCW &PHW & PHWC COPPER	63	LF	60.00	3,770	D2060.30
854		Accessories&Fittings Protected water systems	1	LS	9,330.70	9,331	D2060.30
855		TEMPORARY WATER CONNECTION	1	LS	10,000.00	10,000	D2010.40

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
856							
857		**INSULATION:**					
858		1/2" DOMESTIC WATER-INSULATION 1"WALL	3,783	LF	5.80	21,942	D2010.40
859		3/4" DOMESTIC WATER-INSULATION 1"WALL	2,404	LF	6.10	14,667	D2010.40
860		1" DOMESTIC WATER INSULATION 1"WALL	2,116	LF	6.40	13,542	D2010.40
861		1.25" DOMESTIC WATER -INSULATION 1"WALL	2,235	LF	6.75	15,088	D2010.40
862		1.5" DOMESTIC WATER -INSULATION 1"WALL	2,035	LF	6.85	13,941	D2010.40
863		2" DOMESTIC WATER -INSULATION 1"WALL	1,893	LF	7.20	13,628	D2010.40
864		2.5" DOMESTIC WATER -INSULATION 1"WALL	321	LF	7.75	2,485	D2010.40
865		3" DOMESTIC WATER -INSULATION 1"WALL	118	LF	8.15	962	D2010.40
866		4" DOMESTIC WATER -INSULATION 1"WALL	96	LF	10.00	962	D2010.40
867		6" DOMESTIC WATER -INSULATION 1"WALL	38	LF	12.40	477	D2010.40
868		Accessories&Fittings Domestic water systems insulation	1	EA	19,538.47	19,538	D2010.40
869		1/2" PCW &PHW & PHWC COPPER -INSULATION 1"WALL		LF	23.54	0	D2060.30
870		3/4" PCW &PHW & PHWC COPPER -INSULATION 1"WALL	340	LF	6.10	2,073	D2060.30
871		1" PCW &PHW & PHWC COPPER -INSULATION 1"WALL	212	LF	6.40	1,354	D2060.30
873		1.5" PCW &PHW & PHWC COPPER -INSULATION 1"WALL	205	LF	6.85	1,405	D2060.30
874		2" PCW &PHW & PHWC COPPER -INSULATION 1"WALL	171	LF	7.20	1,228	D2060.30
875		2.5" PCW &PHW & PHWC COPPER -INSULATION 1"WALL	63	LF	7.75	487	D2060.30
876		Accessories&Fittings Protected water systems insulation	1	EA	1,309.53	1,310	D2060.30
877							
878							
879							
880						----------	
881						1,606,460	
882							
883							
884		**D2020 SANITARY DRAINAGE**					
885							
886		2" CI SANITARY AND VENT PIPING	590	LF	27.50	16,222	D2020.30
887		2" CI SANITARY UNDERGROUND	866	LF	37.50	32,460	D2020.30
888		3" CI SANITARY AND VENT PIPING	124	LF	32.00	3,981	D2020.30
889		3" CI SANITARY UNDERGROUND	155	LF	43.00	6,672	D2020.30
890		4" CI SANITARY AND VENT PIPING	380	LF	38.00	14,424	D2020.30
891		4"CI SANITARY UNDERGROUND	2,357	LF	49.57	116,838	D2020.30
892		4"KW CI SANITARY UNDERGROUND	214	LF	49.57	10,616	D2020.30
893		6" CI SANITARY UNDERGROUND	72	LF	66.00	4,740	D2020.30
894		6"KW CI SANITARY UNDERGROUND	29	LF	66.00	1,947	D2020.30
895		6"UOD	147	LF	66.00	9,733	D2020.30
896		IN LINE GREASE INTERCEPTOR BELOW FLOOR	3	EA	12,500.00	37,500	D2020.30
897		IN LINE GREASE INTERCEPTOR ABOVE	1	EA	6,500.00	6,500	D2020.30
898		TP-1 TRAP PRIMER SYSTEM	1	EA	5,000.00	5,000	D2020.10
899		TP-2 TRAP PRIMER SYSTEM	5	EA	3,500.00	17,500	D2020.10
900		TIGHT TANK PIPING/SUPERVISION				----------	
901						284,133	
902							
903							
904		**D2030 BUILDING SUPPORT PLUMBING SYSTEMS**					
905							
906		**FLOOR DRAINS:**					
909		FCO-1	65	EA	235.00	15,369	D2020.10
910		FCO-2	69	EA	245.00	16,966	D2020.10
911		3"FD-1	2	EA	850.00	1,700	D2020.10
912		4"FD-1	2	EA	1,000.00	2,000	D2020.10
913		2" FD	13	EA	413.00	5,296	D2020.10
914		4" FD	9	EA	396.00	3,555	D2020.10
915							
916							
917		**ROOF DRAINAGE SYSTEM:**					
918		4" ROOF DRAIN & OVERFLOW DRAINS	56	EA	750.00	42,319	D2030.20
919		6" ROOF DRAIN & OVERFLOW DRAINS	8	EA	1,100.00	9,107	D2030.20
920		4" (ST)ROOF DRAIN PIPING ELEVATED	2,302	LF	48.64	111,965	D2030.20
921		6 (ST)ROOF DRAIN PIPING ELEVATED	3,410	LF	67.14	228,945	D2030.20
922		8" (ST)ROOF DRAIN PIPING ELEVATED	1,422	LF	104.83	149,086	D2030.20
923		10" (ST)ROOF DRAIN PIPING ELEVATED	162	LF	104.83	16,938	D2030.20

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
924		12" (ST)ROOF DRAIN PIPING ELEVATED	231	LF	104.83	24,198	D2030.20
925		4" (ST)ROOF DRAIN PIPING UNDERGROUND	290	LF	50.00	14,491	D2030.20
926		6" (ST)ROOF DRAIN PIPING UNDERGROUND	358	LF	65.00	23,256	D2030.20
927		8" (ST)ROOF DRAIN PIPING UNDERGROUND	208	LF	70.00	14,542	D2030.20
928		10" (ST)ROOF DRAIN PIPING UNDERGROUND	444	LF	75.00	33,278	D2030.20
929		12" (ST)ROOF DRAIN PIPING UNDERGROUND	321	LF	100.50	32,220	D2030.20
930						----------	
931						745,230	
932							
933							
934		**D2050 GENERAL SERVICE COMPRESSED AIR**					
935				N/A			
936							
937						----------	
938						0	
939							
940							
941		**D2060 PROCESS SUPPORT PLUMBING SYSTEMS**					
942							
943		0.75" GAS LINE	195	LF	12.00	2,339	D2060.10
944		1" GAS LINE	96	LF	15.00	1,443	D2060.10
945		1.25" GAS LINE	1,471	LF	20.00	29,418	D2060.10
946		1.5" GAS LINE	263	LF	23.00	6,046	D2060.10
947		2" GAS LINE	931	LF	29.50	27,465	D2060.10
948		2.5" GAS LINE	357	LF	43.50	15,508	D2060.10
949		3" GAS LINE	603	LF	55.00	33,150	D2060.10
950		4" GAS LINE	455	LF	65.00	29,591	D2060.10
951		5" GAS LINE	162	LF	74.50	12,038	D2060.10
952		10" GAS LINE	40	LF	145.00	5,764	D2060.10
953		GAS SHUT OFF VALVES	14	EA	1,200.00	16,927	D2060.10
954		GAS FLOW METERS-construction narrative-page 39	1	EA	2,500.00	2,500	D2060.10
955		ACID WASTE NEUTRALIZATION SYSTEM-mechanical narrative page 3-4	1	EA	41,036.33	41,036	D2060.20
956		ACID WASTE EJECTOR PUMP -mechanical narrative page 3-4	1	LS	12,695.61	12,696	D2060.20
957		2" LV PVC	1,118	LF	39.50	44,170	D2060.20
958		2" LW PVC	360	LF	44.61	16,075	D2060.20
959		3" LW PVC	112	LF	44.61	4,977	D2060.20
960		4" LW PVC	81	LF	56.49	4,564	D2060.20
961		4" ULW PVC	881	LF	66.50	58,586	D2060.20
962		GAS REGULATORS	10	EA	800.00	8,207	D2060.10
963							
964						----------	
965						372,501	
966							
967		**TOTAL D20 - PLUMBING**	**$12.99**	**/COST PER SF**		**3,008,324**	
968							
969		**D30 - HVAC**					
970							
971		D3000 DESIGN BASIS					
972							
973		230000 HVAC					
974							
975		DDC TEMPERATURE CONTROL	231,509	GSF	4.00	926,036	D3080.10
976		TEST AND BALANCE	231,509	GSF	0.38	87,973	D3090.10
977		COORDINATION WITH COMISSIONING AGENT	231,509	GSF	0.10	23,151	D3095.10
978							
979						----------	
980						1,037,160	
981							
982							
983		**D3010 FACILITY FUEL SYSTEMS**					
984				N/A			
985							
986						----------	
987						0	
988							

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
989							
990		**D3020 HEATING SYSTEMS**					
991							
992		CONDENSING BOILER _CLEARFIRE_4000 MBH_HVAC narrative page 6	3	EA	44,000.00	132,000	D3020.70
993		BOILER BRANCH INTAKES	218	LF	150.00	32,701	D3020.70
994		BOILER BRANCH EXHAUSTS	231	LF	150.00	34,624	D3020.70
995		BOILER PIPING CONNECTIONS & ACCESSORIES	1	LS	10,000.00	10,000	D3020.70
996		EXPANSION TANKS	3	EA	6,500.00	19,500	D3020.70
997		AIR SEPARATOR FOR HOT WATER	3	EA	3,500.00	10,500	D3020.70
998							
999		**ROOF TOP UNITS:**					
1000		RTU_146192 CFM FOR 231509SF OF TOTAL BUILDING	**173,632**	CFM	12.00	2,083,581	D3020.70
1001		DETAILS RTU-NARRATIVE PAGE 7 _NO OTHER INFORMATION		CFM	12.00	0	D3020.70
1002		CLASSROOMS_VAV ROOFTOP AHU WITH ENERG RECOVERY_3 UNITS_narrative page 9		CFM	12.00	0	D3020.70
1003		ADMINISTRATION/GUIDANCE/NURSE_VAV ROOFTOP AHU_1 UNIT-narrative page 10		CFM	12.00	0	D3020.70
1004		BAND/CHORAL VAV ROOFTOP AHU_1 UNIT-narrative page 10		CFM	12.00	0	D3020.70
1005		MEDIA CENTER VAV ROOFTOP AHU_1 UNIT-narrative page 10		CFM	12.00	0	D3020.70
1006		GYMNASIUM_HEATING AND VENTILATION ONLY RTU_1 UNIT-narrative page 11		CFM	12.00	0	D3020.70
1007		CAFETERIA_heating and cooling RTU_1 UNIT-narrative page 11		CFM	12.00	0	D3020.70
1008		KITCHEN Gas Fired Make-up AHU+ kitchen hood exhaust system-narrative page 11		CFM	12.00	0	D3020.70
1009		AUDITORIUM _AHU_1 UNIT		CFM	12.00	0	D3020.70
1010		ENERGY RECOVERY RTU FOR CLASSROOMS_NARRATIVE PAGE 8	3	EA	25,000.00	75,000	D3020.70
1011		VIBRATION ISOLATION	1	LS	30,000.00	30,000	D3060.90
1012		CRANE TO ROOF	1	LS	20,000.00	20,000	D3020.70
1013						----------	
1014						2,447,906	
1015							
1016							
1017		**D3030 COOLING SYSTEMS**					
1018							
1019		**CHILLER:**					
1020		ELECTRIC AIR COOLED CHILLER 175 TONS EACH_NARRATIVE PAGE 7	2	EA	147,500.00	295,000	D3030.30
1021		PROPYLENE GLYCOL 30% system allowance -narrative page 8	1	LS	25,000.00	25,000	D3030.30
1022		BUFFER TANK BT-1 CHW 600 GAL-estimate gallons	1	LS	8,475.00	8,475	D3030.30
1023		CHILLED WATER PIPING AND VALVE	1	LS	19,235.78	19,236	D3030.30
1024		CHILLER VIBRATION ISOLATION	1	LS	4,488.35	4,488	D3030.30
1025		**PUMPS:**					
1026		HOT WATER PUMPS	3	EA	8,720.22	26,161	D3050.10
1027		CHILLED WATER PUMPS	2	EA	12,000.00	24,000	D3050.10
1028		BOILER CIRCULATOR	3	EA	10,000.00	30,000	D3050.10
1030		VFD DRIVES	8	EA	2,875.00	23,000	D3050.10
1031		CHEMICAL TREATMENT SYSTEM	1	EA	8,500.00	8,500	D3050.10
1032		AIR SEPARATOR FOR CHILLED WATER SYSTEM	1	EA	4,500.00	4,500	D3050.10
1033							
1034						----------	
1035						468,360	
1036							
1037							
1038		**D3050 FACILITY HVAC DISTRIBUTION SYSTEMS**					
1039							
1040		**HVAC PIPING:**					
1041		**HOT WATER PIPE**					
1042		3/4" HW	18,861	LF	26.80	505,483	D3050.10
1043		1" HW	3,282	LF	27.00	88,604	D3050.10
1044		1 1/4" HW	2,171	LF	29.00	62,961	D3050.10
1045		1 1/2" HW	1,561	LF	35.00	54,623	D3050.10
1046		2" HW	1,771	LF	48.00	85,007	D3050.10
1047		2 1/2" HW	1,294	LF	70.00	90,575	D3050.10
1048		3" HW	258	LF	90.00	23,198	D3050.10
1049		4" HW	258	LF	160.00	41,242	D3050.10
1050		6" HW	204	LF	320.00	65,248	D3050.10
1051							
1052		**HOT WATER PIPE INSULATION**					
1053		3/4" HW	18,861	LF	7.50	141,460	D3050.10
1054		1" HW	3,282	LF	9.00	29,535	D3050.10

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1055		1 1/4" HW	2,171	LF	9.50	20,625	D3050.10
1056		1 1/2" HW	1,561	LF	10.00	15,607	D3050.10
1057		2" HW	1,771	LF	11.50	20,366	D3050.10
1058		2 1/2" HW	1,294	LF	12.50	16,174	D3050.10
1059		3" HW	258	LF	13.50	3,480	D3050.10
1060		4" HW	258	LF	14.20	3,660	D3050.10
1061		6" HW	204	LF	14.70	2,997	D3050.10
1062							
1063		**CHILLED WATER PIPE:**					
1064		3/4" CW	1,784	LF	26.80	47,806	D3050.10
1065		1" CW	533	LF	27.00	14,404	D3050.10
1066		1 1/4" CW	133	LF	29.00	3,868	D3050.10
1067		1 1/2" CW	291	LF	35.00	10,189	D3050.10
1068		2" CW	464	LF	48.00	22,283	D3050.10
1069		2 1/2" CW	2,194	LF	70.00	153,591	D3050.10
1070							
1071		**CHILLED WATER PIPE INSULATION**					
1072		3/4" CW	1,784	LF	7.50	13,378	D3050.10
1073		1" CW	533	LF	9.00	4,801	D3050.10
1074		1 1/4" CW	133	LF	9.50	1,267	D3050.10
1075		1 1/2" CW	291	LF	10.00	2,911	D3050.10
1076		2" CW	464	LF	11.50	5,339	D3050.10
1077		2 1/2" CW	2,194	LF	12.50	27,427	D3050.10
1078							
1079		**UNIT HEATERS :**					
1080		UNIT HEATERS 420 CFM EACH	5	EA	725.00	3,625	D3050.10
1081		UNIT HEATERS 380 CFM EACH	5	EA	725.00	3,625	D3050.10
1082		UNIT HEATERS 1100 CFM EACH	5	EA	1,200.00	6,000	D3050.10
1083		WALL RECESSED CABINET UNIT HEATER	5	EA	2,500.00	12,500	D3050.10
1084							
1085		**INDUCTION UNITS:**					
1092		VAV BOXES	50	EA	1,350.00	67,500	D3050.10
1093		REFRIGERATE LINES	1,500	LF	25.00	37,500	D3050.10
1094							
1095		**CONDENSATE DRAINS**					
1096		3/4 "	1,000	LF	20.00	20,000	D3050.10
1097		1 "	700	LF	25.00	17,500	D3050.10
1098							
1099		**RADIANT PANEL**					
1100		RADIANT PANEL RP FOR CLASSROOMS (NARRATIVE PAGE 9)	3,055	LF	100.00	305,464	D3020.90
1101		ACCESSORIES	1	EA	10,000.00	10,000	D3020.90
1102							
1103		**FIN TUBE RADIATION**					
1104		FIN-TUBE RADIATION-NARRATIVE PAGE 7	399	LF	90.00	35,894	D3020.90
1105		ACCESSORIES	1	EA	6,000.00	6,000	D3020.90
1106						---	
1107						2,103,716	
1108		**D3060 VENTILATION**					
1109							
1110		**EXHAUST:**					
1111		EXHAUST AIR GRILLES	80	EA	250.00	19,877	D3060.30
1112		VOLUME DAMPERS	38	EA	210.00	8,079	D3060.30
1113		FIRE DAMPERS	32	EA	230.00	7,374	D3060.30
1114		DUCTWORK & ACCESSORIES	19,631	LBS	9.00	176,677	D3060.30
1115							
1116		**SUPPLY:**					
1117		SUPPLY AIR GRILLES	385	EA	250.00	96,179	D3060.10
1118		LINEAR DIFFUSER	192	LF	95.00	18,274	D3060.10
1119		VOLUME DAMPERS	417	EA	210.00	87,523	D3060.10
1120		FIRE DAMPERS	32	EA	230.00	7,374	D3060.10
1121		DUCTWORK & ACCESSORIES	52,943	LBS	8.50	450,018	D3060.10
1122		DUCT LINER FIBERGLASS 1" THICK	9,032	SF	7.25	65,481	D3050.70
1123		DUCT INSULATION WRAP FOIL FACE 1.5" THICK	27,104	SF	4.15	112,484	D3050.70
1124							
1125		**RETURN:**					

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1126		RETURN GRILLES	301	EA	150.00	45,204	D3060.20
1127		VOLUME DAMPERS	64	EA	225.00	14,427	D3060.20
1128		FIRE DAMPERS	26	EA	250.00	6,412	D3060.20
1129		DUCTWORK & ACCESSORIES	73,329	LBS	8.50	623,299	D3060.20
1130		ALUM. DUCTWORK	1,282	LBS	12.00	15,389	D3060.20
1131		DUCT LINER	6,412	SF	4.15	26,609	D3060.20
1132		KITCHEN EXHAUST DUCTWORK - WELDED	1,924	LBS	20.00	38,472	D3060.20
1133		FIRERATED KITCHEN EXHAUST INSULATION	1	LS	8,976.70	8,977	D3060.20
1134							
1135		**EXHAUST FANS:**					
1136		FRACTIONAL HP FANS	12,016	CFM	3.00	36,048	D3060.30
1137		KITCHEN EXHAUST FANS	6,271	CFM	5.00	31,354	D3060.30
1138		FEF EXHAUST FANS 1-4 1000CFM EA.	5,130	CFM	5.00	25,648	D3060.30
1139		SOUND ATTENUATOR VIBRO ACOUSTICS	46	EA	2,532.00	116,892	D3060.90
1140		SUPPLY VARIABLE AIR VOLUME TERMINAL BOX	19	EA	1,525.00	29,335	D3060.90
1141		RETURN/EXHAUST VARIABLE AIR VOLUME AIR TERM .BOX	13	EA	1,000.00	12,824	D3060.90
1142							
1143							
1144						----------	
1145						2,080,227	
1146							
1147		**D3070 SPECIAL PURPOSE HVAC SYSTEMS**					
1148						----------	
1149						0	
1150							
1151		**TOTAL D30 - HVAC**	**$35.15**	**/COST PER SF**		**8,137,370**	
1152							
1153							
1154		**D40 - FIRE PROTECTION**					
1155							
1156		**D4010 FIRE SUPPRESSION**					
1157		SPRINKLER SYSTEM	231,509	GSF	4.00	926,036	D4010.10
1158		*EXCLUDES FIRE PUMP					
1159		DRYPIPE AT FREEZER & ENTRANCE	1	LS	25,000.00	25,000	D4010.10
1160		ROOF MANIFOLDS INCLUDED ABOVE				----------	
1161						951,036	
1162							
1163		**D4040 FIRE PROTECTION SPECIALTIES**					
1164							
1165		104413 FIRE EXTINGUISHERS					
1166		MOVED TO EQUIPMENT					
1167						----------	
1168						0	
1169							
1170		**TOTAL D40 - FIRE PROTECTION**	**$4.11**	**/COST PER SF**		**951,036**	
1171							
1172							
1173							
1174							
1175							
1176		**D50 - ELECTRICAL**					
1177							
1178		**D5010 FACILITY POWER GENERATION**					
1179		GENERATOR					
1180		DIESEL GENERATOR 750KW W/TWO ATS	1	EA	211,752.00	211,752	D5010.90
1181			0			----------	
1182			0			211,752	
1183			0				
1184		**D5020 ELECTRICAL SERVICE & DISTRIBUTION**	0				
1185		ELECTRICAL SERVICE	0				
1186		TEMPORARY ELECTRIC	231509	SF	0.37	85,658	D5020.10
1187		MAIN SWITCHBOARD 4000A 277/480V	1	EA	110,500.00	110,500	D5020.10
1188			0			----------	
1189			0			196,158	
1190		**POWER DISTRIBUTION**	0				

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1191		120/208V PANELS	40	EA	2,837.44	113,498	D5020.30
1192		277/480V PANELS	28	EA	2,633.36	73,734	D5020.30
1193		TRANSFORMERS	26	EA	6,575.45	170,962	D5020.30
1194		POWER DISTRIBUTION CONDUIT/WIRE COMPLETE (VARIES)	6,895	LF	62.73	432,494	D5020.30
1195		EQUIPMENT CONNECTIONS	620	EA	144.26	89,493	D5020.30
1196		PANEL BOARD SURGE PROTECTORS	8	EA	1,750.00	14,000	D5020.30
1197		PV READY ROOF	1	LS	2,500.00	2,500	D5020.30
1198		ELECTRIC ADD	231,509	SF	7.00	1,620,563	D5020.30
1199			0			----------	
1200			0			2,517,243	
1201			0				
1202		GROUNDING	1702.196757	LF	18.15	30,895	D5020.70
1203			0				
1204			0			----------	
1205			0			2,744,296	
1206			0				
1207		**D5030 GENERAL PURPOSE ELECTRICAL POWER**	0				
1208		**BRANCH WIRING**	0				
1209		MECHANICAL BRANCH WIRING/CONDUIT COMPLETE (VARIES)	26,297	LF	16.27	427,853	D5030.10
1210		POWER OUTLET BRANCH WIRING/CONDUIT COMPLETE (VARIES)	59,419	LF	4.19	248,967	D5030.10
1211		SWITCHES BRANCH WIRING/CONDUIT COMPLETE (VARIES)	15,713	LF	3.74	58,767	D5030.10
1212			0			----------	
1213			0			735,587	
1214			0				
1215		**WIRING DEVICES**	0				
1216		POWER OUTLETS (DEVICES, BOXES, COVERS, & CONN.)	2100	EA	82.27	172,767	D5030.50
1217			0			----------	
1218			0			172,767	
1219			0				
1220			0			----------	
1221			0			6,577,803	
1222			0				
1223		**D5040 LIGHTING**	0				
1224		**LIGHTING CONTROL**	0				
1225		THEATRE DIMMING SYSTEM	1	LS	185,000.00	185,000	D5040.10
1226		AUDITORIUM DIMMING SYSTEM	1	LS	75,000.00	75,000	D5040.10
1227		SMART GYM CONTROL SYSTEM	1	LS	20,000.00	20,000	D5040.10
1228		OCCUPANCY SENSORS	200	EA	221.16	44,232	D5040.10
1229		DAYLIGHT PHOTOCELLS	50	EA	113.51	5,676	D5040.10
1230		SP SWITCHES	60	EA	74.90	4,494	D5040.10
1231		3 WAY SWITCHES	200	EA	84.26	16,852	D5040.10
1232		AUTOMATIC WALL SWITCHES	80	EA	137.06	10,965	D5040.10
1233		DIMMERS	55	EA	261.99	14,409	D5040.10
1234		TEACHER STATIONS	100	EA	318.40	31,840	D5040.10
1235			0			----------	
1236			0			408,468	
1237			0				
1238		LIGHTING BRANCH WIRING	0				
1239		LIGHTING BRANCH WIRING/CONDUIT COMPLETE (VARIES)	45,573	LF	4.08	185,940	D5040.20
1240			0			----------	
1241			0			185,940	
1242			0				
1243		**LIGHTING FIXTURES**	0				
1244		(PARKING LIGHTING IN SECTION G4050.10)	0				
1245			0				
1246			0			-	D5040.50
1247			0			-	D5040.50
1248		**INTERIOR LIGHTING**	0				
1249		VOLUMETRIC	120	EA	450.00	54,000	D5040.50
1250		HIGHBAY GYM	45	EA	524.00	23,580	D5040.50
1251		LIGHT STRIP	150	EA	265.00	39,750	D5040.50
1252		WALL SCONCES	245	EA	300.00	73,500	D5040.50
1253		LUMINOUS BOWLS	130	EA	220.00	28,600	D5040.50
1254		DOWNLIGHTS	110	EA	345.00	37,950	D5040.50
1255		WET/GASKETED	80	EA	600.00	48,000	D5040.50

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1256		RECESSED DOWNLIGHTS	125	EA	540.00	67,500	D5040.50
1257		STEPLIGHTING	25	EA	495.00	12,375	D5040.50
1258		PRISMATIC LENS TROFFER LIGHT STRIP	375	EA	615.00	230,625	D5040.50
1259		EXIT SIGNS	75	EA	250.00	18,750	D5040.50
1260		AUDITORIUM/THEATRE LIGHTING	1	LS	150000.00	150,000	D5040.50
1261			0			----------	
1262			0			784,630	
1263			0				
1264			0			----------	
1265			0			1,379,038	
1266			0				
1267		**D5080 MISCELLANEOUS ELECTRICAL SYSTEMS**	0				
1268		SEE D5020.70 FOR GROUNDING	0				
1269		LIGHTNING PROTECTION	231509	SF	0.50	115,755	D5080.10
1270		UTILITY BACKCHARGE - ALLOW	0				
1271						----------	
1272						115,755	
1273							
1274							
1275		**TOTAL D50 - ELECTRICAL**	**$23.15**	**/COST PER SF**		**5,359,194**	
1276							
1277		**D60 - COMMUNICATIONS**					
1278							
1279		**D6010 DATA COMMUNICATIONS**					
1280		SM FIBER	2525	LF	7.60	19,190	D6010.10
1281		MM FIBER	2525	LF	8.95	22,599	D6010.10
1282		TELEPHONE & DATA DROPS	1144	EA	326.00	372,944	D6010.10
1283		TELECOM RACKS & EQUIPMENT	95	EA	1,392.45	132,283	D6010.10
1284		CABLE TRAY	150	LF	125.00	18,750	D6010.20
1285			0			----------	
1286			0			565,766	
1287			0				
1288		**D6020 VOICE COMMUNICATIONS**	0				
1289		SEE D6010.10	0				
1290		DISTRIBUTED ANTENNA SYSTEM (ENS)	1	LS	75,000.00	75,000	D6020.50
1291			0				
1292		**D6030 AUDIO-VIDEO COMMUNICATION**	0				
1293		MEDIA SERVER	1	LS	75,000.00	75,000	D6030.10
1294		DATA ACQUISITION SERVER	1	LS	50,000.00	50,000	D6030.10
1295		AV SYSTEM ROUGH IN & CABLING	65	EA	1,263.78	82,146	D6030.10
1296			0			----------	
1297			0			282,146	
1298			0				
1299			0				
1300		**D6060 DISTRIBUTED COMM. & MONITORING**	0				
1301		AUDITORIUM SOUND & VIDEO SYSTEM	1	LS	300,000.00	300,000	D6060.10
1302		PAGING SYSTEM	540	EA	210.55	113,697	D6060.10
1303		GYM SOUND SYSTEM	1	LS	35,000.00	35,000	D6060.10
1304		BAND MUSIC ROOM SOUND SYSTEM	2	EA	12,000.00	24,000	D6060.10
1305		PE MULTIPURPOSE SOUND SYSTEM	2	EA	12,000.00	24,000	D6060.10
1306		AUDITORIUM PROJECTION SYSTEM	1	EA	50,000.00	50,000	D6060.10
1307		TV STUDIO SOUND SYSTEM	1	EA	70,000.00	70,000	D6060.10
1308		CLOCK SYSTEM	150	EA	268.23	40,235	D6060.50
1309		CLOCK SYSTEM MC	1	LS	15,000.00	15,000	D6060.50
1310		ELECTRIC ADD AV TO 1.1	231,509	SF	2.00	463,018	D6060.10
1311			0			----------	
1312						1,134,950	
1313							
1314		**D6090 COMM. SUPPLEMENTARY COMPONENTS**					
1315						----------	
1316						0	
1317							
1318		**TOTAL D60 - COMMUNICATIONS**	**$8.56**	**/COST PER SF**		**1,982,861**	
1319							
1320		**D70 - ELECTRONIC SAFETY AND SECURITY**					

New Beverly Middle School — SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1321							
1322		**D7010 ACCESS CONTROL & INTRUSION DETECTION**					
1323		CCTV CAMERAS (COMPLETE)	91	EA	2,522.94	229,588	D7010.10
1324		MOTION DETECTORS (COMPLETE)	135	EA	450.00	60,750	D7010.10
1325		CARD READERS (COMPLETE)	40	EA	2,496.00	99,840	D7010.10
1326		DOORS AND INTERCOM (COMPLETE)	290	EA	899.40	260,826	D7010.10
1327						----------	
1328						651,004	
1329		**D7030 ELECTRONIC SURVEILLANCE**					
1330							
1331		SEE D7010.10					
1332						----------	
1333						0	
1334							
1335		**D7050 DETECTION AND ALARM**					
1336		FIRE ALARM BRANCH	25218	LF	0.85	21,435	D7050.10
1337		FIRE ALARM SYSTEM (COMPLETE)	580	EA	511.46	296,651	D7050.10
1338							
1339						----------	
1340						318,086	
1341		**D7070 ELECTRIC MONITORING & CONTROL**					
1342						----------	
1343						0	
1344		**D7090 ELEC. SAFETY & SEC. SUPPLEMENT. COMP.**					
1345						----------	
1346						0	
1347							
1348		**TOTAL D70 - ELECTRONIC SAFETY AND SECURITY**	**$4.19**	**/COST PER SF**		**969,089**	
1349							
1350		**D80 - INTEGRATED AUTOMATION**					
1351							
1352		**D8010 INTEGRATED AUTOMATION FACILITY CONTROLS**					
1353							
1354						----------	
1355						0	
1356							
1357		**TOTAL D80 - INTEGRATED AUTOMATION**	**$0.00**	**/COST PER SF**		**0**	
1358							
1359							
E	**EQUIPMENT AND**						
1360		**E10 - EQUIPMENT**					
1361							
1362		**111300 LOADING DOCK EQUIPMENT**					
1363		LOADING DOCK BUMPERS	1	LS	1,500.00	1,500	E1010.50
1364						----------	
1365						1,500	
1366							
1367							
1368		**E1030 COMMERCIAL EQUIPMENT**					
1369							
1370		114000 FOOD SERVICE EQUIPMENT					
1371		COMMERCIAL ICE MAKER	3	EA	1,385.00	4,155	E1030.80
1372		FOOD SERVICE EQUIPMENT ALLOWANCE	1	LS	450,000.00	450,000	E1030.80
1373						----------	
1374						454,155	
1375							
1376							
1377		**E1040 INSTITUTIONAL EQUIPMENT**					
1378							
1379							
1380		CHEMICAL STORAGE CABINET	3	EA	2,500.00	7,500	E1040.10
1381		FLAMMABLE CHEMICALS CAB	1	EA	1,369.00	1,369	E1040.10
1382		FIRST AID KIT	12	EA	186.45	2,237	E1040.10
1383		FUME HOOD (2 SIDED)	4	EA	9,284.02	37,136	E1040.10

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1384		GOGGLE CABINET	12	EA	953.78	11,445	E1040.10
1385		FIRE BLANKET CAB	12	EA	250.00	3,000	E1040.10
1386		FUME HOOD BASE CABINET	20	LF	1,100.00	22,000	E1040.10
1387							
1388		117900 MISCELLANEOUS EQUIPMENT					
1389						0	
1390		HEALTH OFFICE CUBICLE TRACK W/CURTAIN	38	LF	25.00	950	E1040.20
1391						0	
1392							
1393						----------	
1394						85,638	
1395		**E1060 RESIDENTIAL EQUIPMENT**					
1396							
1397		**113100 RESIDENTIAL APPLIANCES ALLOWANCE**					
1398		REFRIGERATOR -TOP FREEZER	10	EA	1,372.48	13,725	E1060.10
1399		WALL OVEN	1	EA	2,500.00	2,500	E1060.10
1400		RANGE HOOD	1	EA	750.00	750	E1060.10
1401		UNDERCOUNTER ICE MACHINE @ SCIENCE PREP	12	EA	1,500.00	18,000	E1060.10
1402		GARBAGE DISPOSAL	4	EA	500.00	2,000	E1060.10
1403		MICROWAVE	4	EA	516.98	2,068	E1060.10
1404		DISHWASHER	4	EA	537.61	2,150	E1060.10
1405		COOK TOP	1	EA	779.44	779	E1060.10
1406		UNDERCOUNTER REFRIGERATOR	1	EA	499.00	499	E1060.10
1407		WASHER	1	EA	2,029.00	2,029	E1060.10
1408		DRYER	1	EA	1,529.00	1,529	E1060.10
1409						----------	
1410						46,030	
1411							
1412							
1413							
1414		**E1070 ENTERTAINMENT & RECREATIONAL EQUIPMENT**					
1415							
1416		**116133 THEATRICAL RIGGING**					
1417		STAGE CURTAIN & RIGGING	1	LS	150,000.00	150,000	E1070.10
1418							
1419							
1420		**116623 GYMNASIUM EQUIPMENT**					
1421		BASKETBALL BACKSTOP - ELECTRIC	4	EA	9,000.00	36,000	E1070.50
1422		VOLLEY BALL COURT EQUIP. NET, POST AND TENSIONING	4	EA	700.00	2,800	E1070.50
1423		MAT LIFTER	1	EA	15,850.00	15,850	E1070.50
1424		WALL PADDING -7' ALLOWANCE	1,700	SF	13.00	22,100	E1070.50
1425		MOTORIZED GYM DIVIDER CURTAIN	1,589	SF	18.00	28,602	E1070.50
1426		SCOREBOARD ALLOWANCE	2	EA	20,000.00	40,000	E1070.50
1427		SHOT CLOCK ALLOWANCE	2	EA	1,500.00	3,000	E1070.50
1428		FOLDING PARTITION AT GYM	1,133	SF	100.00	113,300	E1070.50
1429		**115213 PROJECTION SCREENS**					
1430		**ELEC. OP. PROJ. SCREENS:**					
1431		CLASSROOMS INTERACTIVE PROJECTOR	272	EA	1,000.00	272,000	E1070.80
1432		AUDITORIUM	1	LS	15,000.00	15,000	E1070.80
1433						----------	
1434						698,652	
1435							
1436		**TOTAL E10 - EQUIPMENT**	**$5.55**	**/COST PER SF**		**1,285,974**	
1437							
1438							
1439		**E20 - FURNISHINGS**					
1440		**E2050 MOVEABLE FURNISHINGS**					
1441		FIRE EXTINGUISHER CABINET ALLOWANCE	34	EA	350.00	11,900	E2050.40
1442		FIRE EXTINGUISHERS ALLOWANCE	4	EA	250.00	1,000	E2050.40
1443						----------	
1444						12,900	
1445		**E 2010 FIXED FURNISHINGS**					
1446							
1447		**122100 WINDOW TREATMENT- ALLOWANCE**					
1448		HORIZ. BLINDS - MANUAL OP (INT. OPENINGS)	4,587	SF	4.00	18,348	E2010.20

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1449		LIGHT FILTERING SHADES - TYP	16,725	SF	4.50	75,263	E2010.20
1450		SCIENCE RM DUEL LIGHT FILTER/DARKENING SHADES	1	LS	25,000.00	25,000	E2010.20
1451		LIBRARY SHEER SHADES(LIGHT MONITOR) - ELEC OP.	1	LS	25,000.00	25,000	E2010.20
1452		CAFE SHADES - ELEC. OP.	1	LS	25,000.00	25,000	E2010.20
1453		ELEC. MOTOR SHADES @ VARIOUS LOCATIONS	1	LS	45,000.00	45,000	E2010.20
1454		BLACKOUT SHADES	1	LS	3,000.00	3,000	E2010.20
1455							
1456		**123200 MANUFACTURED WOOD CASEWORK**					
1457		**06 WOOD MILLWORK**					
1458		MILLWORK @ GENERAL OFFICE /RECEPTION/PRINCIPAL	1	LS	25,000.00	25,000	E2010.30
1459		MEDIA INSTRUCTIONAL AREA	1	LS	25,000.00	25,000	E2010.30
1460		DISPLAY CASE ALLOWANCE	14	EA	5,000.00	70,000	E2010.30
1461		RECYCLING CENTERS ALLOWANCE	15	EA	3,500.00	52,500	E2010.30
1462		MAIL ROOM	1	LS	15,000.00	15,000	E2010.30
1463		NURSE AREA BASE, COUNTER AND WALL CABINET ALLOWANCE	42	LF	800.00	33,600	E2010.30
1464		ACADEMIC ROOM	10	EA	4,000.00	40,000	E2010.30
1465		TEACHERS WARDROBE OR TALL CABINET	190	EA	1,439.23	273,454	E2010.30
1466		WALL CABINET	672	LF	250.00	168,000	E2010.30
1467		BASE CABINET	774	LF	454.00	351,396	E2010.30
1468		BASE CABINET WITH OPEN SHELVING	688	LF	300.00	206,400	E2010.30
1469		OPEN SHELVING	612	LF	175.00	107,100	E2010.30
1470		TEACHER'S CABINET T1	58	EA	800.00	46,400	E2010.30
1471		TECHNOLOGY ALLOWANCE	2	EA	10,000.00	20,000	E2010.30
1472		FLAT CABINET AT ART	15	LF	550.00	8,250	E2010.30
1473		VERTICLE CABINET AT ART	15	LF	350.00	5,250	E2010.30
1474		GLASS DRYING RACK ALLOWANCE	24	EA	250.00	6,000	E2010.30
1475		GUIDANCE DESK	7	LF	500.00	3,250	E2010.30
1476		ART STORAGE	2	EA	9,000.00	18,000	E2010.30
1477							
1478							
1479		**123600 COUNTERTOPS**					
1480		P-LAM COUNTER	223	LF	75.00	16,725	E2010.30
1481		EPOXY COUNTER	672	LF	250.00	168,000	E2010.30
1482		SOLID SURFACE COUNTER AT GANG TOILET-ALLOWANCE	90	LF	175.00	15,750	E2010.30
1483		STAINLESS STEEL COUNTER AT ART ALLOWANCE	48	LF	450.00	21,600	E2010.30
1484		TEACHER COLLABORATION WALL SUPPORTED COUNTER	44	LF	125.00	5,500	E2010.30
1485							
1486		**062000 INTERIOR FINISH CARPENTRY**					
1487		SOLID SURFACE WINDOW STOOL	1,858	LF	32.00	59,456	E2010.30
1488		UTILITY & CLOSET SHELVING	1	LS	5,000.00	5,000	E2010.30
1489		WOOD TRIM	1	LS	35,000.00	35,000	E2010.30
1490							
1491		**126100 FIXED AUDIENCE SEATING**					
1492		AUDITORIUM FIXED SEAT	376	EA	307.48	115,612	E2010.70
1493						----------	
1494						2,133,854	
1495		**E2020 MOVABLE FURNISHINGS**					
1496		**126600 TELESCOPING STANDS**					
1497		ELEC. OPERATED TELESCOPING AUDIENCE SEATING	203	EA	710.00	144,130	E2050.90
1498						----------	
1499						144,130	
1500							
1501		**TOTAL E20 - FURNISHINGS**	**$9.90**	**/COST PER SF**		**2,290,884**	
1502							
1503							
1504						----------	
1505						3,576,858	
1506							
1507							
1508							
F	**SPECIAL CONSTR**						
1509		**F10 - SPECIAL CONSTRUCTION**					
1510		**F1010 INTEGRATED CONSTRUCTION**					
1511							

New Beverly Middle School — SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1512		**F1020 SPECIAL STRUCTURES**					
1513							
1514		**F1030 SPECIAL FUNCTION CONSTRUCTION**					
1515							
1516		**F1050 SPECIAL FACILITY COMPONENTS**					
1517							
1518		**F1060 ATHLETIC & RECREATIONAL SPEC. CONST.**					
1519		MOTORIZED BLEACHER SEATING	200	EA	175.00	35,000	F1060.60
1520							
1521		**F1080 SPECIAL INSTRUMENTATION**					
1522							
1523		**TOTAL F10 - SPECIAL CONSTRUCTION**	**$0.15**	**/COST PER SF**		**35,000**	
1524							
1525							
1526		**F20 - FACILITY REMEDIATION (SELECTIVE BUILDING DEMO)**					
1527							
1528		**F2010 HAZARDOUS MATERIALS REMEDIATION**					
1529		**028000 HAZARDOUS MATERIAL ABATEMENT**					
1530		ASBESTOS REMOVAL PER CDW 9/4/2014	1	LS	1,735,000	1,735,000	F2010.20
1531						---	
1532		FACILITY REMEDIATION				1,735,000	
1533							
1534		**TOTAL F20 - FACILITY REMEDIATION (SELECTIVE BUILDING DE**	**$7.49**	**/COST PER SF**		**1,735,000**	
1535							
1536		**F30 - DEMOLITION**					
1537							
1538		**F3010 STRUCTURE DEMOLITION**					
1539		**024119 SELECTIVE STRUCTURE DEMOLITION**					
1540		REMOVE EXISTING:					
1541		SCHOOL BUILDING	110,000	GSF	5.75	632,500	F3010.10
1542							
1543						---	
1544						632,500	
1545		**F3030 SELECTIVE DEMOLITION**					
1546						0	
1547						---	
1548						0	
1549		**F3050 STRUCTURE MOVING**					
1550						0	
1551						---	
1552						0	
1553							
1554		**TOTAL F30 - DEMOLITION**	**$2.73**	**/COST PER SF**		**632,500**	
1555							
1556							
G	**SITEWORK**						
1557		**G10 - SITE PREPARATION**					
1558		**G1010 SITE CLEARING**					
1559							
1560		**311000 SITE PREPARATION & CLEARING**					
1561		**SITE PREPARATION: ALLOWANCE**					
1562		REMOVE TREE	47	EA	400.00	18,800	G1010.30
1563		SAWCUT PAVEMENT	1,000	LF	4.75	4,750	G1020.50
1564		HAY BALE W/SILTATION FENCE	3,327	LF	4.15	13,807	G1070.35
1565		CONSTRUCTION FENCE	3,327	LF	12.00	39,924	G1070.35
1566		CONSTRUCTION ENTRANCE	2	LOC	4,000.00	8,000	G1070.35
1567		20' CONSTRUCTION GATE	2	LOC	1,500.00	3,000	G1070.35
1568		CLEAR & GRUB	2.29	AC	10,250.00	23,445	G1010.10
1569		STRIP AND STACK TOPSOIL - 6"	10,500	CY	3.50	36,750	G1010.50
1570		TEMPORARY SITE SIGNS- ALLOW	70	EA	250.00	17,500	G1070.35
1571		INLET PROTECTION	16	EA	250.00	4,000	G1070.35
1572		TEMPORARY PARKING LOT (12"SUBBASE/2"BINDER/)	5,738	SY	22.88	131,296	G1020.50
1573		TEMPORARY BUILDING EGRESS ALLOWANCE FOR TEMP STRUCTURES AND WALI	1	LS	50,000.00	50,000	G1020.50

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1574		TEMPORARY UTILITIES ALLOWANCE	1	LS	35,000.00	35,000	G1020.50
1575						----------	
1576						386,272	
1577							
1578		**G1020 SITE ELEMENTS DEMOLITION**					
1579		**311000 SITE PREPARATION & CLEARING**					
1580							
1581		**SALVAGE EXISTING:**					
1582							
1583		**SITE REMOVE EXISTING:**					
1584		MISCL SITE DEMOLITION	1	LS	500,000.00	500,000	G1020.50
1585							
1586		**MAIN STREET. REMOVE EXISTING:**					
1587						----------	
1588						500,000	
1589		**G1030 SITE ELEMENT RELOCATIONS**					
1590						0	
1591						----------	
1592						0	
1593		**G1050 SITE REMEDIATION**					
1594						0	
1595						----------	
1596						0	
1597							
1598		**G1070 SITE EARTHWORK**					
1599		**SITE:**					
1600		SITE CUT	5,502	CY	4.25	23,384	G1070.20
1601		SITE FILL - ON SITE MAT'L	37,168	CY	4.25	157,964	G1070.20
1602		EXPORT MATERIAL OFFSITE	0	CY	12.00	0	G1070.20
1603		SITE FINE GRADING	71,560	SY	0.85	60,826	G1070.20
1604		IMPORT COMMON FILL	31,666	CY	20.00	633,320	G1070.20
1605		STREET SWEEPING/ DUST CONTROL	1	LS	10,000.00	10,000	G1070.20
1606		EXCAVATE/BACKFILL @ SITE AMENITIES	1	LS	5,000.00	5,000	G1070.20
1607						0	
1608						0	
1609						----------	
1610						890,494	
1611							
1612		**TOTAL G10 - SITE PREPARATION**	**$7.67**	**/COST PER SF**		**1,776,765**	
1613							
1614							
1615		**G20 - SITE IMPROVEMENTS**					
1616		**G2010 ROADWAYS**					
1617		**320000 PAVEMENT, CURBING & EDGING**					
1618							
1619		CROSSWALKS & MARKING	1	LS	7,500.00	7,500	G2010.40
1620		PATCH @ UTILITIES	1	LS	20,000.00	20,000	G2010.10
1621		PATCH @ NEW ENTRIES	4	LOC	5,000.00	20,000	G2010.10
1622		PATCH @ NEW CURBING	150	LF	60.00	9,000	G2010.10
1623							
1624		**G2020 PARKING LOTS**					
1625		**SCHOOL:**					
1626		CONCRETE PAVEMENT @ LOADING DOCK	900	SF	7.50	6,750	G2020.10
1627		CONCRETE PAVEMENT	358	SF	5.00	1,790	G2020.10
1628		BITUMINOUS DRIVE/PARKING STANDARD DUTY	6,756	SY	30.73	207,612	G2020.10
1629		BITUMINOUS DRIVE/PARKING HEAVY DUTY	14,015	SY	35.38	495,851	G2020.10
1630		GRAVEL BASE @ BITUMINOUS	6,756	CY	21.00	141,876	G2020.10
1631		PARKING/TRAFFIC SIGNAGE	50	EA	350.00	17,500	G2020.40
1632		GRANITE CURB STRAIGHT	8,697	LF	32.00	278,304	G2020.40
1633		PARKING STRIPING	1	LS	10,000.00	10,000	G2020.40
1634		HC PAVEMENT MARKINGS	10	EA	250.00	2,500	G2020.40
1635		CROSSWALK MARKING	3,500	SF	1.25	4,375	G2020.40
1636		CONC. WHEEL STOP 6'	8	EA	50.00	400	G2020.40
1637						----------	
1638						1,223,458	

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1639							
1640		**G2030 PEDESTRIAN PLAZAS & WALKWAYS**					
1641							
1642		**320000 PAVEMENT, CURBING & EDGING**					
1643		SITE STAIR W/RAILS	1	EA	3,500.00	3,500	G2030.30
1644		5" CONCRETE SIDEWALKS	22,034	SF	5.00	110,170	G2030.10
1645		CONCRETE PAVERS	19,718	SF	7.50	147,885	G2030.10
1646		BITUMINOUS SIDEWALK	924	SY	24.00	22,176	G2030.10
1647		GRAVEL @ WALKS	924	CY	35.00	32,340	G2030.10
1648		HC CURB CUTS	31	EA	450.00	13,950	G2030.10
1649		CONCRETE SEATS ON GRADE	178	LF	50.00	8,900	G2030.10
1650						---	
1651						338,921	
1652							
1653							
1654		**G2050 ATHLETIC, RECREATIONAL & PLAYFIELD AREAS**					
1655							
1656		**323100 SITE IMPROVEMENTS**					
1657							
1658		**FIELD :**					
1659		MULTIPURPOSE FIELD	1	LS	100,000.00	100,000	G2050.50
1660		SOCCER FIELD GOAL	4	EA	1,500.00	6,000	G2050.10
1661						---	
1662						106,000	
1663		**G2060 SITE DEVELOPMENT**					
1664		**323100 SITE IMPROVEMENTS**					
1665		RECYCLING RECEPTACLE	10	PR	775.00	7,750	G2060.25
1666		BIKE RACK	16	EA	500.00	8,000	G2060.25
1667		ELECTRIC VEHICLE CHARGING STATIONS	6	EA	5,000.00	30,000	G2060.25
1668		SITE STAIR W/RAILS (1 FLT)	1	EA	3,500.00	3,500	G2030.30
1669		30' FLAGPOLE & FOUNDATION @ BUILDING	2	EA	5,260.00	10,520	G2060.35
1670		STONE VENEER RETAINING WALL	178	LF	250.00	44,500	G2060.60
1671		SEGMENTAL RETAINING WALL	642	LF	45.00	28,890	G2060.60
1672		STEEL BOLLARDS	10	EA	1,025.00	10,250	G2060.85
1673		12' BLACK VINYL CHAIN LINK FENCE	918	LF	47.00	43,146	G2060.20
1674		12' CHAIN LINK GATE - DBL 24' WIDE	1	EA	3,500.00	3,500	G2060.20
1675		ORNAMENTAL GREEN SCREEN FENCE	123	LF	80.00	9,840	G2060.20
1676		WOOD DECKING	474	SF	40.00	18,960	G2060.85
1677		SCHOOL SIGN @ ENTRANCE	1	EA	50,000.00	50,000	G2060.30
1678						---	
1679						268,856	
1680							
1681		**G2080 LANDSCAPING**					
1682		**329000 LANDSCAPING**					
1683							
1684		**LAWN AND FIELDS:**					
1685		RESPREAD TOPSOIL	1	LS	50,000.00	50,000	G2080.20
1686		SEED MIX	1	LS	50,000.00	50,000	G2080.20
1687		SOD	140,012	SF	0.65	91,008	G2080.20
1688		IRRIGATION SYS	140,012	SF	1.25	175,015	G3010.50
1689							
1690		**PLANTING:**					
1691		BIO RETENTION PLANTING	1	LS	25,000	25,000	G2080.30
1692		DECIDUOUS TREES ALLOWANCE	57	LS	750.00	42,750	G2080.30
1693		FLOWERING TREES ALLOWANCE	72	LS	500.00	36,000	G2080.30
1694		EVERGREEN ALLOWANCE	84	LS	500.00	42,000	G2080.30
1695		SHRUB ALLOWANCE	100	EA	250.00	25,000	G2080.30
1696		PERENNIAL ALLOWANCE	100	EA	50.00	5,000	G2080.30
1697		MULCH	1	LS	20,000.00	20,000	G2080.30
1698		TREE GRATES	7	EA	500.00	3,500	G2080.50
1699		BOULDERS	28	EA	250.00	7,000	G2080.50
1700		PLANT MAINTENANCE	1	LS	10,000.00	10,000	G2080.80
1701						---	
1702						582,273	
1703							

New Beverly Middle School SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1704		**TOTAL G20 - SITE IMPROVEMENTS**	**$10.13**	**/COST PER SF**		**2,344,492**	
1705							
1706							
1707		**G30 - LIQUID & GAS SITE UTILITIES**					
1708		**G3010 WATER UTILITIES**					
1709							
1710		**330000 UTILITIES**					
1711		TAPPING SLEEVE AND VALVE	3	EA	15,000.00	45,000	G3010.10
1712		2" CLDI	317	LF	55.00	17,435	G3010.10
1713		4" CLDI	227	LF	60.00	13,620	G3010.10
1714		6" CLDI	96	LF	66.00	6,336	G3010.10
1715		8" CLDI	1,669	LF	78.00	130,182	G3010.10
1716		POST VALVE INDICATOR	1	EA	1,477.00	1,477	G3010.10
1717		FIRE HYDRANT	8	EA	3,227.00	25,816	G3010.10
1718		THRUST BLOCKS	30	EA	75.00	2,250	G3010.10
1719		GATE VALVE	14	EA	1,750.00	24,500	G3010.10
1720						----------	
1721						266,616	
1722		**G3020 SANITARY SEWERAGE UTILITIES**					
1723		**330000 UTILITIES**					
1724							
1725		**SANITARY SEWER:**					
1726		6" PVC SANITARY	750	LF	23.60	17,700	G3020.20
1727		BUILDING CONNECTION (2 EA)	15	LF	50.00	750	G3020.20
1728		SANITARY MANHOLE	6	EA	2,500.00	15,000	G3020.50
1729		STORM TRAP UNDERGROUND PRECAST RETENTION 50 X 100	1	EA	30,000.00	30,000	G3020.40
1730		STORM TRAP UNDERGROUND PRECAST RETENTION 85 X 140	1	EA	50,000.00	50,000	G3020.40
1731		STORM OUTLET CONTROL	2	EA	7,500.00	15,000	G3020.40
1732		GREASE TRAP (2500 GAL)	1	EA	10,000.00	10,000	G3020.40
1733						----------	
1734						138,450	
1735							
1736		**G3030 STORM DRAINAGE UTILITIES**					
1737		**330000 UTILITIES**					
1738		LOADING DOCK TRENCH DRAIN	20	LF	85.00	1,700	G3030.20
1739		AREA DRAIN	4	EA	1,200.00	4,800	G3030.20
1740		DRAINAGE MANHOLE	34	EA	2,500.00	85,000	G3030.20
1741		CATCH BASIN	52	EA	2,400.00	124,800	G3030.20
1742		24"	668	LF	53.00	35,404	G3030.20
1743		18"	893	LF	50.00	44,650	G3030.20
1744		15"	461	LF	46.50	21,437	G3030.20
1745		STORM SEWER UNSIZED (8)	3,626	LF	52.31	189,676	G3030.20
1746		FLARED END STRUCTURE W/RIP RAP	2	EA	3,500.00	7,000	G3030.20
1747		DRYWELL	1	EA	5,000.00	5,000	G3030.20
1748		INFILTRATION TRENCH 1 SYSTEM	1,900	SF	27.09	51,471	G3030.20
1749		BIO SWALE SYSTEM what is this for should I remove	1	LS	30,000.00	30,000	G3030.70
1750							
1751						----------	
1752						600,938	
1753							
1754		**G3050 SITE ENERGY DISTRIBUTION**					
1755						----------	
1756						0	
1757		**G3060 SITE FUEL DISTRIBUTION**					
1758						----------	
1759						0	
1760							
1761		**G3060 SITE GAS DISTRIBUTION**					
1762		**330000 UTILITIES**					
1763		GAS METER PAD	1	EA	1,500.00	1,500	G3060.10
1764		TRENCH EXCAVATION/BACKFILL - SCHOOL	709	LF	45.00	31,905	G3060.10
1765		GAS SERVICE		By Gas Co.			G3060.10
1766						----------	
1767						33,405	
1768							

New Beverly Middle School — SD Estimate

Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
1769		**TOTAL G30 - LIQUID & GAS SITE UTILITIES**	**$5.25**	**/COST PER SF**		**1,214,424**	
1770							
1771							
1772		**G40 - ELECTRICAL SITE IMPROVEMENTS**					
1773							
1774		**G4010 SITE ELECTRIC DISTRIBUTION SYSTEMS**					
1775		**330000 UTILITIES**					
1776		PRIMARY DUCT BANK CONCRETE ENCASED	850	LF	70.00	59,500	G4010.10
1777		SECONDARY DUCT BANK CONC ENCASED	100	LF	205.00	20,500	G4010.10
1778		DUCTBANK TO FIELD	766	LF	40.29	30,864	G4010.10
1779		ELECTRIC HAND HOLES	32	EA	750.00	24,000	G4010.10
1780		ELECTRIC MANHOLE	2	EA	1,500.00	3,000	G4010.10
1781		GENERATOR PAD	1	EA	10,000.00	10,000	G4010.10
1782		TRANSFORMER PAD	1	EA	3,000.00	3,000	G4010.10
1783		DIRECT BURIED ELECTRICAL FEED - SHED	600	LF	45.00	27,000	G4010.10
1784							
1785		**260000 ELECTRICAL**					
1786							
1787		FEEDERS - 100% NEUTRAL					
1788		PVC - UNDERGROUND - THREE PHASE	110	LF	81.10	8,921	G4010.20
1789							
1790		**DUCT BANK SPARE OR EMPTY RACEWAYS**					
1791		PVC - UNDERGROUND					
1792		4.00"	1,000	LF	21.05	21,050	G4010.20
1793		GROUNDING					G4010.20
1794		GROUND ROD 3/4" X 10'	4	EA	149.00	596	G4010.20
1795		BARE COPPER WIRE #1/0	100	LF	3.75	375	G4010.20
1796							
1797		SCHOOL SIGN					
1798		SCHOOL SIGN CIRCUIT	1000	LF	8.25	8,250	G4050.90
1799		FIBER OPTIC CABLE/TELECOM	1000	LF	7.05	7,050	G4050.90
1800							
1801		SECURITY SYSTEM					
1802		CCTV CAMERA W/ UG DUCTS & WIRES	28	EA	2,500.00	70,000	G5010.30
1803		PTZ CAMERA	10	EA	4,000.00	40,000	G5010.30
1804						334,106	
1805							
1806		**G4050 SITE LIGHTING**					
1807		**330000 UTILITIES**					
1808							
1809		TRENCH LIGHTING LOOP	15,000	LF	2.75	41,250	G4050.10
1810		LIGHT POLE BASE	127	EA	1,450.00	184,150	G4050.10
1811							
1812		**260000 ELECTRICAL**					
1813							
1814		**LIGHTING FIXTURES**					
1815		**EXTERIOR**					
1816						-	
1817		**PARKING & ROADWAY - WITH DUCTS AND WIRING**					
1818		PARKING LOT LIGHTS	59	EA	1562.00	92,158	G4050.10
1819		STREET LIGHTS	68	EA	1682.00	114,376	G4050.10
1820						---	
1821						206,534	
1822							
1823							
1824						---	
1825						431,934	
1826							
1827		**TOTAL G40 - ELECTRICAL SITE IMPROVEMENTS**	**$2.83**	**/COST PER SF**		**656,040**	
1828							
1829							
1830		**G50 SITE COMMUNICATIONS**					
1831							
1832		**G5010 SITE COMMUNICATIONS SYSTEMS**					
1833		EMPTY DUCT BANK TELEPHONE/CABLE	925	LF	63.32	58,571	G5010.30

New Beverly Middle School SD Estimate

	Breakdown		Description	Quantity	UoM	Unit Cost	Total	Uniformat 2010
	1834		TELEPHONE/CABLE MANHOLES	3	EA	1,575.00	4,725	G5010.30
	1835		DUCT BANK TELE/CABLE TO FIELD	660	LF	44.52	29,381	G5010.30
	1836							
	1837							
	1838		TELECOM SERVICE RELOCATION				0	G1030.10
	1839						----------	
	1840						92,677	
	1841							
	1842		**TOTAL G50 - COMMUNICATIONS**				**92,677**	
	1843							
	1844							
	1845							
	1846		**G90 MISCELLANEOUS SITE CONSTRUCTION**		N/A			
	1847							
	1848		**G9010 TUNNELS**					
	1849							
	1850		**TOTAL G90 - MISCELLANEOUS SITE CONSTRUCTION**				**0**	
	1851							
ALT								
	1854		**Alternate 1**					
ALT	1855		Rain Harvesting System (Plumbing Alternate)	1	LS	247,057.00	247,057	ALT 1
	1856							
	1857							

CM's Construction Cost Estimate

CM's Construction Cost Estimate

Beverly Middle School

Schematic Estimate Assumptions and Clarifications

General

1. We have based the Schematic Estimate for the Beverly Middle School on drawings dated July 3, 2015, the Schematic Design Narrative (Schematic Design Submission 1 dated August 6, 2015), and the revised Geotechnical Report dated July 9, 2015.
2. We have reduced the overall size of the structure from 255,000 sf (Plans Presently Scale) to the program square footage of 231,509.
3. The Cost of the Building Permit as well as the respective Trade Contractors permits for Mechanical, Plumbing, Fire Protection and Electrical have been waived by the Building Commissioner.
4. We have included a 8% Design Contingency.
5. We have included a 2% CM Contingency.
6. We have included a 3% Escalation Contingency.
7. We have not included any Utility Company Back Charges or Fees as may be applicable.
8. We have not included Sales Tax on materials that are permanently incorporated into the work.
9. We have not included any provisions for Testing and Inspection services as well as Geotechnical field or laboratory testing services.

Existing Conditions

1. We have confirmed the existing structure includes both a full basement and crawl spaces which have been considered in our estimated quantities. The 1952 existing building drawing elevations do not coincide with the new Middle School drawing elevations. We have correlated the elevations as directed and have determined the existing crawl space is at approximately elevation 17'-6".

Foundations and Structure

1. We have included 14" x 14" PC piers (approximately 500 ea.) at an average length of 60' or an overall total of 30,000 lf.
2. We have included a 12" structural slab on grade with 12" of common fill for slabs at elevations 21 and 28.
3. We have also included filling the voids left from demolition of the existing structure as well as where grades require such. Building fill is partially figured from site cuts and importing the balance of common fill from off-site sources.
4. We have included structural steel framing and steel joists instead of Glulam columns, beams and decking.

Interior Finishes

1. We have included polished concrete for the cafeteria and adjacent classroom areas per the finish schedule. We have included ½" metal decking and 2' normal weight concrete over the 4" x 12" wood decking.

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Schematic Estimate

Summary			$ per SF	% of Total
A Substructure		**$6,922,476**		
A10 Foundations	$3,185,824		$13.76	3.54%
A20 Special Foundations	$1,969,072		$8.51	2.19%
A40 Slabs-on-Grade	$1,767,580		$7.64	1.97%
B Shell		**$19,492,735**		
B10 Superstructure	$8,108,910		$35.03	9.02%
B20 Exterior Vertical Enclosures	$9,010,426		$38.92	10.02%
B30 Exterior Horizontal Enclosures	$2,373,399		$10.25	2.64%
C Interiors		**$12,545,685**		
C10 Interior Construction	$7,473,879		$32.28	8.31%
C20 Stairs	$484,877		$2.09	0.54%
C30 Interior Finishes	$4,586,929		$19.81	5.10%
D Services		**$21,401,731**		
D10 Conveying	$482,800		$2.09	0.54%
D20 Plumbing	$2,494,261		$10.77	2.77%
D30 HVAC	$8,102,815		$35.00	9.01%
D40 Fire Protection	$1,041,791		$4.50	1.16%
D50 Electrical	$9,280,064		$40.09	10.32%
E Equipment & Furnishings		**$2,304,375**		
E10 Equipment	$785,000		$3.39	0.87%
E20 Furnishings	$1,519,375		$6.56	1.69%
F Special Construction & Demolition		**$2,797,100**		
F10 Special Construction	$315,350		$1.36	0.35%
F20 Facility Remediation	$1,735,000		$7.49	1.93%
F30 Demolition	$746,750		$3.23	0.83%
G Building Sitework		**$6,206,850**		
G10 Site Preparation, Demo	$914,990		$3.95	1.02%
G20 Site Improvements	$3,436,538		$14.84	3.82%
G30 Civil/Mech'l Site Utilities	$1,717,942		$7.42	1.91%
G40 Electrical Site Utilities	$122,060		$0.53	0.14%
G50 Site Communications	$15,320		$0.07	0.02%
Z General Requirements	$1,640,209	**$1,640,209**	$7.08	1.82%
Cost Subtotal	**$73,311,161**		**$316.67**	**81.53%**
General Conditions	$3,379,133			
Insurances				
Builders Risk	$525,009	$3.10 per $1,000		
General Liability & Umbrella	$343,573	$4.48 per $1,000		
Overhead & Profit	$1,357,280	1.75%		
Building Permit& Fees	$0	Cost Waived		
Preconstruction	$0	$0.00		
Performance & Payment Bond	$329,768	$4.30 per $1,000		
Design Contingency	$6,339,674	8.00%		
Construction Contingency	$1,711,712	2.00%		
Escalation to Bid Date	$2,618,919	3.00%		
Total General Contract	**$89,916,229**		**$388.39**	**100.00%**

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Schematic Estimate

CSI #	Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
A Substructure										
A10 Foundations										
A1010 Standard Foundations		**$3,185,824**	$988 /cy							
	Pile Caps - 7' sq x 4' 2 ea		15	cy	400	0	6000	0	0	6,000
	Pile Caps - 8' sq x 4' 106 ea		905	cy	400	0	361800	0	0	361,800
	Pile Caps - 9' sq x 4' 59 ea		637	cy	400	0	254880	0	0	254,880
	Pile Caps - 9' sq x 4'-6 39 ea		474	cy	400	0	189720	0	0	189,720
	Strand Pile Caps		206	ea	340	50	70040	10300	0	80,340
	Pile Cut-offs - R & D		850	ea	75	0	63750	0	0	63,750
	Cont. Concrete Footings 8' x 18" @ Lower Floor		196	cy	510	0	100062	0	0	100,062
	Cont. Concrete Footings 3' x 12" @ Select Areas		148	cy	425	0	62688	0	0	62,688
	Foundation Retaining Walls - 16' x 18" Thick		397	cy	650	0	257985	0	0	257,985
	Foundation Walls / Grade Beams - 4' x 1'-4" Thick		355	cy	575	0	203895	0	0	203,895
	Piers and Pilasters - 4' x 2' x 4' Deep avg.		236	cy	650	0	153304	0	0	153,304
	Interior Grade Beams 2' x 3' Deep		986	cy	550	0	542025	0	0	542,025
	Reinforcing Steel - Foundations	Included Above								
	Set Anchor Bolts		1,400	ea	25	0	35000	0	0	35,000
	Grout Plates		350	ea	50	15	17500	5250	0	22,750
	Elevator Pits		3	ea	5800	4200	17400	12600	0	30,000
	Misc. Pits		1	ls	5000	4000	5000	4000	0	9,000
	Waterstop		250	lf	4.75	15	1188	3750	0	4,938
	Housekeeping Pads		1	ls	10200	0	10200	0	0	10,200
	Damproof Foundation Walls		8,000	sf	1.45	0	11600	0	0	11,600
	Waterproof Foundation Walls		8,000	sf	2.75	5.25	22000	42000	0	64,000
	Cement Waterproofing		3	ea	3200	0	9600	0	0	9,600
	Dewatering - Localized		1	ls	10000	8200	10000	8200	0	18,200
	Foundation Earthwork									
	Level New Bldg Pad to Elev 26 +/-									
	Fill Existing Bldg Area - Bsmnt and Crawlspaces		12,800	cy	0	26	0	332800	0	332,800
	Balance of Cuts for New Bldg Area - Move to fills		2,031	cy	0	10	0	20310	0	20,310
	Balance of Fills for New Bldg Area		5,486	cy	0	26	0	142636	0	142,636
	Exc/BF Pile Caps		2,441	cy	0	10	0	24415	0	24,415
	Exc/BF Exterior Walls / Grade Beams		1,570	cy	0	10	0	15704	0	15,704
	Exc/BF Interior Grade Beams		2,222	cy	0	10	0	22222	0	22,222
	Stone Stabilization Layer - 12"		4,000	cy	0	34	0	136000	0	136,000
A1020 Special Foundations		**$1,969,072**								
	Special Foundations									
	Remove Underground Obstructions	Allowance	1	ls	0	10000	0	10000	0	10,000
	Pre Pile Survey		1	ls	0	10000	0	10000	0	10,000
	Pile Lay-out and Verification Survey		1	ls	0	100000	0	100000	0	100,000
	Vibration and Settlement Monitoring		1	ls	0	20000	0	20000	0	20,000
	Pile Mobilization		1	ls	0	65000	0	65000	0	65,000
	Precast Concrete Piles - 14" x 14" -500 ea 60' long		30,000	lf	0	54	0	1620000	0	1,620,000
	Load, R & D Spoils		4,009	cy	0	8	0	32072	0	32,072
	Dynamic Testing		6	ea	0	7000	0	42000	0	42,000
	Static Load Test		1	ls	0	70000	0	70000	0	70,000
A40 Slabs-on-Grade										
A4020 Structural Slabs-on-Grade		**$1,767,580**								
	12" Structural Slab on Grade - 82,875 sf									
	12" Structural Slab Concrete		3,223	cy	0	120	0	386750	0	386,750
	Form Bulkheads		1,330	lf	12	2.5	15960	3325	0	19,285
	Rebar		280	tn	920	1050	257600	294000	0	551,600
	Pour and Finish Slab on Grade		82,875	sf	0	0	0	0	290063	290,063
	Moisture Mitigation Admixture		3,223	sf	0	42	0	135363	0	135,363
	Concrete Pump		8	da	0	2500	0	20000	0	20,000
A4090 Slab-on-Grade Supplementary Components										

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Schematic Estimate

CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
2" Perimeter Insulation 25 PSI		19,090	sf	0.65	1.5	12409	28635	0	41,044
2" Under Slab Rigid Insul - 25 PSI		99,450	sf	0.52	1.5	51714	149175	0	200,889
Vapor Barrier		103,594	sf	0.15	0.18	15539	18647	0	34,186
12" Common Fill		3,683	cy	24	0	88400	0	0	88,400
A Division Total						**$2,847,259**	**$3,785,154**	**$290,063**	**$6,922,476**

B Shell

B10 Superstructure

B1010 Floor Construction **$5,345,538**

Floor Structural Frame									
Elevation 34 -Zone 5 - Auditorium									
Structural Steel Framing - Auditorium Floor		114	tn	3500	incl	399000	incl	0	399,000
Metal Decking		15,000	sf	3	incl	45000	incl	0	45,000
5-1/4" Concrete Slab - 4000 PSI		280	cy	0	120	0	33600	0	33,600
Moisture Mitigation Admixture		280	cy	0	42	0	11760	0	11,760
WW Mesh		16,500	sf	0.35	0.25	5775	4125	0	9,900
Pour & Finish Slab		15,000	sf	0	incl	0	incl	33750	33,750
Form Bulkheads		350	lf	10	2.25	3500	788	0	4,288
PIP Concrete Stairs		2	sts	1500	1200	3000	2400	0	5,400
Concrete Pump		1	da	0	2500	0	2500	0	2,500
Misc. Spray Fireproofing		15,000	sf	2	incl	30000	incl	0	30,000
5" NW Concrete Slab on Metal Deck - 73,650 sf	Classroom Wings								
Steel Columns and Girders - 10 psf		370	tn	3500	incl	1295000	incl	0	1,295,000
Add Steel Joists - 5 lb psf		184	tn	3500	incl	644438	incl	0	644,438
Fireproof Beams and Decking		73,650	sf	2	incl	147300	incl	0	147,300
Intumescent Fireproofing	Eliminated	8,100	lf	0	0	0	0	0	0
6x12 Glue Lam Beams @ 3' OC	Eliminated	73,650	sf	0	incl	0	incl	0	0
1-1/2" Metal Deck		73,650	sf	3	incl	220950	incl	0	220,950
5" Concrete Slab - 4000 PSI		1,200	cy	0	120	0	144000	0	144,000
Moisture Mitigation Admixture		1,200	cy	0	42	0	50400	0	50,400
WW Mesh		84,700	sf	0.35	0.25	29645	21175	0	50,820
Pour & Finish Slab		73,650	sf	0	0	0	0	165713	165,713
Form Bulkheads		3,200	lf	10	2.25	32000	7200	0	39,200
Concrete Pump		10	da	0	2500	0	25000	0	25,000
2" NW Concrete Slab on Wood Plank - 13,350 sf	Cafeteria		ls	0	0	0	0	0	0
Steel Girders		62	tn	3500	0	217000	0	0	217,000
Add Steel Columns and Joists 7 lb psf		47	tn	3500	0	163538	0	0	163,538
Fireproof Beams and Decking		13,350	sf	2	incl	26700	incl	0	26,700
Intumescent Fireproofing	Eliminated	1,630	lf	0	0	0	0	0	0
Glue Lam Beams and Columns	Eliminated	13,350	sf	0	0	0	0	0	0
4" x 12" Wood Planking	Eliminated	13,350	sf	0	0	0	0	0	0
1/2" Metal Decking		13,350	sf	2.25	0	30038	0	0	30,038
2" Concrete Slab - 4000 PSI		90	cy	0	120	0	10800	0	10,800
Increase Slab to 5"		130	cy	0	120	0	15575	0	15,575
Increase Metal Deck to 1-1/2"		13,350	sf	0.75	0	10013	0	0	10,013
WW Mesh		14,685	sf	0.35	0.25	5140	3671	0	8,811
Pour & Finish Slab		13,350	sf	0	0	0	0	30038	30,038
Form Bulkheads		600	lf	10	2.25	6000	1350	0	7,350
Concrete Pump		5	da	0	2500	0	12500	0	12,500
			ls	0	0	0	0	0	0
5" NW Concrete Slab on Metal Deck - 43,870 sf at Classroom Adjacent to Cafeteria									
Steel Girders		60	tn	3500	0	210000	0	0	210,000
Add Steel Columns and Joists 7 lb psf		154	tn	3500	0	537408	0	0	537,408
Fireproof Beams and Decking		43,870	sf	2	incl	87740	incl	0	87,740
Intumescent Fireproofing	Eliminated	1,200	lf	0	0	0	0	0	0
8.5x22 Glue Lam Beams @ 8' OC	Eliminated	43,870	sf	0	0	0	0	0	0
Glue Lam columns	Eliminated	43,870	sf	0	0	0	0	0	0

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Schematic Estimate

CSI #	Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
	1-1/2" Metal Deck		43,870	sf	3	0	131610	0	0	131,610
	5" Concrete Slab - 4000 PSI		717	cy	0	120	0	85985	0	85,985
	Moisture Mitigation Admixture		717	cy	0	42	0	30095	0	30,095
	WW Mesh		50,451	sf	0.35	0.4	17658	20180	0	37,838
	Pour & Finish Slab		43,870	sf	0	0	0	0	98708	98,708
	Form Bulkheads		2,150	lf	10	2.25	21500	4838	0	26,338
	Concrete Pump		6	da	0	2500	0	15000	0	15,000
	Shore Deck for Slab Pours	Not Req. w/ Steel Joists	43,870	sf	0	incl	0	incl	0	0
Floor Construction Supplementary										
	Install Glulam Hangers to Steel	Eliminated	4,747	ea	0	0	0	0	0	0
	Remove Gluelam Protection	Eliminated	640	mhs	0	25	0	16000	0	16,000
	Misc. Spray Fireproofing		1	ls	20000	0	20000	0	0	20,000
	Firestopping / Firesafing		145,870	sf	0.5	incl	72935	incl	0	72,935
	Expansion Joint Covers		1	ls	0	18000	0	18000	0	18,000
	Steel Angle Bracket		2	ea	5000	incl	10000	incl	0	10,000
	Steel Cable Bracing @ Main Lobby		23	ea	2500	incl	57500	incl	0	57,500
B1020 Roof Construction		**$2,763,372**								
Roof Structural Frame										
Low Roof Structures 4600 sf										
	Structural Steel Framing - 15 # psf		35	tn	3500	incl	120750	incl	0	120,750
	Metal Decking		4,600	sf	3	incl	13800	incl	0	13,800
	5-1/4" Concrete Slab - 4000 PSI		81	cy	0	120	0	9660	0	9,660
	Moisture Mitigation Admixture		81	cy	0	42	0	3402	0	3,402
	WW Mesh		5,060	sf	0.35	0.25	1771	1265	0	3,036
	Pour & Finish Slab		4,600	sf	0	0	0	0	10350	10,350
	Form Bulkheads		300	lf	10	2.25	3000	675	0	3,675
	Concrete Pump		1	dy	0	2500	0	2500	0	2,500
	Misc. Spray Fireproofing		4,600	sf	1.75	incl	8050	incl	0	8,050
Auditorium Roof - 13535 sf										
	Structural Steel Framing - 15 # psf		102	tn	3500	0	355294	0	0	355,294
	3" Corrugated Metal Decking		13,535	sf	6	0	81210	0	0	81,210
Classroom Wing Roofs - 26,300 sf										
	Steel Columns and Girders - 10 psf		132	tn	3500	0	460250	0	0	460,250
	Add Steel Joists 2 lb psf		26	tn	3500	0	92050	0	0	92,050
	Fireproof Beams and Decking		26,300	sf	2	incl	52600	incl	0	52,600
	Intumescent Fireproofing	Eliminated	2,700	lf	0	0	0	0	0	0
	6x12 Glue Lam Beams @ 3' OC	Eliminated	26,300	sf	0	0	0	0	0	0
	1-1/2" Metal Deck		26,300	sf	3	0	78900	0	0	78,900
	5" Concrete Slab - 4000 PSI		460	cy	0	120	0	55230	0	55,230
	Moisture Mitigation Admixture		460	cy	0	42	0	19331	0	19,331
	WW Mesh		28,930	sf	0.35	0.25	10126	7233	0	17,359
	Pour & Finish Slab		26,300	sf	0	0	0	0	59175	59,175
	Form Bulkheads		1,200	lf	10	2.25	12000	2700	0	14,700
	Concrete Pump		3	da	0	2500	0	7500	0	7,500
Classroom Roofs Adjacent to Cafe - 9,685 sf										
	Steel Beams		52	tn	3500	0	182000	0	0	182,000
	Add Steel Columns and Joists 7 lb psf		34	tn	3500	0	118641	0	0	118,641
	Fireproof Beams and Decking		9,685	sf	2	incl	19370	incl	0	19,370
	Intumescent Fireproofing	Eliminated	1,000	lf	0	0	0	0	0	0
	8.5x22 Glue Lam Beams @ 8' OC	Eliminated	9,685	sf	0	0	0	0	0	0
	Glu Lam Columns	Eliminated	9,685	sf	0	0	0	0	0	0
	1-1/2" Metal Deck		9,685	sf	3	0	29055	0	0	29,055
	5" Concrete Slab - 4000 PSI		158	cy	0	120	0	18983	0	18,983
	Moisture Mitigation Admixture		158	cy	0	42	0	6644	0	6,644
	WW Mesh		10,654	sf	0.35	0.25	3729	2663	0	6,392
	Pour & Finish Slab		9,685	sf	0	0	0	0	21791	21,791
	Form Bulkheads		400	lf	10	2.25	4000	900	0	4,900
	Concrete Pump		2	dy	0	2500	0	5000	0	5,000
Library Roof - 5,310 sf										
	Steel Beams		5	tn	3500	0	17500	0	0	17,500
	Add Steel Columns and Joists 7 lb psf		19	tn	3500	0	65048	0	0	65,048
	Fireproof Beams and Decking		5,310	sf	2	incl	10620	incl	0	10,620
	Add 1-1/2" Metal Decking		5,310	sf	3	incl	15930	incl	0	15,930

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Schematic Estimate

CSI #	Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
	Intumescent Fireproofing	Eliminated	240	lf	0	0	0	0	0	0
	8x14 Glue Lam Beams @ 8' OC	Eliminated	5,310	sf	0	0	0	0	0	0
	6 x 12 Glu Lam Columns	Eliminated	5,310	sf	0	0	0	0	0	0
	4" x 12" Wood Planking	Eliminated	5,310	sf	0	0	0	0	0	0
	5/8" Plywood	Eliminated	5,310	sf	0	0	0	0	0	0
Main Entrance Lobby - 1,250 sf										
	Canopy Framing and Finish		825	sf	150	0	123750	0	0	123,750
	Steel Girders - #7 psf		5	tn	3500	0	17500	0	0	17,500
	Add Steel Columns and Joists 7 lb psf		4	tn	3500	0	15313	0	0	15,313
	Fireproof Beams and Decking		1,250	sf	2	incl	2500	incl	0	2,500
	Add 1-1/2" Metal Decking		1,250	sf	3	incl	3750	incl	0	3,750
	Intumescent Fireproofing	Eliminated	200	lf	0	0	0	0	0	0
	8x14 Glue Lam Beams @ 8' OC	Eliminated	1,250	sf	0	0	0	0	0	0
	6 x 12 Glu Lam Columns	Eliminated	1,250	sf	0	0	0	0	0	0
	4" x 12" Wood Planking	Eliminated	1,250	sf	0	0	0	0	0	0
	5/8" Plywood	Eliminated	1,250	sf	0	0	0	0	0	0
Cafeteria Roof - 8,000 sf										
	Steel Girders - #10 psf		40	tn	3500	0	140000	0	0	140,000
	Add Steel Columns and Joists 5 lb psf		20	tn	3500	0	70000	0	0	70,000
	Fireproof Beams and Decking	Not req	8,000	sf	0	incl	0	incl	0	0
	Add 1-1/2" Metal Decking		8,000	sf	3	incl	24000	incl	0	24,000
	Intumescent Fireproofing	Eliminated	900	lf	0	0	0	0	0	0
	8x22 Glue Lam Beams @ 8' OC	Eliminated	8,000	sf	0	0	0	0	0	0
	6 x 12 Glu Lam Columns	Eliminated	8,000	sf	0	0	0	0	0	0
	4" x 12" Wood Planking	Eliminated	8,000	sf	0	0	0	0	0	0
	5/8" Plywood	Eliminated	8,000	sf	0	0	0	0	0	0
Gym Roof Structure - 12,850sf										
	Add Steel Columns, Beams and Joists 15 lb psf		96	tn	3500	0	337313	0	0	337,313
	Fireproof Beams and Decking	Not req	8,000	sf	0	incl	0	incl	0	0
	Add 1-1/2" Metal Decking		12,850	sf	3	incl	38550	incl	0	38,550
	Glue Lam Girders (Steel Cable)	Eliminated	945	lf	0	0	0	0	0	0
	Glue Lam Columns - 35' High	Eliminated	1,260	lf	0	0	0	0	0	0
	6x10 Glue Lam Beams @ 8' OC	Eliminated	12,850	sf	0	0	0	0	0	0
	4" x 12" Wood Planking	Eliminated	12,850	ls	0	0	0	0	0	0
	5/8" Plywood	Eliminated	12,850	ls	0	0	0	0	0	0
	B10 Division Total						**$7,008,758**	**$680,628**	**$419,524**	**$8,108,910**
B20 Exterior Enclosures										
B2010 Exterior Walls		**$5,089,458**								
Exterior Wall Veneer										
	Natural Stone Veneer		3,193	sf	45	incl	143694	incl	0	143,694
	Precast watertable		1,916	lf	60	incl	114966	incl	0	114,966
	Aluminum Siding (Longboard, Woodgrain 6" V)		48,046	sf	58	incl	2786645	incl	0	2,786,645
	Fiber Cement Siding		11,304	sf	28	incl	316512	incl	0	316,512
	Staging & Lifts		5	mo	0	3000	0	15000	0	15,000
Exterior Wall Construction										
	CMU backing wall at Gym/Auditorium		13,024	sf	22	incl	286526	incl	0	286,526
	Lt Ga. Metal Stud Framing		49,519	sf	4.75	incl	235215	incl	0	235,215
	5/8" FT Plywood Sheathing		49,519	sf	3.75	incl	185696	incl	0	185,696
	Insulation (2" Rigid)		49,519	sf	2.5	incl	123797	incl	0	123,797
	Misc. Spray Foam Insulation		1	ls	30000	incl	30000	incl	0	30,000
	Fluid Applied Air Barrier		49,519	sf	6	incl	297113	incl	0	297,113
	1-1/2" Spray Foam Insulation		49,519	sf	4	incl	198076	incl	0	198,076
Exterior Wall Interior Skin										
	Gypsum		49,519	sf	2.25	incl	111418	incl	0	111,418
Equipment Screens										
	Louvered Equipment Enclosure		1,280	sf	35	incl	44800	incl	0	44,800
	ALLOWANCE for Louvered Equip. Enclosure	Allowance	1	allw	200000	incl	200000	incl	0	200,000
B2020 Exterior Windows		**$3,445,178**								

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CSI # Item	Responsibility	Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Exterior Windows (Aluminum)								
Aluminum Windows		14,722 sf	80	incl	1177776	incl	0	1,177,776
Window Blocking		6,000 lf	12	0	72000	0	0	72,000
Solar Shades		852 lf	240	incl	204552	incl	0	204,552
Sealants		1,630 lf	2.5	incl	4075	incl	0	4,075
Lifts		5 mo	3000	incl	15000	incl	0	15,000
Exterior Window Wall (curtainwall)								
CW System		18,135 sf	105	incl	1904175	incl	0	1,904,175
Detailing at beam penetrations		55 ea	300	incl	16500	incl	0	16,500
Window Blocking		2,000 lf	12	0	24000	0	0	24,000
Sealants		3,640 lf	2.5	incl	9100	incl	0	9,100
Lifts		6 mo	3000	incl	18000	incl	0	18,000
B2050 Exterior Doors & Grilles	**$395,790**							
Exterior Entrance Doors								
Aluminum Entrance Doors (Pair)		18 pr	6500	incl	117000	incl	0	117,000
Aluminum Entrance Doors (Single)		4 ea	3500	incl	14000	incl	0	14,000
Electric Operators		8 ea	8000	incl	64000	incl	0	64,000
Exterior Utility Doors (Hollow Metal)								
HM Frames (Double)		6 ea	200	250	1200	1500	0	2,700
HM Frames (Single)		1 ea	125	150	125	150	0	275
HM Doors		13 ea	125	150	1625	1950	0	3,575
New Finish Hardware		13 sets	340	750	4420	9750	0	14,170
Exterior Door Caulking		274 lf	2.5	incl	685	incl	0	685
Overhead Coiling Doors		88 sf	90	incl	7920	incl	0	7,920
Multi-Leaf Vertical Lift Doors (Renlita)		497 sf	345	incl	171465	incl	0	171,465
B2070 Exterior Louvers & Vents	**$30,000**							
Exterior Louvers								
Louvers		1 ls	30000	incl	30000	incl	0	30,000
B2090 Exterior Wall Specialties	**$50,000**							
Exterior Wall Specialties								
Sample Exterior Wall Panels	Mock-up	1 ls	50000	incl	50000	incl	0	50,000
B20 Division Total					**$8,982,076**	**$28,350**	**$0**	**$9,010,426**
B30 Exterior Horizontal Enclosures								
B3010 Roofing	**$2,302,899**							
Low Slope Roofing								
EPDM, White		98,858 sf	16	incl	1581725	incl	0	1,581,725
Roof Blocking		3,895 lf	12	5	46742	19476	0	66,218
Metal Roof Edge/Parapet Copings		3,895 lf	30	incl	116856	incl	0	116,856
Metal Roof Edge/Parapet Copings, Radius		100 lf	40	incl	4000	incl	0	4,000
Roof to Wall Flashing		1,260 lf	35	incl	44100	incl	0	44,100
Curbs / Penetrations & Misc. Flashings		1 ls	40000	incl	40000	incl	0	40,000
Walkway Pads		1 ls	15000	incl	15000	incl	0	15,000
Roof Access Ladder and Cage		6 loc	7500	incl	45000	incl	0	45,000
Soffits - Framing and Finish		6500 sf	60	incl	390000	incl	0	390,000
B3060 Horizontal Openings	**$70,500**							
Vents & Hatches								
Elevator Ventilator		3 ea	3500	incl	10500	incl	0	10,500
Smoke Hatches		3 ea	15000	incl	45000	incl	0	45,000
Roof Access Hatches		6 ea	2500	incl	15000	incl	0	15,000
B30 Division Total					**$2,353,923**	**$19,476**	**$0**	**$2,373,399**

C Interiors

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Schematic Estimate

CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
C10 Interior Construction									
C1010 Partitions	**$3,190,212**								
Interior Fixed Partitions									
Corridor Walls		49,777	sf	16	incl	796435	incl	0	796,435
Typical Interior Partition		82,517	sf	12.5	incl	1031468	incl	0	1,031,468
Low wall @ Auditorium		311	sf	14	incl	4354	incl	0	4,354
Furring @ CMU		10,860	sf	7	incl	76022	incl	0	76,022
Premium for cementious board behind tile		20,904	sf	2	incl	41808	incl	0	41,808
Premium for MR board @ single bathroom walls		12,038	sf	1.25	incl	15048	incl	0	15,048
Mechanical Shaftwall - 2HR		14,693	sf	18	incl	264465	incl	0	264,465
Stair Shaft - 2HR		13,496	sf	14	incl	188937	incl	0	188,937
Gyp column box-out		103	ea	750	incl	77250	incl	0	77,250
CMU at Gym/Auditorium/Locker Rooms		10,605	sf	22	incl	233303	incl	0	233,303
CMU elevator hoistways		4,277	sf	22	incl	94094	incl	0	94,094
Operable Partitions - 13 ea		4,400	sf	65	incl	286000	incl	0	286,000
Acoustical Insulation			ls	0	0	0	0	0	0
Acoustical Sealant			ls	0	0	0	0	0	0
Interior Wood Blocking			md	741.44	445	0	0	0	0
Inter Partition Supplementary Components									
Through Penetration Firestopping		231,509	sf	0.35	incl	81028	incl	0	81,028
C1020 Interior Doors	**$1,677,867**								
Interior Swinging Doors									
Hollow Metal									
HM Frames - 3x7		71	ea	125	160	8888	11376	0	20,264
HM Frames - 6x7		35	ea	200	180	7020	6318	0	13,338
HM Frames - 3x9 (Fixed Transom)		104	ea	155	195	16182	20358	0	36,540
HM Frames - 4.25x9 (Sidelite & Transom)		6	ea	175	200	1050	1200	0	2,250
HM Frames - 5.33x9 (Sidelite & Transom)		2	ea	190	220	380	440	0	820
HM Frames - 6x9 (Sidelite & Transom)		2	ea	200	225	400	450	0	850
HM Frames - 8x9 (Sidelite & Transom)		9	ea	215	230	1935	2070	0	4,005
HM Frames - 11.5-12x9 (Sidelite & Transom)		9	ea	250	300	2250	2700	0	4,950
HM Frames - 20x9 (2-Openings, S & T)		3	ea	750	850	2250	2550	0	4,800
HM Windows		2,182	sf	30	incl	65448	incl	0	65,448
HM Doors (Back of House)		11	lvs	150	250	1650	2750	0	4,400
HM Doors (Egress on Hold Opens)		43	lvs	150	250	6450	10750	0	17,200
Flush SC Wood Doors		122	lvs	150	275	18360	33660	0	52,020
Flush SC Wood Doors w/lite		106	lvs	150	325	15930	34515	0	50,445
Paneled Wood Door		4	lvs	175	360	700	1440	0	2,140
Finish Hardware		287	sets	340	900	97444	257940	0	355,384
Glaze Interior Doors / Lites		4,089	sf	25	incl	102231	incl	0	102,231
Sound Control Doors	Allowance	1	allw	0	0	0	0	50000	50,000
Interior Entrance Doors									
Aluminum Entrance Doors, Single		2	ea	2500	incl	5000	incl	0	5,000
Aluminum Entrance Doors, Double		7	ea	3500	incl	24500	incl	0	24,500
Interior Storefront Framing		10,155	sf	65	incl	660056	incl	0	660,056
Glass Slider, 8x8.75		30	ea	3,500	incl	105000	incl	0	105,000
Glass Slider, 6x8.75		12	ea	3,000	incl	36000	incl	0	36,000
Pass Window		1	allw	0	0	0	0	2500	2,500
Coiling Counter Doors	Allowance	1	allw	0	0	0	0	8000	8,000
Overhead Coiling Grilles	Allowance	1	allw	0	0	0	0	15000	15,000
Interior Access Doors		231,509	sf	0.15	incl	34726	incl	0	34,726
C1030 Fittings	**$1,875,000**								
Finish Carpentry	Allowance	1	allw	1875000	incl	1875000	incl	0	1,875,000
C1090 Interior Specialties	**$730,800**								
Fire Extinguisher Cabinets		150	ea	160	325	24000	48750	0	72,750
Fire Extinguishers		150	ea	45	90	6750	13500	0	20,250

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CSI # Item	Responsibility	Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Information Specialties								
Markerboards & Tackboards		1 allw	205000	0	205000	0	0	205,000
Compartments & Cubicles (A10)								
Toilet Compartments		28 ea	950	incl	26600	incl	0	26,600
Toilet Compartments (Accessible)		20 ea	1400	incl	28000	incl	0	28,000
Urinal Screens		20 ea	300	incl	6000	incl	0	6,000
Shower door & panel		2 ea	850	incl	1700	incl	0	1,700
Lockers								
Type 1 - Custodial Lockers		10 ea	200	incl	2000	incl	0	2,000
Type 2 - @ Team Locker Rooms	No Team Locker Rooms	0 ea	0	incl	0	incl	0	0
Type 3 - @ Student Locker Rooms		165 ea	300	incl	49500	incl	0	49,500
Type 4 - @ Kitchen		20 ea	200	incl	4000	incl	0	4,000
Bath Accessories								
Toilet Accessories - Single Toilet Rooms		30 ea	800	incl	24000	incl	0	24,000
Toilet Accessories - Locker Rooms		2 ea	1000	incl	2000	incl	0	2,000
Toilet Accessories - Gang Toilet Rooms		18 ea	1750	incl	31500	incl	0	31,500
Miscellaneous Toilet/Janitor Accessories		1 ls	2500	incl	2500	incl	0	2,500
Window Treatment								
Window Treatments	Allowance	1 allw	75000	incl	75000	incl	0	75,000
Other Interior Specialties								
Signage Package (NIC Traffic Signage)	Allowance	1 allw	180000	incl	180000	incl	0	180,000
C10 Division Total					**$6,947,612**	**$450,767**	**$75,500**	**$7,473,879**
C20 Stairs								
C2010 Stair Construction	**$380,025**							
Stair Construction								
Stair #1 & #7 (rate INC Guardrail w/wood handrail)		6 flts	14000	incl	84000	incl	0	84,000
Stair #2 (Egress, INC small flight from Infirmary)		3 flts	9500	incl	28500	incl	0	28,500
Stair #3, #4,#5, #6 & #9(Egress)		13 flts	8000	incl	104000	incl	0	104,000
Stair #8 (Egress, small, no switchbacks)		2 flts	4500	incl	9000	incl	0	9,000
Auditorium stairs (Railings below)		2 flts	3500	incl	7000	incl	0	7,000
Guardrail w/wood cap at Dining & Lobby		500 lf	180	incl	90000	incl	0	90,000
Guardrail w/wood cap @ Lobby, Radius		14 lf	225	incl	3150	incl	0	3,150
Handrail @ auditorium ramp and stairs		117 lf	125	incl	14625	incl	0	14,625
Ornamental handrail, Radius, Exterior		30 lf	125	incl	3750	incl	0	3,750
Stair Pan Concrete		24 flts	1500	incl	36000	incl	0	36,000
C2010 Stair Finishes	**$104,852**							
Resilient Stair Finish								
Rubber tile @ Stairs		9,559 sf	10	incl	95589	incl	0	95,589
Resilient Base @ Stair Rubber Flooring		2,316 lf	4	incl	9263	incl	0	9,263
C20 Division Total					**$484,877**	**$0**	**$0**	**$484,877**
C30 Interior Finishes								
C3010 Wall Finishes	**$981,611**							
Tile Wall Finish								
Wall tile @ Gang Bathrooms		20,904 sf	20	incl	418080	incl	0	418,080
Wall tile @ Locker Rooms		1,404 sf	20	incl	28080	incl	0	28,080
EXCLUDES Porcelain Wall Tile (None Shown)		0 sf	0	incl	0	incl	0	0
Wall Painting & Coating								
Paint partitions		312,294 sf	0.85	incl	265449	incl	0	265,449
Paint HM frames		249 ea	150	incl	37290	incl	0	37,290
Paint HM doors		67 lvs	120	incl	8040	incl	0	8,040

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CSI # Item	Responsibility	Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Interior Sealants		331,509 sf	0.18	incl	59672	incl	0	59,672
Acoustical Wall Treatment								
Acoustical Treatment	Allowance	1 ls	150000	incl	150000	incl	0	150,000
Wall Finish Supplementary Components								
Aluminum Column Covers, TT/47 & 48		2 ea	7,500	incl	15000	incl	0	15,000
C3020 Floor Finishes	**$1,835,869**							
Tile Flooring								
Polished Concrete		142,133 sf	7.25	incl	1030461	incl	0	1,030,461
Mosaic Ceramic Floor Tile		6,497 sf	20	incl	129942	incl	0	129,942
Ceramic Tile Base		2,378 lf	20	incl	47556	incl	0	47,556
Marble Thresholds		56 ea	150	incl	8400	incl	0	8,400
Quarry Tile		2,718 lf	25	incl	67950	incl	0	67,950
EXCLUDED - Porcelain Paver Tile	None Indicated	0 lf	0	incl	0	incl	0	0
Resilient Base @ Polished Concrete		20,003 lf	2.5	incl	50009	incl	0	50,009
Resilient Base - NIC at Ceramic		0 lf	4	incl	0	incl	0	0
Resilient Base @ Quarry Tile		525 lf	2.5	incl	1313	incl	0	1,313
Wood Flooring								
EXCLUDED - Wood Strip Flooring	None Indicated	0 sf	0	incl	0	incl	0	0
Wood Athletic Flooring		11,222 sf	20	incl	224442	incl	0	224,442
Masonite Flooring System @ Stage		1,513 sf	20	incl	30258	incl	0	30,258
Resilient Flooring								
Rubber tile @ elevators		111 sf	14	incl	1554	incl	0	1,554
Static Control Resilient Flooring		893 sf	12	incl	10714	incl	0	10,714
Resilient Base @ Other Rubber Flooring		439 lf	2.5	incl	1098	incl	0	1,098
Carpeting								
Carpet Tile	No sheet carpet shown	3,560 sy	45	incl	160218	incl	0	160,218
Resilient Base @ Carpet Tile		5,171 lf	2.5	incl	12926	incl	0	12,926
Entrance Flooring								
Recessed Aluminum Foot Grilles		180 sf	90	incl	16200	incl	0	16,200
Walk-off Mat		530 sf	15	incl	7950	incl	0	7,950
Flooring Supplementary Comp.								
Thin Film Epoxy Flooring		3,578 sf	2.5	incl	8946	incl	0	8,946
Resilient Base @ Thin Film Epoxy		373 lf	2.5	incl	932	incl	0	932
Expansion Joints - Interior		1 ls	25000	incl	25000	incl	0	25,000
C3030 Ceiling Finishes	**$1,769,449**							
Acoustical Suspended Ceilings								
ACT Type 1 - 2x4 Armstrong Cirrus Tegular 535		7,574 sf	5.5	incl	41654	incl	0	41,654
ACT Type 2 - 2x2 Armstrong Cirrus 584	None indicated	0 sf	0	incl	0	incl	0	0
ACT Type 3 - Armstrong Clean Room VL		6,473 sf	6	incl	38837	incl	0	38,837
ACT Type A - Armstrong Wood Ceiling		30,899 sf	25	incl	772470	incl	0	772,470
ACT Type B - Classrooms		122,657 sf	5.5	incl	674616	incl	0	674,616
Gypsum Board Ceilings								
Gypsum Board Ceilings		13,543 sf	12	incl	162520	incl	0	162,520
Paint gyp ceilings		13,543 sf	1	incl	13543	incl	0	13,543
GWB Soffits		1 ls	30000	incl	30000	incl	0	30,000
Paint exposed structure		35,809 sf	1	incl	35809	incl	0	35,809
C20 Division Total					**$4,586,929**	**$0**	**$0**	**$4,586,929**
D Services								
D10 Conveying								
D1010 Vertical Conveying Systems	**$482,800**							
Elevator 1 - 4-Stop		4 stp	40000	incl	160000	incl	0	160,000
Elevator 2 - 5-Stop, 2-Door		5 stp	45000	incl	225000	incl	0	225,000

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CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Elevator 3 - 2-Stop		2	stp	40000	incl	80000	incl	0	80,000
Hoist Beams		3	ea	850	incl	2550	incl	0	2,550
Elev. Pit Ladder		3	ea	3500	incl	10500	incl	0	10,500
Sill Angles		11	ea	350	incl	3850	incl	0	3,850
Sump Pit Cover & Frame		3	ea	300	incl	900	incl	0	900
D10 Division Total						**$482,800**	**$0**	**$0**	**$482,800**
D20 Plumbing									
D2010 Plumbing Fixtures									
Fixtures									
Toilet	AC	80	ea	3600	incl	288000	incl	0	288,000
Urinal	AC	28	ea	3800	incl	106400	incl	0	106,400
Sink - Lavatory	AC	36	ea	3950	incl	142200	incl	0	142,200
Sink - Lavatory (Main Toilet Rooms)	AC	48	ea	3950	incl	189600	incl	0	189,600
Sink - Lavatory (Gang Sink)	AC	2	ea	6750	incl	13500	incl	0	13,500
Sink - Kitchen / Pantry	AC	4	ea	3950	incl	15800	incl	0	15,800
Sink - Classroom (w/ Bubbler)	AC	23	ea	4300	incl	98900	incl	0	98,900
Sink - Science Classroom	AC	36	ea	5400	incl	194400	incl	0	194,400
Sink - Art Classroom	AC	4	ea	4400	incl	17600	incl	0	17,600
Sink - Exam Room	AC	2	ea	3950	incl	7900	incl	0	7,900
Sink - Duplicating / Mail	AC	1	ea	3950	incl	3950	incl	0	3,950
Showers	AC	4	ea	4000	incl	16000	incl	0	16,000
Kitchen & Food Prep Sinks	Not Included								
Mop Receptor	AC	9	ea	3800	incl	34200	incl	0	34,200
Drinking Fountain	AC	14	ea	4200	incl	58800	incl	0	58,800
Emergency Eyewash / Showers	AC	12	ea	1591.8	incl	19102	incl	0	19,102
Hose Bib	AC	18	ea	706	incl	12708	incl	0	12,708
Wall Hydrants	AC	10	ea	856	incl	8560	incl	0	8,560
D2020 Domestic Water Distribution									
Water Meter	AC	1	ea	722.4	3500	722	3500	0	4,222
Backflow Preventer (Main Service)	AC	1	ea	1444.8	6280	1445	6280	0	7,725
Backflow Preventer (HVAC)	AC	1	ea	541.8	1940	542	1940	0	2,482
Water Softener	Not Included								
Pressure Booster Pump	Not Included								
Reclaim Water Equipment Skid	Allowance	1	ea	8668.8	36000	8669	36000	0	44,669
Thermostatic Mixing Valve (Main, Kitchen)	AC	2	ea	541.8	1580	1084	3160	0	4,244
Thermostatic Mixing Valve (Public Lavs)	AC	4	ea	541.8	1580	2167	6320	0	8,487
Gas Fired Hot Water Heater (120 gal)	AC	2	ea	1444.8	11900	2890	23800	0	26,690
HW Recirculating Pumps (10 gpm)	AC	1	ea	361.2	800	361	800	0	1,161
HW Recirculating Pumps (4 gpm)	AC	1	ea	361.2	360	361	360	0	721
Misc Equipment (Tanks, etc.)	AC	6.00%		0	82160	0	4930	0	4,930
HW Heater Flues									
Water Heaters - Intake	AC	2	ea	1083.6	650.16	2167	1300	0	3,467
Water Heaters - Exhaust	Included	2	ea	0	0	0	0	0	0
Piping									
Chilled Water Main	AC	2,983	lf	63	incl	187929	incl	0	187,929
Hot Water Recirc Piping	AC	3,996	lf	38	incl	151848	incl	0	151,848
Reclaimed Storm Water (Lavs)	AC	818	lf	38	incl	31084	incl	0	31,084
Hot Water Recirc Piping (Kitchen)	AC	953	lf	32	incl	30496	incl	0	30,496
Hot Water Branch to Fixtures	Included w/ Fixtures	1	ls	0	0	0	0	0	0
CW Supply & Branch to Fixtures	Included w/ Fixtures	1	ls	0	0	0	0	0	0
Vent Branch Piping to Fixtures	Included w/ Fixtures	1	ls	0	0	0	0	0	0

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CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
CW Supply to Exterior Irrigation	Allowance	2	md	722.4	577.92	1445	1156	0	2,601
CW Supply to HVAC System	Allowance	5	md	722.4	577.92	3612	2890	0	6,502
D2030 Sanitary Waste									
Elevator Sump Pump / Oil Separator	AC	2	ea	1444.8	2665	2890	5330	0	8,220
Acid Waste Neutralization System (0-10 gph)	AC / Burt Process	1	ea	2889.6	30000	2890	30000	0	32,890
Floor Drains	AC	34	ea	670	incl	22780	incl	0	22,780
Toilet Rooms		12	ea						
Locker Rooms		4	ea						
Mechanical Rooms		10	ea						
Food Prep		8	ea						
Acid Waste (Main Drops)	AC	234	lf	31.5	incl	7371	incl	0	7,371
Underslab Drainage (Acid Waste)	AC	83,539	sf	0.44	incl	36757	incl	0	36,757
Underslab Drainage (Waste)	AC	83,539	sf	0.8	incl	66831	incl	0	66,831
Branch Piping & Connections to Fixtures	Included w/ Fixtures	1	ls	0	0	0	0	0	0
D2040 Rain Water Drainage									
Roof Drains	AC	46	ea	6400	incl	294400	incl	0	294,400
Roof Area		83,539	sf	1800	sf/drain				
Risers	Included	1	ls	0	0	0	0	0	0
Horizontal Piping	Included	1	ls	0	0	0	0	0	0
Underslab Drainage (Roof Drains)	Included	1	ls	0	0	0	0	0	0
D2090 Other Plumbing Systems									
Gas Service	By Local Gas Co								
Gas Meter	By Local Gas Co								
Utility Backcharges	Not Included								
Gas Piping									
Main Service	AC	150	lf	105	incl	15750	incl	0	15,750
HVAC & Plumbing Equipment	AC	3,038	sf	48	incl	145824	incl	0	145,824
Pipe	Included	1	ls	0	0	0	0	0	0
Fittings	Included	1	ls	0	0	0	0	0	0
Valves	Included	1	ls	0	0	0	0	0	0
Insulation	Not Included								
Kitchen Equipment									
Mains	AC	498	lf	28	incl	13944	incl	0	13,944
Branches	Incl w/ Kitchen Rough								
Science Labs									
Mains	AC	1,800	lf	28	incl	50400	incl	0	50,400
Branches	Included w/ Fixtures	1	ls	0	0	0	0	0	0
Miscellaneous & General Costs									
Fire Watch	Not Included								
Floor & Wall Penetration Cutting	AC	2	mw	4020	1407	8040	2814	0	10,854
Floor & Wall Penetration Sealing	Incl w/ Div 07	1	ls	0	0	0	0	0	0
Staging & Lifts	AC	1	ls	0	7400	0	7400	0	7,400
Equipment & Pipe Labeling	AC	5	md	722.4	108	3612	540	0	4,152
Project Supervision	Included Above	1	ls	0	0	0	0	0	0
Subcontractor General Conditions	Included Above	1	ls	0	0	0	0	0	0
Coordination Drawings	Included	1	ls	0	0	0	0	0	0
Subcontractor OH&P	Included Above	1	ls	0	0	0	0	0	0
Mechanical Permits & Fees	Waived	0.00%		2,464,451	0	0	0	0	0
Subcontractor Bond	AC	1.20%		2,484,167	0	29810	0	0	29,810
D20 Division Total						**$2,355,741**	**$138,520**	**$0**	**$2,494,261**

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Schematic Estimate

CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
D30 HVAC									
D3010 Energy Supply									
D3020 Heat Generating Systems									
D3030 Cooling Generating Systems									
D3050 Terminal & Package Units									
Equipment									
Boilers (4000 mbh)	AC/ Cleaver Brooks	3	ea	0	70000	0	210000	0	210,000
Air Cooled Chillers (175 ton)	AC	2	ea	0	102375	0	204750	0	204,750
Air Handling Units		13	ea	185,259	cfm				
RTU Energy Recovery (Classroom Wings)									
Units		3	ea						
CFM	AC	126,253	cfm	0	7.8	0	984773	0	984,773
Classrooms		157,816	sf	0.8	cfm/sf				
Dedicated Rooftop AHU									
Units		5	ea						
CFM	AC	16,678	cfm	0	6.4	0	106739	0	106,739
Admin/Guidance		6,416	sf	0.65	cfm/sf				
Band/Choral		7,500	sf	0.8	cfm/sf				
Media Center		5,580	sf	0.7	cfm/sf				
Misc Spaces - 2 ea		5,782	sf	0.45	cfm/sf				
Dedicated Rooftop AHU (Demand Control)									
Units		4	ea						
CFM	AC	38,552	cfm	0	7	0	269864	0	269,864
Gymnasium (H&V) - 2 ea		12,460	sf	0.8	cfm/sf				
Cafeteria		24,160	sf	0.9	cfm/sf				
Auditorium		7,600	sf	0.9	cfm/sf				
MUA Unit (Kitchen)									
Units		1	ea						
CFM	AC	3,776	cfm	0	5.4	0	20390	0	20,390
Kitchen		4,195	sf	0.9	cfm/sf				
Sound Attenuators									
Classroom	AC	6	ea	0	4800	0	28800	0	28,800
Misc	AC	18	ea	0	900	0	16200	0	16,200
Split Systems (AV, IT)		6	ea						
Allowance	AC	6	ea	0	6500	0	39000	0	39,000
Pumps		10	ea						
Chilled Water Circulating	AC	3	ea	0	10200	0	30600	0	30,600
Hot Water Circulating	AC	3	ea	0	7800	0	23400	0	23,400
Radiant / Fin Tube Radiation	AC	4	ea	0	2600	0	10400	0	10,400
VFDs		24	ea						
AHUs (Classroom)	AC	3	ea	0	4500	0	13500	0	13,500
AHUs Return Fans (Classroom)	AC	3	ea	0	1900	0	5700	0	5,700
Dedicated AHUs	AC	9	ea	0	1900	0	17100	0	17,100
MUA Unit	AC	1	ea	0	1200	0	1200	0	1,200
Chilled Water Recir Pumps	AC	3	ea	0	2800	0	8400	0	8,400
Hot Water Recirc Pumps	AC	3	ea	0	2400	0	7200	0	7,200
Air Cooled Chiller	AC	2	ea	0	2600	0	5200	0	5,200
Radiant / Fin Tube Radiation	AC	4	ea	0	1400	0	5600	0	5,600
Terminal Boxes	AC	278	ea	0	640	0	177920	0	177,920
Admin/Guidance (TB w/ HW Reheat)		6,416	sf	300	sf/unit				
Classrooms (TB w/ HW Reheat)		125,288	sf	800	sf/unit				
Classroom Area Corridors		32,528	sf	1040	sf/unit				

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CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Band/Choral (TB w/ HW Reheat)		7,500	sf	800	sf/unit				
Media Center (TB w/ HW Reheat)		5,580	sf	800	sf/unit				
Miscellaneous		54,197	sf	1040	sf/unit				
Ceiling Radiant Heat Panel (24" Wide)									
Classroom Perimeters (80%)	AC	2,704	lf	0	95	0	256880	0	256,880
Fin Tube Radiation	AC	2,162	lf	0	52.8	0	114154	0	114,154
Building Perimeters (80%)									
Floor 0	Not Included	0	lf						
Floor 1		2,378	lf						
Floor 2		1,859	lf						
Floor 3		1,560	lf						
Floor 4		1,868	lf						
Ceiling Radiant (Outs)		-3,380	lf						
Auditorium / Gym (Outs)		-670	lf						
Stair (Outs)		-696	lf						
Toilet Rooms (Outs)		-216	lf						
Cabinet / Unit Heaters		20	ea						
Cabinet Unit Heaters	AC	10	ea	0	1800	0	18000	0	18,000
Stairwells		7	ea						
Entries		3	ea						
Unit Heaters	AC	10	ea	0	650	0	6500	0	6,500
Exhaust Fans		3	ea						
General	AC	1	ls	0	22000	0	22000	0	22,000
Toilets	Included Above	1	ea	0	0	0	0	0	0
Janitor Closets	Included Above	1	ea	0	0	0	0	0	0
Elevator Hoistway	Included Above	1	ea	0	0	0	0	0	0
Kitchen Exhaust	AC	1	ls	0	8000	0	8000	0	8,000
Smoke Exhaust	Not Included								
Miscellaneous Equipment	AC	3.50%		0	2612270	0	91429	0	91,429
Chemical Feed System	Included	1	ls	0	0	0	0	0	0
Expansion Tanks	Included	1	ls	0	0	0	0	0	0
Air Separators	Included	1	ls	0	0	0	0	0	0
Shipping & Freight	AC	1	ls	0	25000	0	25000	0	25,000
Rigging & Setting	AC	1	ls	56880	0	56880	0	0	56,880
Cranes & Lifts	AC	1	ls	0	22500	0	22500	0	22,500
D3040 Distribution Systems									
Piping	$1,780,216								
Equipment									
Boiler	AC	3	ea	2814	2111	8442	6333	0	14,775
Chillers	AC	2	ea	4824	3618	9648	7236	0	16,884
Air Handlers (Classroom)	AC	3	ea	9648	7236	28944	21708	0	50,652
Air Handlers	AC	10	ea	3618	2714	36180	27140	0	63,320
Split Systems	AC	6	ea	2814	2111	16884	12666	0	29,550
Circulation Pumps	AC	10	ea	1608	1206	16080	12060	0	28,140
Feed Systems	AC	2	ea	1407	1055	2814	2110	0	4,924
VAV Boxes	AC	278	ea	176	53	48928	14734	0	63,662
Radiant Heating Panels	AC	676	ea	176	53	118976	35828	0	154,804
Finned Tube Radiation	AC	2,162	lf	13.4	10	28971	21620	0	50,591
Cabinet / Unit Heaters	AC	20	ea	502.5	377	10050	7540	0	17,590
Miscellaneous Equipment	AC	5	mw	4020	3015	20100	15075	0	35,175
Chilled Water Mains & Distribution									
HW Loops & Branches	AC	231,509	sf	5.4	incl	1250149	incl	0	1,250,149
ChW Loops & Branches	Included	1	ls	0	0	0	0	0	0
Condensate Returns	Included	1	ls	0	0	0	0	0	0
Misc Unistrut & Pipe Supports	Included	1	ls	0	0	0	0	0	0
Gas Piping (Boilers)									

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CSI # Item	Responsibility	Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Pipe	Incl w/ Plumbing	200 lf	0	0	0	0	0	0
Fittings	Incl w/ Plumbing	18.00%	0	0	0	0	0	0
Valves	Incl w/ Plumbing	28.00%	0	0	0	0	0	0
Insulation	Not Included							
Radiant Floor Heating	Not Included							
Ductwork	$2,343,200							
Equipment								
Boilers (Flues/OA)	AC	3 ea	1425.6	997.92	4277	2994	0	7,271
Air Handlers (Classroom)	AC	3 ea	8553.6	5988	25661	17964	0	43,625
Air Handlers	AC	10 ea	2851.2	1996	28512	19960	0	48,472
VAV Boxes	AC	278 ea	178.2	125	49540	34750	0	84,290
Exhaust Fans	AC	12 md	712.8	499	8554	5988	0	14,542
Miscellaneous Equipment	AC	4 mw	3564	2495	14256	9980	0	24,236
Ductwork								
Distribution Ductwork								
Admin/Guidance	AC	6,416 sf	7.2	0	46195	0	0	46,195
Classrooms	AC	143,464 sf	8.4	0	1205098	0	0	1,205,098
Science Classrooms	AC	14,352 sf	10.8	0	155002	0	0	155,002
General	AC	67,277 sf	8.4	0	565127	0	0	565,127
Exhaust Duct	Included	1 ls	0	0	0	0	0	0
Fume Hood Exhaust (Stainless)								
Risers & Mains	AC	540 lf	90	incl	48600	incl	0	48,600
Branch to Hoods	Incl w/ Hood Hookup	1 ls	0	0	0	0	0	0
Diffusers & Grilles	AC	231,509	0.35	incl	81028	incl	0	81,028
Volume Dampers, Fire Dampers	AC	1.00%	1971422	incl	19714	incl	0	19,714
Laboratory Hookup								
Hoods & Cabinets	AC	12 ea	1069.2	962	12830	11544	0	24,374
Snorkel Exhaust	Not Included							
Miscellaneous Lab Exhaust Hookup	Not Included							
Insulation								
Piping	AC	32.00%	1250149	0	400048	0	0	400,048
Ductwork	AC	24.00%	2072164	incl	497319	incl	0	497,319
D3060 Controls & Instrumentation								
Controls								
Controls	AC	231,509 sf	8.4	incl	1944676	incl	0	1,944,676
CO2 Sensors / Demand Control								
Gymnasium, Auditorium, Cafeteria	AC	44,220 sf	1.2	incl	53064	incl	0	53,064
Science Air Valves & Controls	AC	12 ea	3800	incl	45600	incl	0	45,600
Kitchen Exhaust Mellink Control System	AC	1 ls	24000	incl	24000	incl	0	24,000
D3070 Systems Testing & Balancing								
Test & Balance								
Testing, Adjusting & Balancing	AC	1 ls	112500	0	112500	0	0	112,500
Mechanical System Commissioning	Allowance	1 ls	54000	incl	54000	incl	0	54,000
Miscellaneous & General Costs								
Fire Watch	Not Included							
Seismic Requirements	AC	0.80%	10087076	incl	80697	incl	0	80,697
Vibration Isolation	AC	0.80%	10087076	incl	80697	incl	0	80,697
Floor & Wall Penetration Cutting	AC	6 mw	4020	1407	24120	8442	0	32,562
Floor & Wall Penetration Sealing	Incl w/ Div 07	1 ls	0	0	0	0	0	0
Staging & Lifts	AC	1 ls	0	14500	0	14500	0	14,500
Testing & Commissioning	Included Above							
Equipment & Pipe Labeling	AC	2 mw	3564	713	7128	1426	0	8,554
Project Supervision	Included Above							

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CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
HVAC Subcontractor General Conditions	Included Above								
Subcontractor OH&P	Included Above								
Mechanical Permits & Fees	Waived	0.00%		########	0	0	0	0	0
Subcontractor Bond	AC	1.20%		########	0	124638	0	0	124,638
D30 Division Total						**$7,365,927**	**$3,062,797**	**$0**	**$8,102,815**
						Adjust to $35 psf per AI3 -			
D40 Fire Protection									
D4010 Fire Protection	$1,041,791								
D4010.10 Water-Based Fire Suppression	AC	231,509	sf	4.5	incl	1041791	incl	0	1,041,791
Backflow Preventer	Included	1	ea	0	0	0	0	0	0
Pipe Alarm Valve	Included	1	ls	0	0	0	0	0	0
Sprinkler Drain Valves	Included	1	ls	0	0	0	0	0	0
Fire Pump	Not Included								
Standpipe	Included	1	ls	0	0	0	0	0	0
Floor Control Assembly	Included	1	ls	0	0	0	0	0	0
FDV	Included	1	ls	0	0	0	0	0	0
Electric Bell	Included	1	ls	0	0	0	0	0	0
Kitchen Ansul Systems	By Others / Food Service								
Piping	Included	1	ls	0	0	0	0	0	0
Sprinkler Heads (Concealed Pendant)	Included	1	ls	0	0	0	0	0	0
D4030 Fire Protection Specialties	$0								
D4030.10 Fire Protection Cabinets	See C1090	0	ea	239.7	275	0	0	0	0
D4030.30 Fire Extinguishers	See C1090	0	ea	39.95	50	0	0	0	0
D40 Division Total						**$1,041,791**	**$0**	**$0**	**$1,041,791**
D50 Electrical									
D5020 Electrical Service & Distribution	$1,218,314								
D5020.10 Electrical Service									
D5020.30 Power Distribution									
Transformer	By Others								
Primary Service	AC	920	lf	240	incl	220800	incl	0	220,800
Site Tel/Data Conduit	AC	920	lf	34	incl	31280	incl	0	31,280
Secondary Service Feeders	AC	80	lf	125	incl	10000	incl	0	10,000
Main Switchgear (4000 amp)	AC	1	ea	146000	incl	146000	incl	0	146,000
Panels & Feeders									
Panels		91	ea						
Panels (600 amp)	AC	3	ea	5800	incl	17400	incl	0	17,400
Panels (400 amp)	AC	5	ea	5800	incl	29000	incl	0	29,000
Panels (225A)	AC	30	ea	4200	incl	126000	incl	0	126,000
Panel (125 amp) Emer	AC	23	ea	2600	incl	59800	incl	0	59,800
Panel (100 amp) Emer	AC	30	ea	2600	incl	78000	incl	0	78,000
Misc Panels (Lighting Relay / AV)	AC	1	ls	7500	incl	7500	incl	0	7,500
Panelboard Feeders (Main)	AC	600	lf	36	incl	21600	incl	0	21,600
Panelboard Feeders	AC	18,109	lf	22	incl	398398	incl	0	398,398
		91	ea	199	ave lf ea				
Transformers	AC	10	ea	573.6	3880	5736	38800	0	44,536
D5020.70 Grounding									
Grounding	Allowance	1	ls	28000	incl	28000	incl	0	28,000
D5030 General Purpose Electrical Power	$1,497,929								

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CSI # Item	Responsibility		Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
D5030.10 Branch Wiring System									
D5030.50 Wiring Devices									
D5030.90 Power Supplementary									
Mechanical Equipment Power		$252,492							
Boilers	AC		3 ea	764.8	612	2294	1836	0	4,130
Chillers	AC		2 ea	2294.4	1836	4589	3672	0	8,261
Air Handing Units (Class)	AC		3 ea	3441.6	2753	10325	8259	0	18,584
Return Fans	AC		3 ea	764.8	612	2294	1836	0	4,130
Air Handing Units	AC		10 ea	1912	1530	19120	15300	0	34,420
Feed Systems	AC		1 ea	764.8	574	765	574	0	1,339
Split Systems	AC		6 ea	1147.2	918	6883	5508	0	12,391
Exhaust Fans	AC		8 md	573.6	402	4589	3216	0	7,805
VFDs	AC		24 ea	286.8	201	6883	4824	0	11,707
Pumps	AC		10 ea	478	335	4780	3350	0	8,130
Terminal Units	AC		298 ea	191.2	153	56978	45594	0	102,572
Water Reclamation Skid	AC		1 ea	764.8	574	765	574	0	1,339
Water Storage Tank Pump (5 hp)	AC		1 ea	669.2	535	669	535	0	1,204
Water Heaters	AC		2 ea	382.4	306	765	612	0	1,377
HW Recirculating Pumps	AC		2 ea	669.2	535	1338	1070	0	2,408
Drinking Fountains	AC		14 ea	382.4	306	5354	4284	0	9,638
Elevator Sump Pumps	AC		2 ea	669.2	535	1338	1070	0	2,408
Miscellaneous Mechanical Equip	AC		3 mw	3824	3059	11472	9177	0	20,649
Kitchen Rough	AC		4 mw	3824	3059	15296	12236	0	27,532
Kitchen Fitup	AC		3 mw	3824	3059	11472	9177	0	20,649
Elevator	AC		1 ea	2676.8	2141	2677	2141	0	4,818
Autoflush Toilets	AC		80 ea	143.4	86.04	11472	6883	0	18,355
Autoflow Faucets	AC		36 ea	143.4	86.04	5162	3097	0	8,259
Fume Hoods	AC		12 ea	1032	incl	12384	incl	0	12,384
Misc Lab Equipment Hookup	AC		4 mw	6883	incl	27532	incl	0	27,532
Electric Vehicle Charging Station (C2.1)	AC		9 ea	382.4	2040	3442	18360	0	21,802
Devices & Wiring (Receptacles/Switches)	AC		231,509 sf	2.95	incl	682952	incl	0	682,952
Emergency Generator (Diesel 750kW)	AC		1 ls	0	215000	0	215000	0	215,000
Generator Enclosure	Included		1 ea	0	0	0	0	0	0
Installation	AC		1 ea	11472	7500	11472	7500	0	18,972
Lift/Crane	AC		1 ea	0	4500	0	4500	0	4,500
Automatic Transfer Switches	AC		2 ea	956	8800	1912	17600	0	19,512
Photovoltaic System									
Panels, Equipment & Supports	Not Included								
Conduit	AC		1 ls	12800	incl	12800	incl	0	12,800
Lightning Protection	AC		83,539 sf	1.8	incl	150370	incl	0	150,370
D5040 Lighting		$2,730,204							
D5040.10 Interior Lighting Control									
D5040.20 Branch Wiring for Lighting									
D5040.50 Lighting Fixtures									
D5040.90 Exterior Lighting									
Interior Lighting									
Fixtures		$1,354,007							
Cafeteria Areas	AC		24,160 sf	0	11	0	265760	0	265,760
Gymnasium	AC		12,460 sf	0	4.4	0	54824	0	54,824
Offices, Classrooms, Public	AC		194,889 sf	0	5.2	0	1013423	0	1,013,423
Exterior Building Lighting	Allowance		1 ls	0	20000	0	20000	0	20,000
Fixture Installation & Wiring	AC		231,509 sf	3.3	incl	763980	incl	0	763,980
Emergency Battery Packs	AC		231,509 sf	0.5	incl	115755	incl	0	115,755

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CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Emergency Exit Lights	AC	231,509	sf	0.28	incl	64823	incl	0	64,823
Exterior Lighting	Allowance	26	ea	2800	incl	72800	incl	0	72,800
Sport Field Lighting / Scoreboards	Not Included								
Lighting Control System & Devices	AC	231,509	sf	1.55	incl	358839	incl	0	358,839
D6010 Data Communications	$1,318,327								
D6010.10 Data Communications Equipment									
Data Network Equipment	Allowance	231,509	sf	2.75	incl	636650	incl	0	636,650
Network Switches (272100)	Incl w/ Allowance	1	ls	0	0	0	0	0	0
Wireless Access Points (272133)	Incl w/ Allowance	1	ls	0	0	0	0	0	0
Structured Cabling									
Tel/Data (Conduit Only)	AC	231,509	sf	0.7	incl	162056	incl	0	162,056
Tel/Data (CAT6 Wiring)	AC	231,509	sf	1.6	incl	370414	incl	0	370,414
Patch Panels	Included	1	ls	0	0	0	0	0	0
Tel/Data Cable Tray	AC	3,392	lf	9.56	16	32428	54272	0	86,700
Corridors		2,992	lf						
MDF/IDF Rooms		400	lf						
Telephone System (273000)	By Owner								
Bi-Directional Amplifier System	AC	231,509	sf	0.27	incl	62507	incl	0	62,507
D6030 Audio-Video Communications	$1,271,317								
D6030.10 Audio-Video System	Allowance	1	ls	1100000	incl	1100000	incl	0	1,100,000
Video & Audio Presentation Equipment (274000)									
Interactive Whiteboards & Projectors (274100)									
IPTV System (277000)									
Auditorium	W/ Allowance Above	1	ea	0	incl	0	incl	0	0
Classrooms (Large)	W/ Allowance Above	60	ea	0	incl	0	incl	0	0
Classrooms (Small)	W/ Allowance Above	16	ea	0	incl	0	incl	0	0
Media Center / Instructional Area	W/ Allowance Above	1	ea	0	incl	0	incl	0	0
Cafeterias	W/ Allowance Above	2	ea	0	incl	0	incl	0	0
Gymnasium AV & Scoreboard Wiring	W/ Allowance Above	2	ea	0	incl	0	incl	0	0
Public Address System (275000)	Allowance	231,509	sf	0.74	incl	171317	incl	0	171,317
Conduit & Wiring	W/ Allowance Above	231,509	sf	0	incl	0	incl	0	0
D7010 Access Control & Intrusion Detect	$327,060								
D7010.10 Access Control									
D7010.50 Intrusion Detection (281600)									
Equipment & Wiring	AC	1	ls	48000	incl	48000	incl	0	48,000
Card Readers	AC	50	ea	286.8	480	14340	24000	0	38,340
Door Position Switches & Devices	AC	150	ea	764.8	840	114720	126000	0	240,720
Security Conduit	Eliminated	231,509	sf	0	incl	0	incl	0	0
D7030 Electronic Surveillance	$128,333								
D7030.10 Video Surveillance									
Indoor/Outdoor CCTV System (282300)	AC	1	ls	35000	0	35000	0	0	35,000
Video Cameras (Exterior)	AC	25	ea	286.8	950	7170	23750	0	30,920
Video Cameras (Interior)	AC	46	ea	286.8	1070	13193	49220	0	62,413
Security Conduit	Incl w/ D7010	231,509	sf	0	0	0	0	0	0
D7050 Detection & Alarm	$520,333								
D7050.10 Fire Detection & Alarm									
Fire Alarm System									
FACP - Control Panel	AC	1	ls	55000	incl	55000	incl	0	55,000
Master Box & Antenna	Included	1	ls	0	0	0	0	0	0

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CSI # Item	Responsibility	Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Fire Alarm - Devices	AC	231,509 sf	1.45	incl	335688	incl	0	335,688
Smoke Detectors	Included	1 ls	0	0	0	0	0	0
Speaker/Strobe	Included	1 ls	0	0	0	0	0	0
Pull Station	Included	1 ls	0	0	0	0	0	0
Tamper Switch	Included	1 ls	0	0	0	0	0	0
Flow Switch	Included	1 ls	0	0	0	0	0	0
Pressure Switch	Included	1 ls	0	0	0	0	0	0
Misc Devices	Included	1 ls	0	0	0	0	0	0
Conduit & Wiring	AC	231,509 sf	0.56	incl	129645	incl	0	129,645
Electrical Miscellaneous	$268,247							
Temporary Building Light & Power	AC	231,509 sf	0.3	incl	69453	incl	0	69,453
Temporary Power Usage	By Others	22 mo	0	0	0	0	0	0
Fire Watch	Not Included							
Floor & Wall Penetration Cutting	AC	12 md	764.8	267.68	9178	3212	0	12,390
Floor & Wall Penetration Sealing	AC	1 ls	16000	incl	16000	incl	0	16,000
Staging & Lifts	AC	1 ls	0	10800	0	10800	0	10,800
Testing & Commissioning	AC	1 ls	23000	incl	23000	incl	0	23,000
Equipment & Pipe Labeling	AC	15 md	764.8	114.72	11472	1721	0	13,193
Project Supervision	Included Above							
Electrical Sub General Conditions	Included Above							
Subcontractor OH&P	Included Above							
Electrical Permits & Fees	Waived	0.00%	########	0	0	0	0	0
Subcontractor Bond	AC	1.20%	########	0	123411	0	0	123,411
D50 Division Total					**$7,186,497**	**$2,093,567**	**$0**	**$9,280,064**
E. Equipment & Furnishings								
E10 Equipment								
E1060 Residential Equipment	$10,000							
Appliances		1 ls	10000	incl	10000	incl	0	10,000
Food Service Equipment	Allowance	1 allw	450000	incl	450000	incl	0	450,000
E1090 Other Equipment	$325,000							
Projection Screens		1 ls	25000	incl	25000	incl	0	25,000
Laboratory Equipment	with Manufact. Casework							
Laboratory Fume Hoods	with Manufact. Casework							
Stage Curtain and Rigging	Allowance	1 allw	300000	incl	300000	incl	0	300,000
E10 Division Total					**$785,000**	**$0**	**$0**	**$785,000**
E20 Furnishings								
E2010 Fixed Furnishings	$1,519,375							
Fixed Multiple Seating								
Manufactured Casework	Allowance	1 allw	1250000	incl	1250000	incl	0	1,250,000
Epoxy Resin Countertops & Integral Sinks	INC Man. Casework							
Plastic Laminate Countertops	INC Man. Casework							
Fixed Audience Seating		376 ea	325	incl	122200	incl	0	122,200
Telescoping Audience Seating (Band/Choral)		203 ea	725	incl	147175	incl	0	147,175
E20 Division Total					**$1,519,375**	**$0**	**$0**	**$1,519,375**
F Special Const & Demolition								
F10 Special Construction								

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CSI # Item	Responsibility		Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
F1012 Pre-engineered Structures		$145,350								
Modular Building			1,530	sf	95	incl	145350	incl	0	145,350
F1060 Athletic & Rec. Special Con.		$170,000								
Gymnasium Equipment			1	ls	100000	incl	100000	incl	0	100,000
Motorized backstops, backboards, etc.	INC Above			ea	0	incl	0	incl	0	0
Telescoping gymnasium bleachers			1	ls	70000	incl	70000	incl	0	70,000
Gymnasium Dividers	INC Above			ea	0	incl	0	incl	0	0
F10 Division Total							**$315,350**	**$0**	**$0**	**$315,350**
F20 Facility Remediation										
Haz Material Abatement			1	ls	1735000	incl	1735000	incl	0	1,735,000
F20 Division Total							**$1,735,000**	**$0**	**$0**	**$1,735,000**
F30 Demolition										
Bulk Building Demolition		$746,750								
Demolish Existing Structure			103,000	sf	7.25	0	746750	0	0	746,750
F30 Division Total							**$746,750**	**$0**	**$0**	**$746,750**
G Building Sitework										
G10 Site Demolition										
G1010 Site Clearing		$383,915								
Erosion & Sedimentation Control										
Haybales and Silt Fencing			3,304	lf	4	incl	13216	incl	0	13,216
Temporary Fencing			3,920	lf	8	incl	31360	incl	0	31,360
- Gates Vehicular			3	pr	1200	incl	3600	incl	0	3,600
- Gates Pedestrian			3	ea	450	incl	1350	incl	0	1,350
- Temp Fence Windscreen / Dust Barrier			2,000	lf	3	incl	6000	incl	0	6,000
Tree Protection			1	ls	12000	incl	12000	incl	0	12,000
R & D Trees and Stumps			3	acre	3000	0	7507	0	0	7,507
Clearing and Grubbing			11	acre	1500	0	17063	0	0	17,063
Strip Topsoil 12" avg			18,352	cy	6	0	110111	0	0	110,111
Stockpile Topsoil to be Reused			18,352	cy	4	0	73408	0	0	73,408
Haul Excess Topsoil			8,350	cy	8	0	66800	0	0	66,800
Protect Stockpile			1	ls	4000	0	4000	0	0	4,000
Dust Control			1	ls	15000	0	15000	0	0	15,000
Wash Down Stations			2	ea	7500	0	15000	0	0	15,000
Maintain Wash Down Stations			1	ls	3500	0	3500	0	0	3,500
Temporary Water To Washdown Stations			1	ls	4000	0	4000	0	0	4,000
G1020 Site Elements Disposal		$50,433								
Selective Site Demolition										
R & D Concrete Paving			4,717	sf	2.25	0	10613	0	0	10,613
Sawcut Concrete			160	lf	6	0	960	0	0	960
Sawcut Asphalt Paving			705	lf	3	0	2115	0	0	2,115
R & D Bituminous Paving			6,510	sy	4.5	0	29295	0	0	29,295
Patch Bituminous Paving			25	sy	38	0	950	0	0	950
R & D Hydrant			1	ls	1500	0	1500	0	0	1,500
Miscellaneous Removals			1	ls	5000	0	5000	0	0	5,000
G1030 Site Element Relocations		$11,600								
Locate boulders			28	ea	350.00	0	9800	0	0	9,800
Remove & Reset Stone Memorial			1	ea	1800.00	0	1800	0	0	1,800

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CSI # Item	Responsibility	Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
G1050 Site Remediations	$105,000							
R & D Oil Tanks incl. Sludge		2 ea	25000	0	50000	0	0	50,000
Screen & Analyze water near UGST		1 ls	5000	0	5000	0	0	5,000
R & D Contaminated Soils	Allowance	1 ls	50000	0	50000	0	0	50,000
G1070 Site Earthwork	$364,042							
Building Footprint		87,798 sf						
Unsuitable Soil Allowance - Fill	W/ Foundations							
Unsuitable Soil Allowance - Organics / Peat	W/ Foundations							
Foundation Excavation	W/ Foundations							
Backfill - Inside Foundations (Imp. Str Fill)	W/ Foundations							
Backfill Outside Foundations	W/ Foundations							
Haul & Dispose of Excess	W/ Foundations							
12" Gravel Under Slab	W/ Foundations							
Proof Rolling	W/ Foundations							
Excavate and Backfill Uitilities Under Slab		2,500 lf	8.5	incl	21250	incl	0	21,250
General Site Areas								
Site Cuts to Fills		10,002 cy	18.00	incl	180036	incl	0	180,036
Site Cuts and Haul		10,313 cy	12.00	incl	123756	incl	0	123,756
Miscellaneous Cuts, Fills & Grading		1 ls	15000	incl	15000	incl	0	15,000
Layout & Engineering		15 Cd	1600	0	24000	0	0	24,000
G10 Division Total					**$914,990**	**$0**	**$0**	**$914,990**
G20 Site Improvements								
G2010 Roadways								
G2020 Parking Lots	$1,236,313							
Parking Lot Pavement								
Bituminous Pavement Vehicular - 3-1/2"		21,561 sy	30	incl	646830	incl	0	646,830
Gravel Base 8"		4,791 cy	36	incl	172488	incl	0	172,488
Misc. Paving Markings		1 ls	15000	incl	15000	incl	0	15,000
Granite Curbing, Roadway, Straight		6,570 lf	35	incl	229950	incl	0	229,950
Granite Curbing, Roadway, Radius		1,788 lf	45	incl	80460	incl	0	80,460
Granite Curbing, Building Entry, Straight		44 lf	45	incl	1980	incl	0	1,980
Granite Curbing, Building Entry, Radius		411 lf	55	incl	22605	incl	0	22,605
Parking Lot Curbs and Gutters								
P-I-P Site Retaining Walls and Footings		210 lf	165	incl	34650	incl	0	34,650
Handrails @ Retaining Walls		210 lf	35	incl	7350	incl	0	7,350
Exterior Stairs from Auditorium	Allowance	1 ls	25000	incl	25000	incl	0	25,000
G2030 Pedestrian Plazas & Walkways	$298,680							
Pedestrian Pavement								
Concrete Paving 4"		21,838 sf	10	incl	218380	incl	0	218,380
Concrete Paving 8" (Loading & Dumpster)		916 sf	18	incl	16488	incl	0	16,488
Gravel Under Paving - 8"		562 cy	36	incl	20232	incl	0	20,232
Waterproofing Compound		22,754 sf	1.3	incl	29580	incl	0	29,580
Rails @ Ramps and Site Stairs		400 lf	35	incl	14000	incl	0	14,000
G2060 Site Development	$234,650							
Site Specialties								
Electric Vehicle Charging Station	Assumes Level 2	6 ea	5000	incl	30000	incl	0	30,000
30' Flag Pole		2 ea	4000	incl	8000	incl	0	8,000
Bench Type A		4 ea	4000	incl	16000	incl	0	16,000
Bike Rack Type A		15 ea	750	incl	11250	incl	0	11,250
Bike Rack Type B		7 ea	750	incl	5250	incl	0	5,250
Custom Art Panels (Low, 4' high)		3 ea	2500	incl	7500	incl	0	7,500
Ornamental Green Screen Column Assembly		2 loc	15000	incl	30000	incl	0	30,000
Segmental Block Retaining Walls		624 lf	175	incl	109200	incl	0	109,200
Wood deck @ Building Entry		475 sf	30	incl	14250	incl	0	14,250
Trash Receptacles	Allowance	4 ea	800	incl	3200	incl	0	3,200

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CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
G2080 Landscaping	$1,666,895								
Black Vinyl Chain Link Fencing									
12' Black Vinyl Chainlink Fence		919	lf	30	0	27570	0	0	27,570
12' Black Vinyl Chainlink Double Gate		1	ea	2400	0	2400	0	0	2,400
6'[?] Black Vinyl Chainlink Fence @ R. Wall		624	lf	18	0	11232	0	0	11,232
4' Ornamental Green Screen	Straight	95	lf	125	0	11875	0	0	11,875
4' Ornamental Green Screen	Radius	27	lf	200	0	5400	0	0	5,400
Stone Masonry									
Stone Veneer Ampit. R. Wall w/Wood Top	Radius	180	lf	340	0	61200	0	0	61,200
Stone Veneer R. Wall w/Granite Cap	Mostly Radius	182	lf	360	0	65520	0	0	65,520
Stone Veneer R. Wall @ Building Entry		57	lf	420	0	23940	0	0	23,940
Stone Veneer R. Wall @ Entry Sign		18	lf	420	0	7560	0	0	7,560
Stone Veneer R. Wall w/Wood Bench		229	lf	450	0	103050	0	0	103,050
Unit Pavers									
Concrete Pavers, Type A, on Rigid Base		14,322	sf	35	0	501270	0	0	501,270
Concrete Pavers, Type B, on Rigid Base		4,352	sf	35	0	152320	0	0	152,320
Concrete Pavers, Type C, on Rigid Base		760	sf	35	0	26600	0	0	26,600
Granite Paving Band		1,241	sf	45	0	55845	0	0	55,845
Plants									
Loam									
Screen and Respread Existing		10,000	cy	14	0	140000	0	0	140,000
Large Deciduous		46	ea	800	incl	36800	incl	0	36,800
Deciduous Ornamental		72	ea	650	incl	46800	incl	0	46,800
Large Evergreen		84	ea	650	incl	54600	incl	0	54,600
Shrub Areas		721	sf	10	incl	7210	incl	0	7,210
Wetland Restoration		2,638	sf	3	incl	7914	incl	0	7,914
Ornamental Grasses		2,172	sf	0.62	incl	1347	incl	0	1,347
Ornamental Grasses 2		1,733	sf	0.62	incl	1074	incl	0	1,074
Sod @ Multi-use Field		140,842	sf	0.9	incl	126758	incl	0	126,758
Ornamental Tree Grate		7	ea	2800	incl	19600	incl	0	19,600
Irrigation System - Fields		140,842	sf	1.2	0	169010	0	0	169,010
G20 Division Total						**$3,436,538**	**$0**	**$0**	**$3,436,538**
G30 Liquid & Gas Site Utilities									
G3010 Water Utilities	$250,320								
Fire Protection Water Distribution									
12" x 8" tapping sleeve & valve		2	ea	1500	incl	3000	incl	0	3,000
2" CDLI Domestic Water Line		56	lf	30	incl	1680	incl	0	1,680
4" CDLI Domestic Water Line		77	lf	40	incl	3080	incl	0	3,080
8" CDLI Domestic Water Line		1,810	lf	80	incl	144800	incl	0	144,800
4" CDLI Fire Water Line		316	lf	40	incl	12640	incl	0	12,640
8" CDLI Fire Water Line		77	lf	80	incl	6160	incl	0	6,160
Gate valve		14	ea	1250	incl	17500	incl	0	17,500
Hydrant		7	ea	7500	incl	52500	incl	0	52,500
Cut & cap water line		1	loc	1200	incl	1200	incl	0	1,200
Cut & cap water line at main		1	loc	2500	incl	2500	incl	0	2,500
Maintain existing hydrant & water line		276	lf	10	incl	2760	incl	0	2,760
Maintain underground cabinet		1	ls	2500	incl	2500	incl	0	2,500
G3020 Sanitary Sewerage Utilities	$149,562								
Sanitary Sewerage System									
6" PVC Sanitary Piping		747	lf	80	incl	59760	incl	0	59,760
Allow for Utility Crossings		1	ls	5,000	incl	5000	incl	0	5,000
Allow for Cut & Patch Site Pavings		1	ls	6,000	incl	6000	incl	0	6,000
SS MH		6	ls	7,000	incl	42000	incl	0	42,000
Grease/Oil Separator		1	ls	25,000	incl	25000	incl	0	25,000
Connect into building SS		1	ea	2,500	incl	2500	incl	0	2,500
Cut & Connect to Existing Sanitary MH		1	ea	2,000	incl	2000	incl	0	2,000
Cut & Cap SS Line		1	ea	750	incl	750	incl	0	750

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CSI # Item	Responsibility		Qty Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Maintain existing sewer main & structures			546 lf	12	incl	6552	incl	0	6,552
G3030 Storm Drainage		$1,302,220							
Storm Piping									
Area Drains/Catch Basins			53 ea	3500	incl	185500	incl	0	185,500
12" HDPE			3,561 lf	90	incl	320490	incl	0	320,490
15"			460 lf	105	incl	48300	incl	0	48,300
18"			891 lf	120	incl	106920	incl	0	106,920
24"			671 lf	150	incl	100650	incl	0	100,650
Connect to Existing Drain Line			2 ea	1500	incl	3000	incl	0	3,000
Connect to Existing MH			2 ea	1200	incl	2400	incl	0	2,400
Storm MH			44 ea	3500	incl	154000	incl	0	154,000
Outlet Control Structure			1 ea	5000	incl	5000	incl	0	5,000
UG Precast Concrete Vault Detention System	50' x 100'		5,000 sf	20	incl	100000	incl	0	100,000
UG Precast Concrete Vault Detention System	85' x 140'		11,900 sf	20	incl	238000	incl	0	238,000
Water Quality Structure			4 ea	6500	incl	26000	incl	0	26,000
Cut & temporarily cap drain line			3 ea	1500	incl	4500	incl	0	4,500
Maintain existing drain line & structures			746 lf	10	incl	7460	incl	0	7,460
G3060 Site Fuel Distribution		$15,840							
Site Gas Distribution									
Excavate and Backfill Gas Service			708 lf	20	incl	14160	incl	0	14,160
Sand Bedding			40 cy	42	incl	1680	incl	0	1,680
EXCLUDES Cut & Cap Gas Line	by Utility		ls	0	incl	0	incl	0	0
EXCLUDES Cut & Cap Gas Line @ Main	by Utility		ls	0	incl	0	incl	0	0
EXCLUDES Cut & Cap Temporary Gas	by Utility		ls	0	incl	0	incl	0	0
EXCLUDES Maintaining portion of Gas	by Utility		ls	0	incl	0	incl	0	0
G30 Division Total						**$1,717,942**	**$0**	**$0**	**$1,717,942**
G40 Electrical Site Improvements									
G4010 Electrical Distribution		$53,560							
G4010.20 Elect. Transmission and Dist.									
Primary Power Service Ductbank									
Excavation & Backfill			600 lf	18	incl	10800	incl	0	10,800
Form Conc. Encased Ductbank			2,400 sfca	7.75	incl	18600	incl	0	18,600
Pour Conc. Duct Bank			100 cy	125	45	12500	4500	0	17,000
Sand Bedding			40 cy	35	incl	1400	incl	0	1,400
Exc. BF Power Metal Building			320 lf	18	incl	5760	incl	0	5,760
G4050 Site Lighting		$68,500							
G4050.10 Site Lighting									
Excavation & Backfill			4,000 lf	10	incl	40000	incl	0	40,000
Light Pole Bases - large			30 ea	950	incl	28500	incl	0	28,500
G40 Division Total						**$117,560**	**$4,500**	**$0**	**$122,060**
G50 Site Communications									
G5010 Site Communications		$15,320							
Telecommunications Ductbank			300 lf	20	incl	6000	incl	0	6,000
Form Conc. Encased Ductbank			600 sfca	7.75	incl	4650	incl	0	4,650
Pour Conc. Duct Bank			25 cy	125	45	3125	1125	0	4,250
Sand Bedding			12 cy	35	incl	420	incl	0	420
G50 Division Total						**$14,195**	**$1,125**	**$0**	**$15,320**

Z General Requirements

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CSI # Item	Responsibility	Qty	Unit	Labr$	Matl$	Labor Tot	Matl Total	Sub Total	Total
Z10 General Requirements									
Quality Requirements	$852,709								
Quality Control									
Testing and Inspections	By Owner								
Geotech Field Services	By Owner								
General Conditions									
Submittal Exchange		1	ls	31395	0	31395	0	0	31,395
CORI Checks and Implementation		1	ls	2500	0	2500	0	0	2,500
Security		1	ls	18000	0	18000	0	0	18,000
Temporary Rails and Walks		2,000	lf	16.5	0	33000	0	0	33,000
Live Fire Watch		1	ls	25000	0	25000	0	0	25,000
Temp. Wire and Lighting	W/ Electrical								
Power Consumption Charges		24	mo	4500	incl	108000	incl	0	108,000
Gas Consumption Charges		2	mo	4500	incl	9000	incl	0	9,000
Temporary Water		26	mo	425	incl	11050	incl	0	11,050
Temporary Heating		6	mo	24000	incl	144000	incl	0	144,000
Gas Consumption		6	mo	18000	incl	108000	incl	0	108,000
Snow Removal		6	mo	2600	0	15600	0	0	15,600
Temporary Enclosures		32,000	sf	3.15	1.95	100800	62400	0	163,200
Temp. Doors		1	ls	5200	incl	5200	incl	0	5,200
Diesel Generator Fuel - For Testing		1	ls	5000	incl	5000	incl	0	5,000
Temporary Stairs		12	flts	3200	incl	38400	incl	0	38,400
Scaffolding and Lifts	W/ Trades								
Hoisting and Rigging	W/ Trades								
Misc. Hoisting and Loading - Lull		1	ls	20000	incl	20000	incl	0	20,000
Temp Elevator Usage		1	ls	7500	incl	7500	incl	0	7,500
Humidity Control / Air Quality		231,509	sf	0.12	incl	27781	incl	0	27,781
Temporary Protection of Work		231,509	sf	0.32	incl	74083	incl	0	74,083
Final Property Survey		1	ls	6000	incl	6000	incl	0	6,000

Updated Project Work Plan

Project Directory

HEERY

Project: **BEVERLY MIDDLE SCHOOL**
Project No: HII-1409500
Issue / revision Date: July 20, 2015
Issued By: Meaghan Bumpus
File: HII-1409500 A00-00-PROJ_DIR

PROJECT DIRECTORY

CITY OF BEVERLY

Company: **City Hall**
Address: 191 Cabot Street, Beverly, MA 01915

Name	Title / Special Address Info	Email	Phone / Fax
Mayor Michael P. Cahill	Mayor of Beverly	Mayorcahill@beverlyma.gov	(978) 605-2333
Martha Lewis	Administrative Assistant	mlewis@beverlyma.gov	(978) 605-2333
Stephanie Williams	City Solicitor	swilliams@beverlyma.gov	978-921-6000
Steve Frederickson	General Building Inspector	sfrederickson@beverlyma.gov	978-921-6025
Mike Collins	Commissioner of Public Services and Engineering	mcollins@beverlyma.gov	978-605-2430
William Ambrefe	Electrical Inspector	wambrefe@beverlyma.gov	978-423-7468
Paul Cotter	Fire Chief of City of Beverly		978-922-2424
David Gelineau	City Purchasing Agent	dgelineau@beverlyma.gov	978-921-6000

OWNER

Company: **BEVERLY PUBLIC SCHOOLS**
Address: 502 Cabot Street, Beverly, MA 01915

Name	Title / Special Address Info	Email	Phone / Fax
Steven A. Hiersche, Ed.D.	Superintendent of Schools	shiersche@beverlyschools.org	
Suzanne M. Charochak, M.Ed.	Assistant Superintendent of Schools		

HEERY

ARCHITECT

Company: Ai3 Architects, LLC

Address: 526 Boston Post Road, Wayland, MA 01778

Name	Title / Special Address Info	Email	Phone / Fax
L. Scott Dunlap, AIA, LEED, AP BD+C	Managing Partner/Principal Ai3 Architects, LLC	dunlap@ai3architects.com	508-358-0790 Ext. 106
Troy Randall, AIA, LEED, AP BD+C	Partner/Principal Ai3 Architects, LLC	randall@ai3architects.com	508-358-0790
Craig Olsen	Designer/Project Architect	olsen@ai3architects.com	508-358-0790
John Jordan	Security Consultant	john@ai3architects.com	508-358-0790
Kris M. Bradner, RLA	Landscape Architecture Birchwood Design Group, LLC	kbradner@ birchwooddesigngroup.com	401-383-4950
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Mehul Dhruv	Principal, Structural Engineering Engineers Design Group, Inc.	mdhruv@edginc.com	781-396-9007
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Robert C. Bravo	Principal, Electrical Engineering Griffith & Vary, Inc.	rbravo@griffithandvary.com	508-295-0050
Abdelmadjid M. Lahlaf, Ph.D., P.E	Principal Engineer / Geotechnical Consultant Lahlaf Geotechnical Consulting, Inc.	madjid.lahlaf@lgcinc.net	978-330-5912 781-771-1933 (C)
Ammar M. Dieb, President	Hazardous Materials Universal Environmental Consultants	adieb@uec-env.com	508-628-5486
Peter Bradley, President	Cost Estimating Project Management & Cost	peterbradley@pmc-ma.com	781-740-8007
John Sousa, Jr., President	Food Service Consultant Crabtree McGrath Associates, Inc.	jsousa@crabtree-mcgrath.com	978-352-8500
Ioana Pieleanu	Acoustical Engineer, Consultant Acentech, Inc.	ipieleanu@acentech.com	617-499-8000

HEERY

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Magda Lelek	Sustainable/Green Design /Renewable Energy Consultant A&L Engineering, Inc.	magda@andelmanlelek.com	781-769-8773
Rockwood J. Edwards, P.E., Vice President	Code Consultant Cosentini Associates, Inc.	redwards@cosentini-ma.com	617-494-9090
Katherine McGuiness	Principal, Code Consultant Kessler McGuiness & Associates	kmcguinness@kmaccess.cor	617-641-2802
Nancy Lohrer	Principal, Furniture, Fixtures, and Equipment Consultant Integrated Contract Design, Inc.	nlohrer@icdinc.com	978-499-8970
David Stephen, President	Educational Programming Consultant New Vista Design	david@newvistadesign.net	617-733-0847

SCHOOL BUILDING COMMITTEE

Company:

Address:

Name	Title / Special Address Info	Email	Phone / Fax
Betsy Desmond		Artsy2@mac.com	
Bob Griffin		bgriffin@griffineng.com	
Bryant Ayles		bayles@beverlyma.gov	
David Gelineau		dgelineau@beverlyma.gov	
David Manzi		dmanzigoldcoast@aol.com	
Denise Deschamps		ddeschamps@beverlyma.gov	
Donna Bergeron		dbergeron@beverlyschools.org	
Dr. Steven Hiersche		shiersche@beverlyschools.org	
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Joanna Murphy Scott		Joanna.scott@comcast.net	
Judy Miller		jmiller@beverlyschools.org	
Maria Decker		mtdecker@comcast.net	

HEERY

Martha Lewis		mlewis@beverlyma.gov	
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Matthew Poska		mposka@beverlyschools.org	
Mayor Cahill		Mayorcahill@beverlyma.gov	
Mike Collins		mcollins@beverlyma.gov	
Paul Manzo		paulmanzo@comcast.net	
Ray & Virginia Bouchard		vbouc@msn.com	
Robert Fortado		rfortado@beverlyschools.org	
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Stephanie Williams		swilliams@beverlyma.gov	
Thaddeus S. Siemasko		Thad@SVDesign.com	
Todd Surette		tsurette@vfa.com	
Troy Randall		Randall@ ai3architects.com	
William Guzowski		bdguzowski@hotmail.com	

PROGRAM MANAGER

Company: **HEERY INTERNATIONAL, INC.**

Address: 80 Blanchard Road, Suite 108 Burlington, MA 01803

Name	Title / Special Address Info	Email	Phone / Fax
Al Calcagno	Project Director	acalcagno@heery.com	781-494-9000 office 401-829-3286 cell
Mark Lydon	Project Representative	mlydon@heery.com	781-494-9000 office 609-306-7491 cell
Tom Ellis, Jr.	Area Manager	tellis@heery.com	781-494-9000 office 617-823-6883 cell

CONSTRUCTION MANAGER

Company: Agostini-Bacon Construction Joint Venture

Address: 243 Narragansett Park Drive, East Providence, RI 02916

Name	Title / Special Address Info	Email	Phone / Fax
Steven Agostini.	Project Executive	stevia@baconconstruction.com	401-435-4848
Robert Gilchrist	Sr. Project Manager	robertg@baconconstruction.com	401-265-4005
Robert Lanzieri	Asst. Project Manager	robl@baconconstruction.com	401-641-2888
William “Sharky” Edge	Superintendent	sharkye@baconconstruction.com	401-641-3853

HEERY

Tom Donatelli	Director of Preconstruction	tdonatelli@baconconstruction.com	401-435-4848 x228
Gary Terrell	Chief Estimator	garyt@baconconstruction.com	401-435-4848 x226
Danny Haughey	Dir of Virtual Design & Constr	danh@baconconstruction.com	401-435-4848 x220

CONTRACTOR - TO BE DETERMINED

Company: [Click **here** to type company name.]

Address: [Click **here** to type address.]

Name	Title / Special Address Info	Email	Phone / Fax
Delete table if not required.			

NOTE:

To create multiple Directory sections above: (1) Select entire table you want to copy (hover cursor over top middle area of table and click Table Selection Icon that appears in upper left corner of table); (2) Copy table (Edit menu: Copy); (3) Place cursor below outside of table and type a carriage return; (4) Paste new table (Edit menu: Paste); (5) Edit text of new table.

If you have accidentally joined two tables together (one on top of the other), and need to restore them as separate tables: (1) Place cursor in row directly below where you want to split the table; (2) Go to Insert Menu: Break: Column break. This creates a horizontal break above the row where the cursor is active, creating two separate tables.

Updated Project Work Plan

Roles and Responsibilities

The Roles and Responsibilities of the OWNER, OPM, and DESIGNER have not changed. They are providing the services outlined in the respective agreements. The Construction Manager (CM) has been selected. They are providing preconstruction services during the Schematic Design Phase and will prepare an Independent Estimate based on the Schematic Design package.

Updated Project Work Plan

Communications & Document Control Procedures

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- Change Orders
- Logs
- CORI Process
- Construction Project Schedule
- Reports

SECTION 1: PROJECT DIRECTORY

KEY PROJECT PARTICIPANTS:

- AWARDING AUTHORITY
  City of Beverly
  191 Cabot Street
  Beverly, MA

- OPM
  Heery International, Inc.
  80 Blanchard Road, Suite 108
  Burlington, MA 01803

- Designer
  Ai3
  526 Boston Post Road
  Wayland, MA

- Construction Manager
  Agostini-Bacon
  241 Narragansett Park Drive
  East Providence, RI 02916

A current PROJECT DIRECTORY is included in the Schematic Design Submission.

SECTION 2: OPM PROJECT MILESTONE SCHEDULE

OPM shall prepare an overall project milestone schedule outlining important tasks and dates to provide project team members an overview of the project. At a minimum all activities identified in the applicable MSBA Module will be included in the Project Master Schedule. OPM shall update the Project Master Schedule on a regular basis.

A current PROJECT SCHEDULE is included in the Schematic Design Submission.

SECTION 3: CONTRACTS, PURCHASE ORDERS, AND OTHER FINANCIAL ITEMS

The OPM will maintain copies of key project contracts including: Owner/OPM, Owner/Designer,

and Owner/Construction Manager, in the OPM project files. The OPM will also include all changes to any of these agreements. Copies of each contract and all subsequent changes will be provided to the MSBA project coordinator. A complete set of all contracts and changes will be provided to the Awarding Authority as a part of the project close out process.

The OPM will also assist the Awarding Authority as needed in the preparation and issuance of Requests for Proposals for Independent Inspection and Testing services and other services deemed necessary.

INVOICES:

The OPM will submit their invoice approximately monthly to the Awarding Authority and include a payment recommendation that identifies the appropriate MSBA Pro Pay code (or codes) with the corresponding amount identified for each applicable Pro Pay code. The OPM Project Administrator will update the Total Project Budget as each invoice is submitted and paid.

The DESIGNER will submit their invoice approximately monthly to the Awarding Authority and the OPM for review and processing. The OPM will review the DESIGNER invoice and once deemed acceptable will forward the invoice including a written payment recommendation that identifies the appropriate MSBA Pro Pay code (or codes) with the corresponding amount identified for each applicable Pro Pay code. The OPM Project Administrator will update the Total Project Budget as each invoice is submitted and paid.

The CONSTRUCTION MANAGER will submit their preconstruction services invoice approximately monthly to the Awarding Authority and the OPM for review and processing. The OPM will review the CONSTRUCTION MANAGER preconstruction services invoice and once deemed acceptable will forward the invoice including a written payment recommendation that identifies the appropriate MSBA Pro Pay code (or codes) with the corresponding amount identified for each applicable Pro Pay code. The OPM Project Administrator will update the Total Project Budget as each invoice is submitted and paid.

Once construction activity has commenced the CONSTRUCTION MANAGER will submit their application for payment approximately monthly. The OPM and Designer will review and process the monthly CONSTRUCTION MANAGER application for payment in accordance with the process as outlined in the OWNER/CONSTRUCTION MANAGER contract. Once the application for payment is acceptable the architect will certify the amount. The OPM will provide the certified application for payment to the AWARDING AUTHORITY including a written payment recommendation. The application for payment will include a SCHEDULE OF VALUES in the format prescribed by the MSBA to simplify the AWARDING AUTHORITY's data entry into the MSBA Pro Pay System. The OPM Project Administrator will update the Total Project Budget as each application for payment is submitted and paid.

The Awarding Authority will submit other project invoices to the OPM for review and processing as they are received over the course of the project. The OPM will review all other project related invoices and applications for payment. Once deemed acceptable the OPM will provide copies of all other project related invoices. Each invoice will include the OPM's written

payment recommendation that identifies the appropriate MSBA Pro Pay code (or codes) with the corresponding amount identified for each applicable Pro Pay code. The OPM Project Administrator will update the Total Project Budget as each invoice is submitted and paid.

PROJECT BUDGET:

The OPM will assist the AWARDING AUTHORITY in preparing the TOTAL PROJECT BUDGET in the format prescribed by the MSBA. The OPM will continuously monitor the project budget and update project budget on a monthly basis to include anticipated/committed cost, approved invoices and contract amendments. The OPM will work closely with the AWARDING AUTHORITY to prepare and process any and all Budget Revision Requests (BRR's). The OPM will communicate with the Awarding Authority regularly regarding the Total Project Budget status and will keep the AWARDING AUTHORITY well informed of any budget variances or anomalies.

CASH FLOW:

The OPM with assistance from the DESIGNER and the CONSTRUCTION MANAGER will prepare an initial Project Cash Flow. The OPM will update the Project Cash Flow on a monthly basis.

WBE/MBE:

The OPM shall monitor and report on the DESIGNER's compliance with MBE/WBE requirements. The OPM shall monitor and report on the CONSTRUCTION MANAGER's compliance with MBE/WBE requirements.

PUBLIC RECORDS:

The OPM shall assist the AWARDING AUTHORITY in responding to Public Records Request and other such requests seeking access to project records and documentation.

SECTION 4: MEETINGS

SCHOOL BUILDING COMMITTEE MEETINGS:

The OPM shall prepare agenda for the School Building Committee Meetings. The City of Beverly has arranged to have the meeting minutes produced by a third party. These meeting minutes will be reviewed by the OPM and corrections made if and as needed prior to issuing final draft meeting minutes. SBC meetings will be posted as required by the Open Meeting statute.

DESIGN TEAM MEETINGS:

The Designer will prepare and issue agenda and meeting minutes for Design Team meetings

CONSTRUCTION PHASE PROGRESS MEETINGS:

Recorded by OPM and used at subsequent meetings. Applicable edits are made and minutes are sent to distribution list usually within 3 business days with attachments such as: Submittals & RFI Logs, Change Request Log, etc.

SECTION 5: REPORTING

OPM REPORT:

The OPM will prepare and submit the monthly On Line report required by MSBA not later than the twelve day of the month following of the report period. The OPM will prepare and submit the monthly "hard copy" report required by MSBA not later than the twenty-fifth day of the month following of the report period.

From commencement of on-site construction activity the OPM will prepare daily reports in accordance with requirements of the Owner/OPM Agreement.

DESIGNER REPORTS:

The DESIGNER shall prepare reports as necessary to communicate the design progress to the OPM and the AWARDING AUTHORITY. The DESIGNER will prepare field observation reports associated with each field visit conducted by any member of the design team during the construction phase.

COMMISSIONING AGENT REPORTS:

The Commissioning Agent shall prepare and submit field observation reports in a timely fashion after each filed visit. The Commissioning Agent shall prepare and maintain a Commissioning Log that identifies and provides a status of deficient wok or other items that require corrective action.

SECTION 6: CONSTRUCTION PHASE

(To be updated with input from the CM based on project specific Information Exchange Platform utilized (Submittal Exchange, etc.))

PROJECT SUBMITTALS:

1. Contractor to provide a full submittal/shop drawing schedule to OPM and DESIGNER.
2. Contractor to forward electronic copy of required submittals/shop drawings to Designer for review and approval (when applicable and to Commissioning agent when applicable) with copy to OPM.
3. Designer reviews and returns submittals/shop drawings to Contractor with copy to OPM.

OPM to forward any applicable submittals/shop drawings to AA's departments.

RFIs (REQUEST FOR INFORMATION):

1. Contractor shall issue a RFI to the Designer with copy to OPM when requesting additional information.
2. Designer reviews and provides response to Contractor with copy to OPM.
3. OPM will coordinate any applicable RFIs to AA's departments.

ASIs (ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS):

An ASI is issued by the Designer using AIA G710 to the Contractor for any clarification/minor changes to the work.

PRs (PROPOSAL REQUEST):

1. A Proposal Request is issued by the Designer using AIA G709 for any proposed changes to the Contractor's scope of work.
2. A PR may increase/decrease the Contractor's Contract.
3. The Contractor shall submit a PCO/COR/CR for the OPM and Designer to review.
4. If the PCO/COR/CRs is acceptable, the Designer will issue a Change Order.

CCDs (CONSTRUCTION CHANGE DIRECTIVE):

CCD is issued by the Designer using AIA G714 directing contractor to proceed on a Lump Sum, Unit Price or Time & Material basis.

CHANGE ORDERS:

1. The Contractor submits a PCO/COR/CR for what they perceive as changes to the scope of work. The PCO/COR/CR is reviewed by OPM and Designer. If acceptable the OPM and Designer will include the Contractor's PCO/COR/CR in a Change Order.
2. If a CCD is issued the Contractor will shall issue a PCO/COR/CR related to the CCD. If acceptable the OPM and Designer will include the Contractor's PCO/COR/CR into a Change

Order.

3. When several PCO/COR/CRs are acceptable, the Designer will issue a Change Order using AIA G701 that itemizes the changes.
4. This Change Order is then signed by the Designer, Contractor and AA.

LOGS:

1. Change Orders: OPM shall prepare and update change order log to include; CCD, ASI, PR, RFI, PCO/COR/CR, description of change and value.
2. Submittal; Architect and Contractor shall prepare and update logs for all submittals/shop drawings.

CORI PROCESS:

1. Applicant sends a legible completed CORI application and copy of photo identification to AWARDING AUTHORITY.
2. Standard processing time for applications is approximately 14 days (+/-).
3. If applications are illegible or incomplete, AWARDING AUTHORITY will notify applicant.
4. AWARDING AUTHORITY to notify applicant if their application is Cleared or Denied.
5. AWARDING AUTHORITY to provide Cleared applicant with a badge.
6. Applicant to display badge at all times on project site.
7. Denied CORI applicants are not allowed on project site.
8. Appeal process for Denied CORI applicant is under the discretion of AWARDING AUTHORITY.

CONSTRUCTION PROJECT SCHEDULE:

<u>OPM Milestone Schedule</u>

1. OPM shall prepare an overall project milestone schedule outlining important tasks and dates to provide project team members and overview of the project.
2. OPM shall update variances when applicable.

<u>Contractor's Progress Schedule</u>

1. Contractor to issue a 90 day look ahead schedule upon receipt of notice to proceed.
2. Contractor to issue a complete CPM Schedule within the first the 90 days of notice to proceed to OPM and Designer for review and acceptance.
3. OPM and Designer to review and provide comments.
4. Upon acceptance, the CPM schedule will be considered the Contractor's baseline schedule.
5. Contractor to provide monthly update to baseline schedule for OPM and Designer's review.

REPORTS:

Construction Field Reports

1. Contractor's Daily Report shall include and not necessarily limited to; onsite construction activities, manpower, visitors, equipment, deliveries, weather, safety, etc.
2. OPM onsite representative Daily Report include and not necessarily limited to; contractor's onsite construction activities such as manpower, visitors, weather, quality of work, safety status, equipment, deliveries, observed delays, deficiencies and field problems.
3. Designer & Consultant shall issue a field report recording the progress of work and observations that the work observed is being built in accordance with the contract documents.

Construction Inspections/Observations

1. AWARDING AUTHORITY to provide OPM with their independent materials and testing & inspection company.
2. OPM coordinates materials testing & inspection company as the contractor's work progresses such as: Soils, Reinforcing Steel, Concrete, Structural Steel, Fireproofing, bituminous concrete etc.
3. Designer coordinates their Design Engineers by disciplines.
4. Contractor coordinates AWARDING AUTHORITY departments on work items such as: Storm Drainage, Sewer, Water, Building, Electrical, Plumbing, Board of Health etc.
5. AWARDING AUTHORITY and their departments are at liberty to visit the site at their convenience to perform inspections/observations. AWARDING AUTHORITY to sign in at Contractor's field office and notify onsite OPM representative of their presence.
6. AWARDING AUTHORITY to provide any written observation to OPM prior to departure.
7. OPM to log in AWARDING AUTHORITY's observation and share with Contractor and/or Designer.

Updated Project Work Plan

Designer's Work Plan

Beverly Middle School

Work Plan

Ai3 Architects, LLC

August 6, 2015

Phase	Responsibility	Description of Key Tasks	Deliverable	Submittal Date	Status
Schematic Design					
	UEC	Environmental Assessment	Hazardous Material Identification Report		Complete
	PARE	Phase 1 Environmental Report	Forward copy of report to Designer		Complete
	Owner	Site Survey	Aerial Site Survey with Wetland Flagging Delineation		Complete
	Ai3 Technology, Owner	District Technology Representatives Meeting	District Technology Discussion and Model High School Technology Infrastructure		Complete
	PARE	Geotechnical Site Evaluation	Begin Subsurface Investigation on Site		Complete
	Ai3, Owner	Final Design Program	Excel spreadsheet and architect's signature		Complete
	PARE	Traffic Study	Final Traffic Study		Complete
	Ai3, G&V, EDG, Ai3 Technology	Building Description Narratives	Architectural, Sustainable Design, MEP, Fire Protection, Structural, and Technology		Complete
	Ai3	LEED Scorecard	LEED Scorecard and Potential rating		Complete
	PARE	Utility Analysis	Narrative		Complete
	Ai3, Owner, Heery	**DESE Approval**	**Plans and Program forwarded to Heery and District Working Group. Owners' Narrative describing SPED Program Spaces**	**8/6/2015**	Pending
	Ai3, PARE, Wil-Spec	Document Updates: Plans, Site Plan, Exterior Elevations, Model Images, Specifications	Plans and Specs to PM&C Cost Estimator		Complete
	PARE, Birchwood	Site Development Plans and Analysis	FINAL Schematic Site Plan, Civil Drawings, and Progress Survey		Complete
	Wil-Spec	Specifications	Outline Specifications		Complete
	Ai3, Owner	Schematic Building Floor Plans	Overall 1/8" Building Floor Plans		Complete
	Ai3	Schematic Roof Plans	Overall and 1/8" Roof Plans		Complete
	Ai3	Schematic Exterior Elevations	Overall and 1/8" Exterior Elevations		Complete
	PARE	Geotechnical Site Evaluation	Final Report		Complete
	Ai3	Massing Study	Images of Exterior Design		Complete
	Ai3	Preliminary Project Cash Flow	MSBA Formatted Cash Flow Projections		Complete
	Heery	Project Schedule	OPM Project Schedule		Complete
	PM&C, Heery, Agostini	Cost Estimate	Uniformat Detailed Estimate 100% SD		Complete
	PM&C, Heery, Agostini	Reconcile Cost Estimate	Reconciled Cost Estimates	7/23/2015	Complete
	Ai3, Heery	Project Budget Cost	Excel Spreadsheet 3011		Complete
	Heery	Value Engineering Report	Schematic Design VE Report		Complete
	SUBMITTALS				
	1 Ai3	Submit Documents for DESE Review	Cover Letter, Space Summary, Plans		Pending
	2 Ai3	Submit Documents for Ai3 Cost Estimate	Plans and Specifications		Complete
	3 Ai3	Submit Documents to KBA	MSBA Formatted PS&B Submission		Complete
	4 **Heery**	**Submit Documents to MSBA**	**Final Schematic Design Submittal**	**8/6/2015**	Complete

Board of Directors Meeting Date September 24, 2014

Phase	Responsibility	Description of Key Tasks	Deliverable	Submittal Date	Status
Design Development	Ai3, PARE, Wil-Spec	Document Updates: Plans, Exterior Elevations, Model Images, Specifications	Plans and Specs to PM&C Cost Estimator	12/2/2015	
	Consultants	Document Updates: MEP, Technology, Waste Water, Food Service, Structural, Civil & Site	FINAL Design Devlopment Plans	12/2/2015	
	Wil-Spec	Specifications	Outline Specifications	12/2/2015	
	PM&C, Heery, Agostini	Cost Estimating for Design Development	Cost Estimates Returned to Architect & OPM	12/2/2015	
	PM&C, Heery, Agostini	Estimate Reconciliation	Design Team Reconciliation	12/21/2015	
	SUBMITTALS				
	Heery	Estimates Submitted to MSBA	Transfer of reconciled cost estimates	12/22/2015	
	Heery	**Submit Documents to MSBA**	**100% DD Submittal**	**1/5/2016**	

Phase	Responsibility	Description of Key Tasks	Deliverable	Submittal Date	Status
60% Construction Documents	Ai3, A&L	Chapter 149 Section 44m Life Cycle Cost Estimates	Report from Andelman & Lelek and Compliance Approach and Methodology	4/18/2016	
	PARE	Site Related Code Analysis: Permitting and Zoning	Detailed Review of Beverly's Regulatory Requirements	4/18/2016	
	Ai3	Program Comparison Analysis	Letter from Architect outlining differences from PS&B Space Summary Submittal	5/4/2016	
	Ai3	Program Space Summary	Space Summary Document signed and certified by Architect	5/4/2016	
	Ai3	Project Design Compliance	Letter from Architect verifying compliance of design with PS&B	5/4/2016	
	Heery	Updated Schedule	Schedule	4/18/2016	
	Design Team	60% Construction Documents	PDF Files	4/18/2016	
	Design Team	60% Construction Specification	PDF Files	4/18/2016	
	PM&C, Heery, Agostini	60% Cost Estimate	Detailed Cost Estimate	5/4/2016	
	PM&C, Heery, Agostini	Reconcile Cost Estimate	Reconcilied Cost Estimates	5/5/2016	
	Heery	Value Engineering Report	60% CD VE Report	5/6/2015	
	SUBMITTALS				
	Heery	Estimates Submitted to MSBA	Transfer of reconciled cost estimates	5/6/2016	
	Heery	**Submit Documents to MSBA**	**60% CD Submittal**	**5/11/2016**	

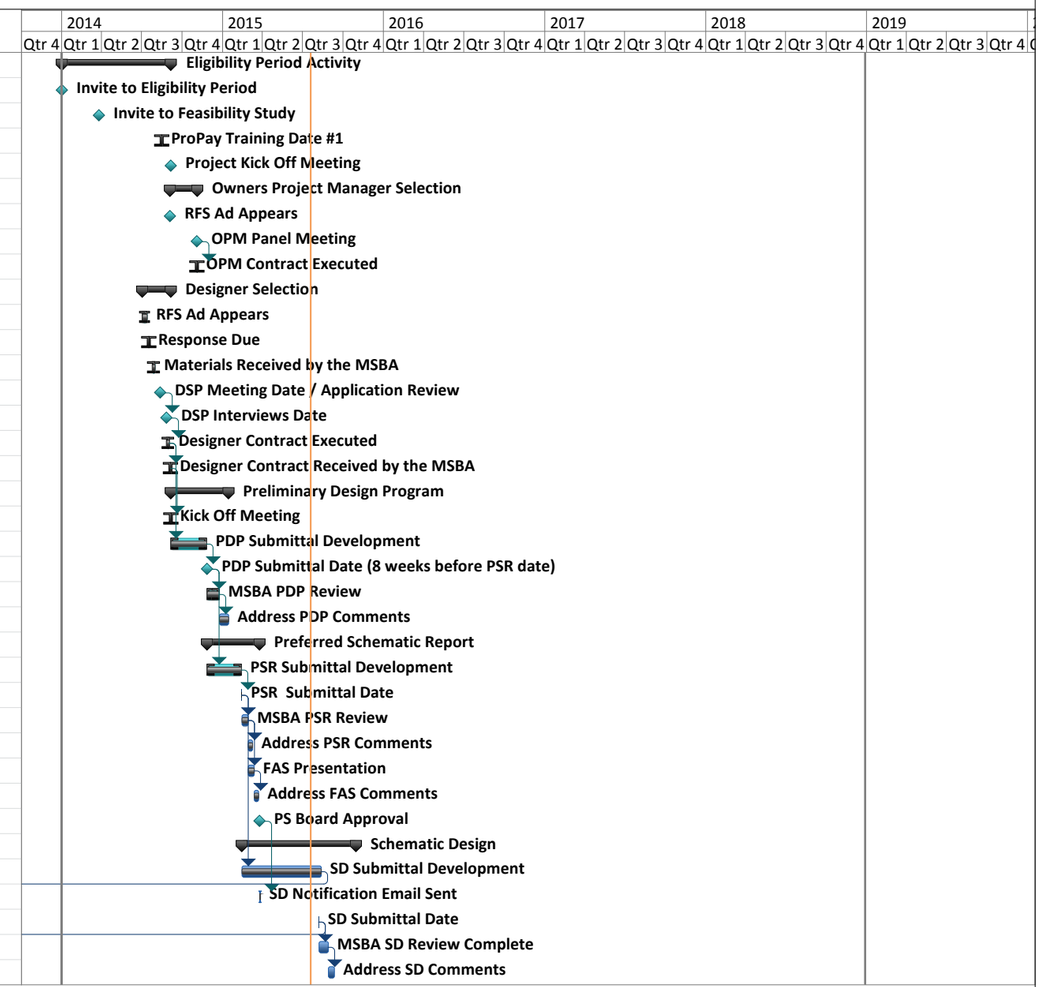
Phase	Responsibility	Description of Key Tasks	Deliverable	Submittal Date	Status
90% & 100% Construction Documents	Ai3	Program Space Summary	Space Summary Document signed and certified by Architect	8/10/2016	
	Heery	Geotechnical Peer Review	Letter and Report from Second Peer Review	8/10/2016	
	Cx Agent	Cx Review	Review Questions and responses from design team	8/10/2016	
	PARE	Site Related Code Analysis: Permitting and Zoning	Detailed Review of Beverly's Regulatory Requirements	8/10/2016	
	Heery	Updated Schedule	Schedule	8/10/2016	
	Ai3, Cosentini	Building Code and Fire Safety Review	Letter from Architect and Code Review Consultant	8/10/2016	
	Ai3	Utility Certification & Town Board Approval	Letter from Architect stating review meetings and approvals obtained from Town Departments	8/10/2016	
	Ai3	Program Comparison Analysis	Letter from Architect outlining differences from 60% Space Summary Submittal	8/10/2016	
	KMA	Site and Building ADA MAAB Review	Letter of Compliance from the Accessibility Consultant. Design Team's responses to the detailed Review Document provided by Accessibility Consultant	8/10/2016	
	Ai3	Testings and Permits compliance	Letter from Architect stating all testing and permits have been obtained for the project	8/10/2016	
	AI3, G&V	Compliance with Energy Code	Com CHECK 3.9.3 2012 IEC Report	7/25/2016	
	EDG	Structural Design Calculations	Structural Design Calculation Report	7/25/2016	
	Ai3	90% Construction Documents	Documents available for review by design team and independent estimator	7/25/2016	
	Design Team	90% Construction Documents	Bound AutoCAD files	7/25/2016	
	Design Team	90% Construction Specification	PDF File of Specification	7/25/2016	
	Ai3	Interior Materials Color Board	Color Board for Owner review	6/1/2016	
	Design Team	Designer review responses to the 60% MSBA review comments	Letters of compliance from Design Team	8/10/2016	
	PM&C	Final Designer Cost Estimate	Cost Estimates	8/10/2016	
	Heery	Final OPM Cost Estimate	Cost Estimates	8/10/2016	
	Agostini	Final CM Cost Estimate	Cost Estimates	8/10/2016	
	Heery	Cost Estimate Comparison Spreadsheet	Cost Estimate Comparison Spreadsheet	8/11/2016	
	PM&C, Heery, Agostini	Reconcile Cost Estimate	Conference Call	8/11/2016	
	Ai3, Heery	Independent Structural Peer Review	Letter of compliance to Building Code	8/12/2016	
	Heery	Value Engineering Report	Schematic Design VE Report	8/12/2016	
	SUBMITTALS				
	Heery	Estimates Submitted to MSBA	Transfer of reconciled cost estimates	8/12/2016	
	Design team	**90% Construction Documents to MSBA**	Drawings & Specifications	**8/17/2016**	
	Design team	**100% Bid Documents to MSBA**	Drawings & Specifications	**9/30/2016**	
	Design team	**Release Bid Documents**	Drawings & Specifications	**9/30/2016**	

Updated Project Work Plan

Project Schedule

City of Beverly, MA
New Beverly Middle School
Schematic Design Submission Master Schedule

ID	Task Name	% Complete	Duration	Start	Finish
1	**Eligibility Period Activity**	**100%**	**247 days**	**Wed 1/1/14**	**Fri 9/5/14**
2	Invite to Eligibility Period	100%	0 days	Wed 1/1/14	Wed 1/1/14
3	Invite to Feasibility Study	100%	0 days	Wed 3/26/14	Wed 3/26/14
4	ProPay Training Date #1	100%	1 day	Fri 8/15/14	Fri 8/15/14
5	Project Kick Off Meeting	100%	0 days	Fri 9/5/14	Fri 9/5/14
6	**Owners Project Manager Selection**	**100%**	**62 days**	**Wed 9/3/14**	**Mon 11/3/14**
7	RFS Ad Appears	100%	0 days	Wed 9/3/14	Wed 9/3/14
8	OPM Panel Meeting	100%	0 days	Mon 11/3/14	Mon 11/3/14
9	OPM Contract Executed	100%	1 day	Mon 11/3/14	Mon 11/3/14
10	**Designer Selection**	**100%**	**65 days**	**Wed 7/2/14**	**Thu 9/4/14**
11	RFS Ad Appears	100%	11 days	Wed 7/2/14	Sat 7/12/14
12	Response Due	100%	1 day	Thu 7/17/14	Thu 7/17/14
13	Materials Received by the MSBA	100%	6 days	Fri 7/25/14	Wed 7/30/14
14	DSP Meeting Date / Application Review	100%	0 days	Tue 8/12/14	Tue 8/12/14
15	DSP Interviews Date	100%	0 days	Tue 8/26/14	Tue 8/26/14
16	Designer Contract Executed	100%	7 days	Tue 8/26/14	Mon 9/1/14
17	Designer Contract Received by the MSBA	100%	1 day	Thu 9/4/14	Thu 9/4/14
18	**Preliminary Design Program**	**100%**	**131 days**	**Fri 9/5/14**	**Tue 1/13/15**
19	Kick Off Meeting	100%	1 day	Fri 9/5/14	Fri 9/5/14
20	PDP Submittal Development	100%	81 days	Fri 9/5/14	Mon 11/24/14
21	PDP Submittal Date (8 weeks before PSR date)	100%	0 days	Wed 11/26/14	Wed 11/26/14
22	MSBA PDP Review	100%	28 days	Wed 11/26/14	Tue 12/23/14
23	Address PDP Comments	100%	21 days	Wed 12/24/14	Tue 1/13/15
24	**Preferred Schematic Report**	**100%**	**119 days**	**Wed 11/26/14**	**Wed 3/25/15**
25	PSR Submittal Development	100%	78 days	Wed 11/26/14	Wed 2/11/15
26	PSR Submittal Date	100%	1 day	Thu 2/12/15	Thu 2/12/15
27	MSBA PSR Review	100%	14 days	Fri 2/13/15	Thu 2/26/15
28	Address PSR Comments	100%	10 days	Fri 2/27/15	Sun 3/8/15
29	FAS Presentation	100%	14 days	Fri 2/27/15	Thu 3/12/15
30	Address FAS Comments	100%	10 days	Fri 3/13/15	Sun 3/22/15
31	PS Board Approval	100%	0 days	Wed 3/25/15	Wed 3/25/15
32	**Schematic Design**	**73%**	**259 days**	**Fri 2/13/15**	**Thu 10/29/15**
33	SD Submittal Development	100%	180 days	Fri 2/13/15	Tue 8/11/15
34	SD Notification Email Sent	100%	2 days	Wed 3/25/15	Thu 3/26/15
35	SD Submittal Date	0%	1 day	Thu 8/6/15	Thu 8/6/15
36	MSBA SD Review Complete	0%	21 days	Fri 8/7/15	Thu 8/27/15
37	Address SD Comments	0%	14 days	Fri 8/28/15	Thu 9/10/15



Project: City of Beverly, MA Modu
Date: Mon 7/20/15

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Critical	
Milestone		External Milestone		Manual Task		Start-only		Critical Split	
Summary		Inactive Task		Duration-only		Finish-only		Progress	

City of Beverly, MA
New Beverly Middle School
Schematic Design Submission Master Schedule

ID	Task Name	% Complete	Duration	Start	Finish
38	PS & B Board Approval	0%	0 days	Wed 9/30/15	Wed 9/30/15
39	PSB Agreement Executed	0%	30 days	Wed 9/30/15	Thu 10/29/15
40	**DESE Review**	**0%**	**37 days**	**Fri 8/7/15**	**Sat 9/12/15**
41	MSBA Review of DESE Submittal	0%	7 days	Fri 8/7/15	Thu 8/13/15
42	DESE Review and Approval	0%	30 days	Fri 8/14/15	Sat 9/12/15
43	**Project Funding Appropriation**	**0%**	**28 days**	**Wed 10/28/15**	**Tue 11/24/15**
44	District Vote	0%	0 days	Wed 10/28/15	Wed 10/28/15
45	Certifications of Votes sent to MSBA	0%	3 days	Wed 10/28/15	Fri 10/30/15
46	Project Funding Agreement Sent	0%	18 days	Tue 11/3/15	Fri 11/20/15
47	Project Funding Agreement Executed	0%	4 days	Sat 11/21/15	Tue 11/24/15
48	ProPay Training Date #2	0%	1 day	Fri 11/13/15	Fri 11/13/15
49	**Pre-Construction**	**100%**	**182 days**	**Tue 12/2/14**	**Mon 6/1/15**
50	CM Procurement	100%	182 days	Tue 12/2/14	Mon 6/1/15
51	Prepare/submit/receive approval of IG for CMR	100%	92 days	Tue 12/2/14	Tue 3/3/15
52	Prepare and issue CM RFQ	100%	37 days	Tue 1/20/15	Wed 2/25/15
53	Receive & Evaluate Qualifications packages	100%	21 days	Wed 3/4/15	Tue 3/24/15
54	Prepare and issue CM RFP	100%	36 days	Wed 3/4/15	Wed 4/8/15
55	Receive & Evaluate technical and Price proposals	100%	14 days	Wed 4/29/15	Tue 5/12/15
56	Select CM	100%	1 day	Tue 5/19/15	Tue 5/19/15
57	**BIM Process**	**100%**	**117 days**	**Mon 1/5/15**	**Fri 5/1/15**
58	Design Team Initial Meeting	100%	5 days	Mon 1/5/15	Fri 1/9/15
59	Owner/OPM/Designer Kickoff Meeting	100%	1 day	Thu 1/22/15	Thu 1/22/15
60	Prepare & Finalize BIM Execution Plan	100%	90 days	Fri 1/23/15	Wed 4/22/15
61	Prep & Finalize BIM Terms for Designer Contract	100%	90 days	Thu 1/29/15	Tue 4/28/15
62	Prep & Finalize BIM Terms for CM Contract	100%	60 days	Tue 3/3/15	Fri 5/1/15
63	**Design Development (DD)**	**0%**	**182 days**	**Thu 8/13/15**	**Wed 2/10/16**
64	Design Development	0%	145 days	Thu 8/13/15	Mon 1/4/16
65	Register with USGBC - LEED	0%	1 day	Fri 11/13/15	Fri 11/13/15
66	DD Submission Date	0%	1 day	Wed 12/23/15	Wed 12/23/15
67	MSBA DD Review	0%	21 days	Thu 12/31/15	Wed 1/20/16
68	Address DD Review Comments	0%	21 days	Thu 1/21/16	Wed 2/10/16
69	**60% Construction Documents (CD)**	**0%**	**183 days**	**Wed 12/23/15**	**Wed 6/22/16**
70	60% CD Development	0%	141 days	Wed 12/23/15	Wed 5/11/16
71	60% CD Submission Date	0%	0 days	Wed 5/11/16	Wed 5/11/16
72	MSBA 60% CD Review	0%	22 days	Wed 5/11/16	Wed 6/1/16
73	Addresss 60% CD Review Comments	0%	21 days	Thu 6/2/16	Wed 6/22/16
74	**90% Construction Documents (CD)**	**0%**	**173 days**	**Wed 5/11/16**	**Sun 10/30/16**

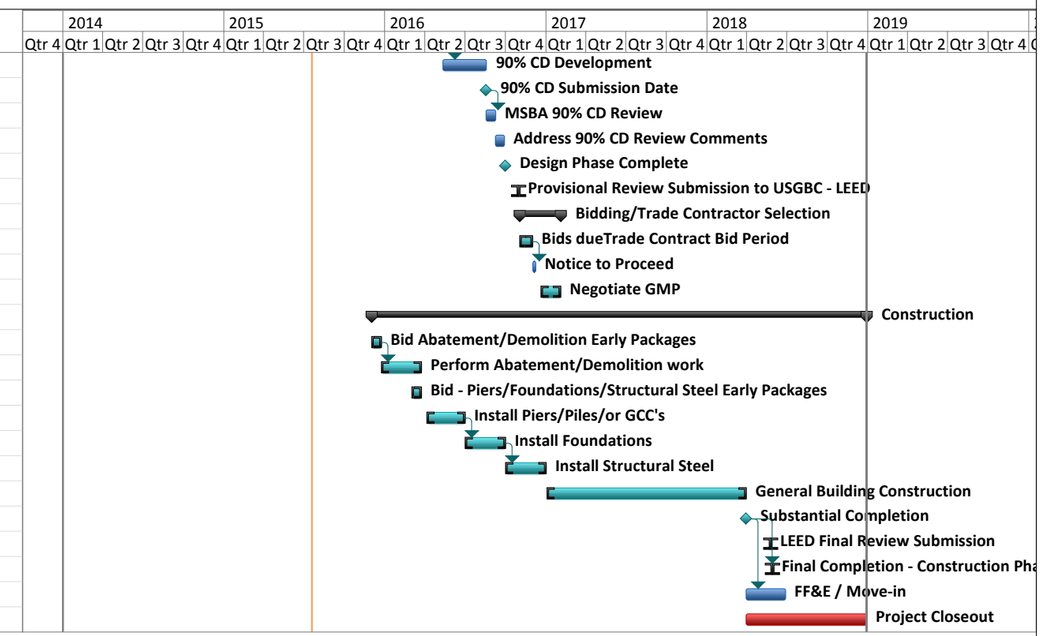
Project: City of Beverly, MA Modu
Date: Mon 7/20/15

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Critical	
Milestone		External Milestone		Manual Task		Start-only		Critical Split	
Summary		Inactive Task		Duration-only		Finish-only		Progress	

Page 2

City of Beverly, MA
New Beverly Middle School
Schematic Design Submission Master Schedule

ID	Task Name	% Complete	Duration	Start	Finish
75	90% CD Development	0%	99 days	Wed 5/11/16	Wed 8/17/16
76	90% CD Submission Date	0%	0 days	Wed 8/17/16	Wed 8/17/16
77	MSBA 90% CD Review	0%	22 days	Wed 8/17/16	Wed 9/7/16
78	Address 90% CD Review Comments	0%	21 days	Wed 9/7/16	Tue 9/27/16
79	Design Phase Complete	0%	0 days	Fri 9/30/16	Fri 9/30/16
80	Provisional Review Submission to USGBC - LEED	0%	1 day	Sun 10/30/16	Sun 10/30/16
81	**Bidding/Trade Contractor Selection**	**0%**	**93 days**	**Wed 11/2/16**	**Thu 2/2/17**
82	Bids dueTrade Contract Bid Period	0%	29 days	Wed 11/2/16	Wed 11/30/16
83	Notice to Proceed	0%	7 days	Thu 12/1/16	Wed 12/7/16
84	Negotiate GMP	0%	45 days	Tue 12/20/16	Thu 2/2/17
85	**Construction**	**0%**	**1123 days**	**Wed 12/2/15**	**Fri 12/28/18**
86	Bid Abatement/Demolition Early Packages	0%	22 days	Wed 12/2/15	Wed 12/23/15
87	Perform Abatement/Demolition work	0%	91 days	Thu 12/24/15	Wed 3/23/16
88	Bid - Piers/Foundations/Structural Steel Early Packages	0%	22 days	Wed 3/2/16	Wed 3/23/16
89	Install Piers/Piles/or GCC's	0%	87 days	Tue 4/5/16	Thu 6/30/16
90	Install Foundations	0%	92 days	Fri 7/1/16	Fri 9/30/16
91	Install Structural Steel	0%	92 days	Sat 10/1/16	Sat 12/31/16
92	General Building Construction	0%	452 days	Tue 1/3/17	Fri 3/30/18
93	Substantial Completion	0%	0 days	Fri 3/30/18	Fri 3/30/18
94	LEED Final Review Submission	0%	1 day	Fri 5/25/18	Fri 5/25/18
95	Final Completion - Construction Phase	0%	1 day	Tue 5/29/18	Tue 5/29/18
96	FF&E / Move-in	0%	90 days	Fri 3/30/18	Wed 6/27/18
97	Project Closeout	0%	274 days	Fri 3/30/18	Fri 12/28/18



Project: City of Beverly, MA Modu
Date: Mon 7/20/15

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Critical	
Milestone		External Milestone		Manual Task		Start-only		Critical Split	
Summary		Inactive Task		Duration-only		Finish-only		Progress	

Local Actions and Approvals

Local Actions and Approvals

Schematic Design Project Manual

Proprietary Items

The proposed use of proprietary products will be considered and discussed with the City and District at the appropriate stage in the design process. To date, no proprietary products have been identified nor has there been any vote(s) by the elected body to accept proprietary products. Please consider this response as confirmation that the District will provide the required documentation in compliance with M.G.L. c.30, §39M(b) as part of a future submission to the MSBA.

Appendix A
DESE Submittal

HEERY

Architecture
Engineering
Interior Design
Program Management
Construction Management

July 10, 2015

Ms. Mary Pichetti
Director of Capital Planning
Massachusetts School Building Authority
40 Broad Street, Suite 500
Boston, Massachusetts 02109

Dear Ms. Pichetti:

The District is pursuing execution of a Project Scope and Budget Agreement for the MSBA approved schematic design of the New Beverly Middle School. The District's 2015 enrollment is 4,562 students. The design enrollment for the proposed school project is 1,395 [see executed design enrollment certification]. The existing Briscoe Middle School currently serves grades 6-8 and the New Beverly Middle School is proposed to serve grades 5-8.

In accordance with G.L. c. 70 B, MSBA staff has assembled the documents required for the review of the special education program at the new Beverly Middle School. The following are attached per the 'Submittal Requirements':

1. A letter from Dr. Steve Hiersche, Superintendent of Beverly school district describing its special education program.
2. Proposed space summary that includes the existing facility, proposed spaces, and MSBA guidelines based on the agreed upon design enrollment. The first page of this summary indicates a total of 15,850 square feet of space dedicated to the delivery of special education.
3. The floor plans for the proposed 231,509 square foot New Beverly Middle School.
4. A completed Special Education Adjacency Table

I have reviewed the attached documents and confirm that the District's School Building Committee has officially approved the attached submittal on June 09, 2015 and verify that the space summary match the floor plan and is complete and conform to the MSBA requirements as described in Module 4 – Schematic Design Guidelines.

Heery International, Inc.
A group of professional service practices
80 Blanchard Road, Suite 108, Burlington, Massachusetts 01803
Telephone 781 494-9000 Fax 781 494-9007

Offices Nationwide

Sincerely,
HEERY INTERNATIONAL, INC.

Mark C. Lydon, CCM
Design Phase Project Manager

Cc: Scott Dunlap – Ai3, Troy Randall – Ai3
Mayor Michael P. Cahill – COB
Dr. Steven A. Hiersche – Beverly Public Schools
File: 1409500, A01-01.01

Enclosures

BEVERLY PUBLIC SCHOOLS
502 Cabot Street
Beverly, Massachusetts
01915
Telephone (978) 921-6100
Fax (978) 927-9463
www.beverlyschools.org

Steven A. Hiersche, Ed.D.
Superintendent of Schools

Stacy Bucyk, M.Ed.
Administrator of Special Education
and Pupil Personnel Services

July 10, 2015

Ms. Christine Lynch
Director of School Governance
Department of Elementary and Secondary Education
75 Pleasant Street
Malden, MA 02148

Dear Ms. Lynch,

This letter is written as part of the application for the Middle School building project through the Massachusetts School Building Authority. The information included in this letter is provided under the guidelines of Appendix 4B, Department of Elementary and Secondary Education Submittal, outlining the proposed provisions for students with disabilities.

The Beverly Public School District takes pride in our special education program. With a variety of programs and supports throughout the district, we are able to meet the individual needs of our students and keep the majority of our students in-district, allowing them to attend school with their peers.

The Beverly Public School District's special education program is designed to:

- maintain a variety of program options to support a wide range of needs, allowing access to the general education curriculum within the least restrictive environment;
- assist in identifying students' abilities and strengths while remediating areas of need;
- service identified students in educational settings appropriate to the individual needs, while maximizing their strengths;
- enable our students to learn and grow socially, emotionally, and academically leading to College and Career Readiness;
- assist school staff to maintain compliance with federal and state regulations;
- provide technology opportunities to assist our students with learning and developing skills to manage careers in the 21st century.

We consider the District as an inclusive one, providing learning opportunities for our students with special education and related services needs. Collaboration and efforts to "think outside the box"

from administration, staff and parents has allowed for increased inclusion and the ability for students to remain in-district. The creation of in-district programs has allowed students the opportunity to access the general education curriculum, participate in community and school-based activities and engage in learning experiences and social experiences within a less restrictive environment. Inclusionary models vary from school to school and continue to meet the unique needs of our students. Special education teachers, related therapies staff and paraprofessionals deliver services with regular education teachers through consultation, inclusion, co-teaching, and small group. Additional small group and individualized instructional models are provided outside of the general education classroom setting. Special education staff at each school works with the regular education staff in the development and modification of curriculum as well as strategies for accommodations and differentiation of instruction in order to meet the needs of our students.

Services are offered for speech and language, occupational therapy, physical therapy, counseling, and behavioral therapy in all of our schools. The majority of our services are provided by in-district staff, which contracted service providers, as needed. Students receive services as identified within their Individual Education Programs. The Beverly Public School District offers a continuum of services for students including supports through Assistive Technology, Augmentative Communication Specialists, Vision Specialists, Orientation and Mobility Specialists, Board Certified Behavior Analysts, Board Certified Assistant Behavior Analysts, Teachers of the Deaf, and Educational Interpreters.

Staff across the district are provided information and opportunities for training regarding state and federal regulations, new mandates, special education law, specialized programs, and their roles and responsibilities in regards to the special education process and supporting our special education students.

The current programs within all of our schools (Ayers Ryal Side Elementary School, Centerville Elementary School, Cove Elementary School, Hannah Elementary School, North Beverly Elementary School, Briscoe Middle School and Beverly High School) provide an array of educational services in order to meet the learning needs of a wide range of students.

The new middle school building configuration, grades 5-8, allows for the continuation of our district programs within models of consultation, inclusion, co-teaching and replacement services, providing access to strong educational programming for all of our students.

Should you need any further information, please do not hesitate to contact us.

Respectfully,

Dr. Steven Hiersche
Superintendent

Stacy Bucyk
Administrator of Special Education and PPS

Module 4 – Schematic Design

4B.2.1 Current Program

Briefly describe the District's special education programs and methodology district-wide, including the number of special education students currently served;

The Beverly Public School District provides an array of support services for children in the district from ages 2 years and 9 months to age 22. The number of students receiving special education services in-district was 835 as of March 1, 2015. The number of students receiving special education services in an out of district placement was 96 as of March 1, 2015.

Programs include the following:

- Integrated Preschool Program, including integrated preschool classrooms, Intensive/Integrated preschool classrooms and an Intensive preschool classroom. This early childhood program includes 103 children with Individual Education Programs and opportunities for learning along-side typically developing peers.
- Transitional Kindergarten Program
- Language-Based Program
- Strategies-Based Instructional Program
- Autism Programming which includes AIM, ATTAIN, ACCOMPLISH
- Student Support Program
- LADDERS Program
- LAUNCH: Life Skills and Adaptive Living program
- Opportunity Room
- Academic Learning Centers
- Therapeutic Learning Centers
- Passports to Transitions
- Inclusionary Programming

Services are offered for speech and language, occupational therapy, physical therapy, counseling, and behavioral therapy in all of our schools. In-district staff provides the majority of our services, with contracted services provided as needed. Students receive services as identified within their Individual Education Programs.

Specifically describe all special education programs serving an age range of students that would be appropriate to the grade range of the subject school building. Include a description of all special education services provided in the subject school building or other school buildings within the school district that serve the same grade levels;

The subject school building, Briscoe Middle School, is currently a 6th through 8th grade model. The proposed building project would include grades 5 through 8. The following special education programs provide special education services for students: ATTAIN, Opportunities Room, Language-Based Program, Strategies-Based Instructional Program,

Student Support Program, Academic Learning Center, Therapeutic Learning Center; within the middle school grade range for the current building and proposed project.

Inclusion Programs

Inclusion services are provided daily at each school as required by Individual Education Programs, Section 504 Plans, or as part of Response to Intervention (RTI) initiatives. The Massachusetts Curriculum Frameworks and Common Core State Standards is implemented utilizing teaching methods that include, but are not limited to co-teaching, small group instruction within the classroom and monitoring of students during whole class instruction. An emphasis is placed on multi-modal approaches to teaching and learning, including integration of technology, to meet the varying learning styles of our students.

Goals and objectives/benchmarks of Individual Education Programs are integrated into lessons and activities, as are necessary accommodations outlined within Individual Education Programs and 504 Plans. Results from psycho-educational testing, speech and language evaluations, occupational therapy evaluations, physical therapy evaluations, academic evaluations and formative assessments are outlined in Individual Education Programs and 504 Plans. This information is incorporated into the recommended goals, objectives/benchmarks, accommodations and modifications in order to support teaching and learning and increase generalization of learned skills across settings for our students. Computer-based assessments, teacher observation and input, district benchmark assessments, formative assessments and daily student performance are used to monitor student progress in the Massachusetts Curriculum Frameworks and Common Core State Standards, district goals and expectations, building goals, and teacher goals.

The inclusion model provides services to special education students and at-risk students. Skills target phonological skills, fluency, comprehension for reading and vocabulary, writing, and mathematics for computation and problem-solving.

Academic Learning Centers

Learning Centers are located in all of our schools and developed for students with disabilities which may include Specific Learning Disability (SLD), Intellectual, Autism, Communication, Health, Neurological, Vision or Hearing and Multiple. All students who access the Academic Learning Centers have an Individual Education Program to address goals and objectives/benchmarks utilizing specialized instructional practices to reinforce skills necessary to access curriculum within the general education setting. Instruction within the Academic Learning Centers is provided in small groups and/or individual sessions, as outlined within the students' Individual Education Programs. Support is further provided within the general education classrooms by learning center teachers and/or paraprofessionals.

Module 4 – Schematic Design

Therapeutic Learning Centers

Therapeutic Learning Centers are located in some of our elementary schools and at Briscoe Middle School. Therapeutic Learning Centers were developed to provide students with high levels of anxiety and/or challenges with regulation a place to go when needing a break from the general education classroom. Within the Therapeutic Learning Centers, students are provided with support to access strategies for coping and de-escalation. Goals are developed for students with the focus on acquisition of strategies for coping with frustrations and anxiety, as well as goals for development of organizational skills to support success within the academic and social settings. Academic support is provided to ensure that students do not fall behind. Support is within the general education classrooms is provided by the learning center teachers and/or paraprofessionals.

Opportunity Room

The Opportunity Room is located at the Briscoe Middle School. The program was developed to support students with an Autism diagnosis, including Asperger's. Students within this program require social/pragmatic skills support, the development of coping strategies for anxiety, and support with executive functioning skills. Students access general education classes for the majority of their day, with paraprofessional support as needed. Students further access support within the Opportunity Room to work on goals and objectives/benchmarks, de-escalate, and/or for a quiet space to work when over-stimulated. Support is provided within the general education classroom by program paraprofessionals.

Autism Program

The ATTAIN Program is located at the Briscoe Middle School and is part of our continuum of program support for our autistic students requiring higher levels of support throughout their school day. Our AIM program supports students K-5 and is located at the Cove Elementary School. ATTAIN currently supports students grades 6-8. Students within the ATTAIN Program are provided individualized programming in a discrete trial format and ABA methodology. Behavioral plans are developed for students and BCBA support is built into the program. Students are integrated within general education classes as tolerable, based on individual student needs and with paraprofessional support. The ATTAIN Program is designed to provide academic, vocational, and social interaction opportunities. Support for integration into general education classes is provided by program paraprofessionals.

Strategies-Based Instructional Program

This program is located at the North Beverly Elementary School and supports students in grades 1-5. The Strategies-Based Instructional Program currently supports students grades 6-8 at the Briscoe Middle School. This program was developed to support students with lower cognition and overall academic deficits. Students within this program are

typically integrated for some content area instruction and expressive arts (PE, Art, Music, Media, etc.). Integration into general education classes in supported by program paraprofessionals. Intensive academic instruction is provided in small group and individual sessions, as outlined within each student's Individual Education Program. The program further provides for social skills support in small group within the program classroom and/or within the School Adjustment Counselor's office, as outlined in students' Individual Education Programs.

Language-Based Program

This program is located at the Hannah Elementary School and supports students in grades 2-5. The Language-Based Program currently supports students in grades 6-8 at the Briscoe Middle School and grades 9-12 at the high school. Students within the Language-Based Program have average to above average cognition, but have deficits in reading and written language skills, requiring significant remediation within those areas. Students within the Language-Based Program typically participate in content area instruction within the general education setting and receive reading, written language, and academic support within the program classrooms. Support is provided for general education content area classes by program paraprofessionals. Services are based on each student's Individual Education Program and may include goals and objectives/benchmarks for additional content area instruction, such as math. Program instruction is within small group and individual instructional models. Paraprofessional and/or program teacher support is provided within the general education setting to support generalization of skills and reinforce newly acquired skills.

Student Support Program

This program is located at the Centerville Elementary School and supports students in grades K-5. The Student Support Program currently supports grades 6-8 at the Briscoe Middle School. The Student Support Program provides social/emotional/behavioral support to students as outlined within each student's Individual Education Program. The overall goal of the program is to provide an educational environment for students with social/emotional/behavioral needs, foster academic success and the development of coping strategies, and integrate fully within the general education setting. The program allows for flexibility in support, including small group and individual instructional models, as well as support for integration into the general education classrooms. Integration into general education classes is supported by the program teachers and/or program paraprofessionals. The program further provides contracted therapeutic supports through a consultative and direct service model by Lahey Behavioral Services.

4B.2.2 Proposed Program

Describe any deficiencies in the existing program that may have been identified locally or through state review;

During the 2014-2015 school year, the Beverly Public School District underwent a coordinated program review in the areas of special education, civil rights, English Language Learners and Title One. The results of the review found no deficiencies within the areas of special education programming at the middle school level.

The District has found that the existing program lacks in it's ability to expand services due to limited and inadequate space.

Describe any programs/services that will continue, those that will be eliminated and those that will be added or enhanced as a result of the proposed project. Include programs or services that will be moved within the District as a result of this construction plan and include the number of special education students what will be serviced in the subject school building;

All programs currently offered at Briscoe Middle School will remain in the proposed project. Providing a neighborhood approach within the proposed project will allow for enhanced and increased abilities for integration of students into the general education setting across all programs. The proposed project has taken into consideration additional space to allow for the inclusion of grade 5 into the middle school. With the addition of this grade, all programs may require additional and a definitive shift in grade level assignment. The proposed project will allow for a more efficient model of consultation and support to the general education staff with programs located in academic neighborhoods. It is anticipated that approximately 266 special education students will be serviced in the subject school building.

The following programs will be further enhanced as a result of the proposed project:

- The ATTAIN Program will include space to facilitate daily living skills development and vocational skills development. The newly designed area will include space for cooking, laundry and the ability to work on hygiene. The location of the ATTAIN classroom will provide additional exposure and ability to participate in nutrition and vocational skills training within the culinary arts field, as the classroom will be located near the kitchen and the health/PE area of the building

- Related services, including speech and language, Occupational Therapy and Physical Therapy will have space adequate to support the individual needs of the students. Occupational and Physical Therapies spaces will be of an appropriate size to offer activities of physical movement to support necessary development of skills.

Module 4 – Schematic Design

Identify any programs/service needs that the District hopes to address in the proposed project;

The proposed project will address program and service needs by enhancing our ability to support vocational skills and daily living skills through adequate space, support enhanced related therapies services through adequate space, expand technology capabilities and support a Universal Design to Learning approach. The proposed project and building design will allow for increased opportunities for collaboration and program consistency. Overall, the proposed project will allow for increased flexibility in programming and the ability to meet the needs of all students by allowing for access and support to make effective progress within the Massachusetts Curriculum Frameworks and Common Core State Standards.

Provide the date of the last Coordinated Program Review and list any issues and/or problems identified in that area;

The Beverly Public School District participated in Coordinated Program Review during the 2014/2015 school year.

Special Education Criterion partially implemented:

SE2: Required Optional Assessments: A review of student records and interviews demonstrated that required observations of preschoolers in their natural environment or early intervention program are not completed for students referred for eligibility at age three.

SE7: Transfer of parental rights at age of majority and student participation and consent at the age of majority: A review of student records indicated that while parents and students are notified of the transfer of educational decision-making rights at least one year prior to the student reaching age 18, the district does not obtain consent from students to continue their special education program immediately following their 18th birthday. Interviews verified that the district waits until the student's annual review to obtain consent, which can be months after the student has turned 18.

Civil Rights Criterion partially implemented:

CR7A: School year schedules: A review of documents and interviews demonstrated that Beverly High School and Briscoe Middle School are in operation 179 days, rather than at least 180 days a year, because of one day of freshman and 6th grade orientation respectively.

CR7B: Structured learning time: A review of documents and interviews confirmed that students at the high school do not take physical education (PE) every year as required. Documents demonstrated that students must complete five (5) credit hours of PE during their four years of high school, which many students complete in less than four years.

CR16: Notice to students 16 or over leaving school without a high school diploma, certificate of attainment, or certificate of completion: Document review demonstrated while the district sends a written notice to parents of students 16 or over within 10 days of the student's 15th consecutive day of unexcused absence to discuss the reasons that the student is leaving school, this notice is not sent to the student and does not allow for an extension of time for the meeting of not longer than fourteen days at the request of the parent/guardian.

Career/Vocational Technical Education Criterion partially implemented:

CVTE 5: All individuals including those who are members of special populations are provided with equal access to career/vocational technical education programs, services and activities and are not discriminated against on the basis of their status as members of special populations or race, color, gender-identity, religion, national origin, English language proficiency, disability, or sexual orientation: Interviewees revealed that no wait list procedure exists to ensure equitable access to oversubscribed programs once space in the program becomes available.

CVTE 8: The programs in which students are enrolled meet the Perkins IV definition of career and technical education as contained in Appendix A of the Massachusetts Perkins IV Manual: Document review and interviews indicated that not every course in the career and technical programs' sequence is offered each year, thereby preventing consistent access to the sequence of courses required by programming design.

CVTE 10: Representatives of business/industry; organized labor (union); college(s); parent(s)/guardian(s); student(s); representative(s) from registered apprenticeship program(s) (only required if the occupational field of the program has a registered apprenticeship program) are involved in the development, implementation, and review of career/vocational technical programs. Representation is race, linguistic, disability, and nontraditional by gender inclusive, and if not, there is a plan (formal recruitment process) to make it inclusive: Document review and interviews revealed that while some programs have industry connections, the district's career and technical education programs do not have Program Advisory Committees.

CVTE 20: Career/vocational technical education instructional facilities meet current occupational standards: A site visit by the Office of Career/Vocational/Technical Education safety specialist revealed that not all facilities used for career/vocational technical education meet current occupational standards. The Office for Career/Vocational Technical Education will send a Safety Survey Report, which will include details specific to each program.

CVTE 21: Career/vocational technical education instructional equipment meets current occupational standards: A site visit by the Office of Career/Vocational/Technical Education safety specialist revealed that not all equipment used for career/vocational technical education meets current occupational standards. The Office for

Career/Vocational Technical Education will send a Safety Survey Report, which will include details specific to each program, to the Superintendent under separate cover.

English Language Learner Education Criterion partially implemented:

ELE 5: A review of the documentation submitted by the district indicated that there is no consistency in the level of ESL instruction ELLs receive at the same proficiency levels. For instance, some of the students at the proficiency levels 1 and 2 receive as low as 60 minutes of daily ESL instruction while those at higher proficiency levels are provided 150 minutes. Therefore, the district does not provide equal access to all ELLs in regards to ESL services by not providing the same learning opportunities to the students with the similar English proficiency levels.

ELE 6: A review of documentation submitted by the district revealed that a student on the ELL roster was marked as being on a waiver. This student was not transferred to an educationally recognized and legally permitted ELL program other than a sheltered English immersion or two-way bilingual program as required by **G.L. c. 71A, § 5**. Upon request for clarification, the district indicated that the student was marked as being on a waiver by mistake and was actually reclassified due to a severe cognitive impairment. The decision to reclassify ELLs with disabilities using the waiver form is not consistent with the district's policy for exiting ELL students and the Department guidelines for reclassification as stated in the "Transitional Guidance on Identification, Assessment, Placement, and Reclassification of English Language Learners August 2013.

ELE 18: See ELE 13.

English Language Learner Education Criterion not implemented:

ELE 13: A review of student records and interviews demonstrated that the district does not actively monitor students who have exited English learner education programming.

ELE 17: Documentation and staff interviews indicated that the district has not conducted periodic evaluations of the effectiveness of its ELE program in developing students' English language skills and increasing their ability to participate meaningfully in the educational program.

Provide the current status and/or remedy of those issues identified as part of the review;

The District has established corrective action plans for all areas of partial implementation and non-implementation. The District has already remedied most criterions and, by October 1, 2015, will have fully documented compliance of all criterions.

Module 4 – Schematic Design

Describe the local review process leading to the decision as to the number, type, and location of special education spaces within the planned building;

The District provided the opportunity for input and review of programming by staff currently located within the middle school. Further visioning sessions provided content specific input and review of student and staff needs in order to appropriately plan for teaching and learning spaces. Within these visioning sessions, interdisciplinary and multi-grade level groupings provided opportunity for input from a variety of stakeholders across the district, including elementary, middle, high school, and central office staff. Further, the building committee has reviewed the need and configuration of classroom spaces.

Describe any special circumstances that led to the decision to locate self-contained special education classrooms and other support spaces in certain areas of the building;

Self-contained programs have been centrally located within academic neighborhoods to provide multi-grade access as well as access for inclusionary purposes. The ATTAIN program has been located on the first floor, with close access to the kitchen for vocational skills and with close access to the related therapies areas, including speech and language, OT and PT, as most students within the ATTAIN program require access to these services.

Describe the grade and school configuration policies.

The District has determined that the grade configuration for the proposed project will include grades 5-8.

4B.2.3 Specialized Programs

Provide a description of all specialized programs that the District currently provides or participates in, both in and out of the District. Also describe any programs the District is planning to add to its current programs as part of the proposed school building project.

<u>Integrated Preschool Program</u>

The Beverly Public Schools has an integrated preschool program for students ages 3-5. Students are referred from Early Intervention, other agencies, or parents. Students participate in programming based on the services outlined within their Individual Education Programs, including placement within an Intensive Classroom, Intensive/Integrated Classrooms or Integrated Classrooms. The Intensive Classroom provides a discrete trial model for teaching and learning of functional skills. ABA methodology is incorporated throughout the school day. Related therapies are integrated within the classroom and are also provided individually outside of the classroom setting, as outlined within student IEP's. The Intensive/Integrated Classrooms provide a discrete model for teaching and incorporates ABA methodology for teaching and learning readiness skills. Related therapies are provided within the classroom settings and outside

of the classroom, in whole class, small group and individualized service models. Peers are tuitioned into the Intensive/Integrated and Integrated classrooms. BCBA and BCABA supports are provided, as well as home-based services, as outlined in students' Individual Education Programs. This program will be located at the McKeown School.

Transitional Kindergarten Program

The Transitional Kindergarten Program is located at the Ayers Elementary School. This program provides support for students transitioning from our Intensive/Integrated and Integrated Preschool classrooms and require a higher level of support to integrate into the larger kindergarten classroom. This program allows for partial to full-integration into the general education setting. Paraprofessionals provide support for integration and a special education teacher provides specialized instruction, as outlined within the students' Individual Education Programs. Related therapies services are provided within the general education classroom setting and in alternative classroom settings.

Inclusion Programs

Inclusion services are provided daily at each school as required by Individual Education Programs, Section 504 Plans, or as part of Response to Intervention (RTI) initiatives. The Massachusetts Curriculum Frameworks and Common Core State Standards is implemented utilizing teaching methods that include, but are not limited to co-teaching, small group instruction within the classroom and monitoring of students during whole class instruction. An emphasis is placed on multi-modal approaches to teaching and learning, including integration of technology, to meet the varying learning styles of our students.

Goals and objectives/benchmarks of Individual Education Plans and are integrated into lessons and activities, as are necessary accommodations outlined within Individual Education Programs and 504 Plans. Results from psycho-educational testing, speech and language evaluations, occupational evaluations, physical therapy evaluations academic evaluations and formative assessments are outlined in Individual Education Programs and 504 Plans. This information is incorporated into the recommended goals, objectives/benchmarks, accommodations and modifications in order to support teaching and learning and increase generalization of learned skills across settings. Computer-based assessment, teacher observation and input, district benchmark assessment, formative assessment and daily student performance are used to monitor student progress in the Massachusetts Curriculum Frameworks and Common Core State Standards as well as district goals and expectations.

The inclusion model provides services to special education students and at-risk students. Skills target phonological skills, fluency, comprehension for reading and vocabulary, writing, and mathematics for computation and problem-solving. Individualized, multi-sensory approaches for reading and writing can take place outside of the general

education classroom. Inclusion Programming is provided to students across the district in grades K-12.

Academic Learning Centers

Learning Centers are located in all of our schools (Ayers Ryal Side Elementary School, Centerville School, Cove School, Hannah School, North Beverly Elementary School, Briscoe Middle School, Beverly High School) and developed for students with disabilities which may include Specific Learning Disability (SLD), Intellectual, Autism, Communication, Health, Neurological, Vision or Hearing. All students who access the Academic Learning Centers have an Individual Education Program to address goals and objectives/benchmarks utilizing specialized instructional practices to reinforce skills necessary to access curriculum within the general education setting. Instruction within the Academic Learning Centers is provided in small groups and/or individual sessions, as outlines within the students' Individual Education Programs. Academic Learning Centers provide support to students in grades K-12. Support is further provided within the general education classrooms by learning center teachers and/or paraprofessionals.

Therapeutic Learning Centers

Therapeutic Learning Centers are located in some of our elementary schools (Cove School, Hannah School, North Beverly Elementary School) and at Briscoe Middle School. The program supports students in grades K-8. Therapeutic Learning Centers were developed to provide students with high levels of anxiety a place to go when needing a break from the general education environment. Within the Therapeutic Learning Centers, students are provided with support to access strategies for coping and de-escalation. Academic support is provided to ensure that students do not fall behind. Support is provided within the general education classrooms by the learning center teachers and/or paraprofessionals.

Opportunity Room

The Opportunity Room is located at the Briscoe Middle School and provides support to students in grades 6-8. The program was developed to support students with an Autism diagnosis, including Asperger's. Students within this program require social/pragmatic skills support, the development of coping strategies for anxiety, and support with executive functioning skills. Students access general education classes for the majority of their day, with paraprofessional support, as needed. Students further access time within the Opportunity Room to work on goals and objectives/benchmarks, to de-escalate, and/or for a quiet space to work when over-stimulated.

Autism Program

The ATTAIN Program is located at the Briscoe Middle School and is part of our continuum of program support for our autistic students requiring higher levels of support throughout their school day. Our AIM program supports students K-5 and is located at

the Cove Elementary School. ATTAIN currently supports students grades 6-8. Students within the ATTAIN Program are provided individualized programming in a discrete trial format and ABA methodology. Behavioral plans are developed for students and BCBA support is built into the program. Students are integrated within the general education as tolerable, based on individual student needs and with paraprofessional support. The ATTAIN Program is designed to provide academic, vocational, and social interaction opportunities. The ACCOMPLISH Program provides supports to students in grades 9-12 at Beverly High School. Integration into the general education classes in supported by program paraprofessionals and/or the program teachers.

Strategies-Based Instructional Program

This program is located at the North Beverly Elementary School and supports students in grades 1-5. The Strategies-Based Instructional Program currently supports students grades 6-8 at the Briscoe Middle School. This program was developed to support students with lower cognition overall academic deficits. Students within this program are typically integrated for some content area instruction and expressive arts. Integration into general education classes is supported by program paraprofessionals. Intensive academic instruction is provided in small group and individual sessions, as outlined within each student's Individual Education Program. The program further provides for social skills support in small group within the program classroom and/or within the School Adjustment Counselor's office. The Strategies-Based Instructional Program further provides support to students in grades 9-12 at Beverly High School.

Language-Based Program

This program is located at the Hannah Elementary School and supports students in grades 2-5. The Language-Based Program currently supports students in grades 6-8 at the Briscoe Middle School and grades 9-12 at Beverly High School. Students within the Language-Based Program have average to above average cognition, but have deficits in reading and written language skills, requiring significant remediation within these areas. Students within the Language-Based Program typically participate in content area instruction within the general education setting and receive reading, written language, and academic support within the program classrooms. Services are based on each student's Individual Education Program and may include goals and objectives/benchmarks for additional content area instruction, such as math. Program instruction is within small group and individual instructional models. Paraprofessional and/or program teacher support is provided within the general education setting to support generalization of skills and reinforce newly acquired skills. The Language-Based Program is located in one elementary school, the middle school, and high school, servicing students in grades 2-12.

Module 4 – Schematic Design

Student Support Program

This program is located at the Centerville Elementary School and supports students in grades K-5. The Student Support Program currently supports grades 6-8 at the Briscoe Middle School. The Student Support Program provides social/emotional/behavioral support to students as outlined within each student's Individual Education Program. The overall goal of the program is to provide an educational environment for students with social/emotional/behavioral needs, foster academic success and development of coping strategies, and integrate fully within the general education setting. The program allows for flexibility in support including small group and individual instructional models, as well as support for integration into the general education classrooms. Integration into the general education classes is supported by program paraprofessionals and/or program teachers. The program further provides contracted therapeutic supports through a consultative and direct service model by Lahey Behavioral Services.

LADDERS Program

The LADDERS Program provides a tiered system of support for students with social/emotional/behavioral challenges. The program provides for inclusionary supports within general education classes with a skills and strategies class to provide academic support within Tier I. Tier II provides for a higher level of support, including inclusionary supports within the general education classes, academic support within the program, and therapeutic support provided by a school adjustment counselor. Content classes are provided within the Tier II classroom setting, as needed, to allow for continued access to the curriculum. Tier III provides sub-separate programming for students who are not able to access the curriculum within the general education classroom settings. Integration into the general education classes is supported by program paraprofessionals. Therapeutic support is provided within the Tier III setting by a school adjustment counselor. Further, the LADDERS Program is supported by an outside psychologist through contracted services. The LADDERS Program is located at the high school and serves students in grades 9-12. Participating students are special education students with Individual Education Programs, students with 504 plans, as well as general education students requiring social/emotional/behavioral supports for a period of time.

LAUNCH Program

The LAUNCH Program is a life skills program, located in the high school and providing programming for our 18-22 years old population. This program provides a small, structured environment with the focus on development of functional skills for reading, math, and writing, vocational skills through internships on various job sites supported by job coaches, daily living skills, social skills, recreational skills, and language and communication skills. The goal for students within the LAUNCH Program is to acquire gainful employment and/or attend community college.

Module 4 – Schematic Design

The District will continue to maintain the current middle school programs within the proposed project. However, the proposed project will allow for enhancement of services across all programs, services and related therapies. Grade level and staffing adjustments will be required, as the proposed project will include 5th grade.

The Beverly Public School District participates in programs outside of the school system. These programs include dual enrollment at North Shore Community College and Salem State College. Students diagnosed with ASD and requiring extended day services and/or extended year services participate in the Recreation Education Center (REC). Students requiring services related to drug and alcohol abuse participate in Recovery High through North Shore Education Collaborative. There are students who require a higher level of services, based on their needs, and cannot remain in the Beverly Public School District. These are placed in out of district placements including Collaboratives, public and private school settings. The decisions for placement of a student are made by the child's educational Team and are included in the Individualized Education Program.

At this time, the District has no plans to add to its current continuum of programs as part of the proposed school building project.

Identify Collaborative(s) that the District currently participates in and how many students from the subject District are served by the Collaborative(s). If the District provides space for the Collaborative(s), identify District schools where collaborative space is currently housed, describe the spaces, programs, age span of the students for each, and any additional collaborative programs and spaces being planned as part of the proposed project. If the District does not currently house collaborative programs, or plan to house collaborative programs within the proposed project, describe the reason for this decision and any discussion had with the Collaborative Director.

The Beverly Public Schools is a member district of the North Shore Education Collaborate (NSEC). The District has students serviced by NSEC (36 students), SEEM Collaborative (8 students), CREST Collaborative (7), and Valley Collaborative (1).

The District does not currently provide space for collaborative programming. Based on space needs within the District, the District does not plan to provide space for collaborative programming.

Describe alternative education programs that the District currently provides or participates in, and whether the programs will continue or be supported in the proposed project.

The District does not currently provide or participate in alternative programming at the middle school level, with the exception of students who are placed in out of district programs.

Module 4 – Schematic Design

Describe if and how the District delivers Per-K or Early Childhood Special Education Programs, the location of these services, how or if these programs or services are offered to non-special education eligible students, how they are accessed, and whether these services are or will be accommodated in the proposed project.

The mission of the Beverly Public School District's Integrated Preschool Program is to enhance the development of all early learners by building a solid foundation for future learning. Our educational team embraces a shared responsibility with parents, administration and the community to provide the opportunity for growth in all areas of development for our diverse preschool population. We are dedicated to providing a safe and nurturing environment that promotes independence and celebrates each child's individual learning style.

The Beverly Public Schools offers a high quality preschool experience committed to meeting the needs of all learners. The Beverly Preschool is based on a quality developmental education. The curriculum provides children with a positive introduction to learning and creates a solid foundation for future school success.

Our preschool program is designed to serve the city's population of children age three to five. Our classes welcome students with special needs, as well as their typically developing peers, to work and learn together in a school community that reflects the real world. Our classrooms include services from educational assistants, BCBA's, BCABA's, occupational therapists, physical therapists, and speech and language therapists who work with our preschool teachers to provide support to all students.

The program follows the Massachusetts Curriculum Frameworks and Common Core Standards and implements the OWL program, with an emphasis on language development.

Children attending the Integrated Preschool with Individual Education Programs meet specific goals through program participation, speech and language therapy, occupational therapy, physical therapy and social/emotional supports as determined by the child's special education team. The Integrated Preschool Program follows the Department of Elementary and Secondary Education approved model of eight typically developing peers to seven students with special education needs in each classroom. Sessions are half-day for the Integrated classrooms and full-day for the Intensive/Integrated classrooms. Our Intensive program follows the Department of Elementary and Secondary Education approved designation for student enrollment as a self-contained early childhood program and does not have typically developing peers included.

The Integrated Preschool Program will be located at the McKeown School beginning in the 2015/2016 school year. This program will not be accommodated within the proposed project.

Module 4 – Schematic Design

Describe any programs with other private or public entities and the relationships that exist with other entities that may impact the District's Special Educational Programs and if they are to be accommodated in the proposed project.

There are no other private or public entities and/or relationships that exist with other entities that may impact the District's special education programs and proposed project.

Proposed Space Summary - Beverly Middle School

Grades 5-8

7.20.15

5-8 BEVERLY MIDDLE SCHOOL	Existing Conditions			PROPOSED: Existing to Remain/Renovated			PROPOSED: New			PROPOSED: Total			MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
CORE ACADEMIC SPACES			**31,524**			**0**			**68,390**			**0**			**65,310**	
(List classrooms of different sizes separately)																
Classroom - General		*34*					850	27	22,950				950	51	48,450	850 SF min - 950 SF max
							1,025	6	6,150							
English	600	2	1,200													
	640	3	1,920													
	675	1	675													
	755	1	755													
	763	1	763													
	725	1	725													
Math	585	2	1,170													
	640	2	1,280													
	675	1	675													
	725	3	2,175													
	788	1	788													
Language	700	2	1,400				850	6	5,100							
	820	1	820													
	588	1	588													
	680	1	680													
Reading	680	1	680				850	5	4,250							
	900	1	900				425	2	850							
Social Studies	600	2	1,200													
	640	3	1,920													
	655	1	655													
	679	1	679													
	688	1	688													
	741	1	741													
Small Group Seminar (20-30 seats) / Resource			0				175	12	2,100				500	3	1,500	
		10	0													
Science Classroom / Lab: 5/6 Grades	648	2	1,296				1,025	6	6,150				1,200	12	14,400	1 period / day / student
Science Classroom / Lab: 7/8 Grades							1,200	6	7,200							
	656	1	656													
	668	2	1,336													
	730	4	2,920													
	1,200	1	1,200													
Prep Room	75	3	225				80	12	960				80	12	960	
Academic Team Room							820	12	9,840							
Teacher Collaboration Room							500	4	2,000							
Health Classroom	814	1	814				840	1	840							
SPECIAL EDUCATION			**8,895**			**0**			**15,850**			**0**			**15,100**	
(List classrooms of different sizes separately)																
Self-Contained SPED	800	1	800				425	1	425				950	10	9,500	assumed 8% of pop. in self-contained SPED
Language Based - 5th Grade							425	1	425							
Language Based - 6th Grade							425	1	425							
Language Based - 7th Grade							425	1	425							
Language Based - 8th Grade							425	1	425							
Opportinity Room - 5-8 Grades							800	1	800							
Learning Center - 5/6 Grades							425	1	425							
Learning Center - 7/8 Grades							425	1	425							
Strageties Based Instruction (SBI) - SS							425	1	425							
Strageties Based Instruction (SBI) - Math							425	1	425							
Strageties Based Instruction (SBI) - ELA							425	1	425							
Strageties Based Instruction (SBI) - Reading							425	1	425							
Student Support Program (SSP) - 5th Grade							425	1	425							
Student Support Program (SSP) - 6th Grade							425	1	425							
Student Support Program (SSP) - 7th Grade							425	1	425							
Student Support Program (SSP) - 8th Grade							425	1	425							
Attain (Autism) 5/6 - 7/8 Grades							1,200	1	1,200							
Thermputic Learning 5/6 Grades							425	1	425							
Thermputic Learning 7/8 Grades							425	1	425							
ELL - English Language Learners							425	2	850							
OT/PT							425	1	425							
	711	1	711													
	675	1	675													
	665	2	1,330													
	610	1	610													
	586	1	586													
Self-Contained SPED Toilet			0				60	1	60				60	10	600	
ESL - English as a Second Language	238	1	238													
ASL - American Sign Language	660	1	660													
Speech / Testing	75	4	300				250	1	250							
OT Office	175	1	175													
Resource Room	400	3	1,200										500	7	3,500	1/2 size Genl. Clrm.
	347	1	347													
	390	1	390													
Small Group Room / Reading	665	1	665				215	12	2,580				500	3	1,500	1/2 size Genl. Clrm.
Small Inclusion Room							75	24	1,800							1/2 size Genl. Clrm.
SPED Conference Room							285	1	285							
SPED Meeting Room							175	1	175							
Special Education Chair Office	208	1	208				200	1	200							
ART & MUSIC			**3,896**			**0**			**6,550**			**0**			**6,550**	
Art Classroom	802	1	802				1,250	2	2,500				1,200	3	3,600	assumed use - 50% population 2 times / week
Art Workroom w/ Storage & kiln	550	1	550				175	2	350				150	3	450	
Band / Chorus - 100 seats	917	2	1,834				2,000	1	2,000				1,500	1	1,500	assumed use - 50% population 2 times / week
Band Storage							300	1	300							
Music Practice / Ensemble	710	1	710				75	3	225				200	5	1,000	
Music Office							125	1	125							
MIDI Lab / Ensemble							450	1	450							
STEAM Academic Support							50	12	600							
VOCATIONS & TECHNOLOGY			**4,649**			**0**			**9,600**			**0**			**9,600**	
Tech Clrm. - (E.G. Drafting, Business)	2,382	1	2,382										1,200	3	3,600	Assumed use - 25% Population - 5 times/week
Tech Shop - (E.G. Consumer, Wood)			0										2,000	3	6,000	Assumed use - 25% Population - 5 times/week
ComputerTechnology #1	1,584	1	1,584													
Computer Technology #2	683	1	683													
Integrated Academic Production Lab							500	12	6,000							
Multimedia & Video Applications Lab							1,300	1	1,300							
Technology Applications & Production Lab							1,300	1	1,300							
Set Design & Construction Applications Lab							1,000	1	1,000							
HEALTH & PHYSICAL EDUCATION			**8,677**			**0**			**15,400**			**0**			**8,400**	
Gymnasium	4,607	1	4,607				6,000	2	12,000				6,000	1	6,000	
Gym Storeroom			0				150	2	300				150	1	150	
Health Instructor's Office w/ Shower & Toilet	125	2	250				250	2	500				250	1	250	
Locker Rooms - Boys / Girls w/ Toilets	3,820	1	3,820				1,300	2	2,600				1,000	2	2,000	
MEDIA CENTER			**2,177**			**0**			**8,401**			**0**			**8,401**	
Media Center / Reading Room	2,177	1	2,177				8,401	1	8,401				8,401	1	8,401	
DINING & FOOD SERVICE			**8,389**			**0**			**15,872**			**0**			**15,872**	
Cafeteria / Dining (5/6)	5,130	1	5,130				5,231	1	5,231				10,463	1	10,463	2 seatings - 15SF per seat
Cafeteria / Dining (7/8)							5,232	1	5,232							
Stage	885	1	885				1,600	1	1,600				1,600	1	1,600	
Chair / Table / Equipment Storage			0				665	1	665				665	1	665	
Kitchen	2,374	1	2,374				2,695	1	2,695				2,695	1	2,695	1600 SF for first 300 + 1 SF/student Add'l
Staff Lunch Room			0				449	1	449				449	1	449	20 SF/Occupant
MEDICAL			**362**			**0**			**910**			**0**			**910**	
Medical Suite Toilet							60	1	60				60	1	60	
Nurses' Office / Waiting Room							350	1	350				250	1	250	
Examination Room	362	1	362				100	2	200				100	6	600	
Resting							150	2	300							
ADMINISTRATION & GUIDANCE			**2,660**			**0**			**4,796**			**0**			**4,795**	
General Office / Waiting Room / Toilet	740	1	740				798	1	798				798	1	798	
Teachers' Mail and Time Room			0				100	1	100				100	1	100	
Duplicating Room			0				200	1	200				200	1	200	
Records Room			0				200	1	200				200	1	200	
Principal's Office w/ Conference Area	230	1	230				375	1	375				375	1	375	
Principal's Secretary / Waiting			0				125	1	125				125	1	125	
Assistant Principal's Office - AP1	175	1	175				150	1	150				150	1	150	
Assistant Principal's Office - AP2	200	1	200				150	2	300				150	2	300	
Supervisory / Spare Office			0				150	1	150				150	1	150	
Conference Room	247	1	247				350	1	350				350	1	350	
Guidance Office	120	4	480				110	4	440				150	7	1,050	
Instructional Coaches (Math / Literary)							150	2	300							
School Adjustment Counselor (SAC)							150	2	300							
Guidance Waiting Room	238	1	238				110	1	110				100	1	100	
Guidance Storeroom			0				50	1	50				50	1	50	
Teachers' Work Room	350	1	350				848	1	848				848	1	848	
CUSTODIAL & MAINTENANCE			**328**			**0**			**2,870**			**0**			**2,870**	
Custodian's Office							150	1	150				150	1	150	

Proposed Space Summary - Beverly Middle School

Grades 5-8

7.20.15

5-8 BEVERLY MIDDLE SCHOOL	Existing Conditions			PROPOSED									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
Custodian's Workshop							250	1	250				250	1	250	
Custodian's Storage							375	1	375				375	1	375	
Recycling Room / Trash							400	1	400				400	1	400	
Receiving and General Supply							565	1	565				565	1	565	
Storeroom							930	1	930				930	1	930	
Network / Telecom Room	328	1	328				200	1	200				200	1	200	
OTHER			10,066			0			5,700			0			0	
Other *(specify)*																
Dental Clinic																
Reception	210	1	210													
Exam	112	1	112													
Exam	90	1	90													
X-ray	132	1	132													
Clean Room	83	1	83													
Office																
Auditorium (Existing: 1,200 seats)	9,439	1	9,439				5,700	1	5,700							
Total Building Net Floor Area (NFA)			81,623			0			154,339			0			137,808	
Proposed Student Capacity / Enrollment									1,395						1,395	
Total Building Gross Floor Area (GFA)[2]			144,349						231,509						223,200	
Grossing factor (GFA/NFA)			1.77						1.50			#DIV/0!			1.62	

[1] **Individual Room Net Floor Area (NFA)** Includes the net square footage measured from the inside face of the perimeter walls and includes all specific spaces assigned to a particular program area including such spaces as non-communal toilets and storage rooms.

[2] **Total Building Gross Floor Area (GFA)** Includes the entire building gross square footage measured from the outside face of exterior walls

Architect Certification

I hereby certify that all of the information provided in this "Proposed Space Summary" is true, complete and accurate and, except as agreed to in writing by the Massachusetts School Building Authority, in accordance with the guidelines, rules, regulations and policies of the Massachusetts School Building Authority to the best of my knowledge and belief. A true statement, made under the penalties of perjury.

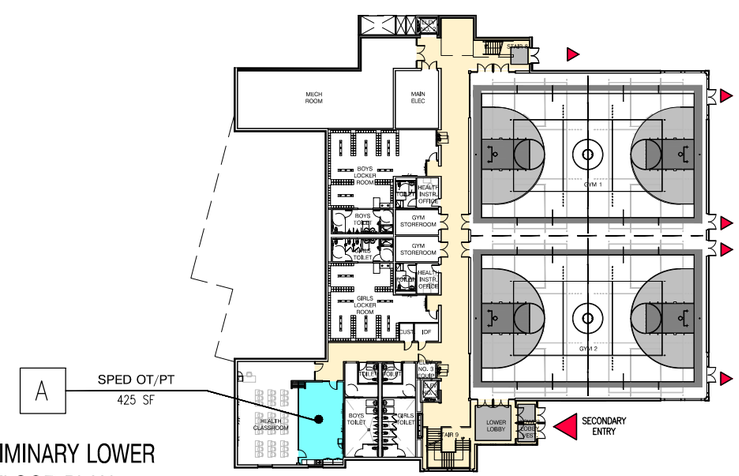
Name of Architect Firm: AJ Architects, LLC

Name of Principal Architect: Troy L. Randall

Signature of Principal Architect:

Date: 7.20.15

PRELIMINARY FIRST FLOOR PLAN



PRELIMINARY LOWER FLOOR PLAN

Legend

Circulation

Special Education

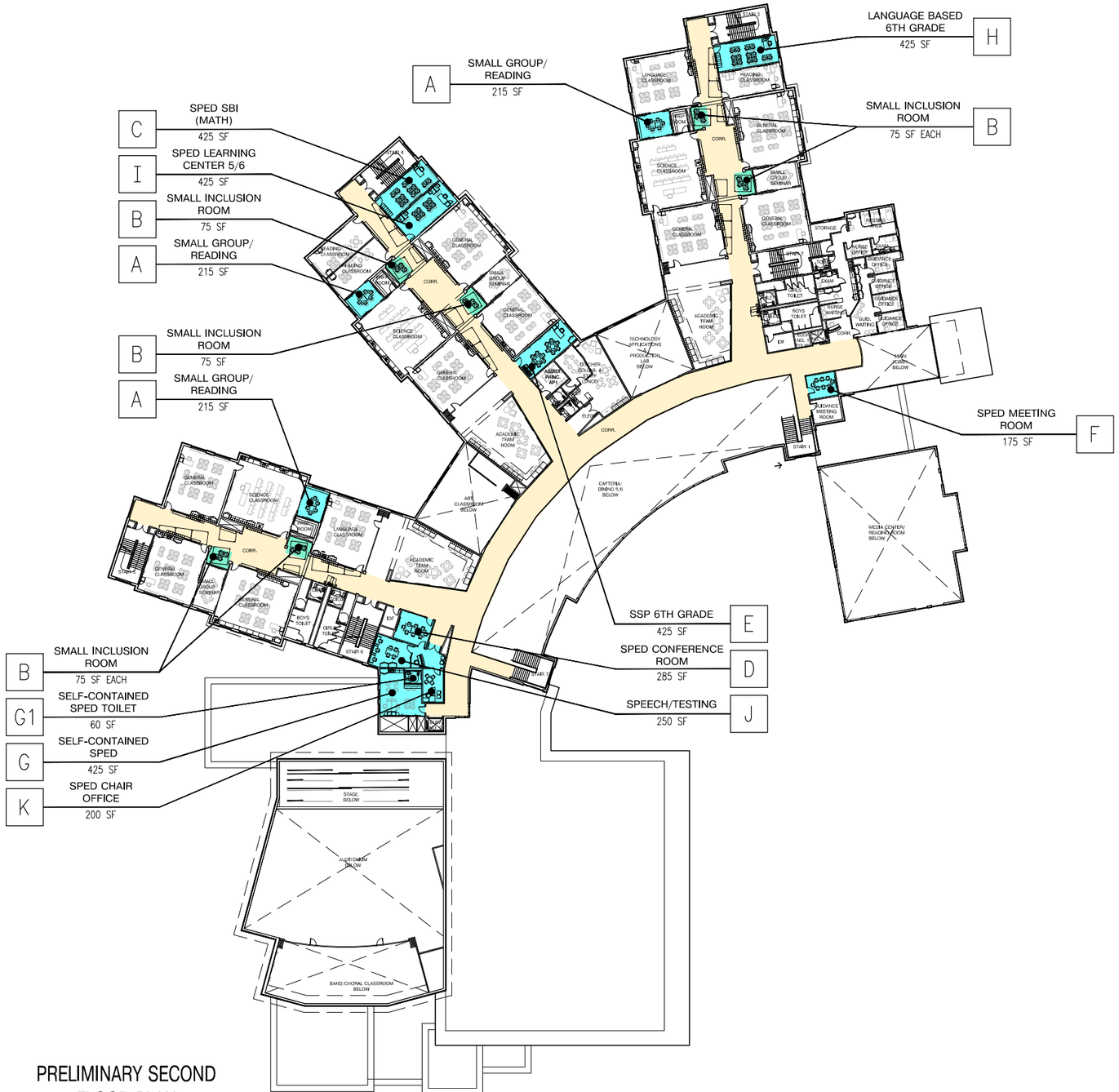
0' 30' 60' 100'

526 Boston Post Road
Wayland, MA 01778
TEL. 508.358.0790
FAX. 508.358.0791

BEVERLY MIDDLE SCHOOL

BEVERLY, MA

DRAWN BY:	JMR	A1.10
SCALE:	AS NOTED	
JOB NO:	1403.00	
DATE:	AUG 6, 2015	REF DWG:



PRELIMINARY SECOND FLOOR PLAN

Legend

Circulation

Special Education

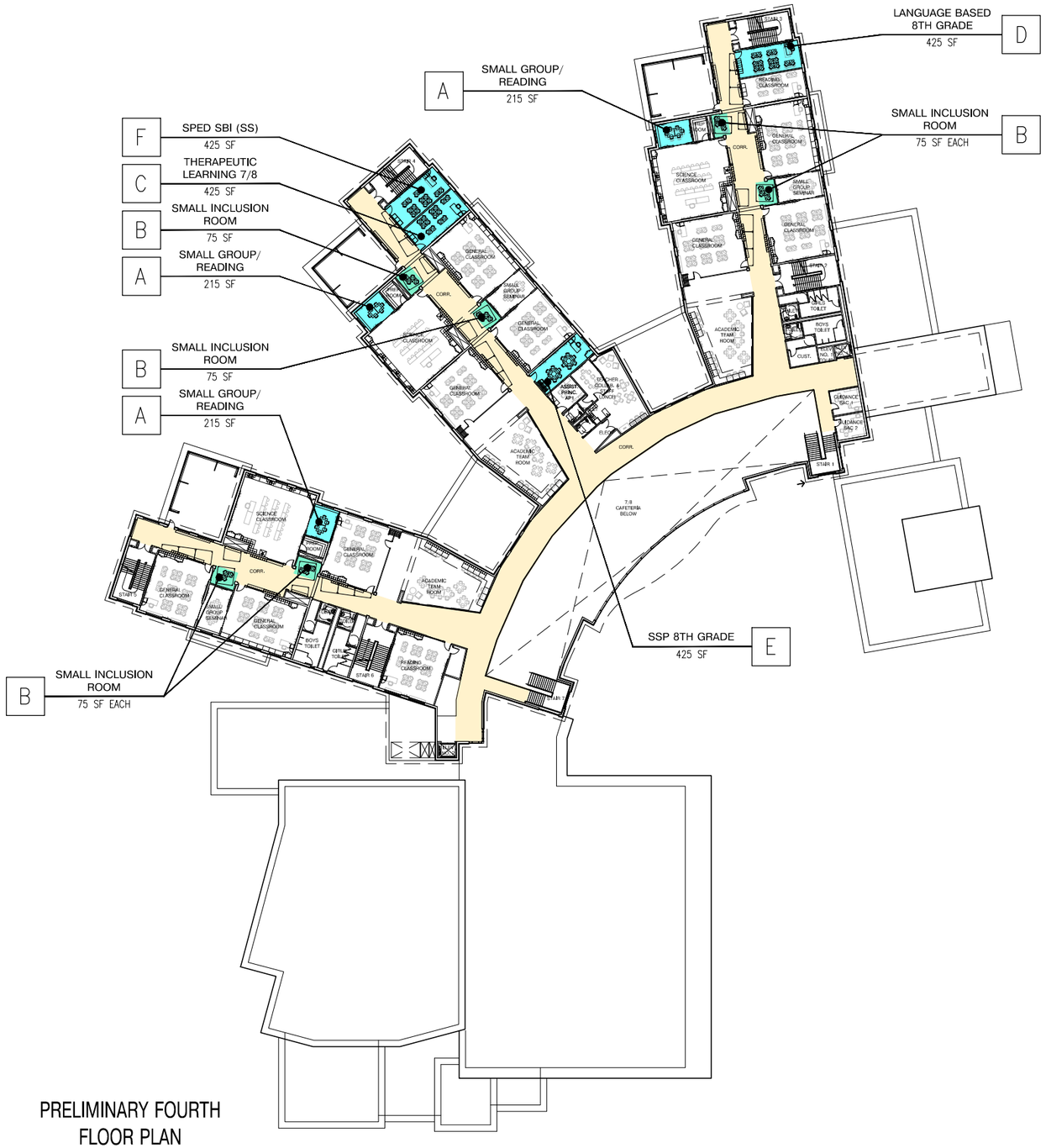
0' 30' 60' 100'

526 Boston Post Road
Wayland, MA 01778
TEL. 508.358.0790
FAX. 508.358.0791

BEVERLY MIDDLE SCHOOL

BEVERLY, MA

DRAWN BY:	JMR	A1.20
SCALE:	AS NOTED	
JOB NO:	1403.00	
DATE:	AUG 6, 2015	REF DWG:



PRELIMINARY FOURTH FLOOR PLAN

Legend

Circulation

Special Education

0' 30' 60' 100'

526 Boston Post Road
Wayland, MA 01778
TEL. 508.358.0790
FAX. 508.358.0791

BEVERLY MIDDLE SCHOOL

BEVERLY, MA

DRAWN BY:	JMR	A1.40
SCALE:	AS NOTED	
JOB NO:	1403.00	
DATE:	AUG 6, 2015	REF DWG:

Special Education Adjacency Table

Beverly Public Schools - Beverly Middle School 7/20/2015

MSBA Guidelines Space	MSBA Guidelines SF	Proposed Room Name	Floor Plan Designation (A-Z)	Proposed SF	Proposed Space Description and Reasoning for Adjacencies
Floor: Lower Level					
*Unique to District		Sped OT/PT	A	425	This room will function as the occupational therapy and physical therapy space. It is located in close proximity to the gyms and outdoor access for extension of physical activities as required to meet the goals and objectives/benchmarks of students' Individual Education Programs. It's location near a stairwell will provide for access by students on all levels of the building.
Floor 1					
Small Group Room/ Reading	500	Small Group Room/ Reading	A	215	This room will serve as an area to bring students for small group reading instruction. It is located within the academic neighborhoods and between classrooms to allow for optimization of inclusion in the general education classroom and flexibility in providing specialized instruction to students with minimal time spent in transition.
*Unique to District		Small Inclusion Room	B	75	This room will function as an academic support space and breakout space for specialists, paraprofessionals, and/or for students to work collaboratively on small group activities. It is located within the academic neighborhood to allow for optimization of inclusion and flexibility in providing specialized instruction and small group work space.
*Unique to District		Therapeutic Learning 5/6 Grades	C	425	The Therapeutic Learning Center will provide social/emotional and academic support to students in grades 5 and 6. It is located within an academic neighborhood to allow for optimization of inclusion into the general education classroom, while providing a location for access when students require a break from the general education classroom. The location close to the stairwell will allow for access by 6th grade students on the second floor, while minimizing transition time.
*Unique to District		Opportunity Room - 5-8 Grades	D	800	The Opportunity Room will provide social/emotional support to our autism spectrum/Asperger's students in grades 5-8. This room is located close to the elevator and stairwell to allow for access for students located all floors of the building. It is further located within close proximity to the main entrance of the building to support students with high anxiety and difficulties entering the building, providing a morning check-in space before entering homeroom. An adjacent building entry/exit will help facilitate entry into the building.
*Unique to District		Student Support Program (SSP) - 5th Grade	E	425	The Student Support program services students with social/emotional/behavioral challenges, providing a self-contained model and inclusionary model, as outlined in students' Individual Education Programs. The room is located within an academic neighborhood to maximize inclusion opportunities. It is also located adjacent to administration for support, as needed.
*Unique to District		Strategies Based Instruction (SBI) - SS	F	425	The SBI program provides instruction within a smaller setting . This classroom is located within an academic neighborhood and adjacent to the stairwell, allowing for access by students on other levels of the building, minimizing transition time.
*Unique to District		Attain (Autism) 5/6 - 7/8 Grades	G	1200	The ATTAIN program services our students with autism in a self-contained model. The classroom is located close to a building entrance, which will provide for easier access to and from the bus. The classroom is also located close to a stairwell to allow for access by students to the other levels of the building for inclusionary purposes. The classroom is within close proximity to the kitchen, OT/PT, speech/language (via stairwell), gym and health classroom. As a life skills program, the location provides the ability to utilize the kitchen for daily living/vocational skills; the health classroom for health/nutrition/daily living skills; related therapies for services; the gym for physical activity breaks.
*Unique to District		Language Based - 5th Grade	H	425	The Language-Based Program provides support to students with specific learning disabilities (SLD) in the areas of reading and writing language in a small group setting. Academic support periods are provided for preview and review of content area instruction and concepts taught during students inclusion in general education classrooms. The room is located in an academic neighborhood and adjacent to the resource room, allowing for additional breakout space, as needed, for individualized and small group instruction.
*Unique to District		ELL - English Language Learners	I	425	The ELL Program classroom is located within an academic neighborhood. The classroom is located close to the stairwell to allow for access by students on other levels of the building, minimizing transition time.
Floor 2					
Small Group Room/ Reading	500	Small Group Room/ Reading	A	215	This room will serve as an area to bring students for small group reading instruction. It is located within the academic neighborhoods and between classrooms to allow for optimization of inclusion in the general education classroom and flexibility in providing specialized instruction to students with minimal time spent in transition.
*Unique to District		Small Inclusion Room	B	75	This room will function as an academic support space and breakout space for specialists, paraprofessionals, and/or for students to work collaboratively on small group activities. It is located within the academic neighborhood to allow for optimization of inclusion and flexibility in providing specialized instruction and small group work space.
*Unique to District		Strategies Based Instruction (SBI) - Math	C	425	The SBI program provides instruction within a smaller setting . This classroom is located within an academic neighborhood and adjacent to the stairwell, allowing for access by students on other levels of the building, minimizing transition time.
*Unique to District		SPED Conference Room	D	285	The SPED Conference Room will provide an area for Team Meetings. This room is located close to the stairwell and elevator for easy access by parents from the main lobby on the first floor, without having to navigate through the building.
*Unique to District		Student Support Program (SSP) - 6th Grade	E	425	The Student Support program services students with social/emotional/behavioral challenges, providing a self-contained model and inclusionary model, as outlined in students' Individual Education Programs. The room is located within an academic neighborhood to maximize inclusion opportunities. It is also located adjacent to administration for support, as needed.
*Unique to District		Sped Meeting Room	F	175	The Sped Meeting Room will allow for Team meetings to review IEP's as well as an additional space for Team collaboration. The room is centrally located close to the elevators and stairwell to allow for access by staff and students on multiple levels of the building, as well as access for parents, minimizing the need to navigate through the building.
		Self-Contained SPED	G	425	The self-contained classroom and toilet is an extension of space for the ATTAIN program. It will allow for adequate space for grades 5-6 and 7-8. The ATTAIN program services our students with autism in a self-contained model. The classroom is located close to a building entrance (secondary entrance near the gymnasium), which will provide for easier access to and from the drop-off area. The classroom is also located close to a stairwell to allow for access by students to the other levels of the building for inclusionary purposes. As a life skills program, the location provides the ability to utilize the kitchen for daily living/vocational skills; the adjacent health classroom for health/nutrition/daily living skills; related therapies for services; the gym for physical activity breaks.

		Self-Contained SPED Toilet	G1	60	The location for this toilet is for any of those special education students that have disabilities regarding social anxiety and usage of other restrooms in the school. It is located adjacent to the Self-contained classroom.
*Unique to District		Language Based - 6th Grade	H	425	The Language-Based Program provides support to students with specific learning disabilities (SLD) in the areas of reading and writing language in a small group setting. Academic support periods are provided for preview and review of content area instruction and concepts taught during students inclusion in general education classrooms. The room is located in an academic neighborhood and adjacent to the resource room, allowing for additional breakout space, as needed, for individualized and small group instruction.
*Unique to District		SPED Learning Center - 5/6 Grades	I	425	The Learning Center provides specially designed instruction within a pull-out models for students, as designated within their Individual Education Program. The Learning Center is located within an academic neighborhood near the stairwell to allow for access by students on all levels of the building, minimizing transition time. It is further located adjacent to the small group reading room to allow for additional breakout space for students.
*Unique to District		Speech / Testing	J	250	The speech/testing area is located on the second floor. This area is centrally located within the building and near a stairwell to allow for access by students on other levels of the building.
*Unique to District		Special Education Chair Office	K	200	The Special Education Team Chairperson Office is located on the second floor. This office is centrally located. The adjacent conference area will allow for team meetings and collaborative meetings with staff. The location will allow for access by staff, parents, and students while minimizing the need to travel throughout the building..
Floor 3					
Small Group Room/ Reading	500	Small Group Room/ Reading	A	215	This room will serve as an area to bring students for small group reading instruction. It is located within the academic neighborhoods and between classrooms to allow for optimization of inclusion in the general education classroom and flexibility in providing specialized instruction to students with minimal time spent in transition.
*Unique to District		Small Inclusion Room	B	75	This room will function as an academic support space and breakout space for specialists, paraprofessionals, and/or for students to work collaboratively on small group activities. It is located within the academic neighborhood to allow for optimization of inclusion and flexibility in providing specialized instruction and small group work space.
*Unique to District		Strategies Based Instruction (SBI) - ELA	C	425	The SBI program provides instruction within a smaller setting . This classroom is located within an academic neighborhood and adjacent to the stairwell, allowing for access by students on other levels of the building, minimizing transition time.
*Unique to District		ELL - English Language Learners	D	425	The ELL Program classroom is located within an academic neighborhood. The classroom is located close to the stairwell to allow for access by students on other levels of the building, minimizing transition time.
*Unique to District		Student Support Program (SSP) - 7th Grade	E	425	The Student Support program services students with social/emotional/behavioral challenges, providing a self-contained model and inclusionary model, as outlined in students' Individual Education Programs. The room is located within an academic neighborhood to maximize inclusion opportunities. It is also located adjacent to administration for support, as needed.
*Unique to District		Language Based - 7th Grade	F	425	The Language-Based Program provides support to students with specific learning disabilities (SLD) in the areas of reading and writing language in a small group setting. Academic support periods are provided for preview and review of content area instruction and concepts taught during students inclusion in general education classrooms. The room is located in an academic neighborhood and adjacent to the resource room, allowing for additional breakout space, as needed, for individualized and small group instruction.
*Unique to District		SPED Learning Center - 7/8 Grades	G	425	The Learning Center provides specially designed instruction within a pull-out models for students, as designated within their Individual Education Program. The Learning Center is located within an academic neighborhood near the stairwell to allow for access by students on all levels of the building, minimizing transition time. It is further located adjacent to the small group reading room to allow for additional breakout space for students.
Floor 4					
Small Group Room/ Reading	500	Small Group Room/ Reading	A	215	This room will serve as an area to bring students for small group reading instruction. It is located within the academic neighborhoods and between classrooms to allow for optimization of inclusion in the general education classroom and flexibility in providing specialized instruction to students with minimal time spent in transition.
*Unique to District		Small Inclusion Room	B	75	This room will function as an academic support space and breakout space for specialists, paraprofessionals, and/or for students to work collaboratively on small group activities. It is located within the academic neighborhood to allow for optimization of inclusion and flexibility in providing specialized instruction and small group work space.
*Unique to District		Therapeutic Learning 7/8 Grades	C	425	The Therapeutic Learning Center will provide social/emotional and academic support to students in grades 7 and 8. It is located within an academic neighborhood to allow for optimization of inclusion into the general education classroom, while providing a location for access when students require a break from the general education classroom. The location close to the stairwell will allow for access by 7th grade students on the third floor, while minimizing transition time.
*Unique to District		Language Based - 8th Grade	D	425	The Language-Based Program provides support to students with specific learning disabilities (SLD) in the areas of reading and writing language in a small group setting. Academic support periods are provided for preview and review of content area instruction and concepts taught during students inclusion in general education classrooms. The room is located in an academic neighborhood and adjacent to the resource room, allowing for additional breakout space, as needed, for individualized and small group instruction.
*Unique to District		Student Support Program (SSP) - 8th Grade	E	425	The Student Support program services students with social/emotional/behavioral challenges, providing a self-contained model and inclusionary model, as outlined in students' Individual Education Programs. The room is located within an academic neighborhood to maximize inclusion opportunities. It is also located adjacent to administration for support, as needed.
*Unique to District		Strategies Based Instruction (SBI) - SS	F	425	The SBI program provides instruction within a smaller setting . This classroom is located within an academic neighborhood and adjacent to the stairwell, allowing for access by students on other levels of the building, minimizing transition time.
			Total	12,630	

Square Footage Summary:

The proposed overall gross square footage of the new building is 231,509; Average square feet of General Classrooms is 825sf

MSBA guidelines allows for 15,100 net square feet of dedicated special education space. The proposed program is 750 nsf in excess of the guidelines.

***Indicates that space is unique to District's program and does not appear in MSBA space guidelines.**