



A4LE 2020 LEsolutions Awards

# North Middlesex Regional High School



## Table of Contents

- 1** Executive Summary
- 2** Scope of Work & Budget
- 3** School & Community Engagement
- 4** Educational Environment
- 5** Physical Environment
- 6** Results

# Executive Summary

The North Middlesex Regional School District, made up of three-member towns, sought to transform its educational vision to support 21st-century teaching and learning techniques. Originally constructed in 1959, the North Middlesex Regional High School (NMRHS) building was incapable of supporting next-generation education with its sprawling layout, dated, and failing infrastructure, and high maintenance and operational costs.

Classrooms and learning environments are strategically located in the newly constructed NMRHS. Its design reflects the goals of key stakeholders developed during the community visioning and planning conducted at the outset of the project. The interdisciplinary floor plan configuration enhances collaboration and communication between students and teachers across academic disciplines, a significant departure from the double-loaded corridor environments that characterized the previous facility.

The planning and design team led those visioning and planning meetings, engaging with a broad range of users from the school's community. As a result, the plan for arranging classrooms in the new building called for the design of two, two-story flexible pods to create interdisciplinary neighborhoods, helping to foster program integration and authentic collaborative learning opportunities.

Each pod includes flexible teaching space, a large group instruction room, and transformational Science, Technology, Engineering, the Arts, and Math (STEAM) spaces. Classrooms, each with abundant natural light, make use of borrowed lights to circulation and collaboration spaces to maximize daylight and transparency. Specialty rooms have oversized doors and two-sided display cases, sharing views into the rooms while showing off student work.

ORIGINAL SCHOOL



NEW SCHOOL



# Scope of Work & Budget

## SITE SIZE (ACRES)

20.2 acres

## GROSS AREA

180,530 sf

## CONSTRUCTION COST

\$64,995,000

## COST PER SF

\$360



*“The first time we let students into the new high school was to plant flowers for opening day. One of my favorite remarks was by a student who said, ‘I knew we were getting a new building, but I didn’t think we were getting this.’ It was so inviting to students and now there are students staying after school in the commons area to do their homework. It’s a beautiful building.”*

JOAN LANDERS, FORMER SUPERINTENDENT



# School & Community Engagement

## The Community

**Planning for the Future:** The north central corridor of Massachusetts lags behind the robust economy enjoyed by most of Massachusetts. The North Middlesex Regional School District is made up of three member towns adjacent to New Hampshire's southern border: Ashby (pop. 3,075); Pepperell (pop. 11,700); and Townsend (pop. 8,900). The District faced issues with the overall organization and condition of their original high school facility, a sprawling, oversized junior high and high school with dated and failing systems, and isolated wings and floors.

The planning process for the school began in 2013. The district knew they needed a new school. Still, except for their forward-thinking Superintendent, most stakeholders didn't understand what makes up a 21st Century school or "future thinking" for Next Generation teaching and learning environments.

## The Stakeholders

The first step required a discussion regarding differentiated learning, and was followed by the visioning process. The planning team met with all stakeholders, from teachers and students to secretaries and custodians. The process began with a series of three visioning sessions, of which the agendas and outcomes included:

- **Differentiated Learning** – Building Committee members, School Committee members, and others were asked to take the Building Excellence Learning Styles Survey. We wanted key stakeholders to understand how learning differently could impact contemporary learning environments. The planning team then led the stakeholders through sessions to discuss how those varying modalities of learning could manifest in the built environment, particularly how that would affect classroom and school design.



- **Visioning Process** – Three visioning sessions were held over a three-week period. Stakeholders included students, teachers, parents, committee members, first responders, town officials, and other constituents. These interactive sessions explored overarching categories – Teaching and Learning, Learning Environments and the Building, and Community Relationships with NMRHS. The agendas included:
  - **Priority Goals and Guiding Principles** – focus on interdisciplinary Project/ Problem Based Learning; Social Emotional Learning, Universal Design for Learning, the joy of learning, STEM & STEAM, and sustainability.
  - **21st Century Design Patterns** – included an exploration of what is happening across the nation in curriculum responsive spaces, adjacencies, and design opportunities.

Their vision informed the new layout and its focus on community-building and interdisciplinary knowledge sharing. The intent was to encourage and accommodate interdisciplinary project / problem-based learning, STEM & STEAM functionalities, and would be driven by sustainability.



## Value of project to community at large

Moving away from the poor learning environment that characterized the existing school, the newly constructed school has pushed the limits of what a typical high school education offers. The new NMRHS fully accommodates future needs such as the potential for student population growth and a shift of educational delivery, along with providing the students with a facility for heightened engagement and collaboration. New curricula have and continue to be developed based on the opportunities the building provides.





## Challenges

At first glance, the site appears expansive. However, building near the existing structure and respecting the rural setback zones, while also protecting play fields and wetlands, required careful consideration of the site.



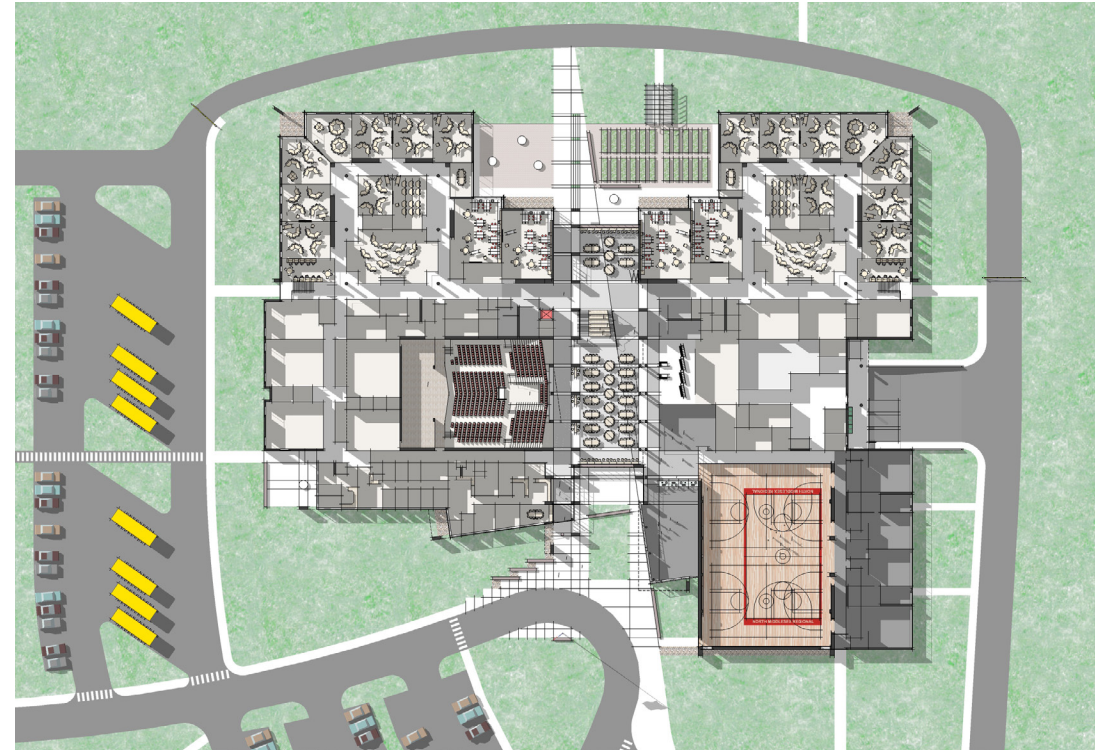


# Educational Environment

## Educational Vision and Goals

In visioning sessions, we collaborated with stakeholders to brainstorm multiple priorities for the project:

- 21st Century skills overlaid on the core curriculum
- Student-centric learning environments
- Flexibility and choices in learning, what, where, and how – impacting students' agency
- Integration of technology, STEM, and the arts (STEAM)
- Interdisciplinary teacher planning spaces that facilitate a collaborative curricula
- Co-location of classes to allow for integrated, applied learning and collaboration
- A safe, energy efficient, technologically adaptive design that facilitates the future needs of students, staff, and citizens.
- Ensure that the building fits in with the Town's appearance and architecture
- Enhancement of the Towns' social infrastructure by incorporating public and academic spaces that could be used for public networking and community activities
- Plan for a Library/Media Center that accommodates both the existing collection and the transition to media-based literature
- Provide exterior learning environments, including classrooms and gardens
- The joy of learning





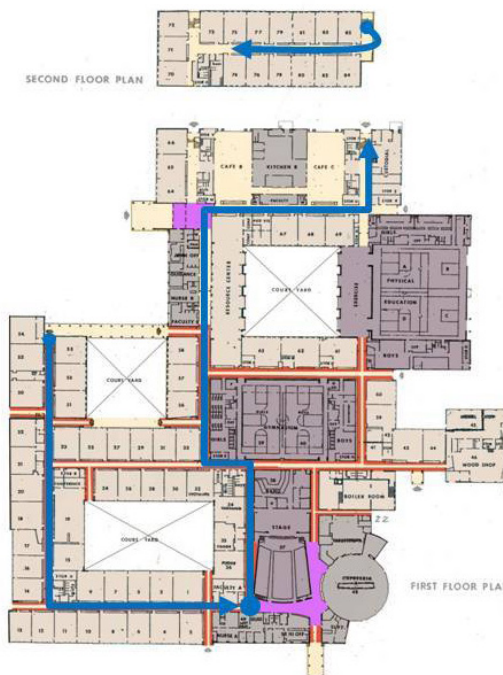
## An Aging Facility

The pre-existing high school was a sprawling, oversized junior high and high school with dated and failing systems, and isolated wings and floors.

### EXISTING ENVIRONMENT



- $\geq 20\%$  Undersized
- 10-20% Undersized

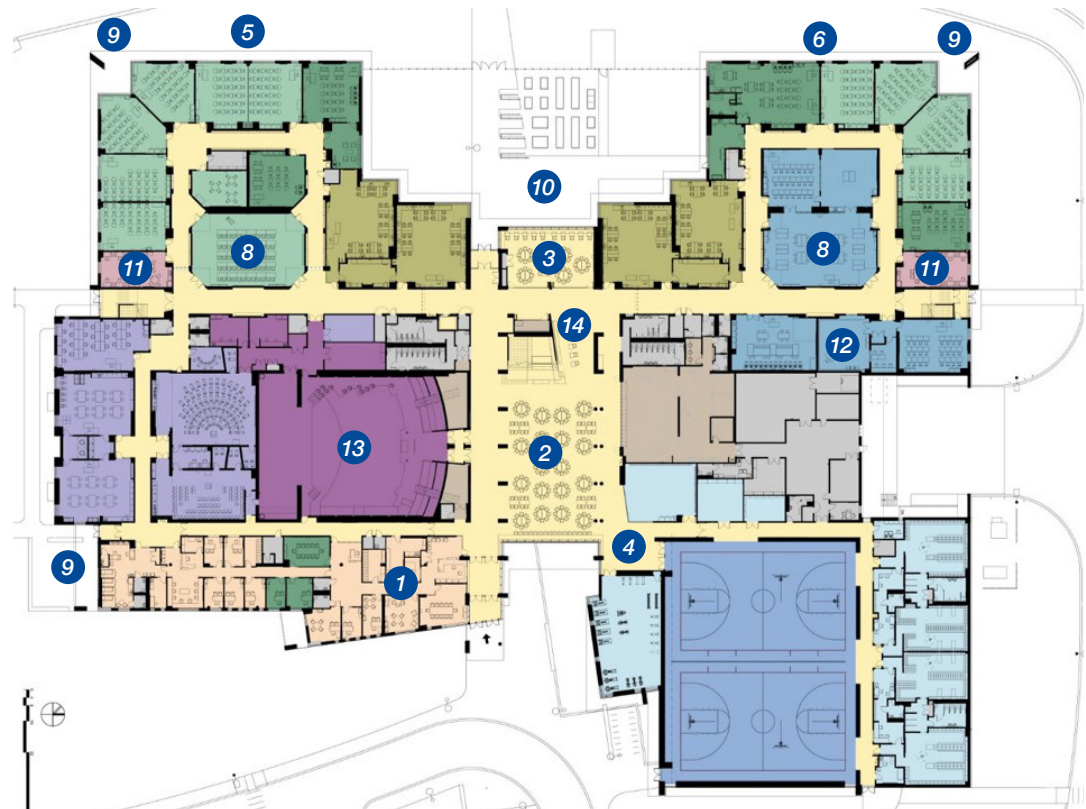


- Narrow Corridors
- Isolated Public Lobbies
- Travel Distances (over 500ft)

## Supporting the Curriculum

The planning and design team's approach to providing next generation learning in today's schools consists of replacing double loaded classroom wings with academic "pod" layouts that included Large Group Instruction (LGI) and STE(A)M programs. Attention is given to placing Music and Arts in direct adjacency to academic programs and to support theater functions. Interdisciplinary classroom pods are organized to provide smaller learning communities. Additionally, our classrooms always provide four teaching walls for multiple zones for peer-to-peer work and flexible, ergonomic furniture. Our schools are designed to support 3:1 user technology, learning environments are designed to an average 35 dbA background noise level, and various spaces include operable glass walls that allow for reconfiguration of spaces for use as circulation space, as gathering and teaching areas. In addition to those features mentioned above, NMRHS also employs the following:

- Two-sided student display cases throughout that showcase exciting programs taking place within the classrooms, labs, and specialty spaces
- Incorporates multiple demonstration examples of the building and site as teaching opportunities, "The Third Teacher"
- A drop-down screen and projection system in the Commons which can be used for learning, announcements, or other uses.
- A raised bed garden for growing foods to be donated to the local food bank



### FIRST FLOOR

- |   |   |
|---|---|
| 1 Administration                                      | 8 Project Based Learning & Maker Spaces         |
| 2 Student Dining Commons with Stair & Stage           | 9 Covered Outdoor Classrooms                    |
| 3 Small Commons w/ Operable glazed wall – Large Group | 10 Outdoor dining and community Service Gardens |
| 4 Gymnasium, Dance & Fitness                          | 11 Teacher Planning                             |
| 5 Humanities, Arts, and Sciences Classroom Pod        | 12 TV Studio and Lab                            |
| 6 STEAM Pod   | 13 600 Seat Auditorium Fine Arts & Music Suite  |
| 7 Science Labs  | 14 School Store                                 |







## SECOND FLOOR

- |   |   |
|---|---|
| 1 Administration  | 8 Project Based Learning & Maker Spaces Below           |
| 2 Student Dining Commons with Stair & Stage Below         | 9 Covered Outdoor Classrooms                            |
| 3 Small Commons w/ Operable glazed wall—Large Group Below | 10 Outdoor dining and Service Gardens                   |
| 4 Gymnasium, Dance & Fitness Below                        | 11 Teacher Planning                                     |
| 5 Humanities, Arts, and Sciences Classroom Pod            | 12 TV Studio and Lab                                    |
| 6 STEAM Pod   | 13 600 Seat Auditorium<br>Fine Arts & Music Suite below |
| 7 Science Labs  | 14 Media Center   |

## Configured for Collaboration

On the second floor, a glassy open media center overlooks the commons. Science labs are centered between two academic pods, rather than isolated or associated solely with traditional STEM programs, allowing for ethics and environmental advocacy values to inform and connect with the broader humanities.



## Planning Module



*Building section illustrating how programs are connected both vertically as well as horizontally – ample circulation breakout areas allow for student centric and collaborative work to happen spontaneously throughout the school.*

### ORIGINAL SCHOOL



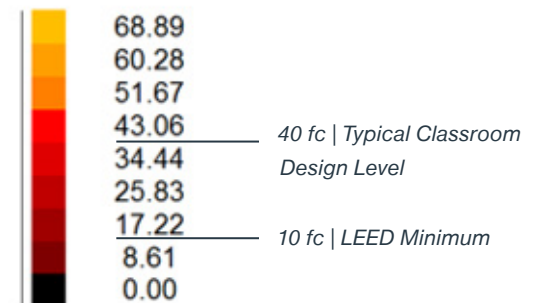


## Daylighting Strategies

Bringing abundant daylight deep into the two-story pod made the space welcoming and functional; top lighting with clerestories and borrowed light is both effective and efficient.



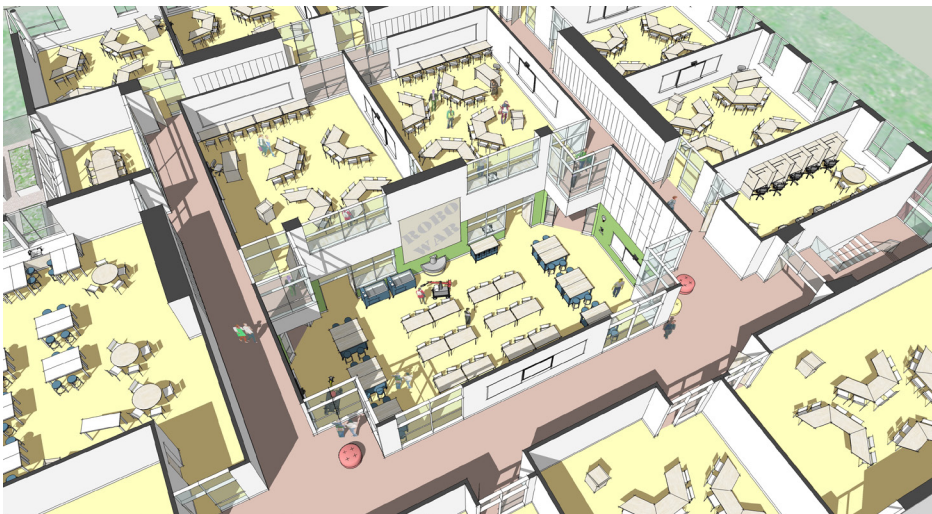
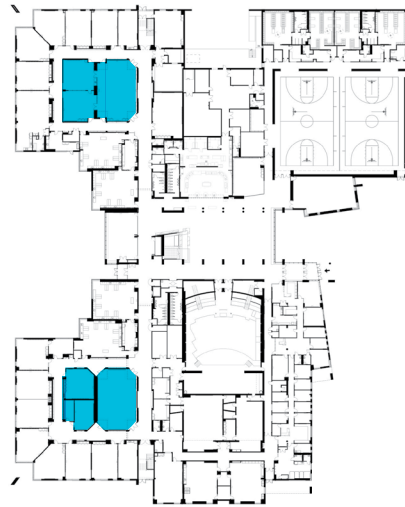
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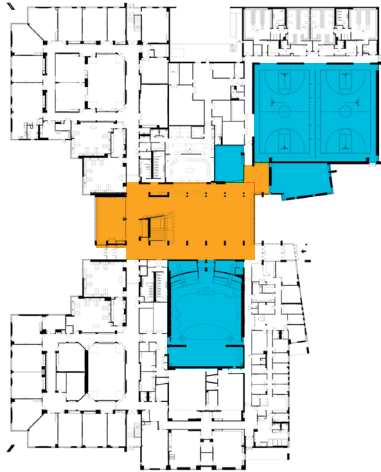


## Project/Problem Based Learning

The classrooms and learning environments in the new building are arranged into two flexible pods, each across two floors, that create interchangeable classroom neighborhoods, helping to foster program integration and interdisciplinary learning opportunities. The Humanities Pod houses the fine and performing arts into a neighborhood, while the STEM Pod includes the technical arts: a TV Studio, robotics lab, and physics and chemistry labs expand on traditional STEM programming. Science labs are distributed across all four pods. Classrooms make use of borrowed lights to maximize daylight and openness. Specialty rooms have oversized doors and two-sided display cases. These display cases provide a window into the life and activity of these learning environments, showing off their wares and accomplishments and in the process, inviting students to sign up for the next semester of hands on learning and joy.







## A Place for Gathering

The three public spaces on the first floor serve the school community and the three towns for gathering, dining, performances, and recreation.

For the school community, they are the communal heart. The Student Dining Commons, auditorium, and gymnasium are openly linked to one another and share visual connections to the main entrance, library and learning commons, and learning pods. The open central stair and seating is an important social space used throughout the day. Each of these spaces double as learning environments.

The dining commons is inherently flexible: its smaller café and quiet dining area, separable by a folding glass wall, can be used as an additional large group instruction space, an intimate dining area for functions, or as a refuge for students more intimidated by larger spaces and crowds.

For the three communities, these gathering spaces serve in traditional ways for performances, large meetings, celebratory functions and nights and weekend recreation. The school building and these spaces provide community focus with identity and pride.







## Large Group Instruction

This open and transparent teaching space fosters interdisciplinary learning and collaboration and can accommodate gatherings up to 200 people. The space often hosts multiple classes at a time for interdisciplinary activities and guest speakers. As well, it is set up like an art gallery, intended to showcase student work. When room darkening or privacy is needed, the overlooks can be automatically screened.

This space is also used by the greater community and is in high-demand.



## Multipurpose by Design

The building circulation was designed to serve as informal learning environments as well as for students' social gatherings. These spaces contribute to the flexible nature of student-centric, active learning environments in each of the pods.

Skylights in the circulation areas provide natural light to the two-story Large Group Instruction space, as well as the STEAM and Fabrication Labs below, while enlivening the circulation itself.

Student voices during visioning and programming contributed to the design.



### ORIGINAL SCHOOL





## Arts at the Heart

This new 600 seat venue is acoustically designed for musical performance, theater, and the spoken word. The theater includes a full fly stage to serve those involved in the school's popular and award-winning music and theater programs, as well as function as a public amenity for the surrounding district communities.









# Physical Environment

## Expression through Materiality

It was critical that the new school physically express the goals and aspirations of the three communities with high-quality materials such as granite and porcelain wall panels, illustrating the town's long-term investment. At the same time, a continuous plinth of darker, textured brick and a granite water table inspired by local stone walls helps situate the building in its rural landscape.











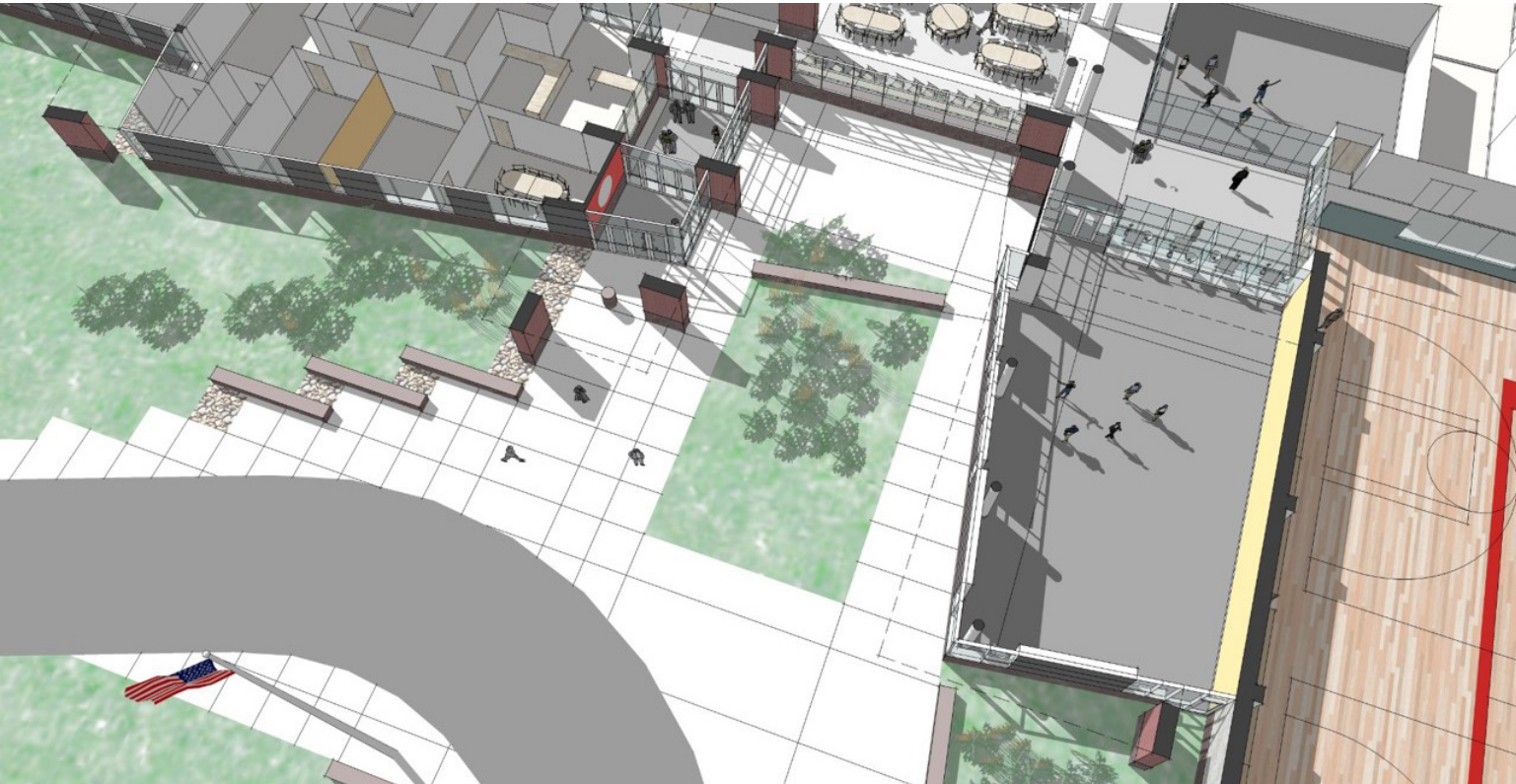
## Mirroring the Landscape

The community use spaces reflect their civic importance through roof forms that add volume to reflect daylighting and acoustical properties that support their use and imitate the foothills of the nearby Monadnock Range.



## Rural Roots

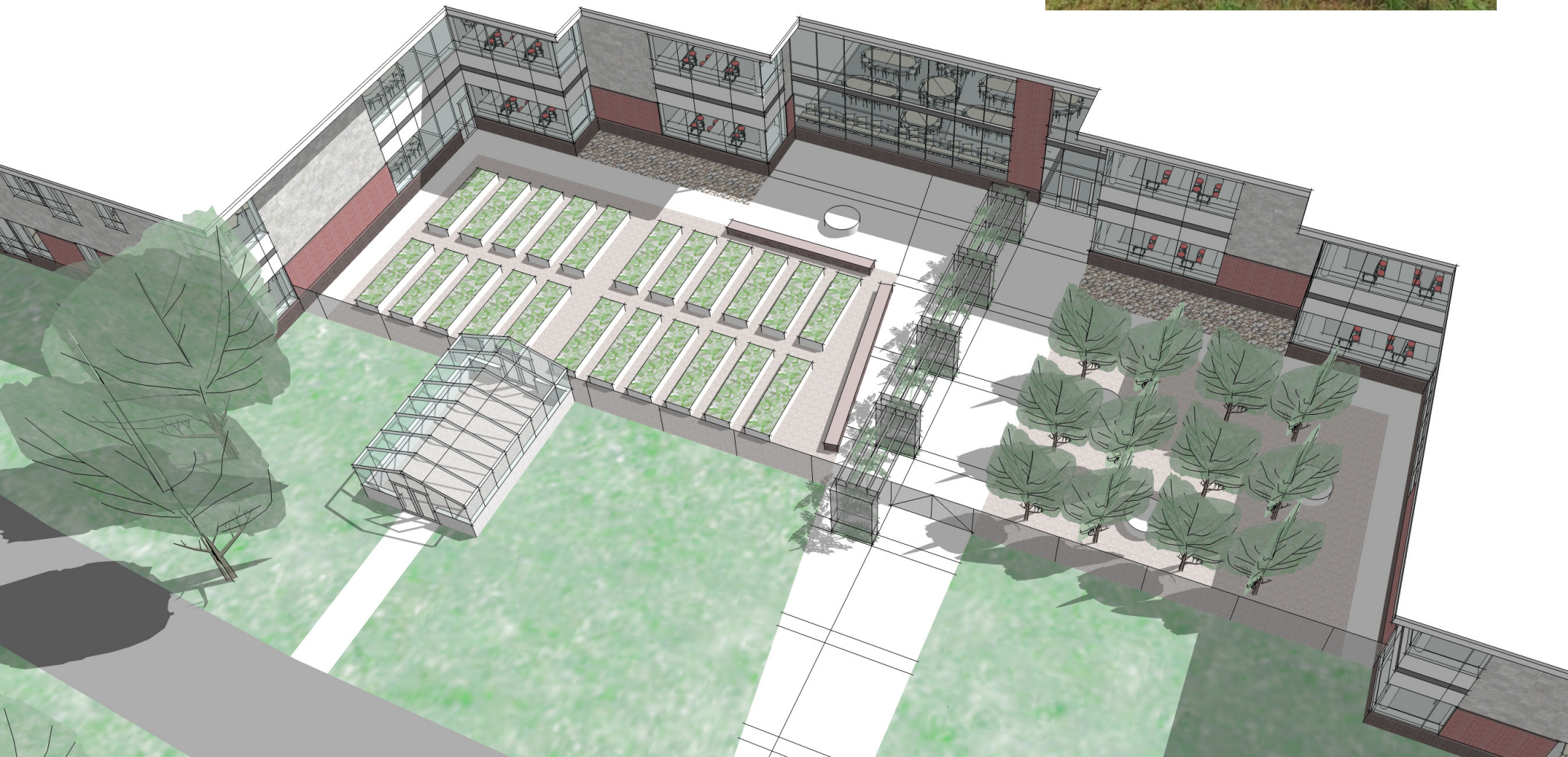
NMRHS remains rooted in an active farming community and natural environment. Families have a strong affinity with the outdoors and the building seeks to not only bring the outdoors in but to extend the learning environment outward – there are five distinct outdoor learning classrooms strategically located around the school.





## Charitable Hearts

In addition to the four outdoor classrooms, the school has an active service club with a vegetable garden and aquatic hydroponic pool and greenhouse. These students donate over 10,000 lbs. of food to local shelters every year. In the new design, the program is now more closely associated with the sciences and STEAM programs. In the previous school, the program was secluded in an out-of-the-way courtyard. Now it is highly visible and focal view from the Student Dining Commons. This important location celebrates the students' contribution to their communities and has significantly increased student interest and participation.



# Results of the Process and Project

## Community goals met and exceeded

The community visioning and planning process' brought these three communities together to develop goals for far more than a replacement high school.

**Educationally**, looking to a future that understands how individuals learn and education in continually evolving. The new building accommodates their educational goals and enhances the learning process.

**Equity and access** for all members of the school community through Universal design or Learning (UDL).

**Fiscally responsible** to the three communities with a building designed to last and run efficiently with a focus on sustainability and resilience.

**A building design** significantly influenced by student and teacher voices.

Some details include:

- Right-sizing the physical plant to meet the school population is viewed as a financial benefit and a culture-building aspect of the new school.
- The design is considered a highly cost-effective means of meeting the stringent performance goals stipulated by the three communities it serves.
- The district realized an increase in the number of returning choice-out students, because of the high school's opening.

## Sustainability

- LEEDv4 for Schools Silver Certification
- 40% Energy savings relative to ASHRAE 90.1–2007
- High performance building enclosure
- 35% Interior potable water savings
- 100% of stormwater managed through LID techniques including bioswales and subsurface infiltration

