3.1.4 EXISTING CONDITIONS

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Evaluation of Southborough Sites

Four town owned parcels were considered for the future Southborough elementary school project.

The sites are:

1. 53 Parkerville Rd - The existing Margaret A. Neary Elementary School

2. 28 Cordaville Rd - The existing Albert S. Woodward Memorial School

3. 208 Parkerville Rd - George Mooney Park

4. Parcel 28-0000-004 (Behind the transfer station) - Town Owned Parcel

MARGARET A. NEARY SCHOOL

The Margaret A. Neary School is located at 53 Parkerville Road (the site), in the town of Southborough, Worcester County, Massachusetts. It is centrally located north of Rt. 9 near downtown Southborough. The school building is located on approximately 32.6-acres of a single, 80.7-acre parcel (identified by parcel ID 43-0000-018-0), shared with the P. Brent Trottier Middle School to the north. The site is owned by the Town of Southborough.

The existing Neary School occupies a large, open field on the southern side of the site. There are athletic fields immediately to the north of the school which abuts a stand of trees and wetlands, that separate the Neary School from the Trottier School. Parking is located to the southeast of the building. A residential neighborhood abuts the west and south sides of the site.

Overall Locus Map

Margaret A. Neary School Locus Map

The site is part of the watershed that drains the surrounding residential neighborhoods to the Sudbury Reservoir. A small brook that bisects the site from west to east creates wetlands along the northern edge of the athletic fields along the stand of trees. There is also a small stream and wetlands along the southeast side of the site. Due to the proximity to the Sudbury Reservoir, there is a FEMA designated flood zone that follows portions of the stream through the northern part of the site.

Although further study is necessary to map the location of the wetlands and other environmental constraints, it appears that the site can support either an addition to the existing building or construction of new school. No additional legal constraints were discovered.

ALBERT S. WOODWARD MEMORIAL SCHOOL

The Albert S. Woodward Memorial School is located in the central part of Southborough at 28 Cordaville Rd. It is adjacent to the public safety complex. The school building is located on an approximately 11.65 acre parcel owned by the Town of Southborough. No wetlands were identified on the site and it is not an area of critical environmental concern or home to rare species.

Choate Memorial Park is located immediately to the west of the building along Cordaville Road. The park is part of a deeded parcel to the town that has a covenant restriction limiting the use to park or recreational uses only. (See the deed for Parcel A in Appendix E). As a result of the deed restrictions, the park is not available to expand or otherwise construct a new building at the Woodward site.

The Woodward School is located in the Southborough Center Historic District, which is listed in the National Register of Historic Places. The historic district designation could further restrict development on the site and will be reviewed further during the next phase of this study.

GEORGE MOONEY PARK

George Mooney Park is located in the southwest part of Southborough adjacent to the Mary E. Finn

Albert S. Woodward School Locus Map

George Mooney Park l Locus Map

Elementary School. The park is home to athletic fields, including dedicated baseball and softball diamonds, tennis courts, and pickleball courts. It is a well utilized center for town recreation.

Several concerns have been identified by the District for the potential use of this property for a new or expanded school.

- The site is located at the southern end of town and is not proximate to the majority of school age population. Use of the site for a new or expanded school would exacerbate concerns about bus and emergency vehicle access from the rest of town.
- The site is located approximately 150 yards from the Massachusetts Turnpike, creating concerns for potential noise and air quality impact on a future school. In addition, access underneath the highway is limited, creating further concerns about travel logistics to the school from the northern side of town.
- A preliminary review of the deed indicates the park may be protected under Article 97, the Public Lands Preservation Act. This restriction is being further reviewed by the town's counsel and will be confirmed prior to submission of the PSR.
- CPA funding was recently used to upgrade the fields and pickleball courts. Additionally, significant private expense has gone into maintaining the fields.
- A significant cost would incur to relocate the parks and no town owned parcels are available equal in size.

Based on these concerns, the Neary Building Committee has decided to exclude the site as a potential location for a new Neary School or expanded Finn School.

PARCEL 28-0000-004-0

Parcel 28-0000-004-0 is located on Middle Road in central Southborough adjacent to the existing Town of Southborough Transfer Station. The parcel stretches from Middle Road on the west side to the rear of the Transfer Station on the east. Access to the site is limited to Middle Road due to the on-going activities behind the Transfer Station from Cordaville Road on the east. Portions of the site are relatively steeply sloped, particularly near the street and southern boundary of the parcel.

The parcel was previously evaluated during feasibility studies for the new public safety building. It was disqualified due to its small size and limited access from adjacent streets. The topography creates significant challenges, particularly for athletic fields. The access road is shared by Eversource, the town DPW, and the transfer station. The public safety study explored an option for rear egress but determined that would lead through a rural residential neighborhood with a steep incline. In addition to the grading challenges, site concerns include adjacency to a large wetland with an MWRA easement and close proximity to the septic system for the DPW salt shed.

These same considerations have led the Neary Building Committee to decide the site is not suitable for a new Neary School.

Parcel 28-0000-004-0 Locus Map

Existing Margaret A. Neary Site Evaluation

CONTROL OF SITE & AVAILABILITY FOR DEVELOPMENT

As noted above, the town owned parcel that is the site of the existing Neary and Trottier Schools is quite large with a large stand of trees that forms a natural buffer running west to east that separates the two schools onto separate sites. For the purposes of this evaluation, the description below will focus on the southern portion of the parcel that contains the Neary School, parking lot, and athletic fields.

The Margaret A. Neary Elementary School is a one-story building constructed in 1970. Due to under enrollment, six classrooms have been converted into the District offices for The Public Schools of Northborough and Southborough. In the event of an addition or renovation of the existing building, it is likely that th`e District offices will be relocated to another facility in town.

The site is improved with (2) modular classrooms, (2) utility/storage sheds, asphalt paved roads and parking areas, a playground, a softball field, a basketball court, a sand volleyball court (3) tennis courts, (5) soccer fields, and landscaped areas. The remaining land consists of forested areas, a small skating pond, and wetlands fed from the nearby Sudbury Reservoir, which divide the parcel on the east/west axis. Please refer to Appendix E. Property Deeds for the property deeds and Appendix F. Existing Conditions Site Survey for the survey of the site, surrounding roads, and parkland.

The Town of Southborough has full access and control of the existing school site for development (refer to the letter from the Office of the Town Solicitor for a legal opinion on the town's ability to use the site). There is one easement along the eastern edge of the property between the school and abutter's properties. The easement does not appear to limit further development of the site.

Considerations of future development of the Site include the steeply sloping land to the south and west of the existing building, potential wetlands or wet soils surrounding the site, and the impact of construction on existing school operations.

DEVELOPMENT RESTRICTIONS & PERMITS

The property is generally available for further development to support the proposed improvements to the Margaret A. Neary Elementary School. The following is a detailed evaluation of potential development restrictions on the site.

Planning Board and Zoning Board of Appeals

According to the Town of Southborough Zoning Map, the site is located within a residential zoning district (RA), where educational use is allowed. Pending final design of a potential new construction project, it is not anticipated that any zoning relief will be required.

Conservation Commission

Massachusetts GIS system (MassMapper) indicates wetlands along the southeast edge of the property adjacent to the existing town owned park on Parkerville Road. The site is further bisected by wetlands along a small stream that separates the Neary School from the Trottier School to the north. The stream is classified as a river with a 200' required riverfront buffer . A potential vernal pool was identified at the south of the site straddling the boundary with the parcel at 55 Parkerville Rd.

No Priority Habitats of Rare Species or Estimated Habitats of Rare Wildlife are noted. FEMA AE flood zones are located along the river and to the east of the access road from Parkerville road and the existing school buildings. Work on the site will likely require oversight from the Southborough Conservation Commission.

Stormwater Management

As noted above, the site provides natural drainage for the surrounding residential properties located to the south and west of the school. There are localized drainage structures in the existing parking lots that outfall to the nearby wetlands . There is no formal storm mitigation system currently in place.

Historic Restrictions

53 Parkerville Rd is not noted in the National Register of Historic Places and does not have a listing in the Massachusetts Cultural Resource Information System (MACRIS) database. It is not located within any of the established historic districts in Southborough. A Project Notification Form (PNF) will be filed with the Massachusetts Historical Commission during the next phase of the project to ensure there are no historical restriction that would impact the renovation or demolition of the existing school building.

National Pollutant Discharge Elimination System (NPDES)

Any potential construction project may require filing a NPDES construction general permit with the EPA for disturbance of an area of more than one acre of land. The Contractor awarded the contract would be responsible for filing the NPDES General Permit and preparing a project- specific Storm Water Pollution Prevention Plan (SWPPP). The Contractor must submit a Notice of Intent 14 days prior to any earth-disturbing activities.

Massachusetts Environmental Policy Act (MEPA)

It is not anticipated that a renovation, addition or new construction project will trigger any thresholds for MEPA regulations. A full analysis will be performed as part of the next phase of this study.

Accessibility

On February 23, 2024, representatives from KMA visited the site at 53 Parkerville Rd. to perform a comprehensive accessibility audit. Any deficiencies from the Massachusetts Architectural Access Board (MAAB) requirements in 521 CMR and the Americans with Disabilities Act (ADA) should be corrected as part of any building renovation.

The accessibility audit identified the following deficiencies:

- Insufficient number of accessible parking spaces, excessive cross slopes, and lack of curb cuts along bus lanes.
- Oversized thresholds, insufficient door widths, and hardware deficiencies at the main entrance and egress doorways.
- Door clearance, width and hardware deficiencies throughout the building. Inaccessible drinking fountains and inaccessible toilet fixtures in the multi-user toilets.
- Furniture deficiencies and lack of accessible seating locations in the cafeteria and classrooms.

Refer to Appendix G. Accessibility Evaluation - Itemized Deficiencies for detailed report on existing conditions.

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Code Red Consultants has prepared this memorandum as part of the feasibility study for the Neary Elementary School project located at 53 Parkerville Road in Southborough, MA. This memorandum is intended to summarize major fire and life safety requirements associated with the project, and facilitate the development of the Preliminary Design Program (PDP). A comprehensive Chapter 34 Investigation & Evaluation Report will be developed as the proposed project becomes further refined.

The information included within this memo is based on existing drawings and a building survey conducted by Code Red Consultants on February 22, 2024, which included a review of the major fire and life safety features within the building. Accessibility features were not evaluated as part of the survey.

Applicable Codes

Code references in this memo are from the Massachusetts State Building Code (780 CMR), the Massachusetts State Existing Building Code (MEBC), and the Massachusetts Comprehensive Fire Safety Code (527 CMR 1.00).

The 10th Edition of the **Massachusetts State Building Code** effective date is tentatively planned for Q2 of 2024 with a 6-month concurrency period. Any project filing for permit after this date will require compliance with the 10th Edition of 780 CMR. This new state code is based on the 2021 editions of the I-Codes with state-specific amendments. The code considerations outlined within this report are based on the 9th Edition of 780 CMR currently in effect.

Existing Building Description

The Neary Elementary School building is 1-story in height and has a footprint of approximately 60,000 square feet. The building was originally constructed in 1968. Two small modular classrooms were constructed as an addition following original construction MEP renovations occurred within the building in 2009, including upgrades to the HVAC and electrical systems.

A building separation was not observed between the original building and the modular addition, so both portions are considered a single building from a code perspective. The school contains classrooms, offices, a cafeteria, a library, and two recreational gymnasium spaces and serves students in grades 1 through 5. It is our understanding that the school also functions as a day care. Table 1 summarizes additional existing building information. Figure 1 includes an aerial view of the building.

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TABLE 1: EXISTING BUILDING SUMMARY

Use and Occupancy:	Group E, Educational [1], Group A-2, Assembly, and Group A-3, Assembly
Construction Type:	The building consists of masonry exterior walls, CMU interior walls and steel structural components. The original 1968 drawings indicate wood as part of portions of floor assemblies and the roof deck. Combustible construction was also observed in the floor assembly of small MEP spaces and in a nonbearing partition. The construction type of the defaults to Type IIIB construction.
Height & Area:	1 story above grade and a footprint of 60,000 square feet.
Automatic Sprinkler System:	The building is not protected with an automatic sprinkler system or standpipe system.
Fire Alarm System:	The building is equipped with a fire alarm and detection system consisting of the following components: • Visual & audible notification, • Smoke detection, and • Manual pull stations.
Means of Egress:	Exits are provided to the exterior serving common spaces/corridors throughout the building.
Exit Signage and Emergency Lighting:	Emergency lighting and illuminated exit signs were observed to be provided in the building.

1. It is assumed that the day care program does not include children younger than 2.9 years, which would otherwise result in a Group E, Day Care Facility (780 CMR 308.6.1).

FIGURE 1: BUILDING SITE OVERVIEW

Project Description

As part of the feasibility study for the project, new construction and renovation options are being considered:

1. *Renovation & Addition:* Major renovations throughout the existing building that could consist of the construction of an addition providing uses consistent with that of the existing building.
2. *New Construction*: Demolition of the existing building and construction of a new elementary school.

Classification of Work

The following details work classifications under consideration for the renovation option (MEBC – Work Area Method).

Renovation & Addition

This scope of work is classified as a **Level 2 Alteration** and an **Addition**. If the renovation scope of work includes work areas that make up more than 50% of the building area, the project would be classified as a **Level 3 Alteration** (MEBC Chapter 9). It is our understanding that no change of occupancy is planned.

- **Level 2 Alteration –** Includes the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment in less than 50% of the aggregate building area.
- **Level 3 Alteration –** Apply where the work area exceeds 50% of the aggregate building area.
- **Addition –** Includes an extension or increase in floor area, number of stories, or height of a building structure.

Use and Occupancy

The building consists of classrooms, gymnasiums, a library, offices, and building support spaces. The posted certificate of inspection indicates that the building contains **Group E, Educational, Group A-2, Assembly, and Group A-3, Assembly** occupancies.

It is our understanding that the day care uses in the building are classified as part of the Group E, Educational occupancy in accordance with 780 CMR 305.2.

The building has a non-separated mixed use occupancy approach.

Construction Type

Renovation & Addition

The 1968 original drawings indicate that the building is constructed with masonry exterior walls and steel framing, which is consistent with what was observed on site. Corridors are generally constructed with CMU throughout. Combustible construction was observed in small MEP spaces and the 1968 drawings indicate plywood at select locations. A small modular structure constructed as an addition consists of masonry exterior walls and noncombustible structure. A building separation was not observed between the existing building and the modular addition. The construction type of the building defaults to **Type IIIB** construction due to the combustible construction. However, if the wood construction is removed, the building would be permitted to be classified as **Type IIB** construction under the current edition of 780 CMR.

FIGURE 2: MASONRY EXTERIOR WALLS

FIGURE 3: PLYWOOD ROOF AND STEEL STRUCTURE

The following table outlines the minimum fire resistance rating for building elements throughout Type IIIB construction.

TABLE 2: FIRE RESISTANCE RATINGS OF BUILDING ELEMENTS (TYPE IIIB)

Building Element	**Type IIIB (Existing)**
Primary Structural Frame	0 Hour
Interior Bearing Walls	0 Hour
Exterior Bearing Walls	2 Hours
Exterior Nonbearing Walls	Refer to the Exterior Walls Section
Floor Construction and Secondary Members	0 Hour
Roof Construction and Secondary Members	0 Hour

New Construction

The construction type of the new building option is required to be based on the proposed height and area. Refer to the following section for limitations to consider for Type IIB construction (unprotected, noncombustible construction).

Height and Area

If an Addition is proposed to be constructed, evaluation of height and area limitations applicable to new construction is required (MEBC 1102).

The footprint of the existing building is 60,000 square feet and one story in height.

Table 3 outlines the area limitations for sprinklered and unsprinklered Type IIIB/ IIB buildings containing Group A-2, Group A-3, and Group E Occupancies. Area increases for 100% open frontage are included.

TABLE 3: NEW CONSTRUCTION AREA LIMITATIONS – TYPE IIB & IIIB

Use Group	**Allowable Height [Unsprinklered]**	**Allowable Height [Sprinklered]**	**Allowable Footprint Area [Unsprinklered]**	**Allowable Footprint Area [Sprinklered]**
A-2/A-3	2 stories/ 55 ft.	3 stories/ 75 ft.	16,625 ft²	45,125 ft²
E	2 stories/ 55 ft.	3 stories/ 75 ft.	25,375 ft²	68,875 ft²

The existing building does not comply with the height and area limitations since it is not sprinklered throughout. If an addition is proposed for the building, sprinklers are required to be provided throughout the existing and new portions of the building to comply with the height and

area limitations, or a compliant building separation (i.e. fire wall or pedestrian walkway) is required between the existing building and new addition.

A separated, mixed-use approach could be applied to the building to increase the allowable footprint. This approach would not require a rated separation between Group A and Group E occupancies (780 CMR Table 508.4).

Exterior Walls

New or altered exterior walls as a result of any renovation or addition are required to be evaluated in accordance with 780 CMR 602 & 705.8.

The following table indicates the fire-resistance ratings and unprotected opening limitations for nonbearing exterior walls based on fire separation distance (780 CMR 602 & 705.8):

TABLE 4: EXTERIOR WALL RATINGS AND UNPROTECTED OPENINGS PERMITTED BASED ON FSD TYPE IIIB (NONSPRINKLERED)

Fire Separation Distance (ft.)	Fire-Resistance Rating	Allowable area
0 ≤ X < 5	1 Hour	Not Permitted
5 ≤ X < 10	1 Hour	10%
10 ≤ X < 15	1 Hour	15%
15 ≤ X < 20	1 Hour	25%
20 ≤ X < 25	1 Hour	45%
25 ≤ X < 30	1 Hour	70%
X ≥ 30	0 Hours	No Limit

1. 20 ft. of fire separation distance is required for unlimited openings and nonrated exterior walls for Type IIIB buildings that are sprinklered throughout.
2. 10 ft. of fire separation distance is required for unlimited openings and nonrated exterior walls for Type IIB buildings.

For the purposes of applying the above table, fire separation distance is measured to one of the following: (1) closest interior lot line, (2) centerline of a street, alley, or public way, or (3) an imaginary line between two buildings on the property.

Based on GIS mapping, a minimum of 280 feet of fire separation distance is maintained to adjacent lot lines around the perimeter of the building. No structures on the same lot are located such that the fire separation distance would be reduced.

Interior Finishes

New interior finishes are required to comply with 780 CMR Chapter 8. All existing interior finishes within the exits/ corridors in the work area in the existing building are required to comply with the code for new construction (MEBC 803.4). If the proposed work area exceeds 50% of the floor area, all interior finishes within exits/ corridors serving the work area are required to comply with 780 CMR (MEBC 803.4.1).

On site, decorations were observed to be mounted on walls in classrooms and corridors. Regardless of the scope of work, it is recommended that paper decorations be reviewed throughout to ensure these materials are within the allowable limits and locations.

- **Paper materials displayed in classrooms are not permitted to exceed 50% of the total wall area where buildings are sprinklered throughout (527 CMR 20.2.4.4.3). Otherwise, paper materials are permitted for up to 20% of the total wall area.**

- **Paper materials displayed in corridors are not permitted to exceed 50% of the surface area of any wall in buildings sprinklered throughout, or 10% if the building is not sprinklered (527 CMR 20.2.4.4.4).**
    - **Paper materials are required to be positioned in such manner to avoid concentration of materials to reduce flame spread in the event of a fire.**
    - **Groupings of materials are not permitted to exceed a maximum horizontal measurement of 12 feet and a maximum vertical measurement of six feet.**
    - **Groups of paper material are permitted as long as there is space between each group equal to at least ½ the horizontal width of the largest adjacent group.**
- **Paper materials are not permitted to cover an egress door or be placed within 5 ft. of an egress door (527 CMR 20.2.4.4.).**

FIGURE 4: CLASSROOM WALL DECORATIONS

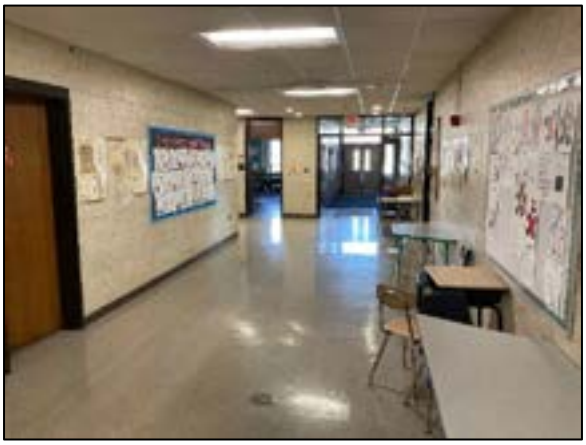


FIGURE 5: CORRIDOR WALL DECORATIONS

Fire Protection Systems

The existing building is not equipped with a sprinkler system. Sprinkler protection is required as part of the project as outlined below:

- A new building is constructed with any of the following (780 CMR Table 903.2)
    - Group E fire area that exceeds 12,000 sf, or an area below the level of exit discharge.
    - Group A-2 fire area that exceeds 5,000 sf, 100 occupants, or an area below the level of exit discharge.
    - Group A-3 fire area that exceeds 5,000 sf, 300 occupants, or an area below the level of exit discharge.
- If an addition is constructed to the existing building without a compliant building separation, an automatic sprinkler system is required to meet the area limitations (780 CMR 506.2).
- If the work area exceeds 50% of the area on a given floor, the work area is required to be provided with sprinklers (MEBC 804.2.2).
- If the scope of work is considered a 'major alteration' based on MGL Ch. 148 Sec. 28G. Massachusetts General Law Ch. 148 Sec. 26G requires every building or structure, including major alterations thereto, which totals more than 7,500 gross square feet, to be protected throughout with an automatic sprinkler system. The law does not implicitly define what constitutes a 'major alteration.' An advisory document published by the Sprinkler Appeals Board in 2009 expands upon the application of this MGL to existing buildings, i.e. what should constitute 'major alterations.' This document summarizes that an existing building is

required to be protected with sprinklers where all of the following four conditions are satisfied:

1. Building gross square footage is more than 7,500 sf;
2. Sufficient water and water pressure exist to serve the system;
3. The nature of work to the building is considered as "major", including any one or more of the following:
    a. The demolition or reconstruction of existing ceilings or installation of suspended ceilings;
    b. The removal and/or installation of sub flooring, not merely the installation or replacement of carpeting or finished flooring;
    c. The demolition and/or reconstruction or repositioning or walls or stairways or doors; or
    d. The removal or relocation of a significant portion of the building's HVAC, plumbing, or electrical systems involving the penetration of walls, floors, or ceilings.
4. The scope of work is proportional to the cost/benefit of sprinkler installation. To evaluate whether this is satisfied, the advisory document lists either of the following as thresholds for requiring sprinkler protection (evaluated over a 5-year period):
    a. Work affects 33% or more of the total gross square footage; or
    b. Total cost of the work (excluding cost to install a sprinkler system) is equal to or greater than 33% of the assessed value of the building, as of the date of permit application.

The 2020 advisory document by the Sprinkler Appeals board notes that buildings owned by the Commonwealth are generally not subject to the provisions of 26G. However, buildings that are owned by state authorities or other similar entities created by Legislature, may not necessarily be considered "state owned".

Fire Alarm & Detection System

The building is equipped with a zoned fire alarm and detection system. The fire alarm control panel (FACP) is located in the office space adjacent to the main entrance vestibule from the parking lot. Fire alarm devices observed throughout the building include smoke detection, manual pull stations adjacent to exits, and audible/visual notification appliances. The system is not provided with emergency voice/alarm capabilities. The fire alarm and detection system is required to be extended/ reconfigured to provide full coverage as part of any renovation (780 CMR 907.2.3 Exception 1 & 527 CMR 1.00, 13.7.2.3.1.2).

All new fire alarm devices and any modifications to the existing fire alarm system are required to meet new construction requirements of NFPA 72 (2013 Edition) and 527 CMR relative to their installation. Group E buildings are also required to be provided with an emergency voice/ alarm communication system (780 CMR 907.2.3).

Means of Egress

Existing means of egress are required to be maintained in accordance with 527 CMR 1.00 & 780 CMR 102.8.

Deficiencies observed relative to the existing means of egress serving the building are outlined below. These existing conditions are permitted to remain unless deemed hazardous by the

building official or otherwise required to be corrected per 521 CMR or the MEBC. Note that this is not an exhaustive list of all existing egress deficiencies in the building.

- **Portions of the corridors and most doors serving the corridors are not provided with a fire resistance rating, latch, and closer. For unsprinklered educational buildings, corridors are required to be 1-hour rated (780 CMR 1020.1).**
- **Exit doors are not provided with the required level landings on both sides, and slopes were observed on the exterior sides of doors (780 CMR 1010.1.6).**
- **Egress doors throughout the building have clear openings less than the required 32 inches (780 CMR 1010).**
- **Missing or noncompliant/nongraspable handrails serving exterior ramps and stairs were observed (780 CMR 1014.1 & 1014.3).**

Alterations to the means of egress are required to comply with the code for new construction (MEBC 702.6). Where an addition to the existing building is constructed, the new and existing means of egress or egress components serving the addition are required to comply with 780 CMR Chapter 10 for new construction. The following include some of the major requirements, based on the building being fully sprinkler protected:

- The means of egress is required to be sized using 0.2" per occupant for stairs and 0.15" per occupant for other egress components (780 CMR 1005.3.1 & 1005.3.2). This assumes the building is being sprinklered and provided with an emergency voice/alarm communication system as part of the renovation scope. **With these factors, the existing exit doors serving the building provide an egress capacity of 2,126 occupants. If either of the systems are not installed, the egress capacity is limited to 1,595 occupants.**
- The number of occupants required to be calculated in accordance with 780 CMR Table 1004.1.2. Factors anticipated to be used on this project are listed in Table 5. The occupant load is permitted to be increased from the occupant load established for the given use where all other requirements of 780 CMR are met (780 CMR 1004.2).

TABLE 5: OCCUPANT LOAD FACTORS

Function of Space	Occupant Load Factor
Assembly, Unconcentrated (Tables & Chairs)	15 net
Classrooms	20 net
Vocational Shops/Labs & Library Reading Rooms	50 net
Fitness Space/Lockers	50 gross
Office & Library Stacks	100 gross
Commercial Kitchen	200 gross
Storage Areas/ MEP Rooms	300 gross

  As the scope of work for the project is developed, egress capacity is required to be maintained in accordance with 780 CMR Chapter 10.

- A single means of egress is permitted from any space where the occupant load or common path of travel distances are less than that specified in the following table (780 CMR 1006.2.1):

TABLE 6: SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

Occupancy	Maximum Occupant Load	Maximum Common Path of Travel Distance
A / E	49	75 feet

- Exit access travel distances are not permitted to exceed 250 ft. (780 CMR 1017.2).
- Where two exits or exit access doorways are required from any portion of the exit access as outlined above, the exit doors or exit access doorways are required to be placed a distance apart equal to not less than 1/3 of the length of the maximum overall diagonal dimension of the building or area served in a building that is sprinklered throughout (780 CMR 1007.1.1 Exception 2). The separation distance increases to at least 1/2 the length of the maximum overall diagonal dimension for buildings that are not sprinklered throughout.
- Corridors serving Group E occupancies on a floor with an occupant load of 100 or more are required to have a clear width of at least 72" (780 CMR Table 1020.2).
- Dead-end corridors are not permitted to exceed 20 ft. for Group A occupancies and 50 ft. for Group E occupancies (780 CMR 1020.4).

Plumbing

248 CMR 10.00, *Uniform State Plumbing Code*, regulates the minimum number of plumbing fixtures. The requirements set forth in 248 CMR 10.10(15) Table 1 apply to plumbing system installation, alteration, or extension projects where a plumbing permit is required. The minimum number of plumbing fixtures are based upon the use and occupancy classification of the building or space and the population as established by the authority having jurisdiction.

TABLE 7: PLUMBING FIXTURE FACTORS

Use Group	Toilets		Urinals	Lavatories Each Sex	
	Female	Male		Female	Male
Elementary Students	≤100: 1 per 25 >100: add 1 per 50	≤100: 1 per 25 >100: add 1 per 50	50% max. substitution	1 per 25	
Educational Staff	1 per 20	1 per 25	33% max. substitution	1 per 20	
Assembly (Gathering/Gymnasium)	≤200: 1 per 25 201-500: 1 per 50 >500: 1 per 100	≤200: 1 per 50 201-500: 1 per 100 >500: 1 per 100	50% max. substitution	1 per 50	

One drinking fountain per restroom set and one service sink per floor is also required.

The posted certificate of inspection for the school indicates that the maximum program load is 600 educational occupants throughout the facility. The gymnasium and cafeteria are each limited to 180 occupants. **Table 8 outlines the required number of plumbing fixtures for students based on the anticipated enrollment. As the scope of work is further developed, the maximum program load of the building should be confirmed, including staff and after-hours events, to determine the number of required plumbing fixtures.**

TABLE 8: PLUMBING FIXTURE CALCULATIONS

Classification	Number of Occupants	Water Closets		Male Urinals [1]	Lavatories	
		Female	Male		Female	Male
K-12 School (Student)	305	5.05	5.05	2.53	6.10	6.10
Total Required Fixtures		**6**	**6**	**3**	**7**	**7**
K-12 School (Student)	450	6.50	6.50	3.25	9.00	9.00
Total Required Fixtures		**7**	**7**	**3**	**9**	**9**
K-12 School (Student)	610	8.10	8.10	4.05	12.20	12.20
Total Required Fixtures		**9**	**9**	**4**	**13**	**13**

1. Permitted to be substituted for required male water closets.

Fire Department Access

Fire Department access roads are required to be provided and maintained such that any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building (527 CMR 18.2.3.2.2). This is permitted to be increased to 250 feet if the building is fully sprinklered.

The design of the access road is required to comply with the following:

- Have an unobstructed width of not less than 20 feet and vertical clearance of 13 feet 6 inches (527 CMR 18.2.3.5.1).
- Have a minimum inside turning radius of at least 25 feet unless otherwise required by the fire official (527 CMR 18.2.3.5.3.1).
- Have a gradient that does not exceed 10% (527 CMR 18.2.3.5.6.1).
- Dead-ends in excess of 150 feet in length are required to be provided with approved provisions for the fire apparatus to turn around.
- Required to be capable of supporting the imposed loads of fire apparatus and provided with an all-weather driving surface (527 CMR 18.2.2.1.1).

Accessibility

Buildings in Massachusetts are subject to compliance with the 521 CMR and the ADA.

ADA Standards

ADA requires altered portions of an existing building to be readily accessible to and usable by individuals with disabilities to the maximum extent feasible (ADA 36.402(a)(1)). Further, alterations to primary function areas should be made such that the level of accessibility, including the path of travel to the space, is made accessible to the maximum extent feasible. When determining if the upgrade is feasible, the ADA requirements state that the upgrade to the path of travel is disproportionate to the project ***when the cost to perform the work exceeds 20% of the cost of the alteration to the primary function area***. Primary function areas are not limited to public use areas and may include lobbies, offices, meeting rooms, etc. In choosing which accessible elements to provide if the cost is disproportionate, priority should be given to those elements that will provide the greatest access, in the following order:

- An accessible entrance
- An accessible route to the altered area
- At least one accessible restroom for each sex or a single unisex restroom

- Accessible drinking fountains
- Accessible telephones

521 CMR

521 CMR Section 3.3 contains the following scoping requirements for work occurring in existing buildings. The costs referred to the scoping requirements below are cumulative for all work to the building within a rolling 36-month period:

1. If the work occurring within the building is less than $100,000, then only the working being performed is required to comply with 521 CMR.
2. If the work costs more than $100,000 but less than 30 of the full and fair cash value of the building then in addition to the work being performed, the following accessible features are also required to be provided in the building:
    a. Accessible entrance
    b. Accessible toilet room
    c. Accessible drinking fountain (if provided)
    d. Accessible public telephone (if provided)
3. If the work, and all permitted work within a 36 month rolling window, costs more than 30% of the full and fair cash value of the building (prorated based on public spaces), then all public portions of the building are subject to the requirements of 521 CMR.

If you have any comments or questions on the contents of this letter, please do not hesitate to contact us.

Prepared By:

Matthew Nicastro

Reviewed By:

Kevin N. Lynch, P.E.

Structural Conditions

The existing building is a one-story masonry structure supported on spread footings with CMU bearing walls and open web steel joists supporting a poured gypsum roof deck. The existing structural drawings indicate an expansion joint along the courtyard which separates the classroom portion of the building from the gymnasium and cafeteria portion of the building. It is unclear from the existing drawings the extent of CMU reinforcing and seismic restraint. Likely both conditions will require further investigation and, potentially, remedial reinforcing if the building is renovated.

The building is generally in good condition. Miscellaneous mortar deterioration, concrete spalling, and cracking was observed throughout the building which should be repaired as part of any general maintenance effort. If the building is renovated, the structural system will need to be evaluated for compliance with current building code requirements.

The diagram below describes the extent of bearing walls. Any renovation Options would need to carefully consider the structural impact and associated cost of removing any of these walls.

Please see the Structural Report on the following pages.

Existing Bearing Wall Diagram

INTRODUCTION

This narrative, prepared by Lim Consultants, Inc., describes the Margaret Neary Elementary School's existing building structure, noting existing conditions and observed structural deficiencies. It also provides a discussion of code requirements related to potential renovation options based on Chapter 34 of the 10th Edition (draft) of the Massachusetts State Building Code (MSBC). The findings in this narrative are based on:

- Observations during a site visit on February 22, 2023, by the staff of Lim Consultants, Inc.
- Existing drawings of the building prepared by Korslund, LeNormand & Quann, Inc. Architects of Norwood, Massachusetts, dated Nov 18, 1968.

EXISTING STRUCTURE

The existing building is a one-story constructed in 1969. An access road from Parkerville Road provides access to this building and a middle school building which is located further ahead on this access road. The front face of the building is in the northeast direction facing the access road. Per existing construction documents, the building is divided into Part A, Part B, and a courtyard in the middle. Part A on the northwest side comprises classrooms, faculty rooms, a library and an auditorium. Part B on the southeast side comprises the main entrance, classrooms, kindergarten classrooms, a cafeteria, a kitchen, playrooms, and storage rooms. An expansion joint is called out between the two parts of the building in the existing foundation plan and roof framing plan. The total building footprint is approximately 70,000 square feet.

The perimeter of the building is supported by concrete frost walls based on the original drawings, and confirmed by field observations. Per the existing drawings, foundation frost walls only have horizontal bars. Some of the shallower wall footings have no reinforcement. At the interior, haunched footings are provided where there are bearing walls above.

The first floor is a 4-inch thick concrete slab on grade with a 12 inches thick gravel base. The auditorium entrance from the corridor near the main entrance is a concrete stair built on a framed concrete slab supported by a concrete beam on one side and a CMU wall on the other.

The superstructure is a one-story building with a framed roof. The roof structure is constructed with a poured gypsum deck with formboards on bulbtees. The bulbtees span between the open web steel joists. The roof pops up in the center of both part A and part B of the building. In part A the pop-up is in the auditorium and library area. In part B the pop-up is in the playrooms and storage area. At both pop-ups, the roof cantilevers with steel joists over the CMU bearing walls. All the roof steel joists bear on CMU walls except in the areas where the corridor turns direction. At those areas the joists are supported by the W-shaped steel beams as the joists spanning direction changes at the turns. The steel beams at the corridor turns are bearing on CMU walls. Where the joists bear directly on CMU walls, the walls are extended up to the roof deck with bricks between the joist bearings for diaphragm engagement and deck edge support. The existing drawings do not show any reinforcement in the CMU wall, further investigation will be required to field verify the reinforcement.

The exterior façade is a 4-inch brick veneer tied back to the CMU walls. The top of the façade is a continuous band of precast concrete. The precast band is a square-shaped beam with a continuous seat at the top for steel joists and a lip at the bottom that goes over the CMU wall. The precast beams also span between the exterior window and door openings and are supported on the CMU wall with pin anchors.

The existing drawings do not define an explicit structural lateral system for the building. The lateral loads of the building are carried by the inherent stiffness of the CMU walls - acting as shear walls despite not detailed to present day masonry shear wall requirements. Since the date of construction predates the adoption of the first edition of the Massachusetts State Building Code in 1975, it is unlikely that the structural design accounted for earthquake loading.

Observed Conditions

The majority of the structure is obscured by ceiling tiles. At a few select locations, ceiling tiles were removed to expose the structure for observation. Based on what we could observe during the walk-through, the overall condition of the existing structure is good. If this building were to be renovated, further investigations would be required to assess the condition of concealed structures associated with the renovation. The following conditions were noted:

1. On the courtyard exterior wall adjacent to the main entrance, a precast band beam has a few spalls in the concrete. We recommend chipping out loose spalls, applying a bonding agent, and infilling with a high-strength mortar.

Figure 1 – Spalls in Precast Band Beam

2. On the right side of the main entrance door, a crack in the brick veneer was observed. We recommend repairing the crack by cutting out loose mortar and repointing with fresh mortar.

Figure 2 – Crack in Brick Veneer

3. On the southeast face of the exterior façade, near a playground equipment door, a step crack has started to form through the joints of the brick veneer. We recommend recaulking the joint between the precast beam and the top of the brick veneer to avoid any precast beam load bearing on the veneer.

Figure 3 – Diagonal Crack Building on Brick Veneer

4. At the south corner of the building, a diagonal crack in the foundation wall was observed. We recommend epoxy pressure injection to seal the cracks.

Figure 4 – Diagonal Crack in Foundation Wall Corner.

5. On the northwest face of the building, caulking was missing from a small portion of a vertical wall joint. Fill the joint with new caulking

Figure 5 – Missing caulking at a Wall Joint

6. On the roof, at a few locations water puddles were observed. We recommend evaluating the roof slope to avoid future ponding of water.

Figure 7 – Water Puddles on Roof

BUILDING CODE REQUIREMENTS ON RENOVATION AND ADDITION

The study will evaluate different schemes of rebuilding a new school building or preserving a part of the existing structure and building a new addition. Renovation and addition will conform to Chapter 34 of MSBC, which is the Massachusetts-amended version of the future International Existing Building Code 2021 (IEBC).

IEBC permits three compliance methods: Work Area Method, Prescriptive Method or Performance Method. On a given project, all aspects of compliance must use the same method. For the purposes of this discussion, the Work Area Method is proposed.

1. Renovation

In addition to repairing the existing structural defects, structural work will include modifications to support the proposed architectural, mechanical, electrical, plumbing, and fire protection (MEP/FP) upgrades. The scope of the structural modification will be determined by the scope of architectural and MEP/FP renovations.

Using the Work Area method, if the floor area is reconfigured by more than 50%, the proposed renovation will likely be classified as a Level 3 Alteration. If the floor area is reconfigured by less than 50%, the proposed renovation will likely be classified as a Level 2 Alteration. No change of use is envisioned. The code considerations are as follows:

Level 3 Alteration

1) Requirements on Gravity Load Supporting System

According to IEBC, all existing structural members – bearing walls, floors (including roof), and foundation must be assessed for capacity under the proposed design gravity loads. Any stress increase in the existing members, including cumulative effects of renovation since original construction, must be limited to 5 percent; all new structural members must comply with the requirements of the current International Building Code (IBC). When the 5 percent limit is exceeded, the existing structural members must be evaluated and reinforced if necessary to support the increased loading.

For example, if the renovation requires adding new equipment on a roof or floor, the gravity load will be altered. If introducing openings in load-bearing walls, the load paths in the wall will be altered. The affected members will need to be evaluated as a result, and new structural supports and/or reinforcement of existing members will be required if existing members are found inadequate.

2) Requirements on Lateral Load Resistance System

For Level 3 Alteration, IEBC requires an engineering evaluation and analysis that establishes the structural adequacy of the altered structure to be performed. If the proposed structural work involves more than 30% of the areas tributary to the vertical load carrying components, the renovation will be a Substantial Structural Alteration; otherwise the renovation will be a Limited Structural Alteration.

For a Substantial Structural Alteration, the altered structure is required to comply with the IBC for wind loading and for reduced IBC level seismic loading. This would result in a major upgrade of the existing structural system. Design efforts should be made to limit the scope of structural modifications in order to avoid the lateral resistance system upgrade.

For a Limited Structural Alteration, any existing lateral load-resisting structural element whose demand-capacity ratio with the alteration considered is more than 10% greater than its demand-capacity ratio with the alteration ignored shall comply with the reduced IBC level

seismic forces. If the demand-capacity ratio increase does not exceed 10%, the proposed upgrades on lateral load carrying members will not be required. Similar to the gravity load increase calculation, the demand-capacity ratio evaluation will include cumulative effect since the original construction of the building.

In Margaret Neary Elementary School, the masonry walls are acting as shear walls to resist lateral loads. In order to avoid seismic upgrades or reinforcement, the walls cannot be removed or weakened with openings or penetrations by more than 10%.

In the event that seismic reinforcement is necessary, it can be achieved by introducing steel framing around new openings, constructing new concrete or CMU shear walls, or new steel braced frames that include diagonal braces, steel beams, and steel columns, and concrete foundations. To re-establish proper load paths to transfer the diaphragm forces to the foundation, seismic reinforcement may not be limited to the locations or bays where weakened structures occur.

3) Diaphragm Anchorage to Structural Walls

There are three conditions that would trigger diaphragm anchorage per the MSBC. If any of these triggers are met, the connection between the roof or floor diaphragms and the masonry wall must be analyzed to take the IBC level reduced seismic loads. If found inadequate, reinforcement of the diaphragm-wall connection with shear connectors, clip angles, or studs will be necessary on the entire building.

The first trigger is specified in IEBC section 906.4. It applies to building alterations which meet all of the following:

- Level 3 alteration (defined as reconfiguration of space in over 50% of building area)
- Building has reinforced concrete or masonry walls
- Has a flexible diaphragm
- Is in seismic design categories D or worse

The second trigger is specified in IEBC section 906.5. It applies to building alterations which meet all of the following:

- Level 3 alteration (defined as reconfiguration of space in over 50% of building area)
- Building contains unreinforced masonry
- Is in seismic design categories B or worse

The third trigger is specified in IEBC section 707.3.2 and amended by MSBC section 302.7. It applies to building alterations which meet all of the following:

- Re-roofing work is planned for at least 50% of the roof
- Building is located where the ultimate design wind speed is greater than 130 mph and the building is Risk Category IV per table 1609.3 of IBC 2021

For this project, the second trigger will apply. The building is a level 3 alteration, the building contains unreinforced masonry bearing walls, and is in seismic design category B.

4) Diaphragm Anchorage to Non-Structural Walls

Per IEBC section 906.7, the unreinforced non-bearing masonry partitions within the work area must be anchored to the diaphragm must be analyzed to resist present day IBC level out-of-plane seismic loads. If found inadequate, the partitions must be removed, or grouted

with additional reinforcement to comply with IBC level seismic loads. Clip angles will also be required to brace the head of the partition walls.

The provisions of IEBC Section 906.7 apply to building alterations which meet all of the following:

- Level 3 alteration (defined as reconfiguration of space in over 50% of building area)
- Has unreinforced masonry partitions
- Is in seismic design categories B or worse

For this project, the provisions of IEBC Section 906.7 will likely apply. The renovation is likely a level 3 alteration, the seismic design category will be B or worse (assuming site class D), and there are unreinforced masonry partitions.

Level 2 Alteration

1) Gravity Load Supporting System

   According to IEBC, all new structural members must be designed to comply with the requirements of the current edition IBC. For any existing element supporting additional loads, the affected element must meet or be upgraded to meet the current code unless the stress increase is less than 5% for the altered building compared to the original condition. Any element whose capacity is reduced by the alteration must comply with Code requirements for new construction.

2) Lateral Load Supporting System

   The IEBC states that any existing lateral load-resisting structural element whose demand-capacity ratio with the alteration considered is more than 10% greater than its demand-capacity ratio with the alteration ignored shall comply with the reduced IBC level seismic forces.

   If the demand-capacity ratio increases by more than 10% due to weakening/removal of lateral members, increased seismic mass, increased wind area, etc., the structure will require re-analysis and reinforcement where necessary. If the demand-capacity ratio increase does not exceed 10%, the proposed upgrades on lateral load carrying members will not be required.

   As stated in the existing structural system section, the building was likely designed without consideration of seismic loads. Any re-assessment or re-analysis of the lateral system will likely lead to building wide upgrades to meet new reduced level IBC seismic forces. It is therefore recommended that the proposed alterations affecting lateral load carrying elements be minimized such that the 10% threshold is not exceeded.

3) Diaphragm Anchorage to Structural Walls

   There are three triggers for diaphragm anchorage per the MSBC. If any of these triggers are met, the connection between the roof or floor diaphragms and the masonry wall must be analyzed to take the IBC level reduced seismic loads. If found inadequate, reinforcement of the diaphragm-wall connection with shear connectors, clip angles, or studs will be necessary on the entire building.

   The first trigger is specified in IEBC section 906.4. It applies to building alterations which meet all of the following:

   - Level 3 alteration (defined as reconfiguration of space in over 50% of building area)
   - Building has reinforced concrete or masonry walls
   - Has a flexible diaphragm

- Is in seismic design categories D or worse

The second trigger is specified in IEBC section 906.5. It applies to building alterations which meet all of the following:

- Level 3 alteration (defined as reconfiguration of space in over 50% of building area)
- Building contains unreinforced masonry
- Is in seismic design categories B or worse

The third trigger is specified in IEBC section 707.3.2 and amended by MSBC section 302.7. It applies to building alterations which meet all of the following:

- Re-roofing work is planned for at least 50% of the roof
- Building is located where the ultimate design wind speed is greater than 130 mph and the building is Risk Category IV per table 1609.3 of IBC 2021

The provisions of IEBC Section 906.4 and Section 906.5 are not applied to Level 2 alteration, and the building is not in Risk Category IV.

4) Diaphragm Anchorage to Non-Structural Walls

Per IEBC section 906.7, the unreinforced non-bearing masonry partitions within the work area must be anchored to the diaphragm must be analyzed to resist present day IBC level out-of-plane seismic loads. If found inadequate, the partitions must be removed, or grouted with additional reinforcement to comply with IBC level seismic loads. Clip angles will also be required to brace the head of the partition walls.

The provisions of IEBC Section 906.7 apply to building alterations which meet all of the following:

- Level 3 alteration (defined as reconfiguration of space in over 50% of building area)
- Has unreinforced masonry partitions
- Is in seismic design categories B or worse

The provisions of IEBC Section 906.7 are not applied to Level 2 alteration.

2. Addition / New Construction

An addition to the existing building will comply with Chapter 11 of IEBC. The following requirements will apply:

a) Vertical Addition

Adding an intermediate floor or a floor over the existing roof would be considered as a vertical addition. The building's entire structural system is to be evaluated for the proposed gravity and lateral load impact. Besides the increased gravity loading, the existing structure is required to support IBC level wind and seismic loads brought by the addition.

b) <u>Horizontal Addition</u>

Requirements on a horizontal addition that is structurally connected to an existing building are similar to those on a vertical addition. To avoid evaluation, reinforcement, or upgrade of the existing structure, a horizontal addition is recommended to be structurally independent from the existing building. An independent addition will be designed as a new building, complying with the IBC.

Architectural Conditions

Exterior Envelope

Completed in 1970, the exterior walls are a brick veneer, backed by masonry-block construction, with exposed, painted, masonry block on the interior face. Patterning at the exterior brick is a Common Bond with a Flemish bond every 6th course serving to tie the veneer back to the masonry block. According to the record drawings, the original wall construction did not include any insulation at the exterior, only thru-wall flashing at the base of the walls and at punched openings. When some of the classrooms were converted to District office, the exterior walls of those rooms were furred out and insulated walls along the interior face.

Visual observations show little sign of efflorescence, deterioration or wear of masonry joints, though there is some staining from corrosion of adjacent materials in some areas.

There is little evidence of water infiltration through the exterior walls, however, it has been observed that moisture and water infiltration has occurred at various exterior doors and windows throughout the building. Should any portion of the existing building be preserved as part of an addition/renovation option, further investigation of materials and construction methods is required to improve thermal performance and mitigation of air and water infiltration.

EXTERIOR FACADE

The red-brick masonry veneer is punctuated with several precast concrete accents along the building exterior. Most notably, are the details that accent the windows which include, vertical precast elements, window sill blocks, exposed-aggregate precast panels below windows, and precast panels above windows at the cafeteria. A deep, precast band at the top of the exterior wall connects the masonry wall and the roof around much of the building perimeter except at the double-height spaces (gymnasium, library, cafeteria) and the back-of-house area at the building's southwest face. Further investigation on how to maintain or preserve these elements is required should an addition/renovation option be preferred.

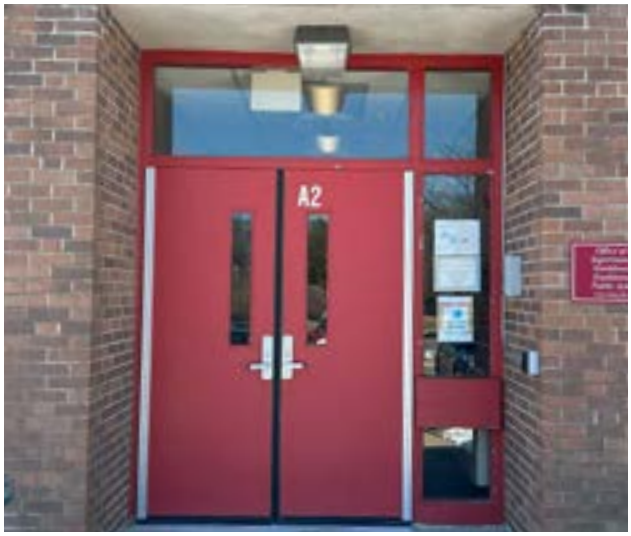
Additionally, there are intake louvers spaced around the building exterior, which serve the perimeter unit heaters in classroom and office spaces. The brick above these louvers is newer than the surrounding brick, which was most likely replaced when the units were upgraded in 2009.

The roof is constructed with a poured gypsum deck over 1-inch formboard and supported by steel trusses. The roof construction over the back-of-house and boiler room is the only portion of roof built with a concrete waffle slab. The roof perimeter is finished with an aluminum gravel-stop, though it is unclear whether this is the original coping. The original gravel roof was replaced in 1990, and is now covered with a rubberized, EPDM roofing membrane. Several patches are present along the roof and require "constant maintenance" as leaking is a persistent problem for the facility. Some ponding was reported at various locations despite the number and distribution of roof drains, but as there are no parapets, the depth of any standing water is minimal. The sloped roof trusses provide the required pitch to roof drains. Given the condition of the existing roof as well as the lack of adequate insulation, complete replacement is recommended in any addition/ renovation option.

Lastly, two modular classrooms were added to the building in 2oo1. This pair of classrooms is permanently attached to the building at the northwest facade, facing the playground and playing fields. Access to the modular classrooms is through an enclosed corridor and ramp. The exterior of the modular classrooms is clad in faux-brick and vinyl paneling. The modular classroom roof is a simple, pitched roof with asphalt shingles.

Exterior Openings

Exterior entrances are constructed of aluminum storefront with single-pane glazing and narrow-lite, hollow metal doors. The main entry features (2) pairs of fully-glazed, aluminum storefront doors, leading to the entry vestibule. All the exterior storefront framing



EXTERIOR ENTRANCE DOOR

INTERIOR VESTIBULE DOORS

shows varying levels of corrosion and wear. Evidence of water infiltration is also present, as the salt used to treat the sidewalks in the winter is contributing to corrosion at the base of the storefront. All the public entrances have a vestibule and the inner doors at these locations feature wire safety glass.

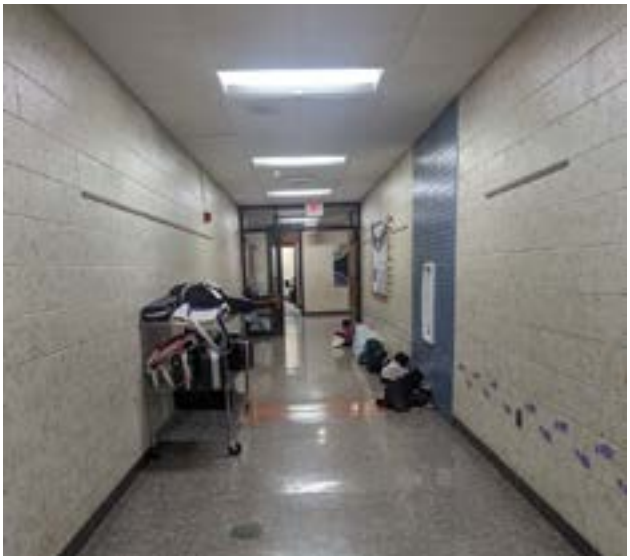
Non-public entries include several hollow-metal doors that access back-of-house and utility areas. There are (2) steel, roll-up doors which each access interior storage areas at the southwest and southeast facades. Ornamentation at and around doors and entries is minimal. Given the age of the doors and frames, and the inefficiency of single-pane glazing, replacement would be recommended in any addition/renovation option.

Existing windows are aluminum-framed, single-pane units with either fixed glazing or in many instances, a lower operable vent. Several windows in classrooms and offices have been modified to permanently hold window unit air conditioners. There is evidence of water infiltration at several windows, including warped and swollen window seats, corrosion, and staining.

Interiors

Interior finishes throughout the building appear

to be in good shape and have been well-maintained, despite their age. As the interior partitions are primarily masonry block construction, there is very little evidence of wear or abuse. The paint on these walls appears to be original. The painted masonry block is consistent throughout the building except in some areas there are ceramic tile accent elements behind drinking fountains. Bathrooms are finished with floor-to-ceiling ceramic tile. Other finishes include acoustic panels in classrooms and the library, wooden acoustic paneling in the library and band room. Some rooms have been divided by a gypsum board partition to create additional office and breakout spaces and (5) sets of classrooms are divided with operable, acoustic partitions with pass-through doors.



Flooring throughout the school is mainly VCT tile with asbestos-containing-mastic. Select areas, such as the spaces around classroom sinks still feature ceramic tile, however the original ceramic tile in bathrooms was either replaced or covered with resinous flooring. The two gymnasiums are covered with a composite play surface, offices and quiet areas are finished with carpet as is the tiered flooring in the band room. The kitchen area is covered in what appears to be the original quarry tile and is showing signs of wear and cracking throughout.

Ceilings throughout the entire building are spline

TOP LEFT View into the courtyard

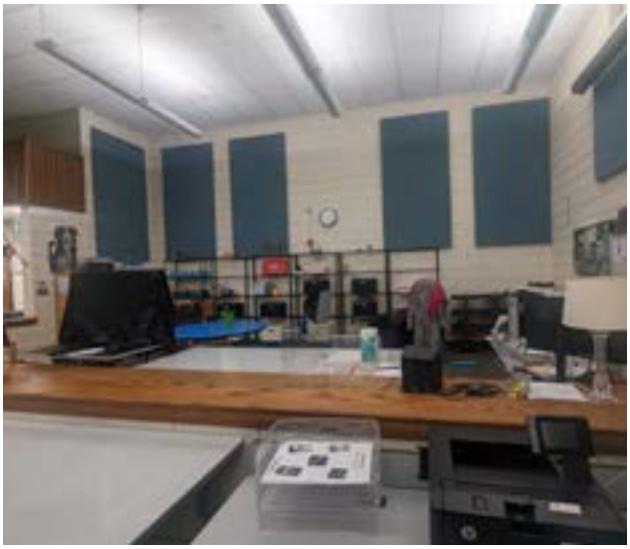
MIDDLE LEFT Stairs from the corridor to the music room

BOTTOM LEFT Tiered risers on the interior of the music room

TOP RIGHT Classroom move-able partition

MIDDLE RIGHT Storage in the corridor

BOTTOM RIGHT Typical classroom



LIBRARY

GYMNASIUM

SERVERY

DISHWASHER

TYPICAL BATHROOM

acoustic ceiling tile. Much of the tile is original and most likely contains asbestos. There is little evidence of staining from ongoing roof leaks as building maintenance is frequently replacing broken or stained tiles.

Equipment & Kitchen

The existing kitchen servery was originally designed and equipped as a full-service cooking kitchen, but is now utilized as a warming kitchen due to the lack of adequate cold storage (both walk-in units have failed beyond a cost-effective repair and are now used as dry storage). Meals are prepared at the Trottier Middle School (located on the north portion of the project site) and delivered to the building to be warmed and served through one of the (2) servery lines. Current equipment includes a pair of warming ovens, (1) commercial refrigerator, (2) standard-grade refrigerators, (2) milk coolers, several serving carts and tray storage, prep sinks, and a full-service dish washing area. Any project option should include a new, full-service kitchen and servery.

Stairs & Vertical Circulation

The building is a single story, so there are not public accessible stairs or an elevator. The majority of the existing building is accessible with the exception of the band room which has tiered seating accessed via (2) stairways at each corner of the space. There are (6) 7-inch tiered risers within the space which result in an approximately 42-inch level change from floor to the top tier.

The other two stairs located within the building are not meant for public use; one is located within the boiler room at the back of house, and the other is located within a library storage room leading to an attic above.

Lastly, there is a single ramp which leads from the corridor at the northwest corner of the building to the modular classrooms. No other vertical circulation is utilized throughout.

Building Systems Condition

The MEP/FP engineers visited the building to observe the condition of the HVAC, plumbing, fire protection and electrical systems. In general, the systems are in good repair but are substantially past their anticipated service life. The following is a brief summary of the building systems and the engineers' observations.

The building is heated by a hot water system that was substantially upgraded in 2009. Natural gas fired boilers provide hot water to unit ventilators and air handling units. A direct digital control (DDC) system was installed in 2009. Due to the age and performance of the system, it is recommended that the system be replaced in any major building renovation, including providing improvements to the indoor air ventilation system.

The plumbing systems (domestic water supply and sanitary drainage) are in fair condition but reaching the end of their service life. The plumbing fixtures are not water efficient and, in many instances, not accessible. The building does not have a fire protection system which would be required in the event of any major renovation or addition.

The existing electrical system is generally original though the switchgear was replaced in 2011. The systems are generally adequate but should be upgraded or replaced in the event of a major building renovation or addition. The fire alarm system has also been upgraded from the building construction but is not code compliant due to lack of voice evacuation.

Refer to the existing conditions reports by GGD for the evaluation of the existing MEP systems, including recommendations for future upgrades or replacement.

Please refer to full MEP report on the following pages.

HEATING, VENTILATION & AIR CONDITIONING (HVAC)

Executive Summary:

While well taken care of and in operational condition, the building heating, ventilation, and air conditioning (HVAC) systems are antiquated, have exceeded, or are nearing, their useful expected service lives. The building HVAC systems generally consist of Natural Gas fired heating hot water boilers, heating hot water (HHW) coil unit ventilators, HHW coil indoor air-handling units, and general exhaust systems. While the exact date of boiler installation was not readily available it is assumed the boilers were installed within 5 years of the 2009 HVAC renovations. The boiler plant is providing adequate overall heating to the building, with much of the heating system piping and terminal equipment, such as unit ventilators, convectors, radiators, and fin tube radiation heating having undergone substantial renovations circa 2009. The building control system appears to have abandoned pneumatic controls in favor of direct digital controls (DDC) with the 2009 HVAC renovations. Therefore, it is our recommendation that the building HVAC system should be replaced in its entirety as part of any proposed major building renovation and repair project. In addition, in order to provide code required ventilation, a higher degree of thermal comfort for the building and improve energy efficiency, we would recommend that the replacement HVAC system have upgraded features such as improved ventilation, lower operating sound levels, higher energy efficiency, and potentially be provided with the addition of air conditioning and/or dehumidification throughout the building since it is currently only heated and ventilated.

Heating System:

The majority of the building is heated by a gas-fired heating hot water plant. The heating hot water plant consists of two (2) cast iron, gas fired heating hot water boilers that were manufactured by Buderus (Model Logano GE615). The boilers appear to be in fair physical and operating condition, based on appearance and level of corrosion. The boilers are approximately 15 years old and should have 10 to 15 more years of service according to ASHRAE's Equipment Life Expectancy Chart. The boilers each have a heating capacity of 3,389 MBH output with a dual-fuel Gordon-Piatt boiler burner, model S10_1-GO-30. The boilers provide a heating hot water and glycol mixture throughout the building serving classroom unit ventilators, heating and ventilation units, convectors, cabinet unit heaters and fin tube radiation heating. The heating hot water system is provided with a glycol make-up unit to prevent freezing of coils and to add the appropriate water/glycol mixture to the system should any water leak or otherwise be lost from the system. The boilers appear to be equipped with code-required low water cut-off and operating safety controls. Dual Base-mounted pumps split the duty of circulating HHW to HHW terminal heating units and air handling units.

Combustion air for the boiler plant is brought into the boiler room through combustion air ducts associated with an external sidewall louver, combustion air fan with dedicated controls, as well as louver control dampers. Combustion gases are discharged from the boilers through an insulated combustion gas flue, to an adjacent masonry chimney which terminates above the roof. Combustion flue insulation should be tested for asbestos prior to any work being performed.

Heating hot water piping is routed from the boiler room to and from the building heating hot water terminal heating equipment. Most of the piping is original to the 1970 building construction and has been reused for the 2009 HVAC renovations.

The Auditorium, Library, and general Corridor spaces are also provided with a local heating hot water re-circulating air handling units (AHU) to supplement the heating capability of the terminal heating units. The air handling units were replaced along with the other terminal units in the 2009 HVAC renovation. The mechanical mezzanine that housed these air handling units was not accessible at the time of the site visit.

Existing Steam Boiler Plant

Typical Hot Water Pumps

Glycol Make-up System

Insulated Boiler Venting to Chimney

Air Conditioning:

Air conditioning throughout the building is provided by through-wall/window, freestanding, or split system air conditioning units. Through-wall/window and freestanding air conditioners operate with onboard controls while the split systems are provided with a wireless thermostat remote control. Condensate generated by the split systems is pumped either outside or to mop sinks. Some classroom spaces are additionally equipped with ceiling mounted destratification fans to assist in cooling and space air circulation.

Typical Window Air Conditioner

Typical Freestanding Air Conditioner

Indoor Terminal of Split Unit

Split System Wireless Remote Thermostat

Typical Outdoor Terminal of Split Unit

Ceiling Mounted Destratification Fans

Ventilation:

Ventilation for most spaces throughout the building is provided with horizontal, or vertical, heating hot water unit ventilators. This includes general offices, classrooms, gymnasium, and cafeteria. Spaces equipped with unit ventilators are provided with louvered through-wall intakes, or are ducted up to roof hoods for outside air. Exhaust fans are provided throughout the building to offset the outside air introduced into the spaces via unit ventilators. The classroom areas are generally inclusive of exterior wall unit-ventilators, while spaces such as the gymnasium utilize ceiling suspended horizontal unit ventilators. Both types of ventilator deliver a mixture of heated re-circulation and outdoor air to the space during occupied hours. The hot water control valve within the unit ventilators is typically controlled by a local wall mounted space thermostat.

The Library, Auditorium, and Corridor spaces are provided with hot water heating and ventilation air handling units located in a mechanical mezzanine near the library, not accessible at the time of visit. The air handling units serving these spaces are recirculation type units with full outside and exhaust capabilities. Heating and ventilating air handling units are controlled by local zone level thermostat control. Meanwhile, the kitchen is equipped with its own make-up air unit and dedicated exhaust fan.

Typical Unit Ventilator w/ OA Louver

Typical Exhaust/Relief Grille

Typical Through Wall Louver

Typical Ceiling Suspended Unit Ventilator

Typical Relief Hood

Roof Mounted Exhaust Fans

Kitchen Make-up Air Unit

Kitchen Range Exhaust Hood

Entryways, Hallways, Toilet Rooms:

Entryways, hallways, storage areas, and toilet rooms are typically heated by cabinet unit heaters, convectors, or HHW fin-tube radiators.

Typical Hot Water Convector

Typical Hot Water Fin Tube Radiation

Exhaust Air Systems:

The building classroom, administration offices, library, auditorium, gym and toilet room areas are exhausted by exhaust air fan systems. Exhaust systems that serve these areas generally terminate at various roof exhaust fans or roof hoods. Exhaust fan systems were replaced in the 2009 HVAC renovation. Even with the renovations within the past 15 years, it would still be recommended to replace current exhaust fan systems within the next 5-10 years.

HVAC Controls:

The building pneumatic control system has been replaced in favor of a standalone direct digital control system consisting of control panels, sensors/thermostats, and wiring. The control system appears to be operating to its designed capability. However, several additional renovations have subdivided spaces requiring auxiliary systems for temperature control. Further, there is no central building management system (BMS) to monitor overall building operations and assist in troubleshooting HVAC related issues.

HHW Plant Control Panel

Controllers within Control Cabinet

Typical Room DDC Sensors

Abandoned Pneumatic Control Compressor

Abandoned Pneumatic Control System Gauges

Abandoned/Cut Pneumatic Control Lines

Recommendations:

While the building HVAC systems appear to have been well maintained throughout the years, the existing HVAC system is of an antiquated type, further the present system is nearing the end of its expected useful service life with an expectancy of 5-10 years per the ASHRAE Equipment Life Expectancy Chart. While the most simplistic system renovation/replacement would be to replace the existing boilers and maintain the existing heating hot water systems, consideration to the equipment nearing end of life, and recent mechanical code requirements for higher energy efficiency and ventilation systems requiring energy recovery, we recommend that the building HVAC system is replaced in its entirety. A new HVAC system will provide code required ventilation and a higher degree of thermal comfort throughout the building. We recommend the following HVAC system scope:

- A lifecycle cost analysis should be performed during the early design stages of the project. A minimum of three HVAC system replacement options should be studied in terms of first, operating and maintenance/replacement costs over the study period to determine the system with the lowest

cost of ownership. To meet current and future electrification goals we recommend the following HVAC system option be considered as one potential option.

- Demolish and remove all existing HVAC systems and equipment.

- Blank off & seal all existing unit ventilator outdoor air intake grilles and restore the envelope in each of these locations to maintain code-required thermal heat transfer resistance.

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- Hot Water Heating Plant: Provide a new electric high efficiency modular Air-source to Hydronic Heat Pump unit that shall be located on grade outdoors within an enclosed area. New primary and secondary hot water pumps sets shall be provided and arranged in a primary standby manner to distribute hot water from the air source heat pump unit to building terminal heating equipment via a new insulated hot water piping distribution loop. The distribution pumps shall be provided with EC motors or VFDs.

- Terminal Heating Equipment: New insulated hot water piping shall be distributed from the plant to a combination of terminal hot water heating equipment The majority of occupied classroom and office areas shall be provided with heating only fan coil units equipped with EC Motors for fan speed control. Entry areas and stairwells shall be provided with cabinet unit heaters. Utility rooms and storage areas with exterior exposures shall be provided with unit heaters. Corridors and areas with extensive exterior exposure areas shall be provided with fin tube radiation heating.

- Ventilation Systems: Provide new indoor-mounted 100% outdoor air localized ventilation systems with energy recovery ventilation units (ERV) with split air source VRF (variable refrigerant flow) heat pump condenser units. The indoor ERV units shall be equipped with supply and return/exhaust fans equipped with VFDs or EC motors, Refrigerant heating/cooling coils, MERV-14 final filter, MERV-8 pre and exhaust filters, economizer control, recirculation air dampers, static pressure control, and demand control ventilation. There shall be separate ERV units for Classrooms and adjacent teacher support and circulation areas, Administration Areas, Cafeteria and Gym Areas. The Classroom areas shall be served by multiple ERV units that shall be designed based on heating/cooling load exposures. Where possible the ERV units shall be connected to common outdoor air and exhaust air duct systems to minimize building envelope penetration.

- Each of the indoor ERV units shall be piped with insulated refrigerant piping to dedicated outdoor air source heat pump condenser units. The outdoor heat pump units shall be of the inverter scroll compressor “VRF” unit design.

- The ERV units shall be designed to provide air conditioning or partial air conditioning (dehumidification) to the majority of building areas. The Administration and Cafeterias areas shall be provided with “full” air conditioning to maintain 75 deg F on a design cooling day, whereas the Gym and Classroom and related Teacher support areas shall be designed for partial air conditioning to maintain a temperature of 78-80 deg F on a design cooling day.

- Code required exhaust for the majority of building areas, including toilet rooms, shall be provided through the localized energy recovery ventilation (ERV) systems.

- Dedicated exhaust air fan systems shall be provided for Kitchen exhaust air and Janitor's closet areas.

- New VAV (variable air volume) terminal boxes with temperature and demand control ventilation shall be provided for each classroom, teacher support room and the office areas. Enthalpy controls shall be provided to shut down mechanical cooling systems when operable windows are opened during hot and humid outdoor air conditions.

- Supplemental split Air Source heat pumps shall be provided to serve IT server rooms and closets.

- The existing building control systems shall be removed and a new direct digital automatic temperature control (ATC) and building energy management system (BMS). The new ATC/BMS system shall be web accessible, include energy metering, and shall be capable of being integrated into the Town-wide energy management system.

Recommendations (Add-Reno or New Construction Project):

We recommend the following HVAC system scope as part of an Addition Renovation or New Construction project:

- A lifecycle cost analysis should be performed during the early design stages of the project. A minimum of three HVAC system replacement options should be studied in terms of first, operating and maintenance/replacement costs over the study period to determine the system with the lowest cost of ownership. Based on our understanding of the Town's electrification goals we recommend the following HVAC system option be considered as one potential option.

- Demolish and remove all existing HVAC systems and equipment.

- Blank off & seal all existing unit ventilator outdoor air intake grilles and restore the envelope in each of these locations to maintain code-required thermal heat transfer resistance.

- Ground Source Wellfield: A new closed loop geothermal wellfield shall be provided to serve the building HVAC system and domestic hot water heating system. The final number and depth of wells shall be determined during later design stages by a geothermal wellfield engineer based on site conditions and cost considerations. A preliminary estimate would be for thirty five (35) 600 ft deep wells that provide a capacity of approximately 5 tons heating/cooling each. Each well should be 20-25 ft from each other, and a minimum of 10 feet from the building or other utility lines. The ground source water distribution system shall serve two different loops. Each groundwater loop shall be provided with a pump set arranged in a primary-standby manner and each pump shall be equipped with VFDs or EC motors. One loop shall serve a Hot Water Heating plant loop and the other loop shall serve the building ventilation air handling heat pump units loop. The ground water piping loops located within the building shall be insulated.

- Ground source to Hot Water Heating Plant: Provide new electric high efficiency modular (non closed coupled) Ground water source to Hydronic Hot Water Heat Pump Generator units that shall be located indoors with a mechanical room area. New hot water pumps sets shall be provided and

arranged in a primary standby manner to distribute hot water to/from the heat pump units to the building terminal heating equipment via a new insulated hot water piping distribution loop. The ground water and hot water system distribution pumps shall be provided with EC motors or VFDs.

- Terminal Heating Equipment: New insulated hot water piping shall be distributed from the plant to a combination of terminal hot water heating equipment. The majority of occupied classroom and office areas shall be provided with finned tube radiation heating (Renovation Areas) or radiant ceiling heating panels (Addition/New Construction). Entry areas and stairwells shall be provided with cabinet unit heaters. Utility rooms and storage areas with exterior exposures shall be provided with unit heaters. Corridors and areas with extensive exterior exposure areas shall be provided with fin tube radiation heating.

- Ventilation Systems: Provide new indoor mounted 100% outdoor air localized ventilation systems with energy recovery ventilation units (ERV) with ground source water heat pump sections. The indoor ERV units shall be equipped with supply and return/exhaust fans equipped with VFDs or EC motors, Ground water to Refrigerant heat exchanger and heat pump section, MERV-14 final filter, MERV-8 pre and exhaust filters, economizer control, recirculation air dampers, static pressure control, and demand control ventilation. There shall be separate ERV units for Classrooms and adjacent teacher support and circulation areas, Administration Areas, Cafeteria and Gym Areas. The Classroom areas shall be served by multiple ERV units that shall be designed based on heating/cooling load exposures. Where possible the ERV units shall be connected to common outdoor air and exhaust air duct systems to minimize building envelope penetration.

- The ERV units shall be designed to provide air conditioning or partial air conditioning (dehumidification) to the majority of building areas. The Administration and Cafeterias areas shall be provided with “full” air conditioning to maintain 75 deg F on a design cooling day, whereas the Gym and Classroom and related Teacher support areas shall be designed for partial air conditioning to maintain a temperature of 78-80 deg F on a design cooling day.

- It is proposed that building addition and new construction Classrooms and adjacent teacher support and circulation areas, Administration Areas, Cafeteria and Gym Areas are served by a displacement ventilation air system which consists of low wall supply displacement air diffusers and ceiling mounted return/exhaust air registers. Spaces within renovated portions of the existing building would be provided with over-head delivery ventilation systems in-lieu of displacement, as the renovation envelope improvements and the existing special availability may not support the use of a displacement system.

- Code required exhaust for the majority of building areas, including toilet rooms, shall be provided through the localized energy recovery ventilation (ERV) systems.

- Dedicated exhaust air fan systems shall be provided for Kitchen exhaust air (if provided) and Janitor’s closet areas.

- New insulated galvanized sheetmetal ductwork shall be provided to connect the ERV units supply and return ductwork to each space. New VAV (variable air volume) terminal boxes with temperature and demand control ventilation shall be provided for each classroom, teacher support

room and the office areas. Enthalpy controls shall be provided to shut down mechanical cooling systems when operable windows are opened during hot and humid outdoor air conditions.

- Unitary type ground water source heat pumps shall be provided to serve IT server rooms and closets.

- Domestic hot water heating systems shall be pre-heated by the building hot water heating loop and a ground source heat pump system shall be utilized to provide additional heating of DHW heating. The DHW storage tank heat exchangers and heat pumps shall be by Plumbing.

- A new direct digital automatic temperature control (ATC) and building energy management system (BMS). The new ATC/BMS system shall be web accessible, include energy metering, and shall be capable of being integrated into the Town-wide energy management system.

Neary Elementary School
Southborough, MA
Electrical Existing Conditions Systems Report
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ELECTRICAL

Executive Summary:

The existing electrical systems of this facility range from original vintage, to more recent upgrades / add-ons installed including 2011 vintage switchgear and some upgraded LED lighting. The fire alarm system is also recent however is not compliant with current code.

The electrical service is adequate in capacity and voltage characteristics for the present load demand of the building. However, the existing service will have to be upgraded in a Base Repair that includes an all electric mechanical system upgrade, or for any major renovation/Addition. The new Service will be sized to 15W/SF.

Life safety lighting and exit signs are in fair condition and seem to be compliant.

Fire alarm system is not compliant with current code. Voice evacuation is not present.

Systems upgrading in an existing facility results in extensive use of surface raceways where wiring cannot be run concealed resulting in a construction premium.

It is our recommendation, taking in consideration the age, capacity and general conditions of the existing equipment, that all electrical systems should be replaced with new energy efficient code compliant systems under a major renovation program.

Electrical Distribution System:

The primary service of the building is fed underground to a pad mounted transformer adjacent to the boiler room. The building is metered at the transformer meter #25140165.

The secondary service of the building consists of a 1200A, 120/208V, 3-Phase, 4 Wire with the main serviced disconnect located within the boiler room. The main service breaker then serves the main distribution panel “MDP-A and “MDP-B” in the main electric room. The main service is sized for approximately 6.6W/SF. The majority of the electrical distribution system was upgraded in 2011, is manufacturer by Eaton and is of the circuit breaker type. The equipment is in good condition. There are some original vintage branch circuit panelboards still in operation.

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Pad Mounted Transformer

Utility Meter

Main Service Disconnect

"MDP" Main Distribution Panel

2011 Vintage Panelboard

2011 Vintage Mechanical Panelboards

Original Vintage Panelboard

Interior Lighting:

Many areas of the building have been retrofit with LED lamps or have had fixtures replaced with LED type, with integral occupancy sensor/daylight harvesting sensors.

Corridor lights generally consists of 2'x4' recessed LED fixtures with integral sensors.

Corridor Fixture

Corridor Fixture

The kitchen contains surface mounted two lamp cross section fluorescent wraparound fixtures with LED lamps.

Kitchen

The office area has surface mounted 1'x4' light fixtures with fins.

Classroom lighting consists of (3) rows of 2 lamp cross section linear fluorescent wraparound light fixtures that have been retrofit with LED lamps. Light switches are built into and part of the Simplex clock/speaker cabinet.

Linear Fluorescent Wraparound Fixtures

Simplex Clock/Speaker Cabinet

Cafeteria has 2'x4' recessed LED fixtures with integral sensors.

Cafeteria Lighting

There are a number of light fixtures that have missing lenses.

Fixtures Missing Lens

The gymnasium contains 4 lamp cross section fluorescent T5HO 2'x4' surface mounted high bays with a wire guard. Each fixture contains an integral occupancy sensor.

Gym Lighting

The school does not have an automated lighting control system. There are sensors integral to the upgraded LED fixtures. The majority of spaces are line voltage switching. The large assembly spaces do have low voltage switches that control circuits via lighting contactor panels. The low voltage controls are beyond their serviceable life.

Exterior Lighting:

Exterior lighting consists of utility pole mounted LED fixtures with integral control

Site Area Light Fixture

Exterior Canopy Light

Emergency Standby System:

The emergency lighting throughout the facility is fed via a diesel generator. The building is also equipped with battery units and self-contained battery exit signs.

The generator is a diesel fired generator, 120/208 Volt, 3-Phase, 4 Wire, manufactured by Caterpillar and is located outside at the rear of the building.

Generator

There is separation of the life safety and optional standby loads. The automatic transfer switches are located in the electrical room and are manufactured by Caterpillar.

Transfer Switch

Exit Sign

Exit Sign

Fire Alarm Systems:

The fire alarm consists of an Edwards addressable panel. The FACP is located in the admin area of the main lobby. The fire alarm system does not contain voice evacuation.

FACP

Pull Station/Horn Strobes

The system consists of original pull stations and horn/strobes, smoke and heat detectors.

There is a fire alarm master box located on pole #17 at Huckins Avenue that notifies the fire department of a fire or a fire alarm activation.

Smoke Detector

Low Energy Cable

Low energy fire alarm wiring is used throughout the building.

Currently, the fire alarm system does not meet code, as it does not contain voice evacuation and does not utilize speakers for notification of the audible alarm. This is required for an E-Use Group Building.

Branch Circuits/Wiring Devices:

The receptacle coverage is inadequate in most spaces. Typical classrooms have two or three receptacles, new receptacles have been added in many classrooms to support Classroom A/V.

Extension cords are used throughout classrooms and offices due to lack of receptacles. The use of extension cords for permanent wiring is a code violation.

New Receptacle

Extension Cords

Receptacle for Window A/C

Kitchen Receptacle

Typically branch circuits are not separate based upon load type. The existing receptacles are in fair/poor condition.

There are no tamper resistant receptacles installed in kindergarten areas.

Receptacles have been added to support Window A/C units.

GFCI protection is missing in the kitchen.

Miscellaneous/Communications/Security Systems:

The building does not contain lightning protection.

The building does not contain a BDA system.

Recommendations:

1. Main Distribution Panel "MDP" and all 2011 vintage sub-panels are in good condition, however the capacity at 6.6W/SF is inadequate for a substantial renovation. Therefore a new primary service, and new secondary service should be provided. The service will be sized to 15W/SF at 277/480V (for all-electric HVAC system) the 2011 equipment can be backfed and re-used. Replace the entire electrical distribution system with new, Existing branch circuits to connect to new panels in areas of minor renovation.

2. Provide automatic lighting control system in combination with automatic dimming sensors throughout.

3. Replace non-LED lighting to LED source and provide dimming photo sensor within areas with natural daylight to dim fixtures automatically.

4. Provide occupancy sensors within each space to conserve energy and meet current energy code.

5. Provide LED wall mounted fixtures with full cutoff for all exterior doors for exit discharge.

6. A larger exterior diesel emergency generator approximately 350kW with sound attenuated enclosure should be provided (all electric HVAC options). Light fixtures and LED exit signs should be installed to serve all egress areas such as corridors, intervening spaces, toilets, stairs, and exit discharge exterior doors. The administration area lighting and selected receptacles should be connected to the emergency generator. Where the HVAC system selected is mixed fuel the existing generator can be re-used.

7. The generator should be sized to include life safety systems, fire safety systems, heat pumps, circulating pumps, refrigeration equipment and communications systems, etc. It is anticipated that the generator will be sized to 8W/SF to accommodate the aforementioned loads.

8. A system of new automatic transfer switches and panelboards should be provided (if an electric HVAC system option is selected).

9. The existing fire alarm system is non-code compliant and should be replaced with new addressable system with voice evacuation in compliance with code.

10. Provide additional receptacles in all classrooms and offices.

11. Provide additional GFCI receptacles in areas required by code.

12. Provide tamper resistant receptacles in kindergarten areas to comply with code.

13. There is no lighting protection system in the facility. It is our recommendation that one should be installed.

14. A BDA system should be installed to support police and fire department frequencies.

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Southborough, MA
Plumbing Existing Conditions Systems Report
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PLUMBING

Executive Summary:

Presently, the Plumbing Systems serving the building are cold water, hot water, sanitary, waste and vent system, Kitchen waste and vent system, storm drain piping, and natural gas. Municipal water and a Septic System service the building.

Most of the plumbing systems are original to the building and its additions. Portions of the system have been updated as part of building renovation and upgrade projects. The plumbing systems, while continuing to function, are nearing their useful life. The school plumbing systems could continue to be used with maintenance and replacement of failed components; however other non-dependent decisions will likely force the plumbing upgrade. Due to its age, completely new water piping systems are recommended. The copper piping is in fair condition but is nearing its life expectancy.

The plumbing fixtures are in fair condition. Attempts have been made to make bathroom fixtures accessible, however, most of the plumbing fixtures do not meet current accessibility codes. In general, the fixtures appear to have served their useful life. The Current Access Code requires accessible fixtures wherever plumbing is provided. In terms of water conservation fixtures, their use is governed by the provisions of the Plumbing and Building Code. Essentially, the code does not require these fixtures to be upgraded, but where new fixtures are installed, as may be required by other codes or concerns, the new fixtures need to be water conserving type fixtures. All new plumbing fixtures are recommended.

Cast iron is used for sanitary and storm drainage. Rainwater from roof areas is collected by interior rain leaders which appear to discharge to a below grade site drainage system. Where visible, the cast iron pipe appears to be in fair condition. Smaller pipe sizes appear to be copper. In general, the drainage piping can be reused where adequately sized for the intended new use.

New domestic water heating systems with thermostatic mixing valves are recommended.

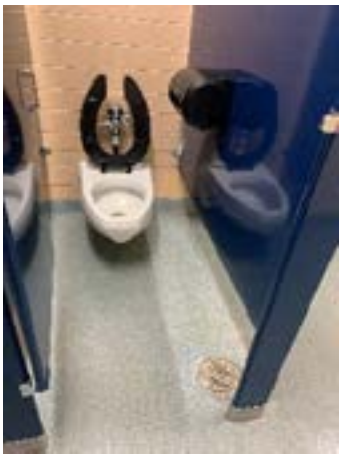
Fixtures:

The water closets are either wall hung or floor mounted, vitreous china fixtures with manually operated flush valves.

Urinals are wall hung vitreous china with manually operated flush valves.

Lavatories are wall hung vitreous china. The lavatories have been retrofitted with two-handle hot and cold-water faucets.

TEL 508-998-5700 FAX 508-998-0883 email: info@g-g-d.com



Water Closet

Urinals

Lavatories

Drinking fountains consist of wall hung vitreous china fountains.

There are no electric water coolers in the school.

Janitor's sink are generally terrazzo floor receptors. Faucets are equipped with vacuum breakers.

Drinking Fountain

Mop Receptor

Kitchen area fixtures are in good condition. The pot washing sink is fitted with an on-the-floor grease interceptor.

Pot Sink

Water Systems:

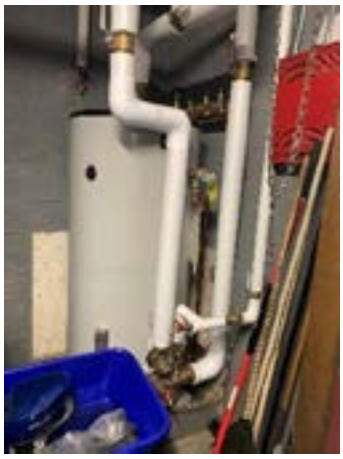
The main domestic water service is located in the Basement Mechanical Room. The service is 4" in size and includes a 3" meter and pressure reducing valve. The main domestic cold-water distribution is 3" in size. The majority of the domestic distribution piping is located above the ceiling throughout the facility.

Piping, where exposed, appears to be copper with sweat joints. The majority of the piping is insulated. Gate valves are utilized for isolating the original water piping system.

Water Service

Water Meter

The main domestic hot water in the building is generated from a gas-fired boiler with indirect storage tank located in the Mechanical Room. The hot water system is not recirculated. There is no thermostatic mixing valve at the water heater, but there are multiple thermostatic mixing valves located throughout the building to serve the lavatory fixtures in the Boys and Girls Core Toilet Rooms.



Water Heater

Mixing Valve

Domestic hot water for the Kitchen areas is generated through a gas-fired, tank type water heater. The water heater has a gas input of 200,000 BTU/HR and the capacity of the water heater is 67 gallons. There are multiple electric tank type water heaters located near the Toilet core areas, each with a power input of 2,000 watts and a storage capacity of 20 gallons.

Gas Water Heater

Electric Water Heater

Electric Water Heater

Gas:

An elevated pressure natural gas with an exterior gas meter is supplied to the building. Natural gas is distributed on the roof from this location. The gas is serving boilers, rooftop units, water heater and Kitchen equipment.

Gas piping is black steel with a combination of screwed and welded joints and fittings depending on the time of installation.

Natural gas is provided for kitchen cooking equipment. The kitchen supply is not equipped with an automatic shutoff valve.

Gas Service

Gas on Roof

Drainage Systems:

Cast iron is used for sanitary and storm drainage. Where visible, the cast iron pipe appears to be in fair condition. Smaller pipe sizes appear to be copper. In general, the cast iron drainage piping can be reused even in a major renovation where adequately sized for the intended new use.

Roof Drain

Vent Through Roof

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FIRE PROTECTION:

In general, Massachusetts General Law M.G.L. c.148, s.26G requires that any existing school building over 12,000 square feet which undergoes major alterations, or a building addition, must be sprinklered. Examples of major alterations are demolition or reconstruction of existing ceilings or installation of suspended ceilings; removal of sub flooring; demolition and/or reconstruction of walls, doors, or stairways; or removal or relocation of a significant portion of the building's mechanical or electrical systems. Alterations are considered major when such work affects 33% or more of the building area or when total work (excluding sprinkler installation) is equal to 33% or more of the assessed value of the building.

Also, according to this section of M.G.L., any work performed, even if under separate contracts or building permits, within a 5-year period must be included in the aggregate construction cost to determine the applicability of M.G.L. This includes sitework and building renovations, whether done separately or together.

A hydrant flow test will be required to determine if adequate Municipal water supply is available.

TEL 508-998-5700 FAX 508-998-0883 email: info@g-g-d.com

Existing Security Report

As part of the review of the existing conditions of the Neary Elementary School, the security consultant, Pamela Perini Consulting, toured the school with the District leadership to assess existing security conditions. The security report is confidential and will be issued under separate cover to the District and public safety providers.

ENVIRONMENTAL CONDITIONS

Prior to the submission of this report, the following testing and studies have been completed at the site: preliminary geotechnical desktop review, hazardous materials survey, geoenviromental, Environmental Site Assessment and preliminary traffic studies.

GEOTECHNICAL CONDITIONS

Lahlaf Geotechnical Consulting, Inc. (LGCI) performed an initial review of the underlying geological conditions using superficial geologic maps and performed four (4) geotechnical borings at the site. The borings in two locations encountered fill for a depth of approximately six feet over an existing layer of sand and gravel.

In the event of construction of an addition or new building, the existing fill will need to be removed and replaced with structural fill. Please refer to Appendix H. Geotechnical Preliminary Desktop Review for the full report.

ENVIRONMENTAL SITE ASSESSMENT

Preliminary testing of the soil was performed by PEER Engineering coincidentally with the Geotechnical borings. Groundwater was observed at depths ranging from 2’ to 4’ below the ground surface.

HAZARDOUS MATERIALS

A preliminary hazardous materials assessment was performed by PEER Consultants in April 2024. Locations of hazardous materials are documented in their report included in Appendix J. Hazardous Materials Report.

TRAFFIC

Traffic conditions at the existing Neary school was analyzed over a multi-week study. Preliminary findings indicate that the existing school operations are currently accommodated on site, with no reliance on the adjacent roadway. Parent/guardian activity is managed on site and the school currently provides approximately 188 marked spaces within its on site parking lot which adequately accommodates the school activity.

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

PRINCIPALS
Robert J. Michaud, P.E.
Daniel J. Mills, P.E., PTOE

MEMORANDUM

DATE: May 17, 2024

TO: Katy Lillich, AIA
Arrowstreet
10 Post Office Square, Suite 700N
Boston MA 02109

FROM: Robert J. Michaud, P.E. – Managing Principal
Daniel A. Dumais, P.E. – Senior Project Manager

RE: **Proposed Margaret A. Neary School Expansion Project – Existing Conditions**
53 Parkerville Rd, Southborough, MA

MDM Transportation Consultants, Inc. (MDM) has prepared this initial traffic memorandum for the existing Margaret Neary Elementary School located at 53 Parkerville Road in Southborough, Massachusetts. The location of the Site relative to the adjacent roadway network is shown in **Figure 1.** This memorandum quantifies existing school operations based on field observations, traffic data collection and analysis of weekday peak school traffic activity and summarizes existing off-street parking within the school's parking field.

Existing Conditions

For the 2023/2024 school year Margaret Neary Elementary School had an existing enrollment of 260± students in grades 4 and 5 and 50± staff. The existing school layout and parking areas are shown in **Figure 2**. The existing school operations are as follows:

- *School Operations.* The general hours of operation for the school are 8:45 AM to 3:00 PM Monday through Friday. The morning drop-off period generally begins at 8:25 AM and the students are dismissed at 3:00 PM for afternoon pick-up.

- *Drop-Off Period*. The drop-off period generally occurs from 7:45 AM to 8:45 AM. Parent/guardian vehicles associated with drop-off activity generally occurred along the sidewalk in the designated drop-off area that is marked along the western portion of the parking field near the main entranceway. The parent/guardian vehicles then exited the school via the main driveway. The maximum queue observed in the live parent drop-off line was approximately 7 vehicles during the morning drop-off period.

Figure 1

Site Location

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Figure 2

Existing Site Layout

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School bus activity associated with drop-off activity was observed to enter the main driveway, loop around the back of the building, and drop-off students near the basketball courts. The school buses then exit the school out the bus loop entrance driveway. Pedestrian and bicycle counts indicate a portion of the student population walk or bike to school with a bicycle rack located near the main entranceway.

- *Pick-Up Period.* The pick-up period generally occurs from 2:45 PM to 3:45 PM on typical school days. Parent/guardian vehicles associated with drop-off activity were observed to occur via parking within the main parking field. The parents would generally walk to the sidewalk near the main entranceway for dismissal of students from staff. The maximum observed vehicles parked associated with parent pickup was approximately 60 vehicles during the afternoon pick-up period

  School bus activity associated with drop-off activity was observed to enter the bus loop driveway wait for students to load and then exit the bus loop driveway. The school buses were observed to begin to exit the school around 3:08 PM. The maximum number of queued buses was observed at 5 buses which occurred prior to the 3:08 bus departure. Pedestrian and bicycle counts indicate a portion of the student population walk or bike to school with a bicycle rack located near the main entranceway.

- *Staff Levels.* Staff includes approximately 50± total staff members which includes administrative staff and teachers. The school also uses a number of support staff, part time staff, and occasional volunteers.

- *School Bus/ Van Activity.* Approximately 13 school buses and 1 van service the school during the weekday morning drop-off period and afternoon pick-up periods. The van was observed to utilize a handicap access in the front of the school. During the morning drop-off period and afternoon pick-up period up to 6 full size buses were observed on the property at the same time.

- *After School Programs.* The school operates an after school program after the regular dismissal time of 3:00 PM. Observations indicate a parking demand of approximately 17 vehicle associated with the peak parent/guardian pick-up activity from the after school program which occurred between 4:15 PM and 4:45 PM.

BASELINE TRAFFIC CHARACTERISTICS

An overview of existing (Baseline) traffic volume characteristics for the existing school operations for the existing Margaret Neary Elementary School is provided below.

Baseline Traffic Data

Traffic volume data was collected in March 2024 during the weekday morning period (7:00 AM - 9:00 AM) and weekday afternoon period (2:45 PM to 6:00 PM) periods to coincide with peak traffic activity of the school. The resulting Baseline weekday morning drop-off period and weekday afternoon pick-up period traffic volumes for the study intersections are depicted in **Figure 3**. Turning movement counts which include passenger vehicles, school buses, heavy vehicles, pedestrians, and bicycles are provided in the **Attachments**.

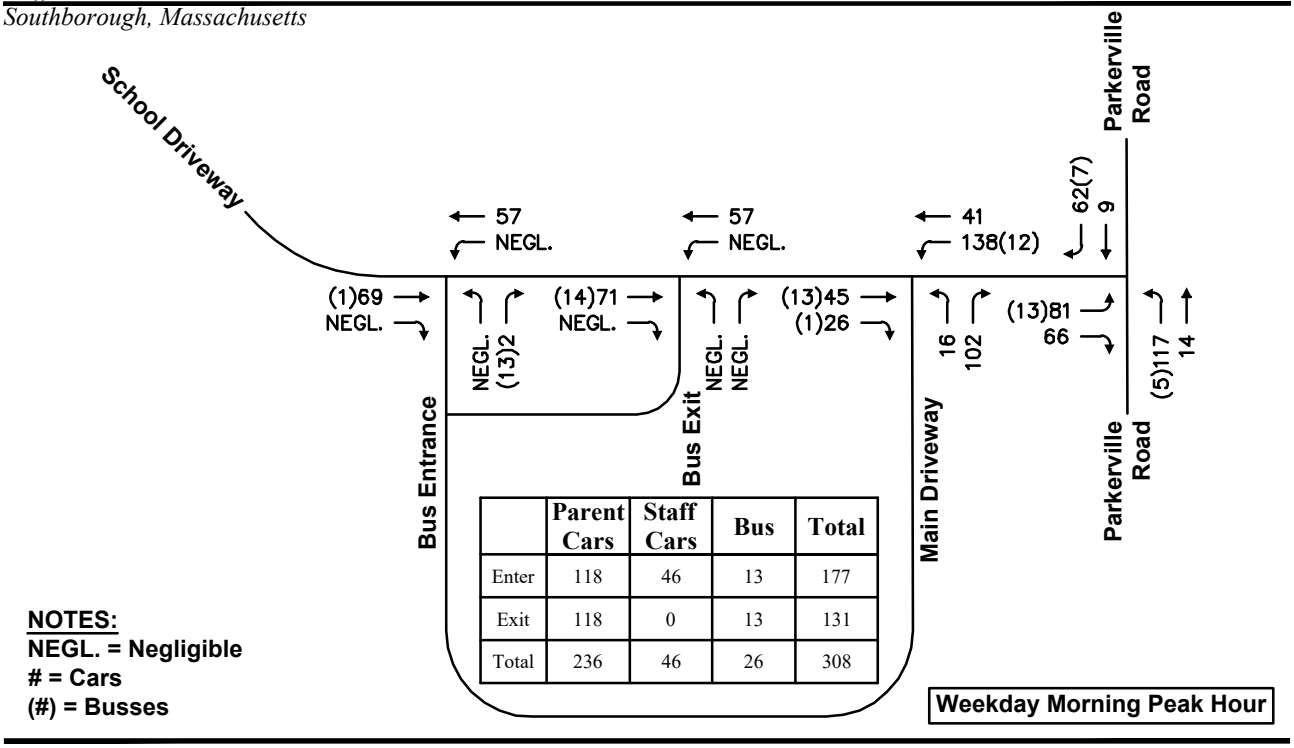
Existing Trip Generation – Margaret Neary Elementary School

Existing site trips generated by the Neary Elementary School were observed during critical school activity periods including the weekday morning drop-off period and weekday afternoon pick-up period on Wednesday March 13, 2024 between 7:45 AM – 8:45 AM and 2:45 PM – 3:45 PM. A detailed trip generation summary for the Site, based on the existing student enrollment of 260± students and approximately 50± staff at the school, including a breakdown of vehicular trips and school bus/van activity is presented in **Table 1** and described below.

TABLE 1
OBSERVED NEARY SCHOOL TRIP-GENERATION

Period	Student/Parent Auto	Staff/ Auto	School Bus	Total
Weekday Morning Drop-Off Period (7:45-8:45 AM):				
Enter	117	46	13	**177**
Exit	117	0	13	**131**
Total	234	46	26	**308**
Weekday Afternoon Pick-Up Period (2:45-3:45 PM):				
Enter	72	0	13	**85**
Exit	72	30	13	**115**
Total	144	30	26	**200**

[1]Peak hour trips based on empirical trip generation data provided by the Neary Elementary School and observations on Wednesday, March 13, 2024.



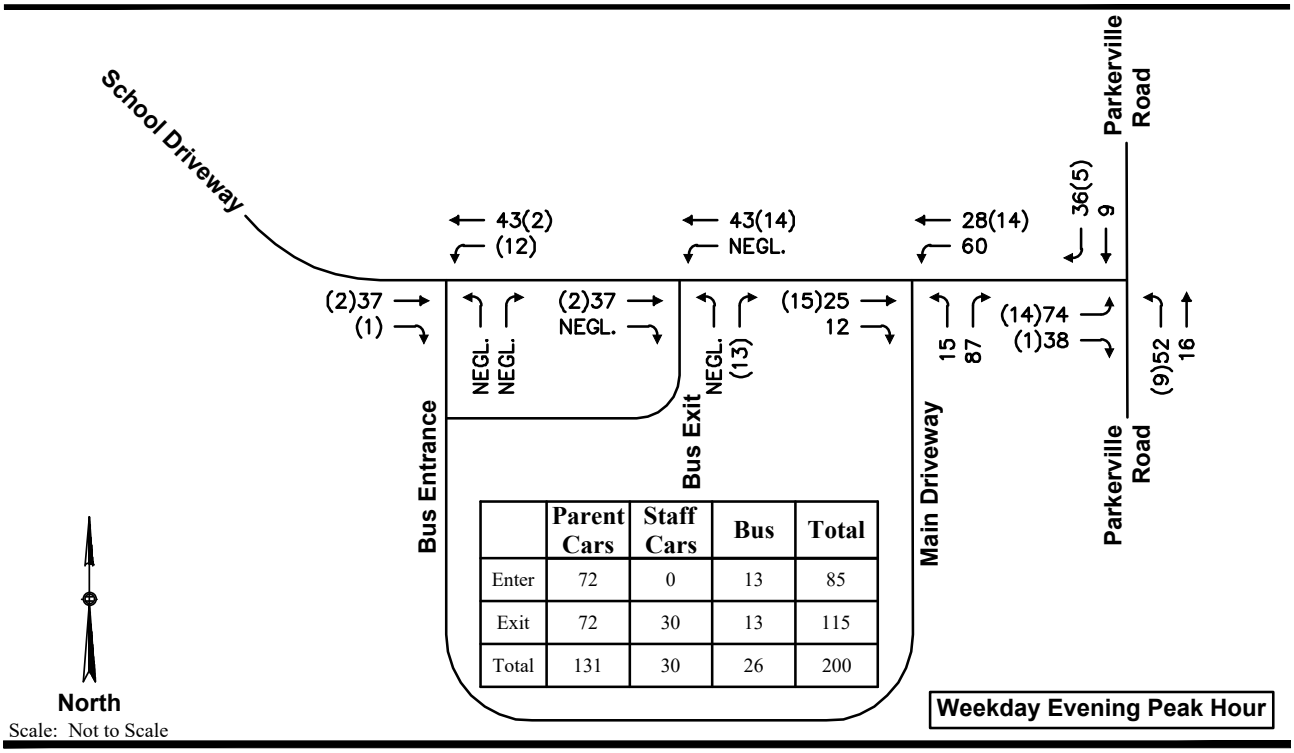


Figure 3

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2024 Baseline Conditions
Weekday Peak Hour Volumes

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As presented in **Table 1**,

- *Weekday Morning Drop-Off Period.* Trip generation during the critical weekday morning drop-off peak hour was 308 vehicle-trips (177 entering and 131 exiting), including 118 parent/guardian drop-off vehicles, 13 school buses and 46 staff vehicles. Parent/guardian vehicles associated with drop-off activity generally occurred along the sidewalk in the designated drop-off area that is marked along the western portion of the parking field near the main entranceway. The parent/guardian vehicles then exited the school via the main driveway. The maximum queue observed in the live parent drop-off line was approximately 7 during the morning drop-off period and the maximum number of concurrent buses on site was less than 5 full size buses.

- *Weekday Afternoon Pick-up Period.* Trip generation during the weekday afternoon peak hour was 200 vehicle-trips (85 entering and 115 exiting), including 72 parent/guardian pick-up vehicles, 13 school buses, and 30 staff vehicles. Parent/guardian vehicles associated with drop-off activity were observed to occur via parking within the main parking field. The parents would generally walk to the sidewalk near the main entranceway for dismissal of students from staff. The maximum observed vehicles parked associated with parent pickup was approximately 60 vehicles during the afternoon pick-up period and the maximum number of concurrent buses within the bus loop was 6 full size buses.

PARKING DEMAND

Existing peak parking demands at the Site were reviewed based on a parking survey conducted on Wednesday, March 13, 2024 On-site parking for the school currently includes 188± spaces. The parking activity associated with the Neary School between 7:00 AM and 6:00 PM is shown in **Figure 4** with detailed parking observations are included in the **Attachments**. The parking data indicates the following characteristics:

- *Before School.* Off-street peak parking demands for the Neary School were observed to gradually increase from negligible parked vehicles at 7:00 AM to approximately 60 vehicles at 8:30 AM.

- *Core School Day Period.* During the core school hours (8:45 AM and 2:30 PM) up to 70± parked vehicles were observed within the lot. At 12:00 noon the parking within the lot drops slightly from 70 vehicles to closer to 55 vehicles prior to the dismissal period with parents beginning to arrive around 2:30 PM.

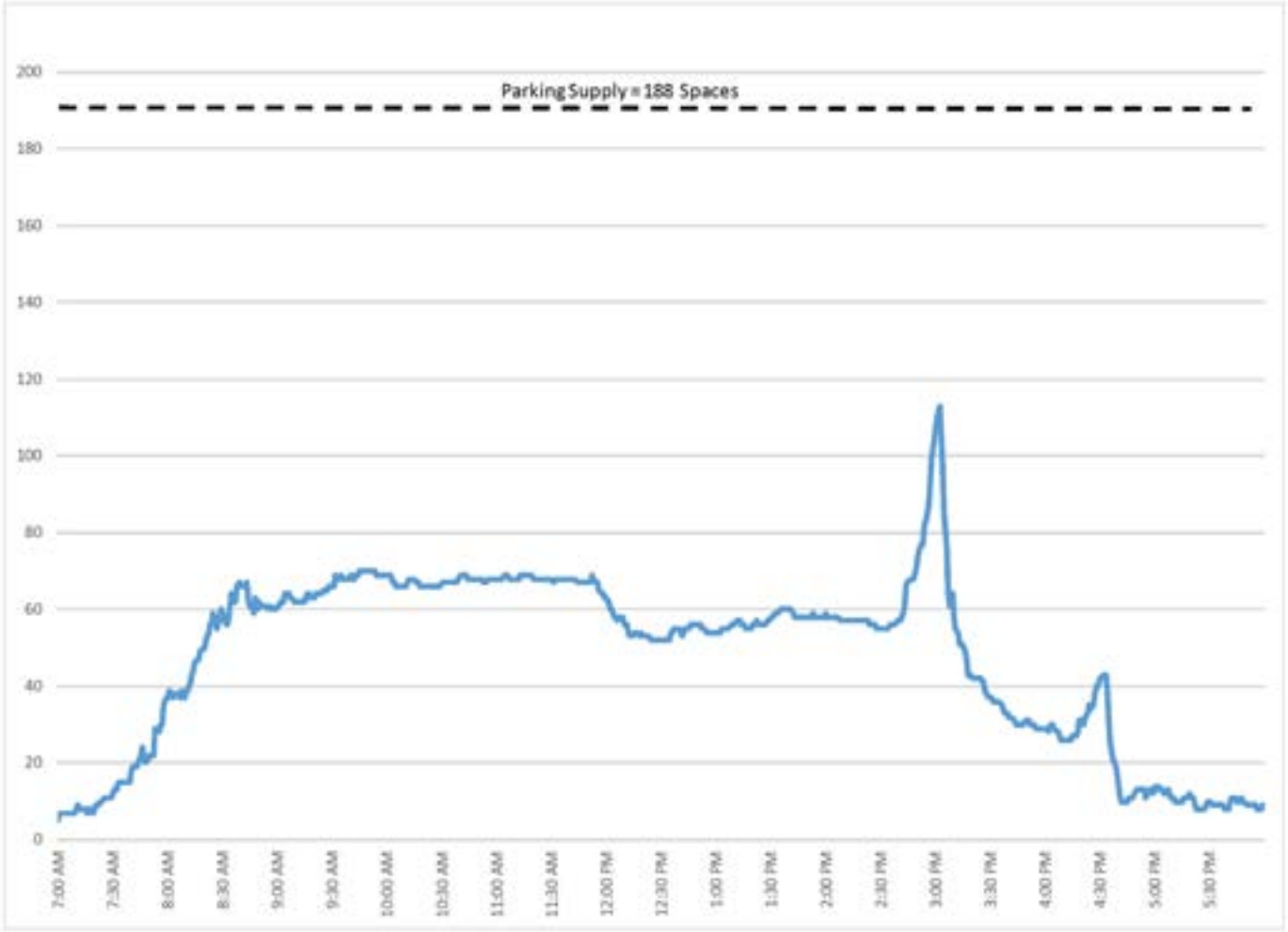

Figure 4

Observed Neary School Parking Activity
Wednesday, March 13, 2024

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Date: May 2024
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- *Pick-Up Period.* Off-street peak parking demands for the Neary School were observed to gradually increase from 55 vehicles at 2:30 PM until 113 vehicles at dismissal at 3:00 PM. The resulting maximum parent/guardian demand was observed at approximately 60 vehicles.

- *After School Care.* The after school program was observed to result in a parking demand of approximately 17 vehicle associated with the peak parent/guardian pick-up activity between 4:15 PM and 4:45 PM.

CONCLUSIONS

Review and evaluation of existing Neary School operations indicate that the existing school operations are currently accommodated on-site with no reliance on the adjacent roadway. The parent/guardian activity to be managed on-site include approximately 117 parent vehicles during the weekday morning drop-off period and approximately 72 parent vehicles during the afternoon pick-up period. The resulting observed queues include 7 parent vehicles during the drop-off period and 60 parent vehicles during the pick-up period. The peak parking activity at the site was observed at 70± parked vehicles were observed within the lot during the core school operating hours and 113± parked vehicles during the critical weekday afternoon pick-up period. The school currently provides approximately 188 marked spaces within its on-site parking lot which adequately accommodates the school activity.

ATTACHMENTS

- □ Traffic Volume Data
- □ Parking Data

□ Traffic Volume Data

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Marlborough, MA

N/S: Neary Driveway
E/W: Bus Entrance Driveway
Southborough, MA

File Name : 1339 Neary Dwy at Bus Entrance AM
Site Code : 1339
Start Date : 3/13/2024
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks

	Neary Driveway From North				Neary Driveway From South				Bus Entrance From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
07:45 AM	0	47	0	47	41	0	0	41	0	0	1	1	89
Total	0	47	0	47	41	0	0	41	0	0	1	1	89
08:00 AM	0	7	0	7	5	0	0	5	0	0	0	0	12
08:15 AM	0	7	0	7	3	0	0	3	2	0	0	2	12
08:30 AM	0	9	0	9	7	0	0	7	13	0	0	13	29
Grand Total	0	70	0	70	56	0	0	56	15	0	1	16	142
Apprch %	0	100	0		100	0	0		93.8	0	6.2		
Total %	0	49.3	0	49.3	39.4	0	0	39.4	10.6	0	0.7	11.3	
Lights	0	69	0	69	56	0	0	56	2	0	1	3	128
% Lights	0	98.6	0	98.6	100	0	0	100	13.3	0	100	18.8	90.1
Mediums	0	1	0	1	0	0	0	0	13	0	0	13	14
% Mediums	0	1.4	0	1.4	0	0	0	0	86.7	0	0	81.2	9.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0

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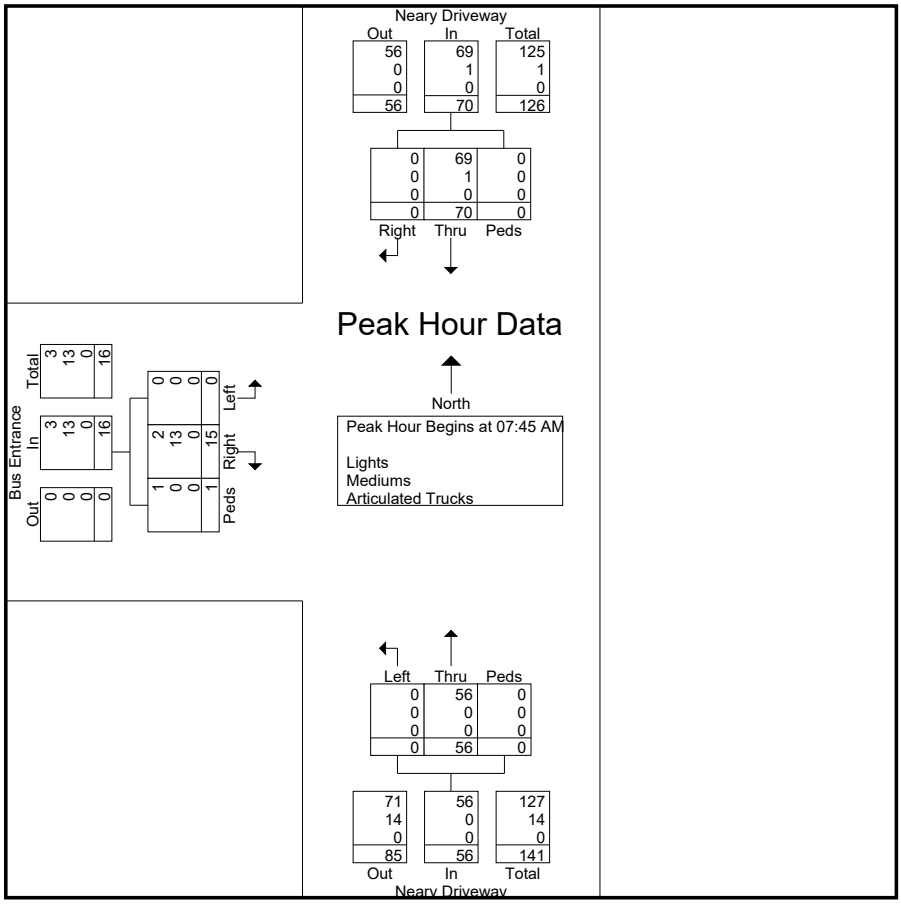
Site Code : 1339
Start Date : 3/13/2024
Page No : 2

	Neary Driveway From North				Neary Driveway From South				Bus Entrance 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 07:45 AM to 08:30 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	0	**47**	0	**47**	**41**	0	0	**41**	0	0	**1**	1	**89**
08:00 AM	0	7	0	7	5	0	0	5	0	0	0	0	12
08:15 AM	0	7	0	7	3	0	0	3	2	0	0	2	12
08:30 AM	0	9	0	9	7	0	0	7	**13**	0	0	**13**	29
Total Volume	0	70	0	70	56	0	0	56	15	0	1	16	142
% App. Total	0	100	0		100	0	0		93.8	0	6.2		
PHF	.000	.372	.000	.372	.341	.000	.000	.341	.288	.000	.250	.308	.399
Lights	0	69	0	69	56	0	0	56	2	0	1	3	128
% Lights	0	98.6	0	98.6	100	0	0	100	13.3	0	100	18.8	90.1
Mediums	0	1	0	1	0	0	0	0	13	0	0	13	14
% Mediums	0	1.4	0	1.4	0	0	0	0	86.7	0	0	81.3	9.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0



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E/W: Bus Entrance Driveway
Southborough, MA

File Name : 1339 Neary Dwy at Bus Entrance PM
Site Code : 1339
Start Date : 3/13/2024
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks

	Neary Driveway From North				Neary Driveway From South				Bus Entrance From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
02:45 PM	1	10	0	11	2	4	0	6	0	0	0	0	17
Total	1	10	0	11	2	4	0	6	0	0	0	0	17
03:00 PM	0	6	0	6	23	2	0	25	0	0	0	0	31
03:15 PM	0	1	0	1	13	6	0	19	0	0	0	0	20
03:30 PM	0	22	5	27	7	0	0	7	0	0	0	0	34
Grand Total	1	39	5	45	45	12	0	57	0	0	0	0	102
Apprch %	2.2	86.7	11.1		78.9	21.1	0		0	0	0		
Total %	1	38.2	4.9	44.1	44.1	11.8	0	55.9	0	0	0	0	
Lights	0	37	5	42	43	0	0	43	0	0	0	0	85
% Lights	0	94.9	100	93.3	95.6	0	0	75.4	0	0	0	0	83.3
Mediums	1	2	0	3	2	12	0	14	0	0	0	0	17
% Mediums	100	5.1	0	6.7	4.4	100	0	24.6	0	0	0	0	16.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0

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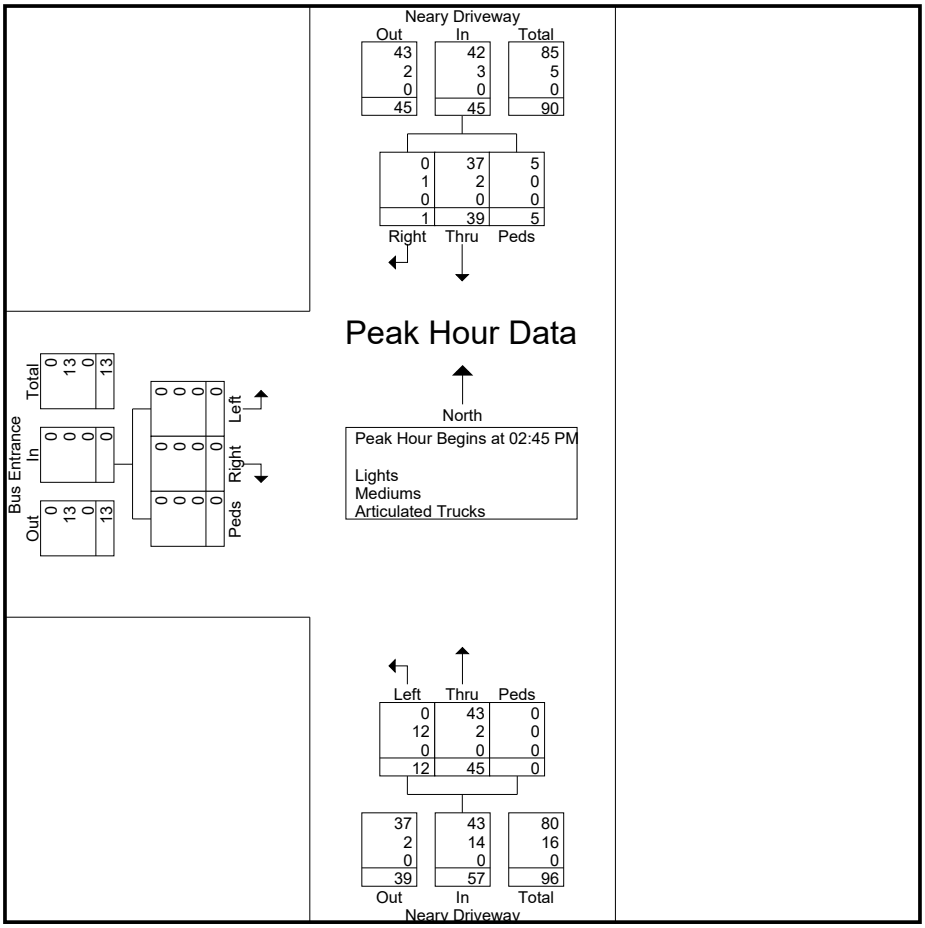
Site Code : 1339
Start Date : 3/13/2024
Page No : 2

	Neary Driveway From North				Neary Driveway From South				Bus Entrance 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 02:45 PM to 03:30 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:45 PM													
02:45 PM	**1**	10	0	11	2	4	0	6	0	0	0	0	17
03:00 PM	0	6	0	6	**23**	2	0	**25**	0	0	0	0	31
03:15 PM	0	1	0	1	13	**6**	0	19	0	0	0	0	20
03:30 PM	0	**22**	**5**	**27**	7	0	0	7	0	0	0	0	**34**
Total Volume	1	39	5	45	45	12	0	57	0	0	0	0	102
% App. Total	2.2	86.7	11.1		78.9	21.1	0		0	0	0		
PHF	.250	.443	.250	.417	.489	.500	.000	.570	.000	.000	.000	.000	.750
Lights	0	37	5	42	43	0	0	43	0	0	0	0	85
% Lights	0	94.9	100	93.3	95.6	0	0	75.4	0	0	0	0	83.3
Mediums	1	2	0	3	2	12	0	14	0	0	0	0	17
% Mediums	100	5.1	0	6.7	4.4	100	0	24.6	0	0	0	0	16.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0



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Marlborough, MA

E/W: Neary Driveway
NB: Neary Bus Loop
Southborough, MA

File Name : 1339_Neary_Dr_at_Bus_Loop_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks - Bicycles on Road

	Neary Driveway From East				Neary Bus Loop From South				Neary Driveway From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
07:00 AM	11	0	0	11	0	0	0	0	0	12	0	12	23
07:15 AM	20	0	0	20	0	0	0	0	0	6	0	6	26
07:30 AM	42	0	0	42	0	0	0	0	0	31	0	31	73
07:45 AM	41	0	0	41	0	0	1	1	0	47	0	47	89
Total	114	0	0	114	0	0	1	1	0	96	0	96	211
08:00 AM	5	0	0	5	0	0	0	0	0	7	0	7	12
08:15 AM	3	0	0	3	0	0	0	0	0	9	0	9	12
08:30 AM	7	0	0	7	0	0	0	0	0	22	0	22	29
08:45 AM	2	1	0	3	1	0	0	1	0	3	0	3	7
Total	17	1	0	18	1	0	0	1	0	41	0	41	60
11:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	1
11:15 AM	2	0	0	2	0	0	0	0	0	1	0	1	3
11:45 AM	2	0	0	2	0	0	2	2	0	2	0	2	6
Total	4	0	0	4	0	0	2	2	0	4	0	4	10
12:00 PM	2	0	0	2	0	0	1	1	0	0	0	0	3
12:15 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
12:30 PM	0	0	0	0	0	0	0	0	0	2	0	2	2
12:45 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
Total	4	0	0	4	0	0	1	1	0	3	0	3	8
02:45 PM	8	0	0	8	0	0	0	0	0	10	0	10	18
Total	8	0	0	8	0	0	0	0	0	10	0	10	18
03:00 PM	23	2	0	25	7	0	0	7	0	6	0	6	38
03:15 PM	13	6	0	19	6	0	0	6	0	1	0	1	26
03:30 PM	7	0	0	7	0	0	5	5	0	22	0	22	34
03:45 PM	2	0	0	2	0	0	0	0	0	3	0	3	5
Total	45	8	0	53	13	0	5	18	0	32	0	32	103
04:00 PM	4	0	0	4	0	0	1	1	0	1	0	1	6
04:15 PM	0	0	0	0	0	0	4	4	0	3	0	3	7
04:30 PM	5	0	0	5	0	0	3	3	0	2	0	2	10
04:45 PM	1	2	0	3	1	0	1	2	0	1	0	1	6
Total	10	2	0	12	1	0	9	10	0	7	0	7	29
05:00 PM	3	1	0	4	1	0	1	2	0	1	0	1	7
05:15 PM	1	0	0	1	1	0	3	4	0	5	1	6	11
05:30 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
05:45 PM	0	1	0	1	2	0	2	4	0	2	0	2	7
Total	5	2	0	7	4	0	6	10	0	9	1	10	27
Grand Total	207	13	0	220	19	0	24	43	0	202	1	203	466
Apprch %	94.1	5.9	0		44.2	0	55.8		0	99.5	0.5		
Total %	44.4	2.8	0	47.2	4.1	0	5.2	9.2	0	43.3	0.2	43.6	
Lights	190	4	0	194	5	0	24	29	0	182	1	183	406
% Lights	91.8	30.8	0	88.2	26.3	0	100	67.4	0	90.1	100	90.1	87.1
Mediums	14	8	0	22	13	0	0	13	0	17	0	17	52
% Mediums	6.8	61.5	0	10	68.4	0	0	30.2	0	8.4	0	8.4	11.2

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E/W: Neary Driveway
NB: Neary Bus Loop
Southborough, MA

File Name : 1339_Neary_Dr_at_Bus_Loop_03-13-2024
Site Code : 1339
Start Date : 3/13/2024

Groups Printed- Lights - Mediums - Articulated Trucks - Bicycles on Road

	Neary Driveway From East				Neary Bus Loop From South				Neary Driveway From West				
	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	3	1	0	4	1	0	0	1	0	3	0	3	8
% Bicycles on Road	1.4	7.7	0	1.8	5.3	0	0	2.3	0	1.5	0	1.5	1.7

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28 Lord Road, Suite 280
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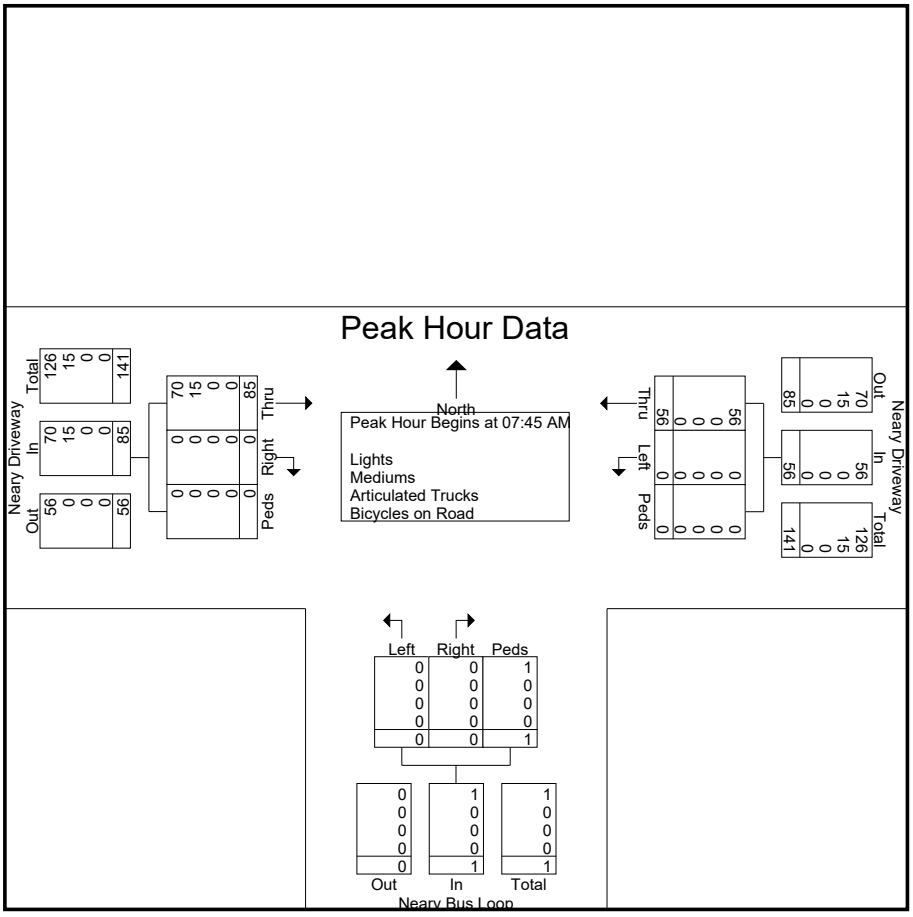
E/W: Neary Driveway
NB: Neary Bus Loop
Southborough, MA

File Name : 1339_Neary_Dr_at_Bus_Loop_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 3

	Neary Driveway From East				Neary Bus Loop From South				Neary Driveway From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:45 AM to 09:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	**41**	0	0	**41**			**1**	**1**		**47**	0	**47**	**89**
08:00 AM	**5**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**7**	**12**
08:15 AM	**3**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**9**	**12**
08:30 AM	**7**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**22**	**0**	**22**	**29**
Total Volume	**56**	**0**	**0**	**56**	**0**	**0**	**1**	**1**	**0**	**85**	**0**	**85**	**142**
% App. Total	**100**	**0**	**0**		**0**	**0**	**100**		**0**	**100**	**0**		
PHF	**.341**	**.000**	**.000**	**.341**	**.000**	**.000**	**.250**	**.250**	**.000**	**.452**	**.000**	**.452**	**.399**
Lights	**56**	**0**	**0**	**56**	**0**	**0**	**1**	**1**	**0**	**70**	**0**	**70**	**127**
% Lights	**100**	**0**	**0**	**100**	**0**	**0**	**100**	**100**	**0**	**82.4**	**0**	**82.4**	**89.4**
Mediums	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**0**	**15**	**15**
% Mediums	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**17.6**	**0**	**17.6**	**10.6**
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0



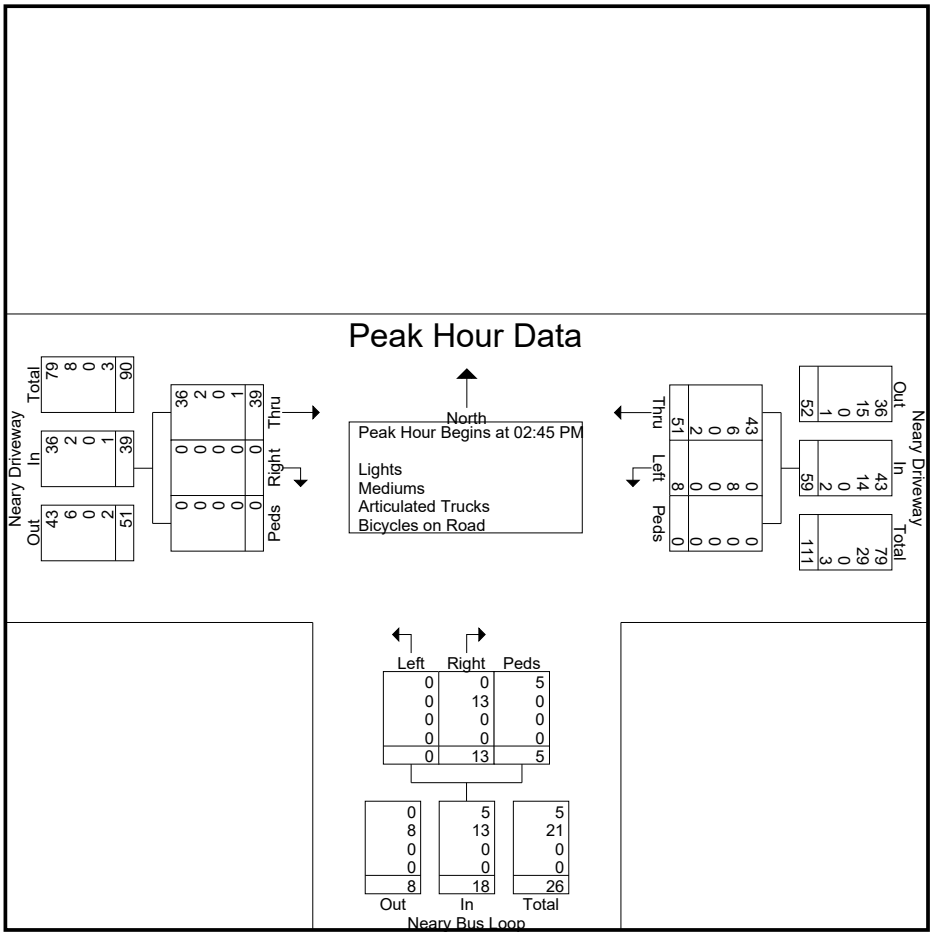
MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

28 Lord Road, Suite 280
Marlborough, MA

E/W: Neary Driveway
NB: Neary Bus Loop
Southborough, MA

File Name : 1339_Neary_Dr_at_Bus_Loop_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 5

	Neary Driveway From East				Neary Bus Loop From South				Neary Driveway From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	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 02:45 PM													
02:45 PM	8	0	0	8	0	0	0	0	0	10	0	10	18
03:00 PM	**23**	2	0	**25**	**7**	0	0	**7**					**38**
03:15 PM	**13**	**6**	0	19	6	0	0	6	0	1	0	1	26
03:30 PM	7	0	0	7	0	0	**5**	5	0	**22**	0	**22**	34
Total Volume	51	8	0	59	13	0	5	18	0	39	0	39	116
% App. Total	86.4	13.6	0		72.2	0	27.8		0	100	0		
PHF	.554	.333	.000	.590	.464	.000	.250	.643	.000	.443	.000	.443	.763
Lights	43	0	0	43	0	0	5	5	0	36	0	36	84
% Lights	84.3	0	0	72.9	0	0	100	27.8	0	92.3	0	92.3	72.4
Mediums	6	8	0	14	13	0	0	13	0	2	0	2	29
% Mediums	11.8	100	0	23.7	100	0	0	72.2	0	5.1	0	5.1	25.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	2	0	0	2	0	0	0	0	0	1	0	1	3
% Bicycles on Road	3.9	0	0	3.4	0	0	0	0	0	2.6	0	2.6	2.6



MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

28 Lord Road, Suite 280
Marlborough, MA

E/W: Neary Driveway
NB: Neary Parking Lot
Southborough, MA

File Name : 1339_Neary_Dr_at_School_Lot 245
Site Code : 1339
Start Date : 3/13/2023
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks

	Neary Driveway From East				Neary School Lot From South				Neary Driveway From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
02:45 PM	6	38	1	45	2	0	0	2	10	0	0	10	57
Total	6	38	1	45	2	0	0	2	10	0	0	10	57
03:00 PM	10	21	0	31	63	14	6	83	1	12	0	13	127
03:15 PM	18	1	0	19	15	1	0	16	1	6	0	7	42
03:30 PM	7	0	0	7	7	0	5	12	0	22	0	22	41
03:45 PM	1	1	0	2	2	0	0	2	0	3	0	3	7
Total	36	23	0	59	87	15	11	113	2	43	0	45	217
04:00 PM	1	3	0	4	2	3	1	6	0	1	0	1	11
04:15 PM	0	14	0	14	4	0	3	7	3	0	2	5	26
04:30 PM	1	6	0	7	33	4	3	40	1	1	0	2	49
04:45 PM	3	5	0	8	3	1	2	6	1	1	0	2	16
Total	5	28	0	33	42	8	9	59	5	3	2	10	102
05:00 PM	3	6	0	9	8	0	1	9	0	2	0	2	20
05:15 PM	0	2	1	3	3	1	5	9	1	2	2	5	17
05:30 PM	1	2	0	3	2	0	1	3	1	0	0	1	7
05:45 PM	0	4	0	4	6	1	0	7	1	3	0	4	15
Total	4	14	1	19	19	2	7	28	3	7	2	12	59
Grand Total	51	103	2	156	150	25	27	202	20	53	4	77	435
Apprch %	32.7	66	1.3		74.3	12.4	13.4		26	68.8	5.2		
Total %	11.7	23.7	0.5	35.9	34.5	5.7	6.2	46.4	4.6	12.2	0.9	17.7	
Lights	37	103	2	142	150	25	27	202	20	38	4	62	406
% Lights	72.5	100	100	91	100	100	100	100	100	71.7	100	80.5	93.3
Mediums	14	0	0	14	0	0	0	0	0	15	0	15	29
% Mediums	27.5	0	0	9	0	0	0	0	0	28.3	0	19.5	6.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0

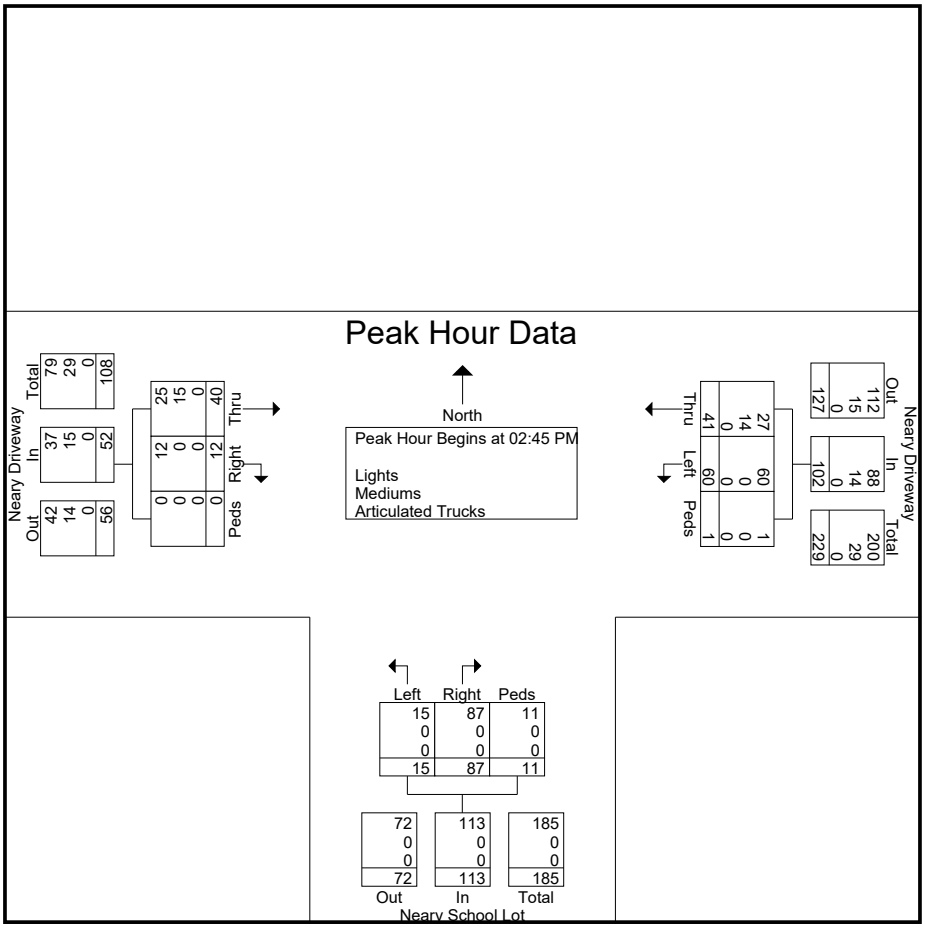
MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

28 Lord Road, Suite 280
Marlborough, MA

E/W: Neary Driveway
NB: Neary Parking Lot
Southborough, MA

File Name : 1339_Neary_Dr_at_School_Lot 245
Site Code : 1339
Start Date : 3/13/2023
Page No : 2

	Neary Driveway From East				Neary School Lot From South				Neary Driveway From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:45 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:45 PM													
02:45 PM	6	**38**	**1**	**45**	2	0	0	2	**10**	0	0	10	57
03:00 PM	10	21	0	31	**63**	**14**	**6**	**83**	1	12	0	13	**127**
03:15 PM	**18**	1	0	19	15	1	0	16	1	6	0	7	42
03:30 PM	7	0	0	7	7	0	5	12	0	**22**	0	**22**	41
Total Volume	41	60	1	102	87	15	11	113	12	40	0	52	267
% App. Total	40.2	58.8	1		77	13.3	9.7		23.1	76.9	0		
PHF	.569	.395	.250	.567	.345	.268	.458	.340	.300	.455	.000	.591	.526
Lights	27	60	1	88	87	15	11	113	12	25	0	37	238
% Lights	65.9	100	100	86.3	100	100	100	100	100	62.5	0	71.2	89.1
Mediums	14	0	0	14	0	0	0	0	0	15	0	15	29
% Mediums	34.1	0	0	13.7	0	0	0	0	0	37.5	0	28.8	10.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0



MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA, 01752

E/W: Neary Driveway
NB: Neary Parking Lot
Southborough, MA

File Name : 1339_Neary_Dr_at_School_Lot_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks - Bicycles on Road

	Neary Driveway From East				Neary School Lot From South				Neary Driveway From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
07:00 AM	11	5	0	16	2	0	0	2	0	12	0	12	30
07:15 AM	19	6	0	25	2	1	0	3	0	6	0	6	34
07:30 AM	43	13	0	56	7	1	1	9	4	27	0	31	96
07:45 AM	38	36	0	74	24	4	0	28	9	38	0	47	149
Total	111	60	0	171	35	6	1	42	13	83	0	96	309
08:00 AM	2	34	0	36	28	3	0	31	4	3	0	7	74
08:15 AM	3	28	0	31	11	3	0	14	7	2	0	9	54
08:30 AM	1	52	0	53	39	6	0	45	7	14	0	21	119
08:45 AM	2	9	0	11	12	2	2	16	2	2	2	6	33
Total	8	123	0	131	90	14	2	106	20	21	2	43	280
11:00 AM	0	4	0	4	3	0	0	3	0	2	0	2	9
11:15 AM	2	0	0	2	1	0	0	1	0	0	0	0	3
11:30 AM	0	1	0	1	2	0	0	2	0	0	0	0	3
11:45 AM	1	2	0	3	5	2	0	7	2	0	0	2	12
Total	3	7	0	10	11	2	0	13	2	2	0	4	27
12:00 PM	1	1	0	2	10	1	1	12	0	0	0	0	14
12:15 PM	0	2	0	2	1	2	0	3	0	1	0	1	6
12:30 PM	1	3	0	4	2	0	0	2	2	0	0	2	8
12:45 PM	1	1	0	2	2	0	0	2	0	0	0	0	4
Total	3	7	0	10	15	3	1	19	2	1	0	3	32
03:00 PM	10	21	0	31	63	14	6	83	1	12	0	13	127
03:15 PM	18	1	0	19	15	1	0	16	1	6	0	7	42
03:30 PM	7	0	0	7	7	0	5	12	0	22	0	22	41
03:45 PM	2	1	0	3	2	0	0	2	0	3	0	3	8
Total	37	23	0	60	87	15	11	113	2	43	0	45	218
04:00 PM	1	3	0	4	2	3	1	6	0	1	0	1	11
04:15 PM	0	14	0	14	4	0	3	7	3	0	2	5	26
04:30 PM	1	6	0	7	33	4	3	40	1	1	0	2	49
04:45 PM	4	5	0	9	3	1	2	6	1	1	0	2	17
Total	6	28	0	34	42	8	9	59	5	3	2	10	103
05:00 PM	3	6	0	9	8	0	1	9	0	2	0	2	20
05:15 PM	0	2	1	3	3	1	5	9	1	5	2	8	20
05:30 PM	1	2	0	3	2	0	1	3	1	0	0	1	7
05:45 PM	0	4	0	4	6	1	0	7	1	3	0	4	15
Total	4	14	1	19	19	2	7	28	3	10	2	15	62
Grand Total	172	262	1	435	299	50	31	380	47	163	6	216	1031
Apprch %	39.5	60.2	0.2		78.7	13.2	8.2		21.8	75.5	2.8		
Total %	16.7	25.4	0.1	42.2	29	4.8	3	36.9	4.6	15.8	0.6	21	
Lights	148	249	1	398	298	50	31	379	46	132	6	184	961
% Lights	86	95	100	91.5	99.7	100	100	99.7	97.9	81	100	85.2	93.2
Mediums	18	13	0	31	1	0	0	1	1	28	0	29	61
% Mediums	10.5	5	0	7.1	0.3	0	0	0.3	2.1	17.2	0	13.4	5.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	6	0	0	6	0	0	0	0	0	3	0	3	9
% Bicycles on Road	3.5	0	0	1.4	0	0	0	0	0	1.8	0	1.4	0.9

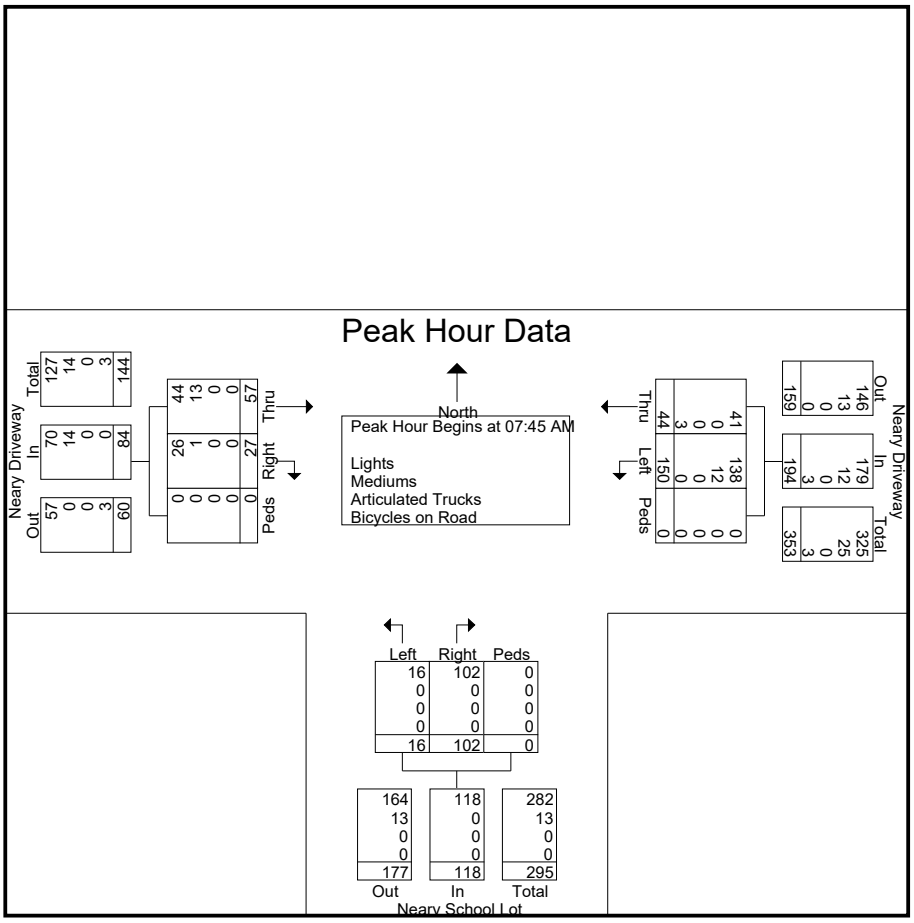
MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA, 01752

E/W: Neary Driveway
NB: Neary Parking Lot
Southborough, MA

File Name : 1339_Neary_Dr_at_School_Lot_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 3

	Neary Driveway From East				Neary School Lot From South				Neary Driveway From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	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 07:45 AM													
07:45 AM	**38**	36	0	**74**	24	4	0	28	**9**	**38**	0	**47**	**149**
08:00 AM	2	34	0	36	28	3	0	31	4	3	0	7	74
08:15 AM	3	28	0	31	11	3	0	14	7	2	0	9	54
08:30 AM	1	**52**	0	53	**39**	**6**	0	**45**	7	14	0	21	119
Total Volume	44	150	0	194	102	16	0	118	27	57	0	84	396
% App. Total	22.7	77.3	0		86.4	13.6	0		32.1	67.9	0		
PHF	.289	.721	.000	.655	.654	.667	.000	.656	.750	.375	.000	.447	.664
Lights	41	138	0	179	102	16	0	118	26	44	0	70	367
% Lights	93.2	92.0	0	92.3	100	100	0	100	96.3	77.2	0	83.3	92.7
Mediums	0	12	0	12	0	0	0	0	1	13	0	14	26
% Mediums	0	8.0	0	6.2	0	0	0	0	3.7	22.8	0	16.7	6.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	3	0	0	3	0	0	0	0	0	0	0	0	3
% Bicycles on Road	6.8	0	0	1.5	0	0	0	0	0	0	0	0	0.8



MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

28 Lord Road, Suite 280
Marlborough, MA

N/S: Parkerville Road
EB: Neary Driveway

File Name : 1339_Parkerville_at_Neary_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks - Bicycles on Road

	Parkerville Road From North				Parkerville Road From South				Neary Driveway From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
07:00 AM	2	0	0	2	2	14	0	16	6	8	0	14	32
07:15 AM	5	3	0	8	4	19	0	23	2	5	0	7	38
07:30 AM	5	1	0	6	3	48	0	51	16	11	0	27	84
07:45 AM	14	2	0	16	9	52	0	61	33	30	0	63	140
Total	26	6	0	32	18	133	0	151	57	54	0	111	294
08:00 AM	21	5	0	26	2	21	0	23	16	20	0	36	85
08:15 AM	11	1	0	12	1	16	0	17	1	11	0	12	41
08:30 AM	23	1	0	24	2	28	0	30	14	30	1	45	99
08:45 AM	4	3	0	7	4	10	0	14	8	14	0	22	43
Total	59	10	0	69	9	75	0	84	39	75	1	115	268
11:00 AM	2	3	0	5	0	2	0	2	1	3	0	4	11
11:15 AM	2	2	0	4	3	0	0	3	0	2	0	2	9
11:30 AM	0	1	0	1	2	1	0	3	1	0	0	1	5
11:45 AM	3	0	0	3	2	2	0	4	1	3	0	4	11
Total	7	6	0	13	7	5	0	12	3	8	0	11	36
12:00 PM	1	6	0	7	7	1	0	8	4	8	0	12	27
12:15 PM	1	1	0	2	3	1	0	4	3	0	0	3	9
12:30 PM	3	2	0	5	2	1	3	6	2	1	1	4	15
12:45 PM	1	1	0	2	8	1	0	9	0	2	0	2	13
Total	6	10	0	16	20	4	3	27	9	11	1	21	64
02:45 PM	17	2	0	19	5	24	0	29	3	0	0	3	51
Total	17	2	0	19	5	24	0	29	3	0	0	3	51
03:00 PM	15	2	0	17	5	20	3	28	16	55	0	71	116
03:15 PM	8	4	0	12	2	11	0	13	7	15	0	22	47
03:30 PM	2	1	0	3	4	4	4	12	12	15	1	28	43
03:45 PM	2	6	0	8	3	0	0	3	3	6	0	9	20
Total	27	13	0	40	14	35	7	56	38	91	1	130	226
04:00 PM	2	4	0	6	6	3	2	11	1	2	0	3	20
04:15 PM	12	6	0	18	6	4	3	13	3	2	0	5	36
04:30 PM	1	3	0	4	9	5	1	15	9	26	0	35	54
04:45 PM	4	5	0	9	4	5	1	10	0	1	0	1	20
Total	19	18	0	37	25	17	7	49	13	31	0	44	130
05:00 PM	4	2	0	6	10	7	0	17	2	10	0	12	35
05:15 PM	1	4	0	5	2	1	1	4	0	5	0	5	14
05:30 PM	1	2	0	3	6	3	2	11	1	1	1	3	17
05:45 PM	3	5	0	8	6	1	0	7	3	5	2	10	25
Total	9	13	0	22	24	12	3	39	6	21	3	30	91
Grand Total	170	78	0	248	122	305	20	447	168	291	6	465	1160
Apprch %	68.5	31.5	0		27.3	68.2	4.5		36.1	62.6	1.3		
Total %	14.7	6.7	0	21.4	10.5	26.3	1.7	38.5	14.5	25.1	0.5	40.1	
Lights	151	70	0	221	120	282	20	422	167	263	6	436	1079
% Lights	88.8	89.7	0	89.1	98.4	92.5	100	94.4	99.4	90.4	100	93.8	93
Mediums	13	6	0	19	1	22	0	23	1	28	0	29	71
% Mediums	7.6	7.7	0	7.7	0.8	7.2	0	5.1	0.6	9.6	0	6.2	6.1

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

28 Lord Road, Suite 280
Marlborough, MA

N/S: Parkerville Road
EB: Neary Driveway

File Name : 1339_Parkerville_at_Neary_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 2

Groups Printed- Lights - Mediums - Articulated Trucks - Bicycles on Road

	Parkerville Road From North				Parkerville Road From South				Neary Driveway From West				
	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	6	2	0	8	1	1	0	2	0	0	0	0	10
% Bicycles on Road	3.5	2.6	0	3.2	0.8	0.3	0	0.4	0	0	0	0	0.9

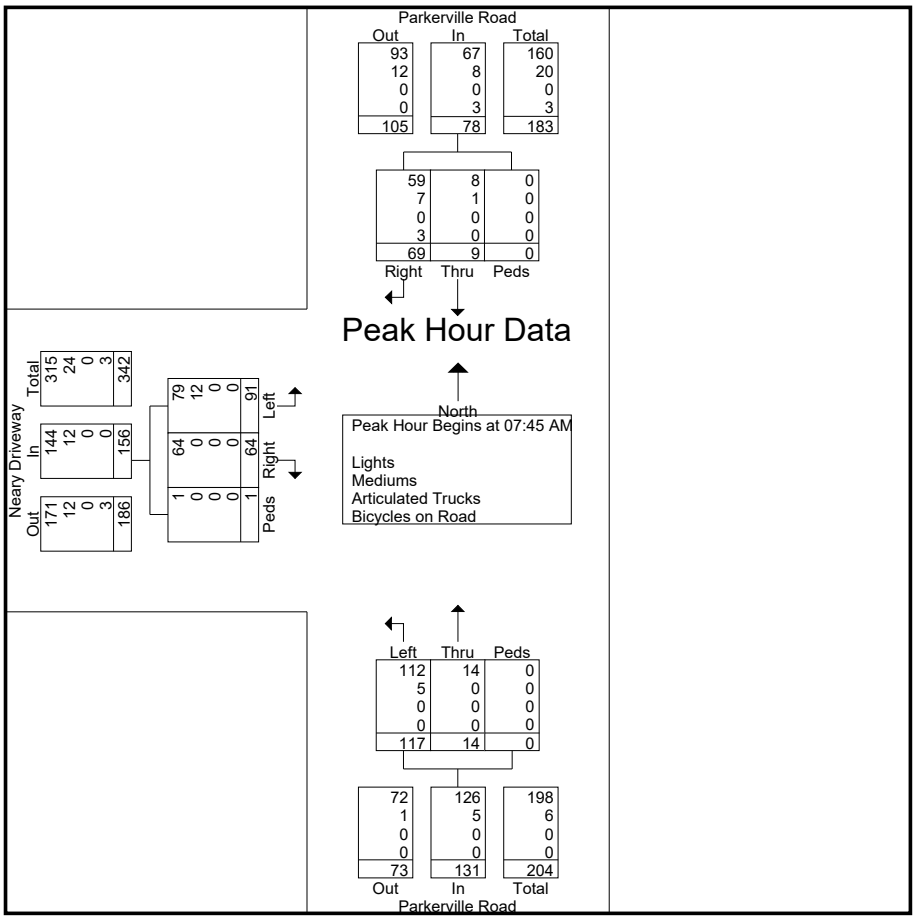
MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

28 Lord Road, Suite 280
Marlborough, MA

N/S: Parkerville Road
EB: Neary Driveway

File Name : 1339_Parkerville_at_Neary_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 3

	Parkerville Road From North				Parkerville Road From South				Neary Driveway 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 09:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	14	2	0	16	**9**	**52**	0	**61**	**33**	**30**	0	**63**	**140**
08:00 AM	**21**	**5**	0	**26**	**2**	**21**	**0**	**23**	**16**	**20**	**0**	**36**	**85**
08:15 AM	**11**	**1**	**0**	**12**	**1**	**16**	**0**	**17**	**1**	**11**	**0**	**12**	**41**
08:30 AM	**23**	1	0	24	2	28	0	30	14	30	**1**	45	99
Total Volume	69	9	0	78	14	117	0	131	64	91	1	156	365
% App. Total	88.5	11.5	0		10.7	89.3	0		41	58.3	0.6		
PHF	.750	.450	.000	.750	.389	.563	.000	.537	.485	.758	.250	.619	.652
Lights	59	8	0	67	14	112	0	126	64	79	1	144	337
% Lights	85.5	88.9	0	85.9	100	95.7	0	96.2	100	86.8	100	92.3	92.3
Mediums	7	1	0	8	0	5	0	5	0	12	0	12	25
% Mediums	10.1	11.1	0	10.3	0	4.3	0	3.8	0	13.2	0	7.7	6.8
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	3	0	0	3	0	0	0	0	0	0	0	0	3
% Bicycles on Road	4.3	0	0	3.8	0	0	0	0	0	0	0	0	0.8



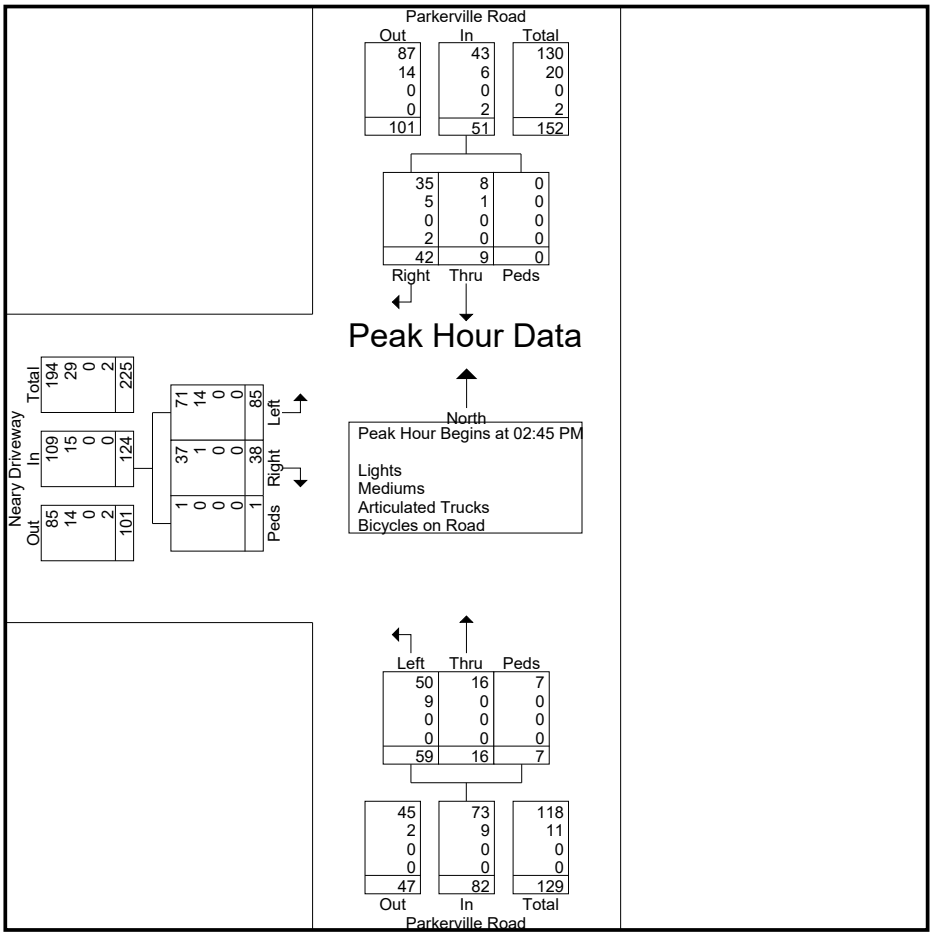
MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

28 Lord Road, Suite 280
Marlborough, MA

N/S: Parkerville Road
EB: Neary Driveway

File Name : 1339_Parkerville_at_Neary_03-13-2024
Site Code : 1339
Start Date : 3/13/2024
Page No : 5

	Parkerville Road From North				Parkerville Road From South				Neary Driveway 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 02:45 PM													
02:45 PM	**17**	2	0	**19**	**5**	**24**	0	**29**					
03:00 PM	**15**	**2**	**0**	**17**	**5**	**20**	**3**	**28**	**16**	**55**	0	**71**	**116**
03:15 PM	**8**	**4**	0	12	2	11	0	13	7	15	0	22	47
03:30 PM	2	1	0	3	4	4	**4**	12	12	15	**1**	28	43
Total Volume	42	9	0	51	16	59	7	82	38	85	1	124	257
% App. Total	82.4	17.6	0		19.5	72	8.5		30.6	68.5	0.8		
PHF	.618	.563	.000	.671	.800	.615	.438	.707	.594	.386	.250	.437	.554
Lights	35	8	0	43	16	50	7	73	37	71	1	109	225
% Lights	83.3	88.9	0	84.3	100	84.7	100	89.0	97.4	83.5	100	87.9	87.5
Mediums	5	1	0	6	0	9	0	9	1	14	0	15	30
% Mediums	11.9	11.1	0	11.8	0	15.3	0	11.0	2.6	16.5	0	12.1	11.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	2	0	0	2	0	0	0	0	0	0	0	0	2
% Bicycles on Road	4.8	0	0	3.9	0	0	0	0	0	0	0	0	0.8



□ Parking Data

Study Name 1339 Neary Lot Parking
Start Date 03/13/2024
Start Time 7:00 AM
Site Code 1339

Channel Direction	Direction Entering	Direction Exiting	Peak Parking Demand
7:00 AM	5	2	9
7:15 AM	6	3	11
7:30 AM	17	8	20
7:45 AM	45	28	37
8:00 AM	38	31	44
8:15 AM	30	14	60
8:30 AM	48	45	67
8:45 AM	10	13	63
9:00 AM	4	2	64
9:15 AM	5	1	66
9:30 AM	7	4	69
9:45 AM	1	1	70
10:00 AM	3	4	69
10:15 AM	0	2	68
10:30 AM	4	2	69
10:45 AM	1	1	68
11:00 AM	4	3	69
11:15 AM	0	1	69
11:30 AM	1	2	68
11:45 AM	4	8	69
12:00 PM	1	11	63
12:15 PM	2	3	54
12:30 PM	5	2	55
12:45 PM	1	2	56
1:00 PM	4	2	57
1:15 PM	3	2	57
1:30 PM	4	3	60
1:45 PM	1	1	59
2:00 PM	1	2	59
2:15 PM	0	2	57
2:30 PM	11	0	66
2:45 PM	41	3	104
3:00 PM	21	74	113
3:15 PM	2	16	51
3:30 PM	0	7	37
3:45 PM	1	2	31
4:00 PM	2	5	30
4:15 PM	18	4	40
4:30 PM	7	37	43
4:45 PM	6	4	13
5:00 PM	6	8	14
5:15 PM	4	4	12
5:30 PM	3	2	11
5:45 PM	5	7	11