



*New England School Development Council*

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**FACILITY STUDY AND CAPACITY ANALYSIS  
MINUTEMAN CAREER AND TECHNICAL HIGH  
SCHOOL  
LEXINGTON, MASSACHUSETTS**

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## **INTRODUCTION AND EXECUTIVE SUMMARY**

The New England School Development Council (NESDEC) was asked by the School Committee of the Minuteman Career and Technical High School to conduct a Space Utilization Study of the Minuteman Career and Technical High School. The scope of the work included an analysis of prior studies and documents, enrollment data, and curricular and program-related information. The NESDEC Team met with school officials and surveyed the building to determine the Current and Planned Operating Capacity. The team identified areas of program constraint due to space deficiency and provided information on what modifications, renovations or new facilities might be considered to accommodate future programming.

After completing a Capacity Analysis of the Minuteman Career and Technical High School, NESDEC determined that the Current Operating Capacity of the building is 1,171. The Planned Operating Capacity, which makes accommodations for deficiencies in instructional storage space and Related Classroom space, was determined to be 1,011. (see Part A)

Planned Operating Capacity is based upon maximum class sizes that educational spaces can accommodate for a 21<sup>st</sup> Century program. Schools often operate below their Planned Operating Capacity due to factors including: specialized elective offerings (upper level courses), budget/staffing issues, declining enrollment, and the need to provide smaller classes for certain students with special needs. All of these factors apply to Minuteman which, importantly, has a large special needs population (currently 44% of the student body, more than double the MA average). In order to provide an effective instructional setting for several of these students (including space for assistive equipment/aides or training space), some class sections operate with class sizes that are below the capacity of the affected instructional spaces. Minuteman administrative officials indicate that, because of the above-mentioned factors, the effective operating capacity of the school is 951.

Because the high school has not had a major addition or renovation since its opening in 1975, there are several building and site issues which are in need of attention.

Some of these building issues affect instructional program delivery. (see Parts B and C for a list and description of building and facility/program issues)

The final section of the Report (Part D) considers plans for future programming and examines space and facility limitations which may have an impact on program expansion into areas such as Animal Science, Criminal Justice, Technical Theater Arts and Green Energy.

The NESDEC Team found the school staff to be cooperative and forthright in our school visits. We suggest that similar tours be organized for key stakeholders so they may observe first-hand what we have seen and have attempted to describe in this Report. The Minuteman School Administration and School Committee deserve to be commended for commissioning this study. The school is engaged in thoughtful planning and prudent use of available resources.

## **A. FACILITY AND CAPACITY ANALYSIS**

### **Minuteman Career and Technical High School Summary**

Minuteman Career and Technical High School, a three-level building, was constructed in 1975. Since then, there have been no major additions, although there have been several interior structural reconfigurations which have attempted to accommodate program changes and needs. The 310,000 square foot building which is located on a 64-acre site, houses 634 students in Grades 9-12 and an additional 120 post-graduate students. There are 60 instructional spaces at the high school, 19 of which are interchangeable classrooms. Specialized areas have been designated for seven Science Labs, one Art, one Music, and three Physical Education teaching stations, including a full-sized swimming pool. The building also houses 25 specialized instructional spaces, which accommodate the programs within the five Career Clusters. Additional undersized spaces are available for use by the Special Education Program. Three spaces that were originally designated as a TV Studio are presently used for storage and small group instruction spaces. The Auto Refinishing area is also vacant. Using class size numbers provided by the district of 25 students per academic class and 30 students for most Career Cluster classes, the Current Operating Capacity of the school would be 1,171. The square footage of most academic classrooms is 950 square feet. Some are smaller and this creates an overcrowding situation. Specialized instructional space for Science Labs, Art and Music are in the 1,200 square foot range. Shop and Lab spaces for the Career Cluster Programs vary in size from 950 square feet for the Medical Occupations instructional spaces to 3,375 square feet for the Carpentry shop. Some shops have self-contained related instructional classrooms, while others share spaces. Storage spaces vary in size, and the inadequacy of storage facilities and the lack of separate Related Classrooms is an issue in several areas including: Automotive Technology, Plumbing, Welding, Culinary, Cosmetology and Medical Careers.

The 64-acre site includes space for athletic fields, including football, soccer, baseball and softball. The playing fields are in need of an upgrade. Parking on school grounds for students and staff is described by administration as adequate. Visitor parking is limited and event parking is tight. Traffic is congested during pick up and drop off

times. Street traffic near the entrance to the school property is also quite congested at the beginning and end of the school day.

Minuteman High School has several maintenance issues. The roof leaks in several locations, including the area above the third level in the Electro-Mechanical-Robotics area, which is above the Cafeteria mezzanine. Skylights also leak. The HVAC system has been upgraded recently, but the shop areas still overheat in the late spring and early fall. The plumbing system is the original and it is in need of an upgrade. The windows, which date back to 1975, are not energy-efficient, and some of the seals allow leakage. The electrical system is described as adequate. Restrooms are inadequate in size and need new fixtures. The carpeting in some sections of the building is the original and is badly in need of replacement. (see more complete and detailed Building and Site Needs list which follows this narrative)

The entrances to the high school meet minimum handicapped-accessible standards and there are some handicapped bathrooms in the building. Two elevators provide access from one floor to another, but they have not been outfitted according to ADA regulations. Many doors have not been retrofitted with levered door handles. Sinks and water bubblers do not meet ADA specifications. It would be difficult for persons with certain mobility issues to move throughout the building. The Nurses' spaces do not have handicapped-accessible restrooms.

The Library/Media Center is spacious and can accommodate two classes of students. It is equipped with a sign-out computer area which has 20 stations. Library open space design issues create acoustical problems. Most academic classrooms have at least one computer with access to the Internet. Two sign-out mobile labs are available for teacher use.

Administrative and department offices are generally viewed as adequate. Conference space is somewhat limited. Secretarial work space appears to be adequate. The main office reception area is small.

The high school has a gymnasium and a pool area. The gym has an estimated capacity of 800. There are two sets of bleachers, one of which is in need of repair. Boys' and girls' locker rooms are available, but they are in need of an upgrade. The pool, which has men's and women's locker rooms, is utilized by members of the community.

Minuteman High School does not have an auditorium. Instead, there is an Instructional Resource Center (IRC), an open-spaced area that has been equipped with a stage. The area has an inadequate seating capacity, minimal lighting and sound equipment, and it was not designed acoustically to support musical or theatrical performances. The Cafeteria has a lower level and a mezzanine section that is used by staff and post-graduate students. The capacity of the combined Cafeteria spaces is 350 students. There are two lunch waves per day, each of which has four serving stations. The kitchen is viewed as adequate.

To address the existing deficiencies with regard to storage and the need for Related Classrooms, it will be necessary to reassign eight instructional spaces for other purposes. The Planned Operating Capacity would be reduced to 1,011.

### FACILITY PROFILE – HIGH SCHOOL

Name: <b>Minuteman Career and Technical High School</b>	Grades: <b>9-12</b>	Reg. ed. enr.: <b>754</b> <b>Includes post-graduates</b>	
Year of construction: <b>1975</b>	Year of additions: <b>None</b>	Site size acres: <b>64</b>	Sq. ft. bldg.: <b>310,000</b>
Maximum number of pupils per class: <b>25 Academic Classes</b> <b>30 Career and Technical Courses</b> <b>– with 2 supervisors</b>	Number of interchangeable general classrooms: <b>19</b>		

In addition, does the school have dedicated space for (indicate number of rooms in the appropriate box):

	Full-size room	Conf.-size room	Space shared with	No. of student stations	Comments (if desired)
Art	1			25	
Music	1			25	
Foreign Languages	2			50	Included with general classrooms
Science Rooms - Labs	7			175	1 Lab needs upgrade – used as office
Physical Education	3			75 Gym capacity - 800	2 Gym stations, plus pool
Automotive	2			45	Includes post-graduate Related classroom
Carpentry	1			30	Related classroom
Electrical	1			30	Related classroom
HVAC	1			30	Related classroom
Plumbing	1			30	Related classroom
Welding	1			22	Related classroom
Drafting	1			36	
Electro/Mechanical/Robotics	1			20	Plus Machine Lab
Engineering	1			30	
Telecommunications	1			22	Additional space
Cosmetology/Barbering	3			48	Includes P.G. – Related classrooms
Culinary/Hospitality	3			45	Includes bakery, restaurant, and kitchen
Early Childhood	1			18	High school students only
Graphic Communications	1			30	
Computer Tech	1			40	



Business, Finance, and Marketing	1			20	Mall store, Bank
Bio-Technology	2			45	P.G. Area - Plus Clean Room
Horticulture	1			25	Greenhouse needs upgrade
Environmental Technology	1			30	Plus additional room
Health Occupations	1			18	
Dental	1			15	Post-Graduate only
TV Studio	1				Vacant – used for storage
Auto Refinishing	1				Vacant
Computer Lab	1			40	Plus 2 mobile labs
ELL					No designated space
Speech Language		1			Near Library
OT/PT					No designated space
Resource Rooms		8		40	Pull out
Library	1			50	1 sign-out Computer Lab
Cafeteria	1			350	2 Waves – 4 Lines
Auditorium					IRC Room – poor acoustics – Seats 150
Psychologist		1			
Social Worker		1			Near Library
Guidance		5			Near Main Office – Conf. Space
Nurse's Office		2			1 near shops – 1 on 3 <sup>rd</sup> floor – remote
Administrative Offices		4			Includes Superintendent and Special Ed – Adequate Conference space
Teachers' Dining Room		1			
Teachers' Work Space					Several – adequate

**Current Operating Capacity = 1,171**

**Planned Operating Capacity = 1,011**

(See Capacity Analysis Sheet)

**MINUTEMAN – CURRENT/PLANNED OPERATING CAPACITY**

<b>Room Description</b>	<b>Number of Rooms-Teaching Stations</b>	<b>Student Stations</b>	<b>Total</b>
Regular Classrooms	19	25	475
Art	1	25	25
Music	1	25	25
Science	7	25	175
Physical Education	3	25	75
Automotive	2	1 at 30 + 1 at 15	45
Carpentry	1	30	30
Electrical	1	30	30
HVAC	1	30	30
Plumbing	1	30	30
Welding	1	22	22
Drafting	1	36	36
Electro/Mechanical/Robotics	1	20	20
Engineering	1	30	30
Telecommunications	1	22	22
Cosmetology/Barbering	3	16	48
Culinary/Hospitality	3	15	45
Early Childhood	1	18	18
Graphic Communications	1	30	30
Computer Technology	1	40	40
Business, Finance, Marketing	1	20	20
Biotechnology	2	1 at 30 + 1 at 15	45
Horticulture	1	25	25
Environmental Technology	1	30	30
Health Occupations	1	18	18
Dental	1	15	15
Automotive (Vacant)	1	30	30
TV Studio (Vacant)	1	30	30
<b>Total</b>	<b>60</b>		<b>1,464</b>
<b>Current Operating Capacity</b>		1,464 x .80 Space Utilization Factor	<b>1,171</b>
<b>Planned Operating Capacity</b>		8 classrooms used for Related Classrooms and additional instructional storage space (see Section C) 1,464 - 200 = 1,264 1,264 x .80 = 1,011	<b>1,011*</b>

\*Planned Operating Capacity is based upon maximum class sizes that educational spaces can accommodate for a 21<sup>st</sup> Century program. Schools often operate below their Planned Operating Capacity due to factors including: specialized elective offerings (upper level courses), budget/staffing issues, declining enrollment, and the need to provide smaller classes for certain students with special needs. All of these factors apply to Minuteman which, importantly, has a large special needs population (currently 44% of the student body, more than double the MA average). In order to provide an effective instructional setting for several of these students (including space for assistive equipment/aides or training space), some class sections operate with class sizes that are below the capacity of the affected instructional spaces. Minuteman administrators indicate that, because of the above-mentioned factors, the effective Operating Capacity of the school is 951.

## **B. BUILDING AND SITE NEEDS**

The Minuteman Career and Technical High School has not had a major addition or renovation since the building was constructed in 1975. As a result, there are a number of building and site-related issues that are in need of attention.

### **Building Issues**

- The roof leaks in several areas – buckets are used. Leakage is severe in Machinery/Robotics area above the Cafeteria mezzanine.
- Skylights leak – most have been covered.
- Plumbing system is the original – there are no major problems reported, but the system is 36 years old.
- Windows are originals and some of the seals surrounding the windows allow leakage. All windows need replacement.
- Heating is new, but shop areas are very warm during spring and fall – Foreign Language room overheats.
- Carpeting is the original and needs replacement – this process has begun.
- Some stairwells are dark and poorly heated.
- Storage cabinets have been “carved out” of corridor spaces.
- All restrooms need an upgrade.
- Some shops need improved venting systems.
- Trades Mall access to women’s restroom – up flight of stairs.

### **Site Issues**

- Visitor parking is limited.
- Street traffic is congested.
- Area for pick up and drop off is congested.



**Restrooms not handicapped-accessible**



**Bubblers not handicapped accessible**



**Carpeting – 1975 original – Needs to be replaced**



**Skylights leak**

## **C. PROGRAM-RELATED BUILDING ISSUES**

Beyond the building issues that have been identified in Part B, there are other building-related issues which affect program delivery.

### **Minuteman Career and Technical High School Facility-Related Program Issues**

#### **ADA Compliance Issues**

- Handicapped access is limited – 3-4 toilets, knob door handles, bubblers, elevators are not ADA compliant, movement from section to section of the building is difficult.
- Nurse's facility lacks handicapped-accessible bathroom.
- Mezzanine in shops is "makeshift" and not handicapped-accessible.

#### **Space-Related Issues**

- Automotive Technology needs an adjacent Related Room which could be shared with Advanced Automotive.
- Lack of storage space – outdoor shed is used for Automotive – materials rust.
- Plumbing needs a Related Room adjacent to the shop area.
- Additional space for a mock-up student project area is needed in the Plumbing Shop.
- The Welding Shop needs a classroom within, which is equipped with computers/software of the industry.
- Separate Related Rooms are needed for Cosmetology and Culinary.
- Additional space is needed for the Barbering Program.
- The Instructional Kitchen space is not adequate.
- Additional meeting and function space is needed in the Restaurant area.
- The Medical Careers Program needs an adjacent Related Room and a larger Lab with more bed locations and storage areas for equipment.
- Robotics storage is limited.
- Changing areas needed for some shops.
- No area for large meetings.

### **Other Facility Issues Which Affect Educational Programming**

- Lack of properly located loading dock – Carpentry has no outside access.
- Locker room needs upgrade – gang showers, damaged lockers.
- Gym – one set of bleachers does not open – gym floor needs replacement.
- Vehicle traffic through the center of the Welding Shop to the Advanced Automotive Shop is both an instructional and a safety issue.
- In the Welding Shop, obstructed views prevent proper supervision.
- The space utilized for Electro/Mechanical/Robotics should be reviewed – the floor has settled and the roof leaks on the equipment.
- The Instructional Resource Center (IRC) space is used as an Auditorium – inadequate – major issue.
- Acoustics in the Library are poor.
- TV Studio is used for storage.
- Several classrooms on third floor with outside walls have no windows – original design issue – additional classrooms have been constructed into corridors – lack natural light.
- Design of Bakery and Restaurant storage areas does not allow for adequate student supervision.
- The current location of the Child Care Facility creates logistical problems.
- Main Nurse's station is in a remote third floor location.
- Student lockers are not functional – too small; most are not used.
- Athletic fields are in need of an upgrade.



**IRC – Poor acoustics, inadequate seating, lighting and sound system**



**TV Studio used for storage**

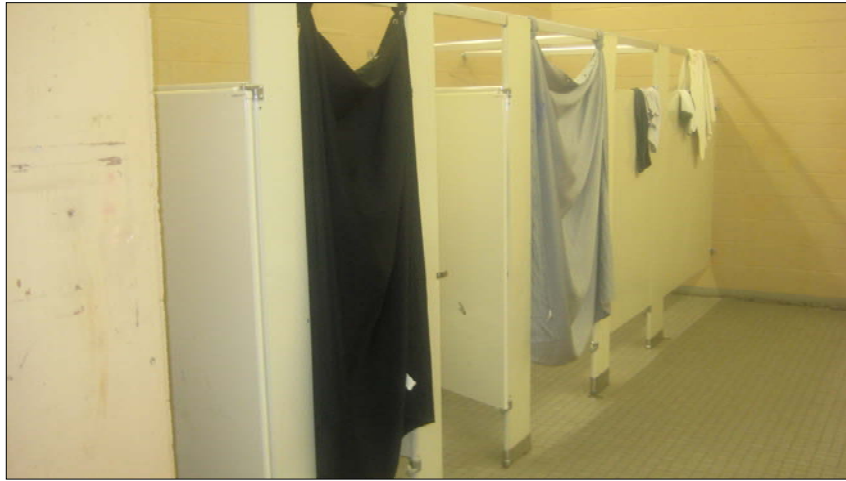




**Overcrowded Foreign Language classroom**



**Automotive Shop cars enter through center of Welding Shop**



**Outdated locker rooms**



**One set of bleachers needs replacement**



**Classrooms built into corridor area – no windows**

## **D. FUTURE PROGRAMMING – FACILITY NEEDS**

The Minuteman Career and Technical High School is contemplating future program expansion into the following areas: Animal Science, Criminal Justice, Technical Theater Arts, and Green Energy Programs. The nature and content of each of these program areas at Minuteman is still in the early developmental stages. NESDEC was asked to consider, in the case of each program, facility-related issues which would have an impact on program implementation. In every case, thought should be given not only to instructional areas but also space for the storage of educational materials, an issue at Minuteman as at most 21<sup>st</sup> Century schools.

**Animal Science** – The school is contemplating adding an Animal Science Program. This may be implemented as an extension of the Bio-Medical Curriculum. It would focus on animal caretaking and lab work and would include Non-farm Animal Caretakers, Vet Assistants and Lab Animal Caretakers. Animal Science Programs are approved for Chapter 74 funding. Present on-site space to accommodate such a program would be limited. Also, depending on the nature of the program (lab animals v. domesticated or farm animals), the activity may require 24-hour services for animals. Animal Science programs, as evidenced by the cost of operation of Massachusetts Agricultural Schools, are expensive programs for large animals. In this case, an off-site partnership with an existing program might be an alternative. If, however, the focus was upon small animals and veterinary services, the space required would be modest and the range of dogs, cats, and other household pets need not require 24-hour services.

**Criminal Justice** – Presently, the state has not approved guidelines for a Criminal Justice Program. In the event that such a program was to be implemented at Minuteman, the former TV Studio, which presently is used for storage, could be utilized to house the program. Conversion of this area to meet Criminal Justice Program needs would be comparatively inexpensive. Also, some Criminal Justice classes could utilize regular instructional classrooms (such as Social Studies, Mathematics, World Languages, and English). In the protective service industry, health, safety, and emergency medical technician (EMT) are essential skill areas. In Vermont, vocational students take Pre-Law

classes for those interested in Police, Fire, EMT, Paralegal/Law careers. The feasibility of locating such a program adjacent to the Health Services as a program option could be considered. Such a program would meet growing demands in member communities and an ever-expanding senior population.

**Technical Theater Arts** – A Technical Theater Arts Program would focus on career training for Lighting, Video and Sound Technicians, as well as Camera Operators and Broadcast Technicians.

Presently, the Instructional Resource Center (IRC) serves as the “performance area” for the Music Program and all other school productions. As was mentioned previously, this area was not designed for this purpose. The acoustics are poor, and seating (portable) is limited, as are the sound and lighting systems. The stage is small and has no wing or fly space. There is no area in close proximity for costume storage or set design. A reconfiguration of the Library as an Instructional Resource Center, and locating Performing Arts in an area that makes use of the former television media area for associated performance activities and storage, could be educationally advantageous. A limited performance area could be located in space not occupied by the new IRC and its activities.

There is no existing space within the school that could adequately accommodate a Technical Theater Arts Program. In order to properly support this program, Minuteman would have to construct and equip a Performing Arts Center. Possible alternatives include extending the building out from the TV Studio. If this option were chosen, then parking for events would be limited in the area near the Performing Arts Center. Most vehicles would have to park on the other side of the building, toward the west. A second alternative would be to construct a Performing Arts Center near the staff parking lot area off to the west of the school; this would also provide a common lobby area for several school activities. A third alternative, or aspect, could be a partnership with several nearby community theater groups (examples, Regal Theater, Concord Players, Vokes Theater, etc.) whose venues could serve as off-site work spaces. Such partnerships with community-based theater occur in Vermont. At the present time, Technical Theater Arts Programs are not approved for Chapter 74 funding.

**Green Energy Programs** – Promoting energy efficiency, including solar and renewable and alternative energy.

Given the present programming and space utilization at Minuteman, the likely location of a Solar Energy Shop would be in the former Auto Body Shop, which is now vacant. The shop has outside access that would facilitate the movement of supplies and materials in and out of the area. In order to adapt the space to meet the needs of a sustainable energy program, a major conversion would be required. At the present time, it is questionable as to whether state funding would be available to support this endeavor as a stand-alone Chapter 74 approved program, with a cohort of students adding to the enrollment of the school. However, if this was an instructional space shared by component disciplines in the sustainable energy industry, such programs could expand up-to-date knowledge and skill sets to the array of technology and skills mastered by students in carpentry (building codes and installation of panels), electrical wiring, plumbing, heating, ventilation, air conditioning and refrigeration, and (to a limited degree) to robotic controls and the metal fabrication program students. If rotating students from the other Chapter 74 approved programs of the school allows for larger enrollment in those programs, then installation of a Green Energy Program laboratory area to the school would have a capacity advantage. The area also could serve as a construction laboratory staging area to apply and demonstrate construction industry techniques with related energy conservation projects. Certainly the topic of energy conservation is a growth industry. Some of these products could be modular for local design and assembly by technical students who could also install the units off-site. An advantage which the vacant Auto Body Shop area has is the multiple outside overhead doors in the area. This space could be designed to provide much greater access to all construction-related programs that are now adjacent to this area.\*

\*Auto Body and Collision Repair remains as a viable program in many technical schools, and occupational demand still remains. As a stand-alone program, it could be considered for return to the school. One reason for its demise as a Minuteman offering was the cost of the program and the need to bring its technology and environment standards (including clean air standards) up to present and future levels of health and safety. Reconstruction funds could upgrade the Auto Body space to

standards that are future-oriented in the industry. Auto Collision Repair Technology returned as a stand-alone approvable program would add 30 learning stations to the school's enrollment.

An obvious advantage, because of its proximity to the high school Automotive Program, would be to relocate the Advance Automotive Program to the former Auto Body space. This could allow for the consolidation of relatively expensive equipment and resources and allow a flow of activities to move from the simpler to the more technical and complicated as students progress in their learning.