NESEA Headquarters
Master Planning for 50 Miles Street

EXECUTIVE SUMMARY

Submitted to:
NESEA Building Committee
July, 2014

Submitted by:

MaclayArchitects
CHOICES IN SUSTAINABILITY

Energy Balance, Inc.

WRIGHT BUILDERS

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NESEA's Mission

NESEA advances the adoption of sustainable energy practices in the built environment

We as a community of professionals recognize and respond to the crucial connections between the generation and use of energy and the whole systems that sustain planetary health.

We envision energy systems that give more than they take:

That preserve and improve our air, water, resources, and ecosystems

That invigorate economies, building local and regional security and self-reliance

That improve the quality of all lives—and all life

EXECUTIVE SUMMARY

The purpose of this master plan process and documentation is to generate clear goals, metrics, and actions in phases for NESEA's stewardship of their headquarters at 50 Miles Street in Greenfield, MA. This master plan anticipates the first phase of improvements beginning in 2014 as the first step in a 50-year stewardship master plan.

1.1. CONCLUSIONS

The overall goals include:

- Workplace productivity and health
- Code compliance
- Energy and carbon responsible
- Durable, low-maintenance and fiscally sustainable
- Environmental stewardship

Priority for the first phase is workplace productivity and health, as well as code compliance. These areas were identified by the building committee as the most important aspect of the 50-year plan and should occur first. Energy was not determined a priority in the first phase as the energy consumption of the building was analyzed from three years of utility data and averages 37 kBtu/sf-yr, which is significantly better than average for a building of this type and age.

The phased implementation of the master plan over 50 years will meet NESEA's desire to pay for improvements through incremental loans over time. The building committee and design team selected building upgrades for Phase 1 that do not compromise any future phases. This 50-year stewardship plan positions NESEA to leverage their building as an asset for the overall well being of the organization.

Phase 1 consists primarily of upgrades required for code compliane. The Phase 1 total cost exceeds the budgeted $250,000. To comply with code requirements, the first phase will be divided into two sub-phases (1A and 1B), which will each be reduced to under 30% of the building assessed value, or $100,000, and not occur within the same three-year period. By doing Phase 1 in two parts, NESEA will be able to move forward toward full code compliance with incremental costs they can afford.

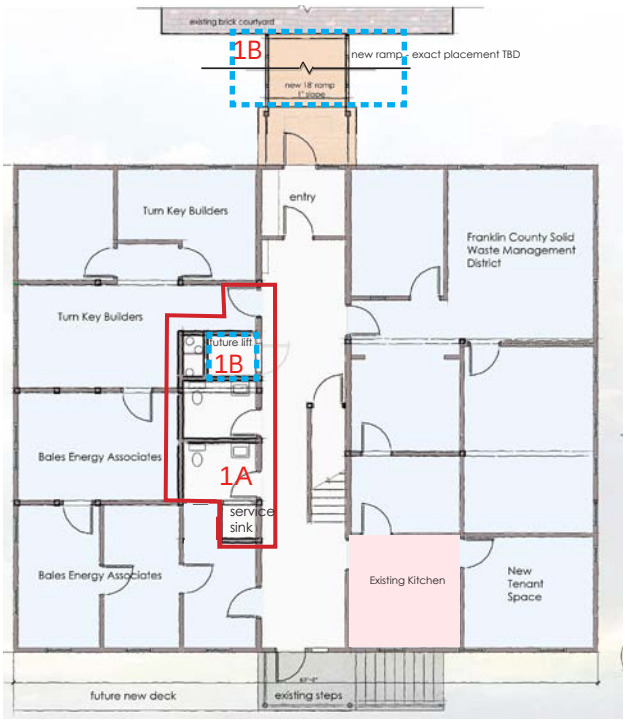
1.2. RECOMMENDATIONS

The following recommendations are broken into two sections: Phase 1A and 1B, followed by subsequent phases as desired by the building committee. This enables NESEA to do the work incrementally.

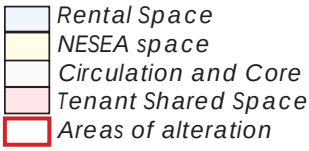
1.2.1. PHASE 1A AND 1B

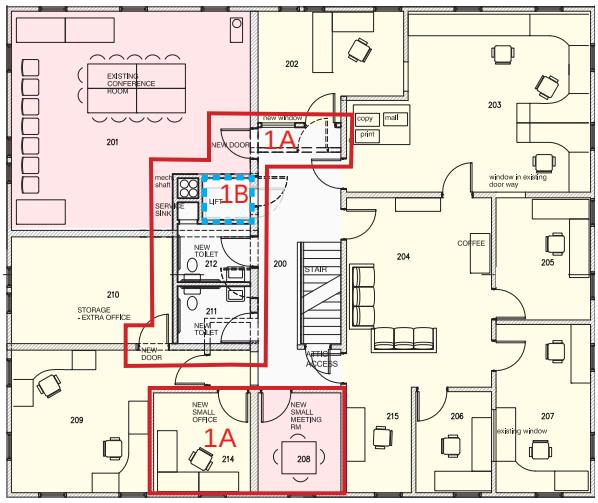
Phase 1 is broken into two parts, 1A and 1B. Phase 1A changes to the first floor include a central core that consists of two unisex and accessible bathrooms, a service sink, mechanical shaft and future lift shaft. The second floor has the same central core elements added, and the existing perimeter bathrooms are removed. The plumbing in the existing men's room will remain for a future option to move the kitchen to the second floor.

Phase 1B includes the ramp to the main door, the lift, and finishing the remaining core areas. The second floor old bathrooms are turned into new small office space or meeting rooms. There are no changes to the basement in Phase 1. Phase 1 will include air sealing and blown-in cellulose, both in the attic, if feasible within the budget.



Proposed First Floor Phase 1A and 1B

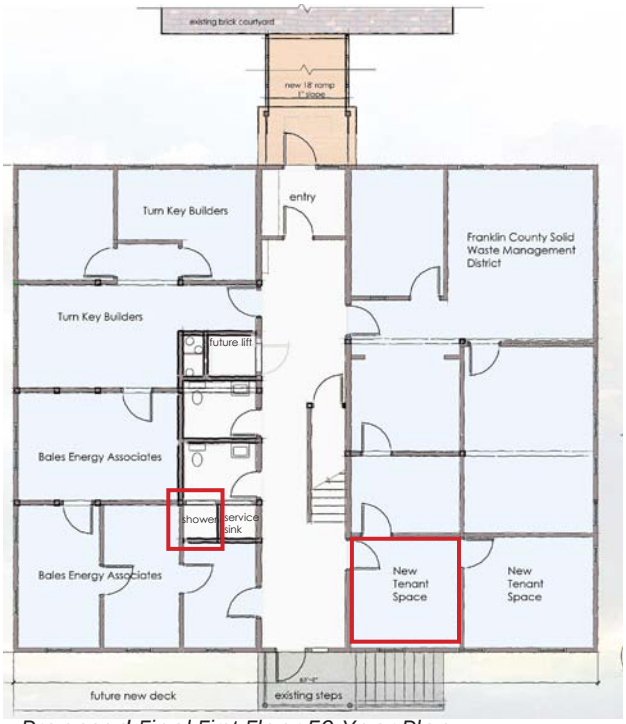




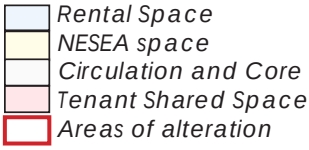
Proposed Second Floor Phase 1 - tenant access to copy and print area are through NESEA space but have been moved to the interns room and are closer than the existing copy room in the southeast corner.

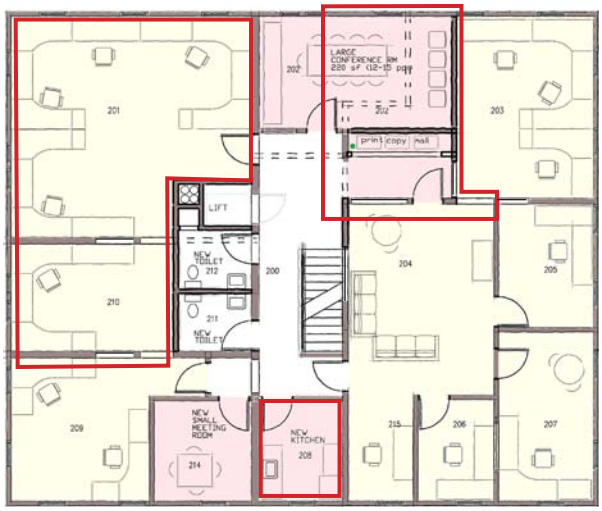
1.2.2. SUBSEQUENT PHASES

The subsequent phases include the remaining components to complete the 50 year master plan including a shower and moving the first floor kitchen to the second floor. On the second floor, the conference room is repositioned at the top of the stairs and is slightly smaller to allow NESEA more open offices around the perimeter. This also enables tenants to share the main conference room, kitchen, bathrooms, lift, copy area, and small conference room without going through NESEA office space. The work spaces ring the perimeter with a mix of closed offices, open offices, and semi-open offices. This plan also keeps most of the existing walls to help transfer roof loads to the ground.



Proposed Final First Floor 50-Year Plan





Proposed Final Second Floor 50-Year Plan

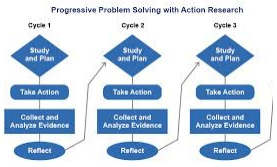
1.3. FINAL GOALS AND METRICS

The project goals guided the building committee and design team and were developed from an initial committee goals statement, and a questionnaire given to the building committee. These were further refined with in-person meetings and discussion on the project priorities. The following list includes the final goals and metrics used to guide the 50-year stewardship plan for NESEA's 50 Miles Street.

Overall Goal:

Create a headquarters for NESEA that is a replicable model for stewardship of older office buildings.

1. Workplace Productivity / Health
   - Productive
   - Collaborative
   - Satisfying
   - Flexible
   - Healthy interior environment, air quality and light
2. Code Compliant
   - Accessibility
   - Fire and Life Safety
3. Energy / Carbon Responsible
   - 2030 Challenge goals
   - Energy conserving
   - Renewably powered
   - Water/ resource conserving
4. Durable, Low-Maintenance and Fiscally Sustainable
   - Model for similar building owners
   - Meet NESEA financial goals
   - Well-maintained
5. Environmental Stewardship (incorporated in all work)
   - Resilient
   - Resource efficient
   - Water conserving
   - Historically sensitive



1.4. PROJECT UNDERSTANDING / INTENTIONS

The design team began with understanding project requirements, expectations, and aspirations through investigation of existing conditions, historic significance, site, program, and building features. To collect this data the design team researched documents, provided staff with questionnaires, and investigated the building conditions. The summary below states the findings from this investigation and some of the features that were important considerations throughout the design process.

SITE

- Location in Greenfield fits NESEA mission with nearby amenities and proximity to a future commuter train and Interstate 91

HISTORIC

- Historic railroad support building with significant alterations
- Not located in the Greenfield Historic District
- Preserve detail where appropriate
- Preserve massing and window openings
- Install new siding and windows with 21st century design

PROGRAM

- In 2014, there are 9 full time staff and 3 interns
- In 2020, NESEA anticipates 14 full time staff and 3 interns
- Minimal community educational or other non-staff or non-tenant functions are anticipated in the future
- Current NESEA program needs can be met on the 2nd floor
- First floor will remain leased space to other organizations
- Tenants will continue to share some spaces (co-office), such as the conference room, kitchen, bathrooms, and copy room

BUILDING INVESTIGATION

- Energy
  - o Building energy performance generally good, despite poor occupant comfort
  - o Enclosure reasonably well insulated
  - o Foundation uninsulated
  - o No continuous air barrier
- Envelope Durability
  - o Exterior siding beyond useful life and is deteriorating
  - o No foundation drainage
  - o No envelope drainage plane
  - o Roof condition adequate
- HVAC
  - o Inefficient hot water heating and window AC system
  - o Poor occupant comfort
  - o No mechanical ventilation
- Structure
  - o Shear walls and earthquake compliance likely issues if the structure is changed
  - o Structural changes should not be made without structural analysis
  - o Column and roof support on 2nd floor unknown
  - o Floors designed for much higher loads than projected use
- Electric
  - o Unused wiring needs to be removed
  - o Likely non-code compliant wiring
- Code
  - o Life Safety
    - Building currently complies with life safety code
    - Building has full automatic sprinkler system and only requires one entrance/exit

    -Open stairs permitted
  - o Accessibility:
    - No access to building, no access to 2nd floor, and no accessible bathrooms, limited access within spaces
    - Accessibility must be met if cost of new work is greater than 30% of the assessed value or above $100,000
    - Platform lift or LULA may be used in lieu of an elevator because the building is less than 3 stories and less than 3,000 sf per story

1.5. PROCESS SUMMARY

The 50-year stewardship planning process began with the selection of the design team by the NESEA building committee. Maclay Architects led the design team with Wright Builders providing cost estimating, and Energy Balance providing the mechanical system description and energy modeling. The NESEA planning committee was comprised of current and past board members and provided support throughout the project.

The following process was followed to develop the strategic plan. This study occurred from November 2013 - July 2014.

1. Understand project needs and vision
2. Refine and revise project goals, outcomes, and metrics
3. Generate long-term design
4. List potential upgrade options to implement design
5. Estimate upgrade option costs
6. Develop code strategy
7. Analyze energy and finance
8. Create strategic master plan
9. Select Phase 1 improvements

The design team and Building Committee outside 50 Miles St. (from left top row: Michael Bruss, Jonathan Wright, Rick Renner, Paul Eldrenkamp, from left bottom row: Bruce Coldham, Jennifer Marrapese, John Jacobson, Andy Shapiro, Bill Maclay and Laura Bailey, not picured - Roger Cooney of Wright Builders)

1.6. LESSONS LEARNED

This process revealed lessons that others can learn from when implementing a strategic 50-year stewardship vision for an aging building on the budget of a non-profit. The design approach was holistic and integrated. A Deep Energy Retrofit for the building is feasible if integrated with building program, maintenance, comfort and health, but not as a stand alone project to reduce energy costs. Although we did allocate costs associated with energy, comfort, code, health, maintenance, and productivity to single categories, the interconnected nature of this renovation, and renovations generally, made this a more challenging task. To care for older buildings, such as 50 Miles Street, requires a stewardship attitude and long-term thinking from building owners including non-profit organizations and NESEA.

1.7. NEXT STEPS

The next steps for the building committee after the presentation at BE14 was to determine a recommendation for the Board of Directors. In May, the building committee presented the recommendation to break Phase 1 into two parts (1A and 1B) in order to move forward toward full accessibility with incremental implementation. Phase 1A would be implemented as soon as possible and includes building the central core area for the building, framing the shaft for the lift. Phase 1B would include the entry ramp and lift to complete Phase 1. This phased approach enables NESEA to work toward full accessibility as soon as possible and provides workplace improvements. The building committee is also investigating the option to increase the assessed value of 50 Miles St to raise the Phase 1A cap. In this way NESEA can provide accessibility incrementally and move toward their 50-year stewardship plan.

The documentation of this process is intended to support NESEA's progress toward implementing their plan.

NESEA Headquarters
Master Planning for 50 Miles Street

DETAILED REPORT

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3.0. APPENDIX

2.1. HISTORY

NESEA's headquarters is located at 50 Miles Street in Greenfield, MA. NESEA entered into a loan agreement with the town of Greenfield on December 5th, 1994 to occupy and eventually acquire 50 Miles Street after 20 years. Thus NESEA will own the building outright on December 15, 2014.

Stipulations in the agreement required NESEA to occupy the building for 20 years and use it "as an office building and educational center demonstrating environmentally responsible building and land use practices, including the demonstration of energy efficient and renewable energy technologies." In addition NESEA agreed to develop a park on a parcel abutting 50 Miles Street which is now the Greenfield Energy Park. Owning the building is an opportunity for NESEA as they are now able to leverage it as an asset to finance building improvements. An Historic Building Assessment is located in Section 2.4.7.

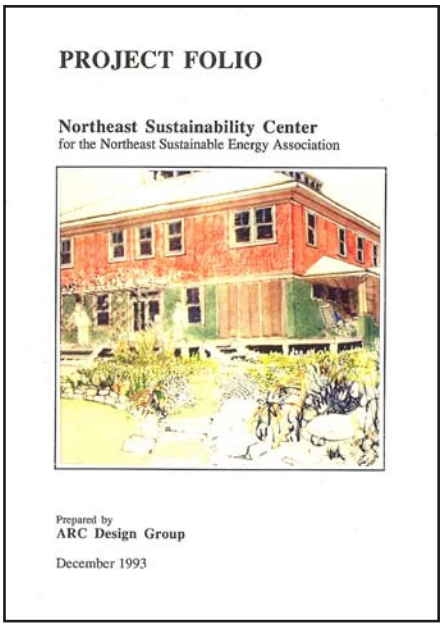
50 Miles Street approximately 1994

Over the past 20 years numerous studies and reports have been developed (See Section 2.4.8 Existing Building Conditions Investigation). Due to a lack of funding, only a small percentage of recommendations and reactive maintenance have been implemented.

Greenfield, MA Energy Park Adjacent to 50 Miles St.

While success of major building improvements have been limited, NESEA's development of the Energy Park in 1997 transformed a community liability into an asset for Greenfield. NESEA also realized that this effort drained NESEA resources and energy and made it difficult to focus on NESEA's mission. From this, NESEA decided to focus efforts at 50 Miles Street on building improvements without capital campaigns and significant sweat equity, but rather to make improvements based on prudent financial investments. This would also be a model for other building owners and non-profits with old and existing buildings.

Past studies have investigated the changes for the 50 Miles Street building. In 1994 Arc Design Group provided an integrated vision and design for the NESEA headquarters, including detailed enhancements to the interior and exterior of the building. NESEA was unable to raise sufficient funds for the comprehensive plan at that time and therefore this plan was not implemented.


PROJECT FOLIO

Northeast Sustainability Center
for the Northeast Sustainable Energy Association

Prepared by
ARC Design Group

December 1993

Since then NESEA has focused on more modest and achievable goals to improve the building. Since 2010 there have been energy and maintenance projects and NESEA is moving forward to achieve their goal to be a good building steward and environmental leader.

In 2010 John Jacobson joined the board and reignited the push toward a stewardship plan for the building, which includes maintenance as well as this strategic master plan for the next 50 years and this Phase I plan.

This renewed focus resulted in the following action items since 2010:

- Fully leasing of the building and analyzing the financial situation
- Hiring a building manager to oversee maintenance
- March 2010 - Building assessment from Cozy Home
  - Basement asbestos remediation
  - Sprinkler upgrades in the attic
- 2013 - Detailed O&M manual from the Sparhawk Group
- April 2013 - Connection of the solar arrays to the grid
- May 2013 - Energy & Facility Study by Bales Energy Associates
- August 2013 - Maclay Architects, Energy Balance, and Wright Builders hired for 50 Miles Street Planning
- March 2014 - Presentation at BuildingEnergy 2014
- May 2014 - Board approved to move forward with Phase 1A of the master plan

2.2. 2013-2014 HEADQUARTERS MASTER PLANNING HISTORY - PURPOSE AND OVERALL PROCESS

> The purpose of this study is to ***"develop a stewardship plan and budget for 50 Miles Street that lays out a strategy for catching up on deferred maintenance, for performing resource efficiency improvements, and for incorporating capital improvements commensurate with program needs and the overall mission of the organization."*** - in May, 2013 the NESEA Board, passed the above resolution unanimously.

The NESEA building committee developed and distributed a Request for Proposals for work that included the following statement:

> " A prime motivating idea behind requesting this plan is to enable NESEA to be a model steward of its own building over time, that is, to practice what we preach. Too many non-profits who own old buildings deal with those buildings on an ad-hoc basis, with no big-picture context. Building committee members come and go, institutional memory is lost, building maintenance and improvement budget line-items are chronically under-funded, and major liabilities accumulate. NESEA would like to try to use the opportunity this planning process presents to set an example of how to break out of that negative feedback loop and practice exemplary stewardship over time.
>
> The 50-year stewardship plan should be a realistic treatment of the building that realizes its potential while acknowledging its limitations, that recognizes that the building is fundamentally a place to house the organization, not a program, or an end in and of itself; and, finally, that will be financially within reach of the anticipated resources of NESEA. It is safe to assume that the organization will be able to invest approximately $1 million in the building (in 2013 dollars) over the course of the next 50 years, including the initial $250,000 investment mentioned above. "

Maclay Architects was hired in the fall of 2013 with a team that included Energy Balance and Wright Builders. Together with the NESEA building committee the design team worked through the winter of 2014 to develop the 50-year stewardship plan including the detailed Phase 1 items and cost estimates. This document outlines the process taken and the final outcomes.

2.2.1. GOALS FROM THE RFP

The RFP stated the 50-year stewardship plan should address the following primary areas of concern:

ENERGY

WATER

INDOOR AIR QUALITY

DURABILITY AND MAINTENANCE

FUNCTIONALITY AND ADAPTABILITY

WORKING CONDITIONS FOR STAFF

CODE COMPLIANCE

By addressing these items NESEA prioritized developing a plan to be a model steward of its own building. The plan developed is intended to serve as an example to other non-profits facing similar challenges of aging buildings on limited budgets. The 50-year stewardship plan recognizes that the building is fundamentally a place to house NESEA headquarters and that the recommendations of the plan should be financially within reach of the anticipated resources of NESEA.

2.2.2. KEY QUESTIONS FROM THE RFP

The following questions were developed by the building committee and outlined in the RFP. These initial questions framed the discussion with the design team and the building committee and generated the strategy for developing the stewardship plan. The range of questions required to address a comprehensive stewardship plan enabled a broad investigation in the beginning of the design process. Once key areas were identified the questions became more focused resulting in some changes in direction which are detailed in Section 2.4.1 and 2.4.2 Initial and Final Goals. The following are the initial questions from the RFP:

ENERGY:

How much primary energy you imagine this building should be consuming by 2063, and why; where might that energy be coming from; and how much energy will be produced on-site?

WATER:

How much water will the building consume in 2063? Why that number? Where will it come from?

INDOOR AIR QUALITY:

How will we cost-effectively provide a healthy indoor environment for the building users on an ongoing basis over the course of the 50 years of anticipated improvements?

DURABILITY AND MAINTENANCE:

In what order do you recommend we replace major systems such as heating, cooling, wiring, and plumbing, and major components such as roofing, siding, and windows? How long should the replacement systems and components last? What materials and equipment would you recommend that will strike the best balance between cost, durability, and environmental impact? What would you recommend for an annul maintenance budget, and what do you think the affect of each major round of improvements will be on that budget?

FUNCTIONALITY AND ADAPTABILITY:

The building will never be an architectural masterpiece; we're not looking for that. We're looking for space that lends itself to uses that will evolve and shift over time while minimizing renovation costs. It should be a pleasant space that's easy to keep looking clean with a minimum of effort. How do we achieve these goals?

2.3. PROJECT PROCESS

The process outlined below began in November 2013, including a presentation at the BE 2014 conference, and is more fully documented within this report. The building committee represented the stakeholders and advisors of NESEA, and were integral to the development of this process and the final outcomes. At critical junctions the design team met with the building committee and NESEA staff at 50 Miles Street.

PROJECT START

PREP
- History
- Programming
- Questionnaire
- Building Science
- Project definition

SITE VISIT
- Goals
- Building Assessment
- Programming
- Visioning
- Project Definition
- Process
- Energy Input

Committee, Design Team, Staff, Advisors, Stakeholders

DISCOVER

Investigation of the siding at 50 Miles St

SD MEETING
- Review choices
- Costs
- Performance
- Space planning

VISIONING/ CHOICES

1. Understand project needs and vision
2. Refine and revise project goals, outcomes, and metrics

DESIGN DIRECTION MEETING
- Review near term and 50 year recommendations
- Modify

PRESENTATION AT BE 14

Railroad side exterior of 50 Miles St

SYNTHESIZE

3. Generate long term design
4. List potential upgrade options to implement design
5. Estimate upgrade option costs
6. Develop code strategy
7. Energy Analysis
8. Create strategic master plan

FINAL DOCUMENT
- Near term
- 50 Years

DOCUMENT

9. Select Phase 1 improvements

2.4. PROJECT UNDERSTANDING

For background understanding of this project, the design team investigated the project goals, past reports, site, historic assessment, programming, building systems, code review, and existing utility data. These areas are described in detail below.

2.4.1. INITIAL GOALS AND METRICS

In order to determine the project goals and areas to focus, a questionnaire was developed by the design team and given to the building committee as the first step in the project. On November 14, 2013 the committee provided a unanimous response to the goals questionnaire that is summarized below and can be found in the Appendix.

OVERALL: Replicable Model for stewardship of older office buildings

ENERGY: Primary Energy usage (Current building use is 37.4 kBtu/sf-yr based on 6000 sf)
- Metric: Develop metrics based on that baseline usage (Such as 10-20kBtu/sf-yr as goal)
- Strive for 2030 goals: 70% reduction 2015, 80% reduction 2020, 90% reduction 2025, Carbon Neutral 2030.
- Consider Site + Source energy in Btus/occupant and Btus/sf
- Acquire data through thoughtful monitoring (someone needs to "own")

WATER: Current water consumption is an average of 137 gallons/day, 50,000 gallons/year (Currently 137 gallons/day @ 20 occupants = 6.85 gal/day/person, 15 occupants = 9.13 gal/day/person)
- Metric: Gallons of water/occupant
- Low flow fixtures to reduce consumption by 60%
- Possible composting and/or cistern with rainwater collection in future

INDOOR AIR QUALITY:
- Material selection prioritize occupant health
- Ventilation system
- Increase access to daylight
- Building envelope with building science to minimize moisture

DURABILITY AND MAINTENANCE:
- 2nd to health impacts
- Lifetime of material choices important
- Phased maintenance and upgrades toward final goal

FUNCTIONALITY AND ADAPTABILITY:
- Diversity of spaces, open flexible offices
- Disentangle systems so it's easy to move around (chases and exposed duct work)

WORKING CONDITIONS FOR STAFF:
- Healthy / Productive / Inspiring workplace, phased upgrades with minimal disturbance
- Occupant behavior: develop an occupant manual
- Occupant comfort: Provide environmental conditions for occupants' comfort year round

CODE COMPLIANCE:
- Accessible for everyone: code and AAB compliant

2.4.2. FINAL GOALS AND METRICS

Based on understanding NESEA and the project requirements of the existing conditions, project goals and priorities were revised. In the final goals and metrics the primary focus is on workplace productivity and health, as well as accessibility and code compliance as outlined below:

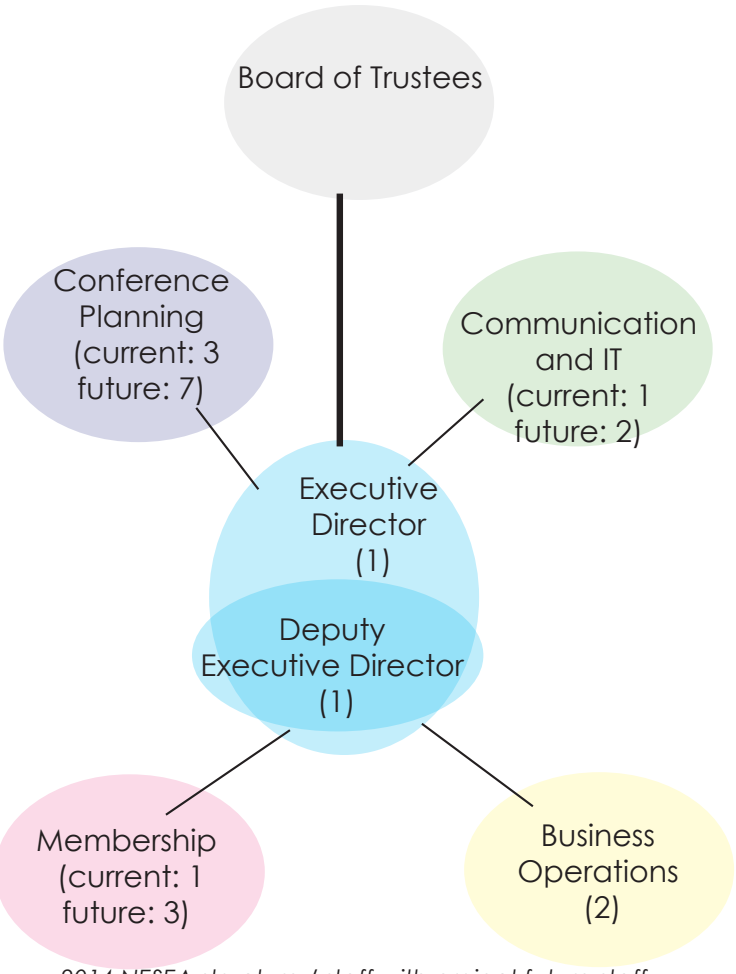
OVERALL - Building Stewardship: A replicable model for stewardship of older office buildings.

1. WORKPLACE PRODUCTIVITY / HEALTH
   - Productive
   - Collaborative
   - Satisfying
   - Flexible
   - Healthy interior environment, air quality and light
2. CODE COMPLIANT
   - Accessibility
   - Life Safety
3. ENERGY / CARBON RESPONSIBLE
   - 2030 Challenge goals
   - Energy conserving
   - Renewables
   - Water/ resource conserving
4. DURABILITY, MAINTENANCE AND FISCAL SUSTAINABILITY
   - Model for similar building owners
   - NESEA financial goals
   - Well maintained
   - Durable
5. ENVIRONMENTAL STEWARDSHIP
   (incorporated in all work)
   - Resilient
   - Resource efficient
   - Water conserving
   - Historic sensitivity

2.4.3. PROGRAMMING

The design team developed a questionnaire for the NESEA staff to determine the utilization of the current NESEA building and to generate future programming. This also provided insight into how people work in their current locations, what activities they do with others, and what spaces are under utilized. Maclay architects shared a presentation on organizational ecology, the workplace as an ecosystem, and open versus closed offices to the NESEA staff in December. This stimulated discussion on the workspace needs of the NESEA staff. This informed the final plan with plans that include a combination of closed offices and open offices with additional closed meeting spaces.

The current NESEA headquarters in 2014 has 9 full time and 3 rotating interns. By 2020, they project to have 14 full time and 3 rotating interns. The diagram below left shows the current staff numbers and organization, while the diagram on the right is the projected build out and staff numbers.



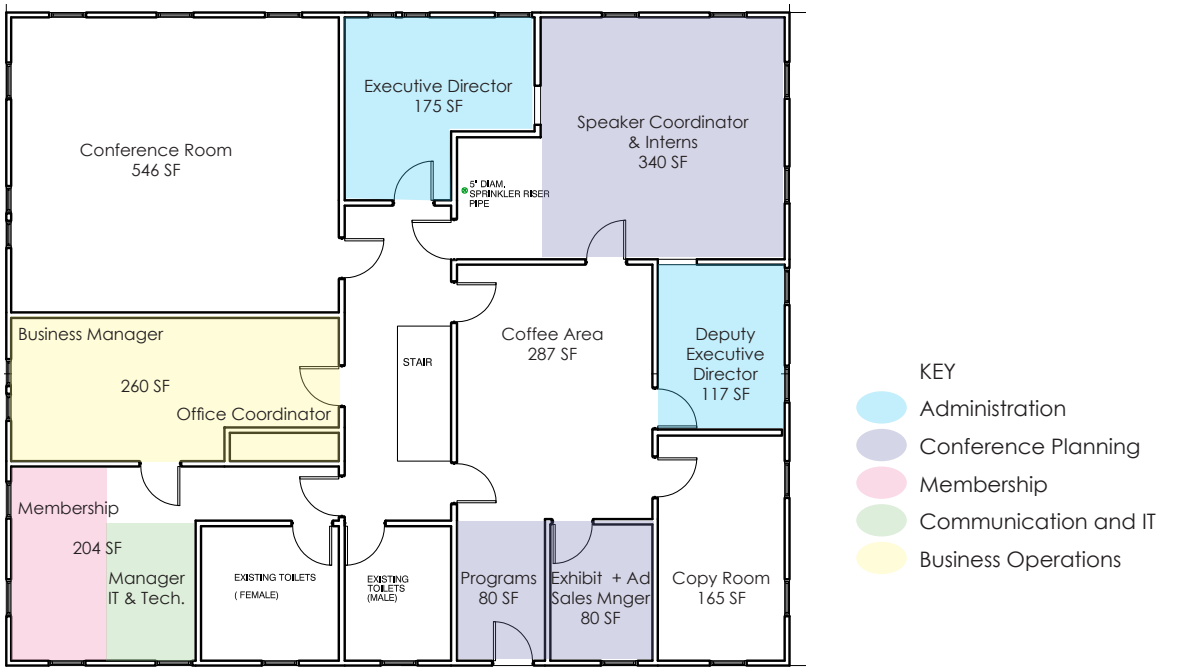
2014 NESEA structure / staff with project future staff changes

The programming discussion revealed implications for space planning. Specifically, NESEA did not envision hosting educational programs at the building. Current and anticipated program requirements of NESEA can comfortably be accommodated on the second floor. First floor use will remain leased space to other organizations. Tenants as a whole will continue to share some space with NESEA (such as the conference room, kitchen, and copy room).

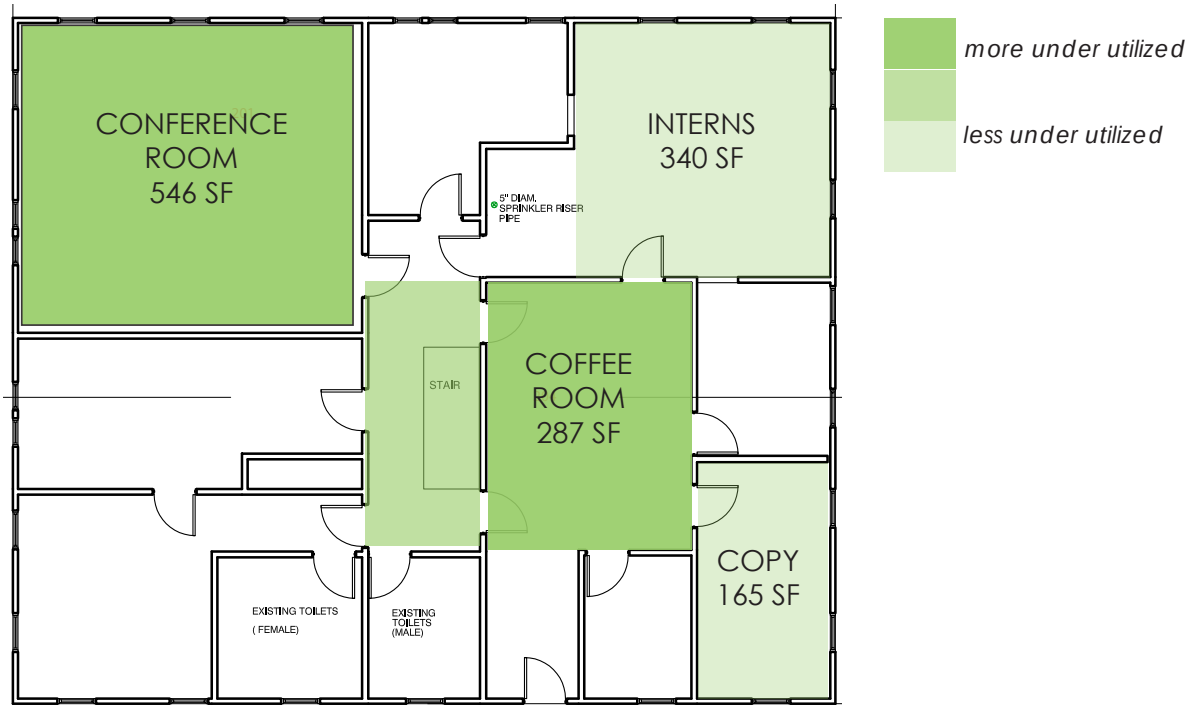
2.4.4. EXISTING BUILDING USE

The following floor plans show the second floor existing layout of NESEA staff. The colors coordinate with the bubble diagram on the previous page and the NESEA organizational structure. It was clear from discussion with the staff that even though they have distinct job titles and rolls, they work directly with nearly everyone in the office and communicate easily throughout the day.

Under-utilized areas were identified by the current NESEA staff in a questionnaire in November 2013. The darker green shading indicates more people identified that space as under utilized and all of the common areas on the second level were identified as under utilized.



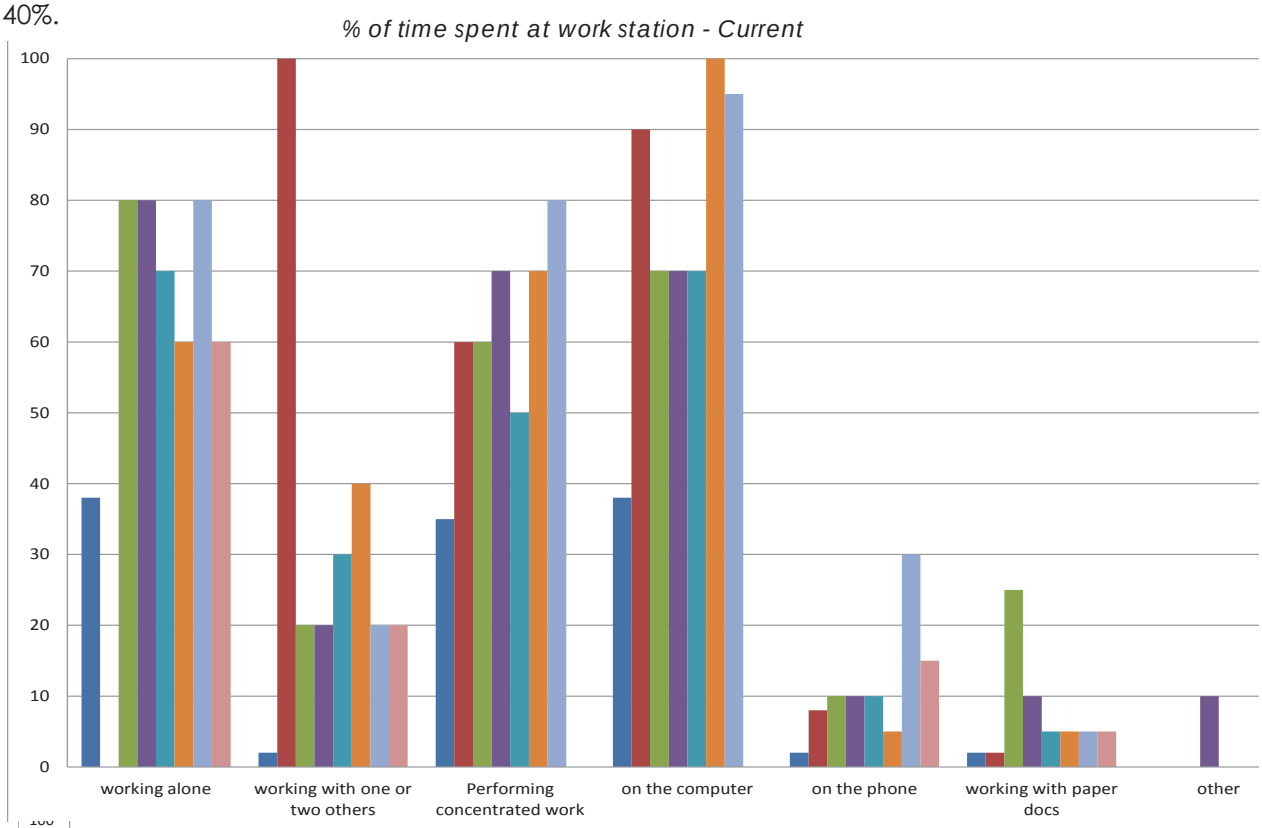
2014 Existing NESEA Staff layout

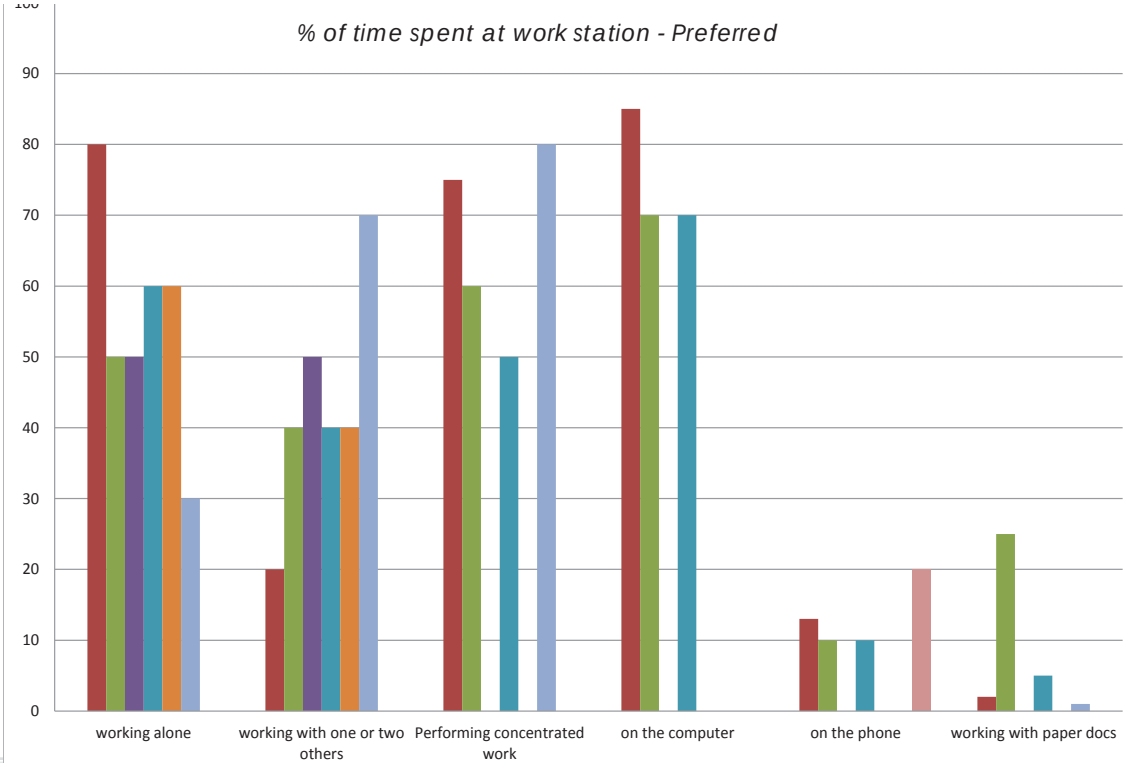


Under-utilized spaces shown in green, the darker the color, the more survey responses noted it as under utilized

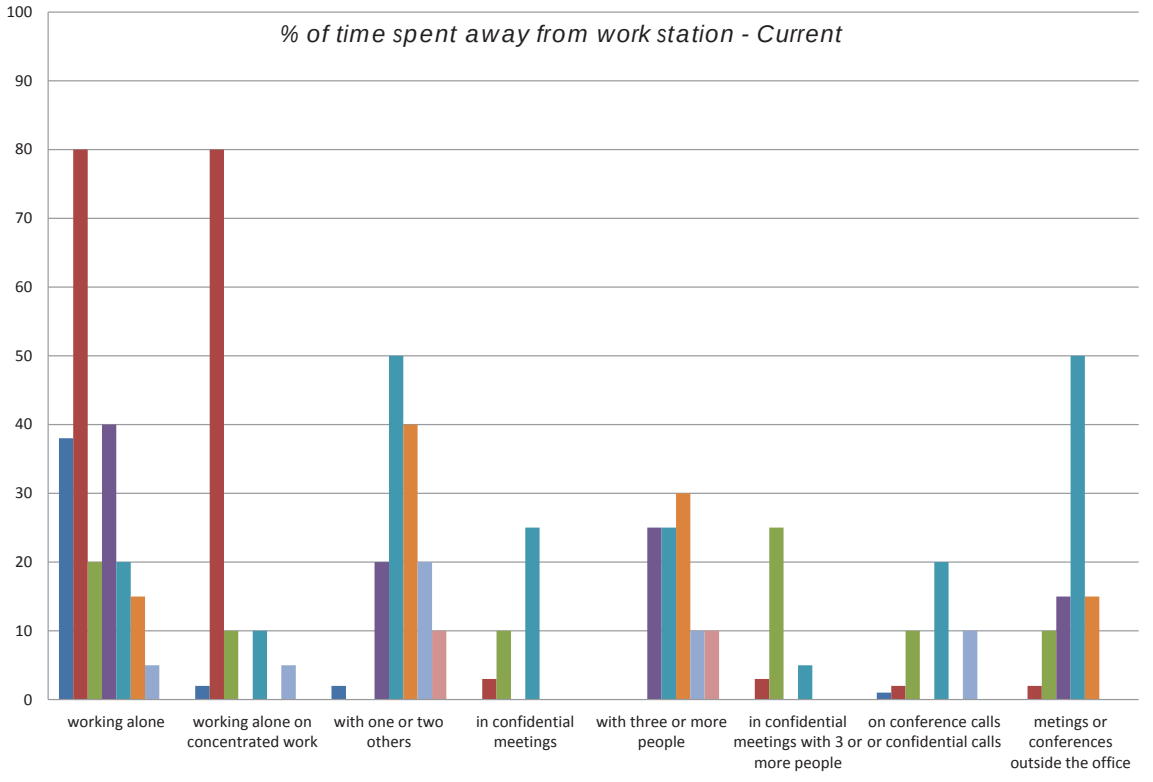
2.4.5. STAFF QUESTIONNAIRE

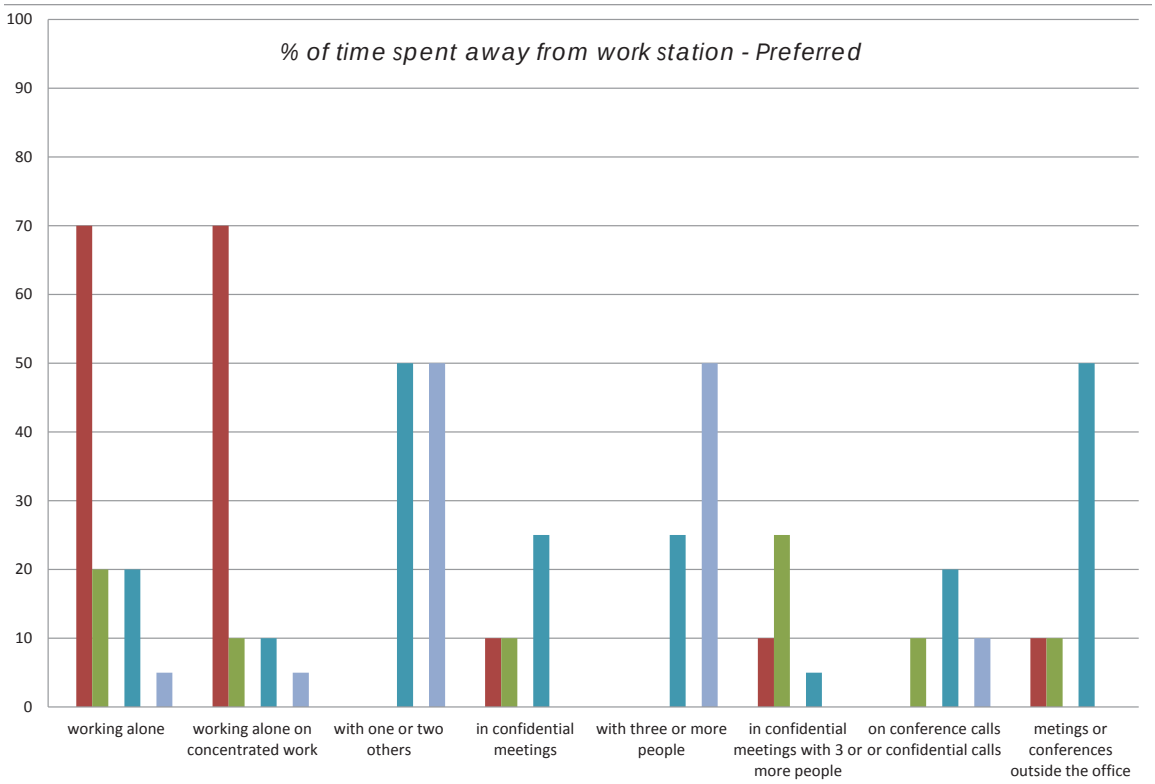
The 2014 Staff Questionnaire provided insight into the current and preferred workspace conditions of the existing staff. The graphs below show the percent of time each person spends at their workspace and the graph on the next page shows time spent away from their workspace. For each condition two questions were asked: how they currently spend their time and how they would prefer to spend their time. The current and preferred time at the work station (shown below) are similar, which indicates the work spaces are where the majority of employees spend their time and likely will in the future. Currently approximately 20% of people's time is spent working with one or two other people, and staff would prefer that to be closer to 40%.





The graphs below show that minimal time is spent away from their workstation for the majority of employees. The bottom graph shows that the preferred time away from the work station is not significantly different than current levels, which again indicates the work spaces are where the majority of employees spend their time and likely will in the future. Staff spend a significant amounts of time away from their workstation when working with other people in groups.

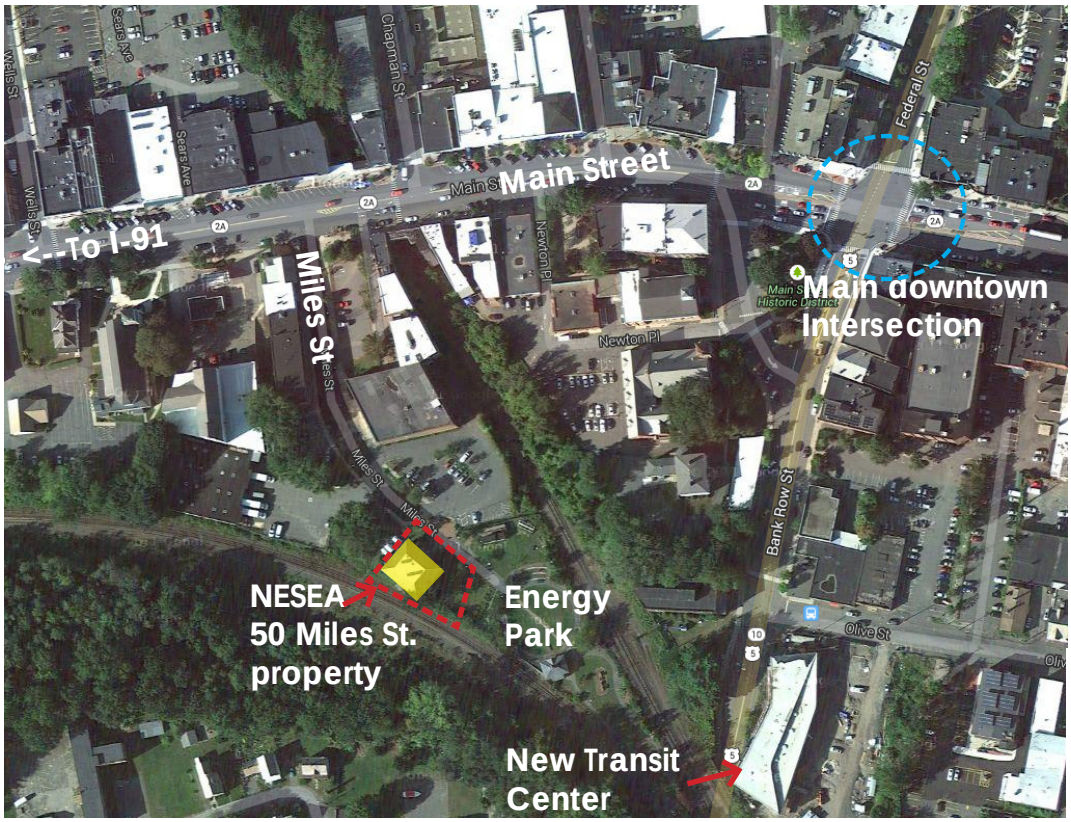




2.4.6. SITE

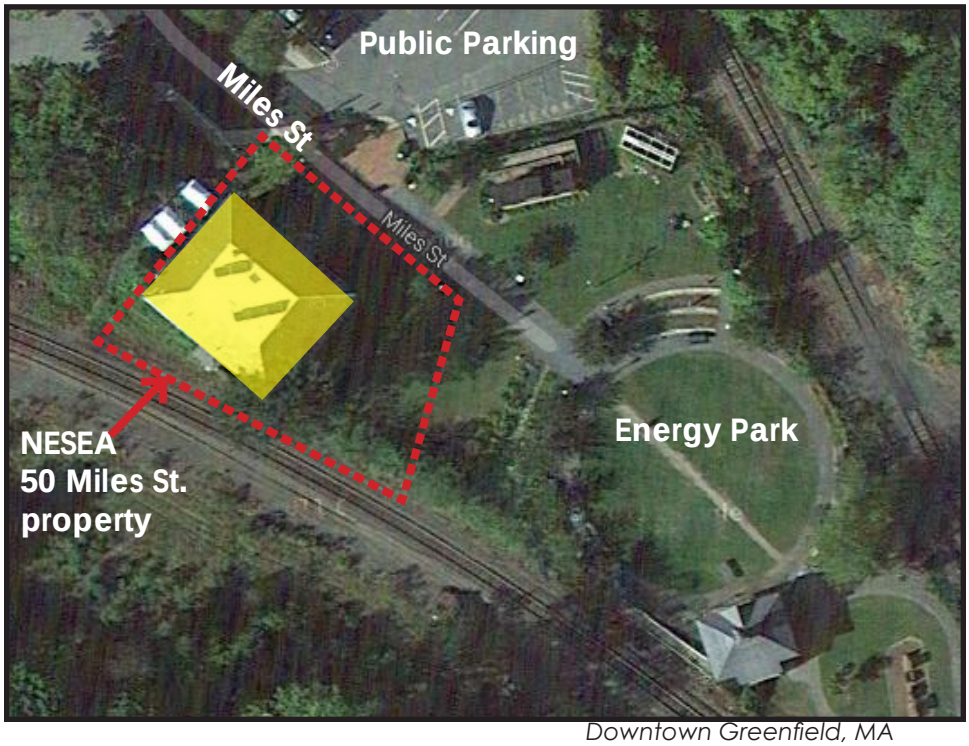
NESEA Headquarters' location in Greenfield, MA fits with NESEA's mission with nearby amenities and proximity to a new net zero Transit Center and Interstate 91. The Energy Park is located adjacent to the NESEA headquarters, which connects by a pedestrian route to the new Transit Center. There are numerous shops and restaurants within walking distance from NESEA as well as an adjacent public parking lot, making this location convenient for staff and visitors.

The 50 Miles Street property is 0.196 acres, or approximately 8,500 sf. Given the 3,000 sf building footprint, the building coverage is 35% of the lot. Including walkways and porches the additional site coverage is 500 sf, for a total of 41% of the lot.



The building is located at the end of Miles Street, and sits 35 feet back from an existing brick plaza to the north, the set back from the west is approximately 5 feet, the south 12 feet, and the east 45 feet. This limits expansion potential and access to the south and west sides of the building.

While the lot is small, adequate public parking is conveniently located to the north of the building. The Energy Park to the east provides quality green space for NESEA employees and easy walking distance to the new transit center.

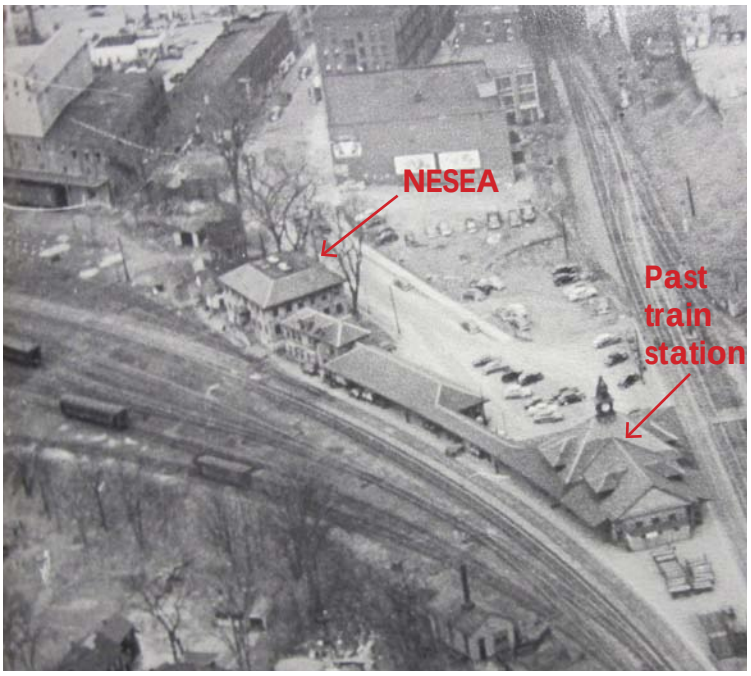


Downtown Greenfield, MA

2.4.7. HISTORIC ASSESSMENT

The NESEA headquarters was built around 1910 for the Boston & Maine Rail Road and Freight Yards. It is the only building left standing from the old train complex, shown in the picture below, and served as a support building. It appears that the second floor was initially subdivided with multiple spaces, including a telegraph station and administrative offices. The second floor layout has not significantly changed with much of the upper trim present and in line with existing walls (shown below).

The first floor structure is massive and likely supported a machine shop or other heavy equipment. The structure reveals what was likely an open first floor plan with the columns that are visible today. The basement level opens to grade at the level of the railroad on the south side, and

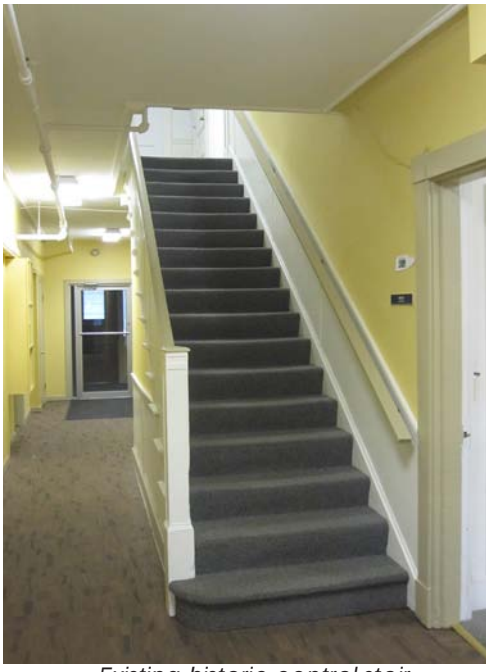


Historic aerial image of the Boston & Maine Rail Road and Freight Yard, with 50 Miles Street as a support building.

Existing central stair rail detail

Existing historic trim is visible along most of the second floor walls and on the doorways.

Existing historic trim is visible along most of the second floor walls.



Existing historic central stair

appears to also have been used for heavier equipment and utilitarian uses. The central entry and stairway connecting the two floors and basement remains the same.

It appears from limited historic photos that the building exterior has not significantly changed, including the window openings. The building is located outside of Greenfield's designated Historic Districts as shown below. Therefore, historic preservation is not required, although it still is a concern for NESEA.

The conclusions from the building committee are to preserve the detail and trim where appropriate, maintain the central stair, keep the massing and openings the same, but design for today and meet the needs of NESEA and NESEA staff.

National Historic Districts of Greenfield, MA

2.4.8. EXISTING CONDITIONS INVESTIGATION

NESEA's original project report was completed by ARC Design Group in 1993-1994. Since 2010, NESEA has commissioned energy, maintenance and operation investigations, and reports by Cozy Home Performance, Bales Energy Associates, and Sparhawk Group. The design team reviewed these past reports and inspected the building with the Building Committee, Executive Director, and Building Manager.

The following is a summary of building investigation and previous reports:

BUILDING INVESTIGATION

- Energy
  - o Building energy performance generally good, despite poor occupant comfort
  - o Enclosure reasonably well insulated
  - o Foundation uninsulated
  - o No continuous air barrier
- Envelope Durability
  - o Exterior siding beyond useful life and is deteriorating
  - o No foundation drainage
  - o No envelope drainage plane
  - o Roof condition adequate
- HVAC
  - o Inefficient hot water heating and window AC system
  - o Poor occupant comfort
  - o No mechanical ventilation
- Structure
  - o Shear walls and earthquake compliance likely issues if the structure is changed
  - o Structural changes should not be made without structural analysis
  - o Column and roof support on 2nd floor unknown
  - o Floors designed for much higher loads than projected use
- Electric
  - o Unused wiring needs to be removed
  - o Likely non-code compliant wiring

2.4.8. EXISTING CONDITIONS INVESTIGATION

Exterior images are from the building investigation in November and December 2013.

Non-accessible main entrance

South elevation along railroad tracks - showing stucco at the end of it's useful life

Deterioration of horizontal wood trim

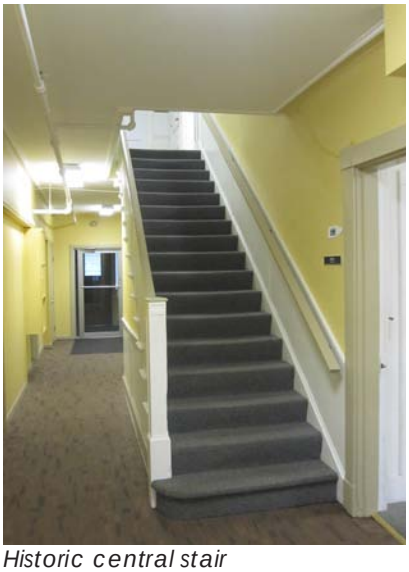
Main north entrance with the Energy Park beyond

Deterioration of the stucco at the base of wall

Roof with 1.5 kW photovoltaic system.

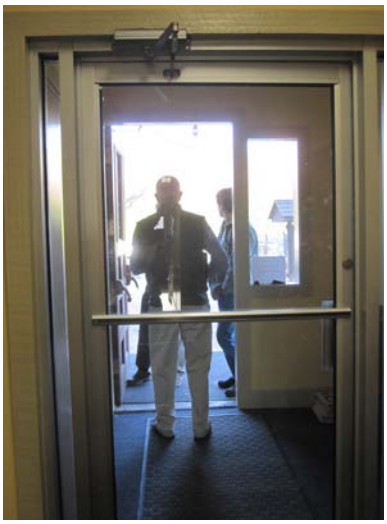
2.4.8. EXISTING CONDITIONS INVESTIGATION

Interior images from the building investigation in November - December 2013. The entrance and access to the second floor are not currently accessible, but the glass vestibule clearances are code compliant. There is a full-building sprinkler system.

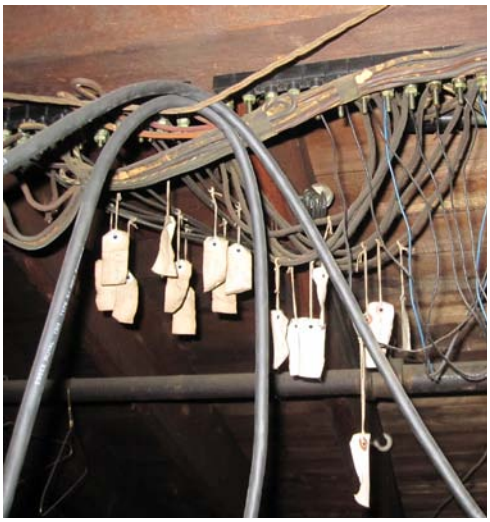


Historic central stair

Attic cellulose insulation



Code-acceptable entry vestibule



Unused telegraph wiring in the attic

Attic access stairs

Non-accessible bathroom stalls

Existing sprinkler system

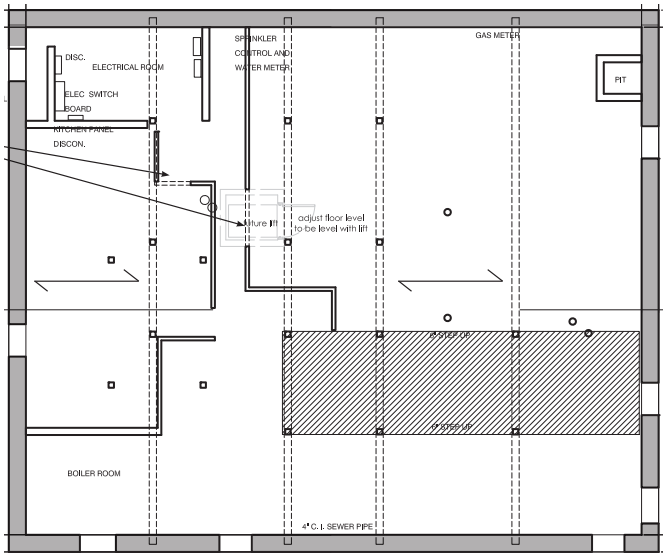
2.4.9. STRUCTURAL INVESTIGATION

The structural investigation was limited to a visual inspection by the design team and building committee. No structural calculations of loading conditions were performed. The overall building structural system is post and beam construction on the interior, likely with load-bearing exterior walls.

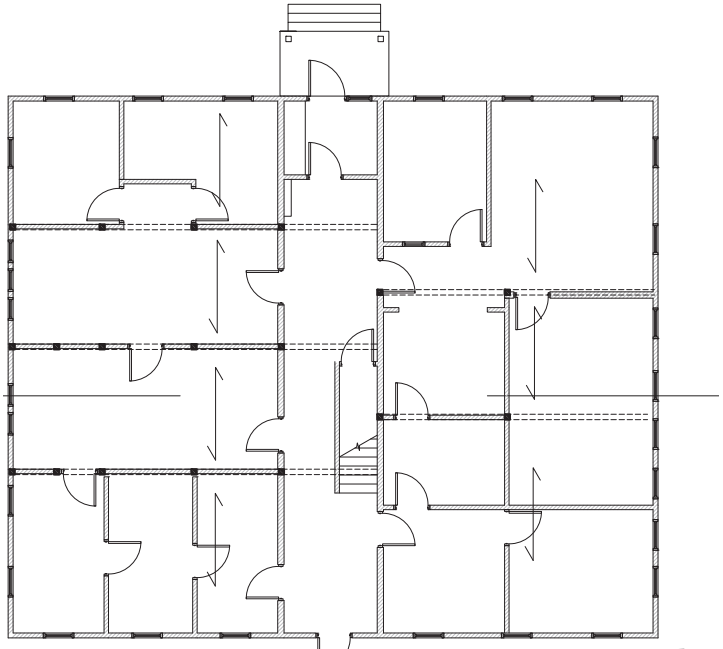
The first floor framing is exposed and clearly evident in the basement. First floor columns are thicker than the walls and also clearly evident. The basement and first floor columns appear to generally align. Some additional columns have been added in the basement, presumably due to specific point loads added over time. The second floor columns are concealed in walls so that it is not easily possible to determine their locations. There are multiple places where columns on the basement and first floor do not extend to the second floor and/or attic.

The roof structure is a hip roof with a flat central section with internal columns. Only two of these columns align with the columns supporting the first floor, but most of them likely align with beam locations below roof support columns. However, some roof support columns land in places with long spans, assuming there are beams to relocate the point loads from the roof. There is no visible evidence of significant structural deflection or other deficiencies, nor removal of columns or post structural elements. The structure appears to have been designed for heavier loads and overall is more than adequate for NESEA and other tenant's office use. There is no specific evidence of shear walls.

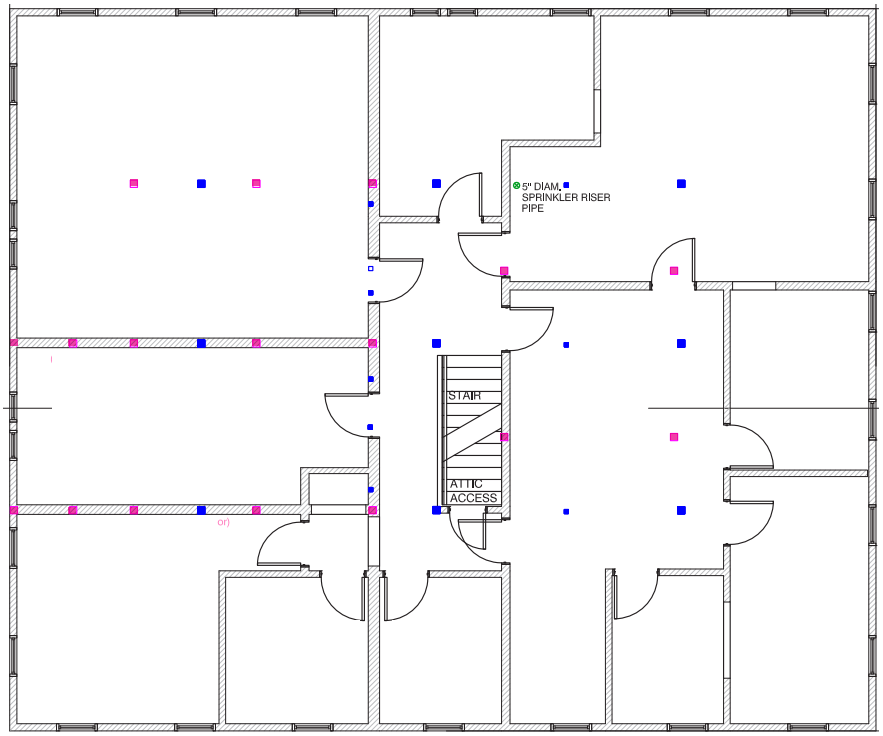
Based on this assessment, any structural changes would require structural analysis particularly given code requirements, including earthquake design that did not exist when the building was built. For both structural and functional reasons, the final plan (Section 2.5) does not propose to remove any columns and maintains many of the second floor walls. It does include the creation of additional openings in interior walls. This will provide a more open workspace with alcoves, but maintains the structural integrity of the building.



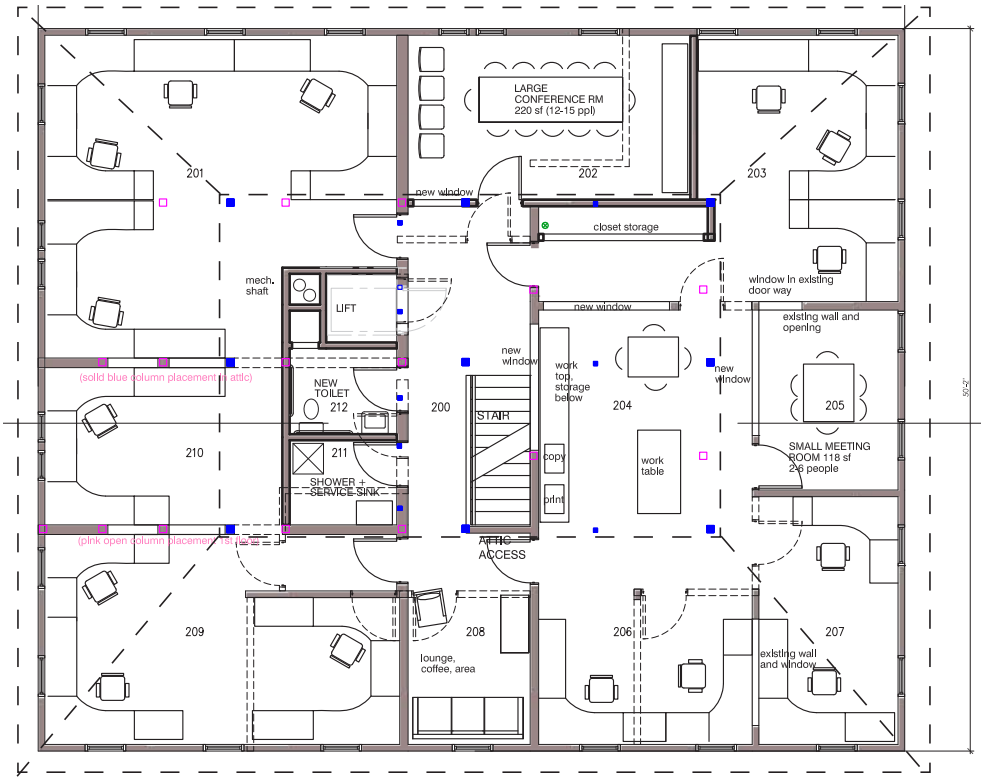
Existing basement plan with basement columns, beams, and ceiling framing



Existing First Floor plan with columns, beams, and ceiling framing



Existing second floor plan with first floor and attic structure superimposed, the column locations of the first floor (in pink) and the attic (in blue). As shown these column loads do not align and the second floor walls are carrying some of the point load from the attic to the first floor.



The final floor plan aligns new walls with the column grid on the first floor and/or attic, and reduces disturbance to walls where there are known structural loads passing through but unidentified. Several columns on the second floor do not align. It is assumed there are beams transferring loads to first floor columns.

2.4.10. CODE REVIEW

Maclay Architects reviewed code requirements for 50 Miles St. and the findings are outlined below. Due to the various paths to implement the master plan, there are different code implications. A preliminary design code review was performed by A. Vernon Woodworth at AKF Group and is located in the Appendix.

- Life Safety
    - Building currently complies with life safety code
    - Building has a full automatic sprinkler system
    - A single means of egress is permitted from any story in Use Group B occupancy where the occupant load does not exceed 49.
    - Open stairs are permitted for egress in Use Group B occupancy where:
        - The opening is a maximum of two stories, and
        - The travel distance from the most remote point to an exit does not exceed 300 feet (from IBC 2009 Table 1016.1)

- Renovation Work Area
    - Level 1 alterations include the removal, replacement or covering of existing parts of the building (IEBC 403.1). Level 2 alterations include any re-configuration of spaces including the addition or elimination of any door or window, changes to any system, or the installation of any additional equipment where the work area is equal to or less than 50% of the area of the building (IEBC 404.1). Level 3 alterations apply where the work area includes the re-configuration of space in more than 50% of the aggregate area of the building (IEBC 405.1).
    - The identified Phase 1 and modified Phase 1A renovations will comply with Level 2 Alterations (IEBC Chapter 7) – see above. Level 2 Alterations must also comply with the requirements for Level 1 Alterations (IEBC Chapter 6.)
        - Interior finishes must comply with the code for new construction.
        - The existing level of safety and protection throughout the building regarding fire protection and means of egress must be maintained. Sprinkler protection is required within the work area where the work area exceeds 50% of the floor.
        - Only those systems or portions of the building that are altered are required to comply with the energy conservation requirements for new construction.
        - All reconfigured and converted spaces intended for occupancy must be provided with natural or mechanical ventilation in accordance with the IMC. In existing mechanically-ventilated spaces, existing mechanical ventilation systems that are altered, reconfigured, or extended must provide not less than 5 cfm per person of outdoor air and not less than 15 cfm of ventilation air per person or not less than the amount of ventilation air determined by the Indoor Air Quality Procedure of ASHRAE
    - The full master plan would fall under Level 3 alterations if implemented all at once, as pieces of the master plan are implemented over time the code requirements must be revisited if work occurs outside Level 2 alterations described above.

- Accessibility:
    - There is currently no accessible entrance to building, no access to 2nd floor, no accessible bathrooms, and limited access in some spaces. Accessibility codes (Massachusetts 521 CMR and ADA) require:
        - Accessible public and employee parking
        - Accessible exterior route to accessible public/employee entrances
        - Accessible interior route to all spaces required to be accessible (including vertical access to second floor)

- Accessible toilet rooms, break rooms and kitchens.
- 521 CMR does not apply to employee-only spaces not open to the public, though ADA does (employee spaces must be designed such that individuals with disabilities can approach, enter and exit the work space.)

o 521 CMR Thresholds for extent of accessibility upgrades for existing buildings undergoing alterations or repairs (includes all work completed within a three-year period):

- If the cost of work is less than $100,000, only new work must comply.

(Phase 1A follows this first path by not exceeding $100,000 over three years)

- If the cost of work is at least $100,000 but less than 30% of the assessed building value, in addition to all new work, an accessible public entrance, accessible toilet rooms, telephone, and drinking fountain must be provided (where the building contains public toilets, telephones and drinking fountains). Exceptions are listed below:

521 CMR: ARCHITECTURAL ACCESS BOARD

b. if the work costs $100,000 or more, then the work being performed is required to comply with 521 CMR. In addition, an *accessible* public *entrance* and an *accessible* toilet room, telephone, drinking fountain (if toilets, telephones and drinking fountains are provided) shall also be provided in compliance with 521 CMR.

Exception: General maintenance and on-going upkeep of existing, underground transit facilities will not trigger the requirement for an *accessible entrance* and toilet unless the cost of the work exceeds $500,000 or unless work is being performed on the *entrance* or toilet.

Exception: Whether performed alone or in combination with each other, the following types of *alterations* are not subject to **521 CMR 3.3.1**, unless the cost of the work exceeds $500,000 or unless work is being performed on the entrance or toilet. (When performing exempted work, a memo stating the exempted work and its costs must be filed with the permit application or a separate building permit must be obtained.)

a. Curb Cuts: The construction of *curb cuts* shall comply with **521 CMR 21.00: CURB CUTS.**

3.00: **JURISDICTION**

b. *Alteration* work which is limited solely to electrical mechanical, or plumbing systems; to abatement of hazardous materials; or retrofit of automatic sprinklers **and** does not involve the *alteration* of any *elements* or *spaces* required to be *accessible* under 521 CMR. Where electrical outlets and controls are altered, they must comply with 521 CMR.

c. Roof repair or replacement, window repair or replacement, repointing and masonry repair work.

d. Work relating to septic system repairs, (including Title V, 310 CMR 15.00, improvements) site utilities and landscaping.

(The building is currently assessed by the town at $325,900 in March 2009, thus 30% is $97,770. In the future the value is likely to increase, and would result in a higher upper threshold)

- If the cost of work exceeds 30% of the assessed value of the building, the entire building must be brought into compliance with 521 CMR (triggering the requirement for an elevator or lift to the second floor.)

(The original Phase 1 followed the path of full compliance)

- o A platform lift or LULA may be used in lieu of an elevator:
  - In existing buildings where no other work is being performed, except for the installation of a vertical wheelchair lift.
  - In existing buildings of less than 3 stories in height or that have less than 3,000 s.f. per story.

(50 Miles St. falls into this category)

- Electrical:
  - o Non-code compliant wiring exists in parts of the building including existing unused electrical wiring and equipment that likely will need to be removed.

2.4.11. ENERGY/WATER USE

The following energy consumption was compiled from the past 2.5 years to develop the baseline for the building. The current building uses 37.2 kBtu/sf-yr site energy shown in yellow below. The utility data from WMECO and Berkshire Gas is broken out by unit, kBtu, and total price paid by NESEA. The total monthly cost to NESEA for all of the energy utilities is located in the far right column and highlighted in blue. Yearly averages for both electricity and natural gas were determined and converted to kBtu to find the building's Energy Use Intensity (EUI).

The 1.5 kW photovoltaic system located on the roof offset building electric use and was not net- metered until 4/23/13 when the park (3 kW) system was net metered. Together these two systems should produce 5,193 kWh/yr and reduce the total building EUI by 2.95 kBtu/sf-yr for a net total of 34.25 kBtu/sf-yr.

Project NESEA Headquarters
50 Miles St. Greenfield, MA

Building sf 6000 Source: building plan

			WMECO			Roof PV system	Berkshire			
	Account	Solar Exported	Electricity	Electricity	Electricity	Electricty	Gas	Gas	Gas	Energy $
Year	Month	kWh	kWh	kBtu	Total $	sales (kWh)	Therms	kBtu	Total $	Total
2011	Jun		1440	4913	$279		0	0	$13	$292
	Jul		1560	5323	$287		0	0	$13	$300
	Aug		1240	4231	$211		0	0	$13	$224
	Sep		1240	4231	$233		0	0	$13	$246
	Oct		1360	4640	$282		89.5	8950	$106	$388
	Nov		1520	5186	$275		189.9	18990	$250	$525
	Dec		1400	4777	$251		367.7	36770	$445	$696
2012	Jan		1360	4640	$244		399.6	39960	$448	$692
	Feb		1360	4640	$264		308.5	30850	$354	$618
	Mar		1240	4231	$252		143.1	14310	$182	$434
	Apr		1240	4231	$208		60.8	6080	$80	$288
	May		1320	4504	$289		2.1	210	$15	$304
	Jun		1400	4777	$271		0	0	$13	$284
	Jul		1760	6005	$326		0	0	$13	$339
	Aug		1400	4777	$256		1	100	$14	$270
	Sep		1200	4094	$258		0	0	$13	$271
	Oct		1280	4367	$252		67	6700	$80	$332
	Nov		1360	4640	$231		316.2	31620	$368	$599
	Dec		1240	4231	$231		404.8	40480	$461	$692
2013	Jan		1520	5186	$280		394.2	39420	$450	$730
	Feb		1360	4640	$250		296.8	29680	$348	$598
	Mar		1480	5050	$264		237.2	23720	$282	$546
	Apr	40	600	2047	$106	40	79.3	7930	$103	$209
	May	80	1080	3685	$368	80	20.6	2060	$37	$405
	Jun	120	1280	4367	$262	120	0	0	$13	$275
	Jul	80	1380	4709	$279	80	0	0	$13	$292
	Aug	80	960	3276	$192	80	1	100	$14	$206
	Sep	40	840	2866	$185	40	0	0	$13	$198
	TOTAL	440	36420		$7,086	440	3379.3		$4,167	$11,253
	Total average per month	73	1300.7143		$253		120.68929		$149	$402
	Total for two years (unit)	10386	31960		$6,168		3378.3		$4,114	$10,282
	Total for two years (kbtu)	35437	109048				337830			
	Average for one year (kbtu)	17719	54524		$3,084	1650	168915		$2,057	$5,141
	total kBtu		223439			3543				
	EUI		37.2		total solar(kWh)/yr	5193				
					solar kBtu	17719				
					Solar EUI	2.95				

NOTES
[1]April 2013 electric only 11th-22nd
[2] 4/23/13 PV panels inspected - source WMECO letter w/ statements and PV panels hooked up to net-meter
[3] roof pv system is expected to produce 1,650 kWh/year (Christopher Kilfoyle) and 3 kW park system should produce 3,543 kWh/yr

The following water consumption data was compiled to develop the baseline use for the building. The current building uses on average 137 gallons per day and 50,000 gallons per year.

		Town of Greenfield				
		Water				
Year	Month	CF	gallons	# days	gal/day	Total $
	Jun					
	Jul					
	Aug					
2011	Sep		19893	121	164.4	$276
	Oct					
	Nov					
	Dec					
	Jan					
	Feb					
	Mar					
	Apr	3000	22442	189	118.7	$207
	May					
2012	Jun					
	Jul					
	Aug					
	Sep					
	Oct	3000	22442	180	124.7	$207
	Nov					
	Dec					
	Jan					
	Feb					
	Mar					
	Apr	3000	22442	183	122.6	$207
2013	May					
	Jun					
	Jul					
	Aug					
	Sep	4000	29922	186	160.9	$276
		13000	117140	859		$1,173
		Average gal($)/day		136		$1.37
		total Average /day		137.5		$2.88
		Total Average / yr		50199		$1,051

2.5. 50-YEAR MASTER PLAN

The final design recommendations are shown in this section. From the project understanding and design phases the following project goals evolved and were established by the building committee to fulfill the 50 year building master plan overarching goal to create a model of environmental stewardship of existing commercial buildings:

1. Workplace Productivity & Health
2. Code Compliant
3. Energy & Carbon Responsible
4. Durable, Low-Maintenance and Fiscally Sustainable
5. Environmental Stewardship

The 50-year stewardship design principles and processes as reflected in space plans, building envelope design, and building systems is described in this section. The following plans, interior details, and sections show the overall 50 year master plan for the building that creates a workspace that is productive, collaborative, satisfying, flexible, healthy, connected to the environment, daylit, and inspiring.

2.5.1. 50-YEAR SPACE PLAN

The 50-year space plan is generated by the goal for a model workspace for NESEA as well as likely use by other tenants.

Based on programming, the following design requirements were agreed upon for inclusion in building plans.

- Incremental building improvements to the building and in NESEA's space will maximize daylight and workplace performance using integrated design principles
- The overall building use will be for multiple office tenants in a "co-office" environment
- NESEA will occupy the second floor for the foreseeable future and will not need to use the first floor
- A conference, print/copy, and kitchen/lounge area will be available as an amenity to tenants as well as NESEA staff
- The first floor will accommodate multiple tenants
- Changes on the first floor will be minimized to reduce impact to the first floor tenants
- The central stair will remain
- At the front entry a key code or intercom system will be installed to get into the central building space

2.5.1.1. 50-YEAR SPACE PLANNING PROCESS

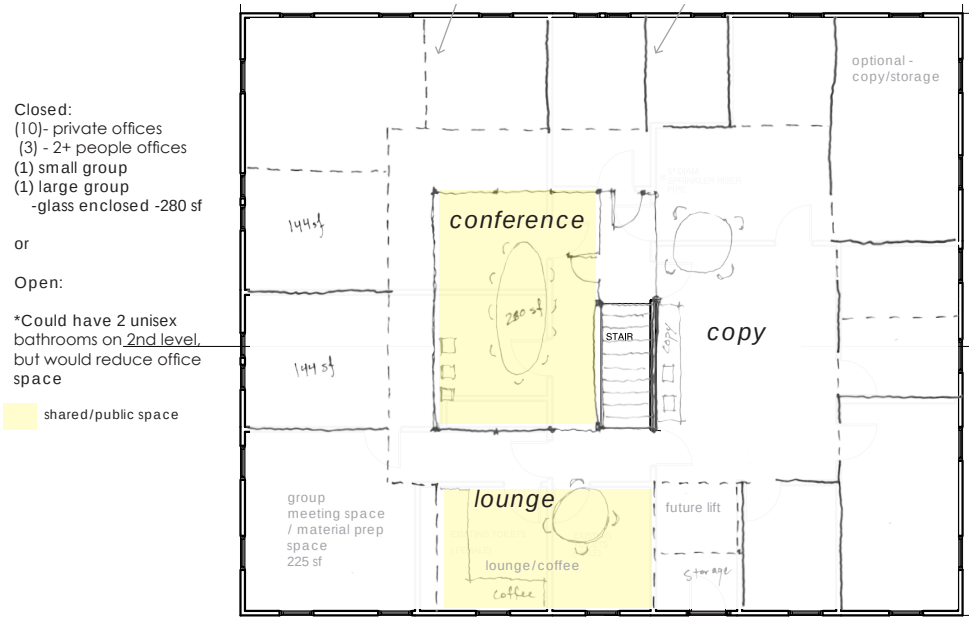
During the design process, a series of space planning alternatives were offered which led to the final recommended 50-year space plan. In the first plan option a shared kitchen and all bathrooms were located on the first floor. This minimized changes to the first floor tenant spaces. The initial proposed plan for the second floor included a mostly glazed conference room and copy areas in the middle of the space to maximize daylight to work spaces around the periphery while allowing for visual continuity and work areas broken into smaller areas. Two options for the first and second floor plans were considered.

Initial First Floor Space Plans - Option 1 and Option 2 of the first floor layout alternatives. Both reduce the impact on the current leased space and provide shared building amenities of a kitchen, future deck, and bathrooms on the first floor.

The NESEA offices on the second floor were initially designed so that they could combine whatever portion of open and closed offices desired. Open offices increase teamwork and collaboration, and reduce heating and cooling capital and operation costs, but offer less privacy.

The second floor plan on the following page shows existing walls with solid lines and dashed lines that could be future walls. These could be open, partial height partitions, glass walls, or opaque walls. The central conference space reflects the survey information that it is an under-utilized space, could be smaller, and could be moved into the center of the building with work stations occupying the perimeter for maximizing daylight and creating a loop of circulation.

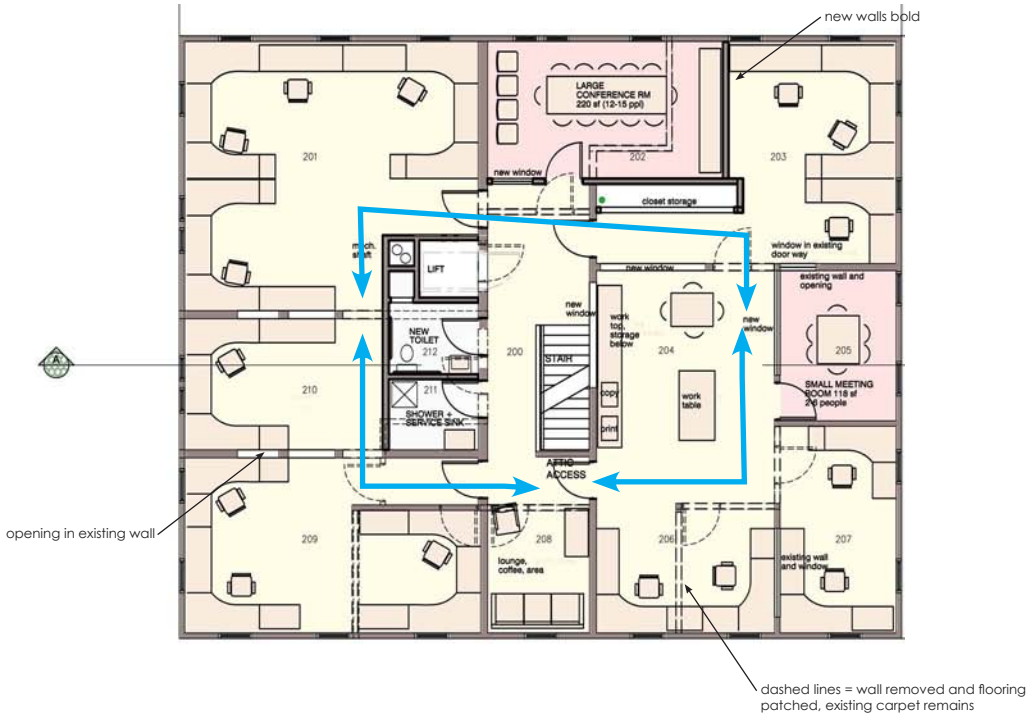
While this plan reduced first floor alterations and tenant impacts, it did not optimize the lift and bathroom locations. It also requires significant structural alterations on the second floor, including associated complexity and expense.



Initial Second Floor Space Plan - Second floor layout with central conference and work area. This option could provide all open, all closed offices, or a combination of open and closed. Existing walls are solid lines, and potential future walls are dashed.

The second space plan alternative relocated the conference room from the central core, retained the circulation loop, and provided all open offices broken down into smaller alcoves. From this plan, NESEA decided to have a mixture of open and closed offices and small private meeting rooms.

This plan was revised to create the final plan shown in Section 2.5.1.2, which creates a bathroom and lift core in the building for uses not requiring daylight.



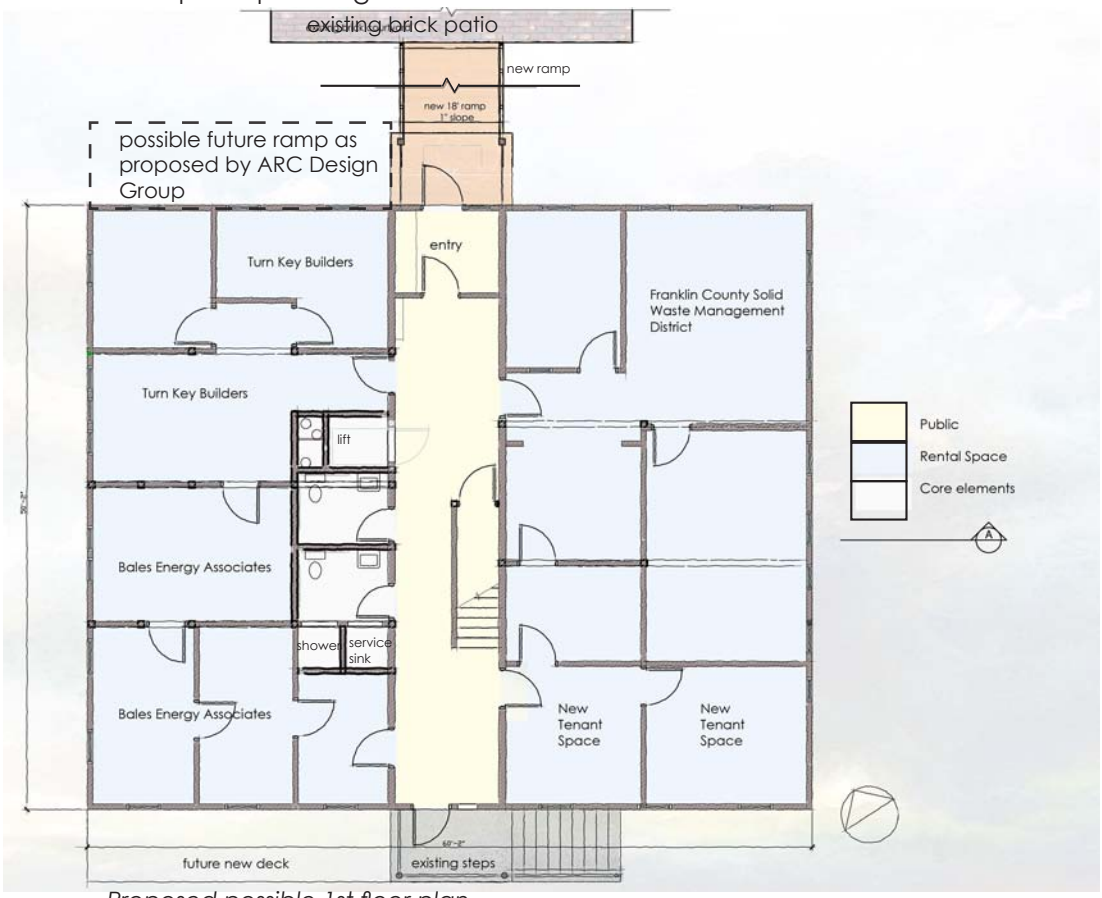
Modified Second Floor Space Plan - An open plan surrounding a support core. The blue lines indicate the circulation around the core elements that provide access to all of the work stations and offices.

2.5.1.2. FINAL 50-YEAR SPACE PLAN

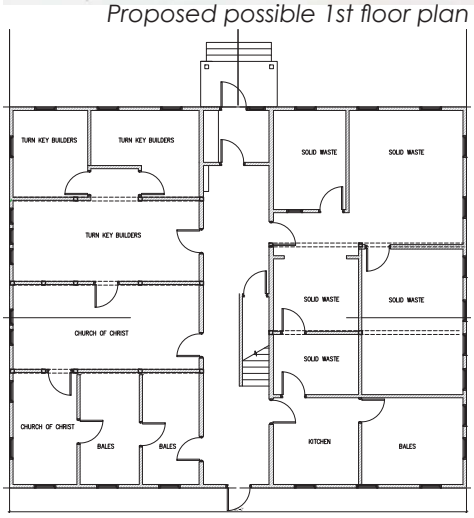
The final 50-year space plan is outlined in this section and shows the final site plan, floor plans, building section, and office space details. The site plan shows minimal change to the exterior of the building and site, with a ramp to the front entry from the public plaza leading to the Energy Park.

Final site plan

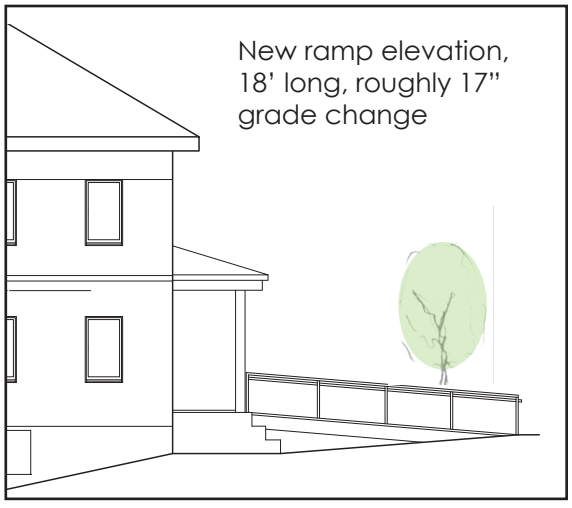
These final floor plans allow for shared "co-office" areas for all building tenants, including the kitchen, conference room, and office support functions, while providing locked access to NESEA space. While this option does require some tenant relocation on the first floor, it can accommodate nearly all of the current tenants. This option also does not require any structural changes and complies with all current code requirements including accessibility. The proposed first floor plan shows the minimal changes with the core and ramp. Over time with changes in tenant use, office layouts can become more oriented to daylight and/or open, neighborhood, or other office space planning ideas.



Proposed possible 1st floor plan

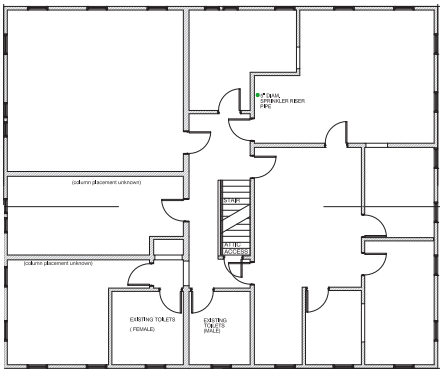


Existing 1st floor plan

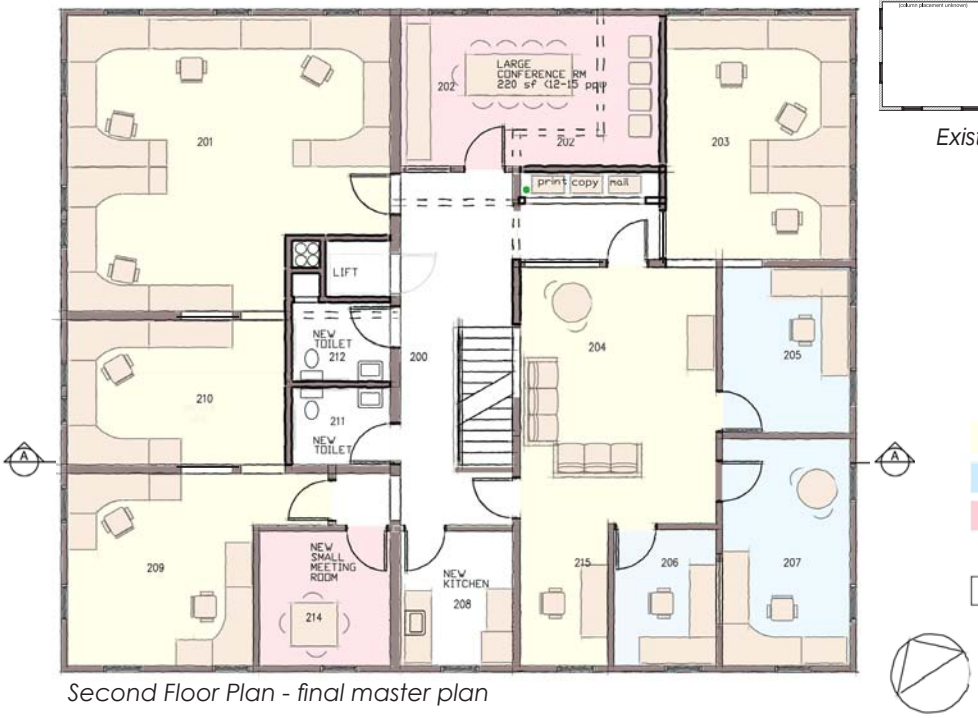


Minimal changes to the outside of the building are proposed. At the front door a ramp is proposed connecting to the brick plaza in the front of the building. In the long term a ramp under an enlarged porch, as proposed by ARC Design Group in 1994, would be a more attractive alternative. Additional exterior changes when the building is re-skinned could be a possible large deck off of the central corridor on the south side, adjacent to the railroad tracks for tenant use.

The second floor also has minimal changes and includes a circulation loop around the stairs with a central bathroom, stair, and lift core. Open and closed office spaces are located around this core. The proposed second floor plan also could be accomplished incrementally.



Existing



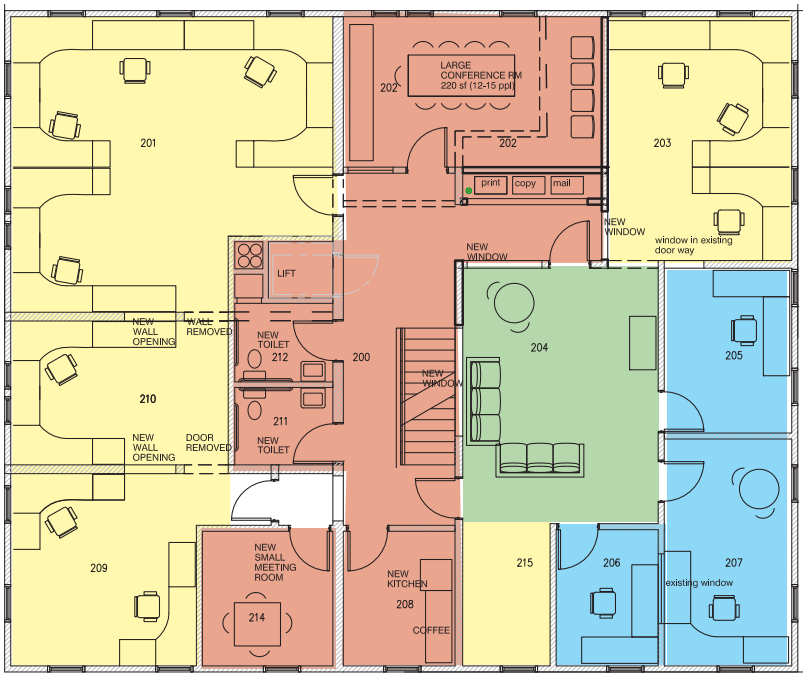
Second Floor Plan - final master plan

NESEA Open office

NESEA Closed office

Meeting Rooms

Common spaces for all tenants



Second Floor Plan - type of spaces delineated

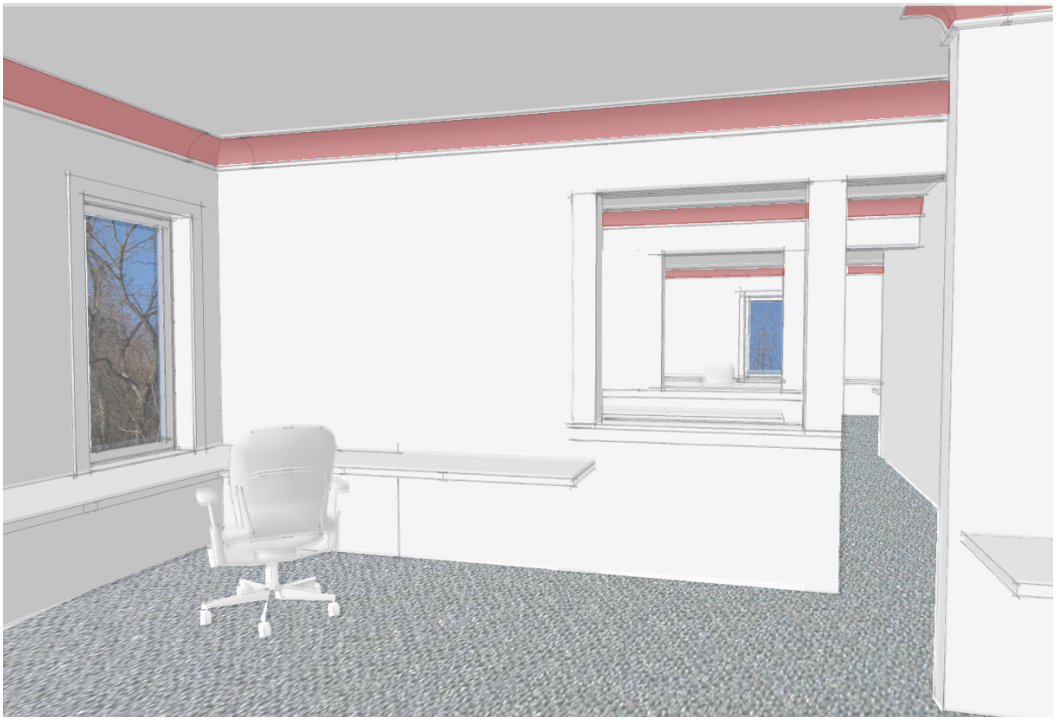
Co-office areas

Open Offices

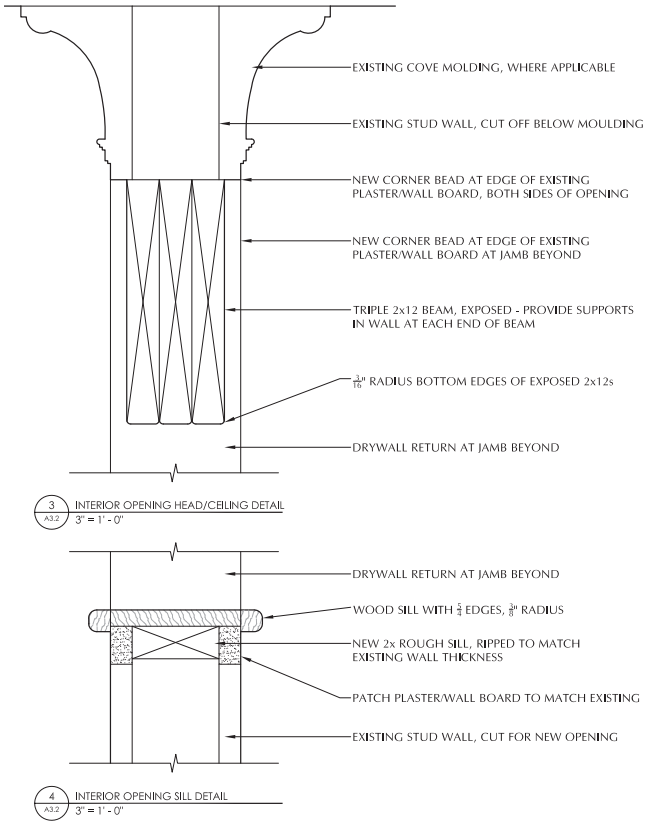
NESEA Open Lounge

Closed Offices

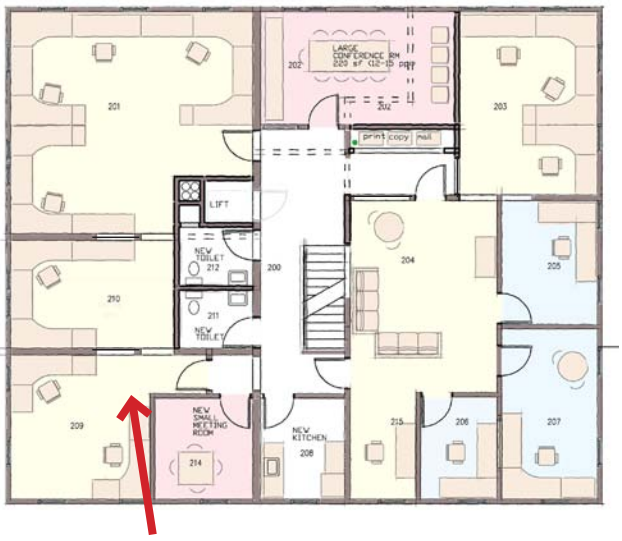
This plan creates semi-open offices which will encourage collaboration among staff; enable more efficient heating, cooling, and ventilation distribution; and use the existing walls as much as possible to reduce structural change. All likely load bearing walls and/or columns are not disturbed. Only small alterations occur such as interior window openings and new circulation paths. The sketch below, building section, and detailed section show how the goal of increased openness and connectivity is accomplished minimizing structural and mechanical costs.



Sketch view showing openings connecting work spaces along the West central area to allow openness and daylight penetration with minimal or no structural impact.

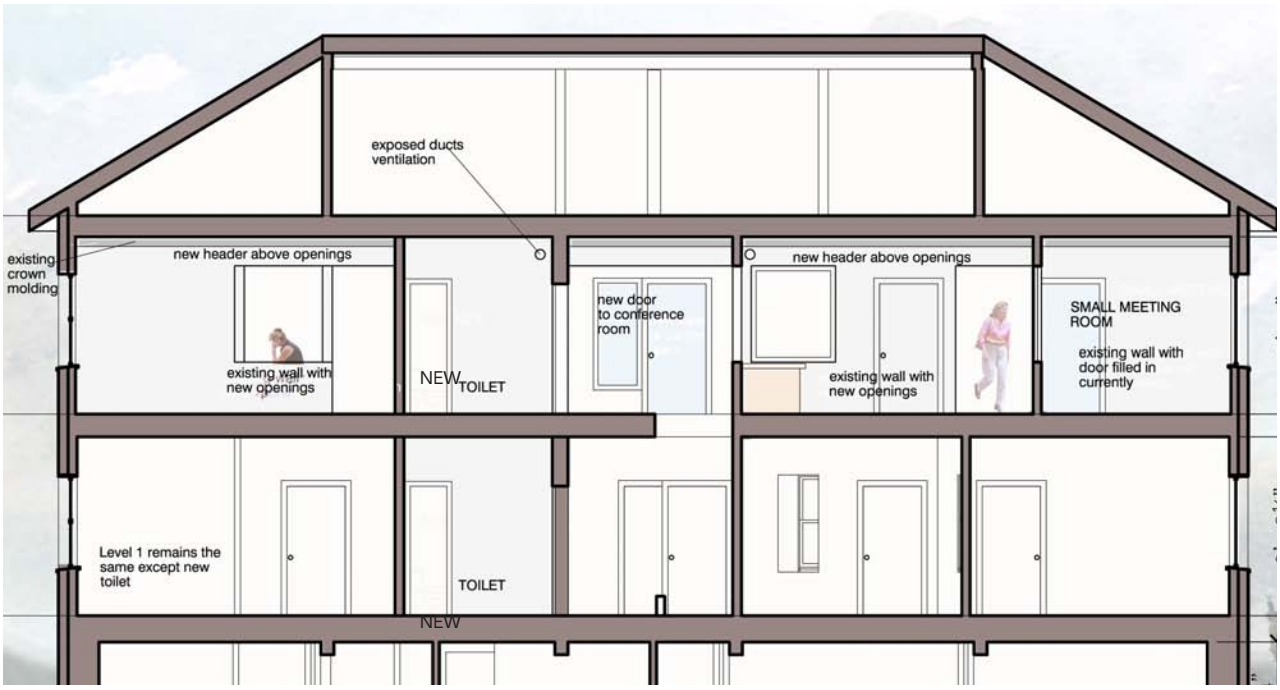


Section showing the interior wall opening detail to maintain the existing structure and historic trim.



Plan showing the location of the sketch view

Building section



Building Section Detail of the Second Floor changes. All building systems including HVAC, sprinkler, and electrical are proposed to be exposed for transparency, cost, ease of future changes, and minimizing disturbances to existing finishes.

2.5.2. BUILDING ENVELOPE

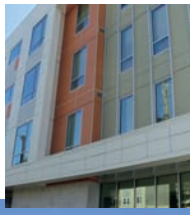
The existing building enclosure is deteriorating and is less insulated than recommended for a net zero ready building. While the energy goals for the master plan are to be a net zero building, of equal (or even greater) importance is addressing the building durability and resilience of the enclosure to be good stewards for the long term.

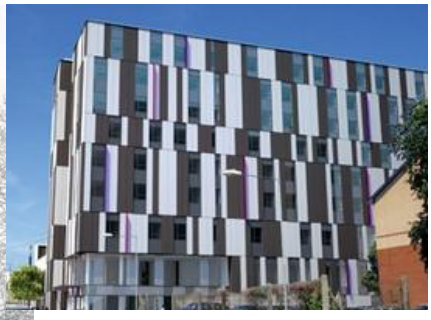
2.5.2.1. BUILDING ENVELOPE PROCESS

The building investigation indicated that the building enclosure does not have a proper air, moisture, or vapor control management system. If water gets behind the stucco there does not appear to be an adequate drainage plane. The minimal existing drainage plane is asphalt impregnated paper without adequate detailing at doors, windows, and trim. Air and water vapor control are also insufficient. The exterior stucco and wood trim have exceeded their useful life. The building insulation generally meets the current building code, but it does not meet net zero metrics (R60 roof, R40 walls, R20 below grade insulation, R5 windows, and 0.1 cfm50/sf above grade surface area at 50 pascals, with an EUI of 10-20 kBtu/sf-yr).

The upgrade of the wall assembly is an objective of the 50-year master plan to net zero ready or net zero standards. Given the deterioration of the building exterior and the benefits of exterior insulation to allow for a continuous air, water, and vapor control layer, the exterior enclosure design strategy is to insulate the exterior while installing continuous air, water, and vapor control layers. The first option investigated was the removal of the existing stucco and the installation of new exterior insulation, water, air and vapor control layers on top of the existing sheathing. Given the very small building setbacks from the property lines, challenges with getting easements from the adjoining landowners, having to move NESEA staff and tenants out of the building and cost; a strategy for leaving the stucco in place was investigated. To accomplish installing insulation and other building control layers over the existing stucco, both board foam and sprayed urethane foam were investigated and the two best options are included below in the detailed wall sections. Particular attention is required at the roof and wall intersection. Typical window and door details are also included. These wall assemblies assume Hardi panel as a exterior cladding, and a few options are attached. These options could have paint colors to match the existing colors or could have more abstract patterns as shown in the precedent examples.

Since a new building skin is needed for protection of weather, our financial analysis only included the cost of insulation as an energy expense.





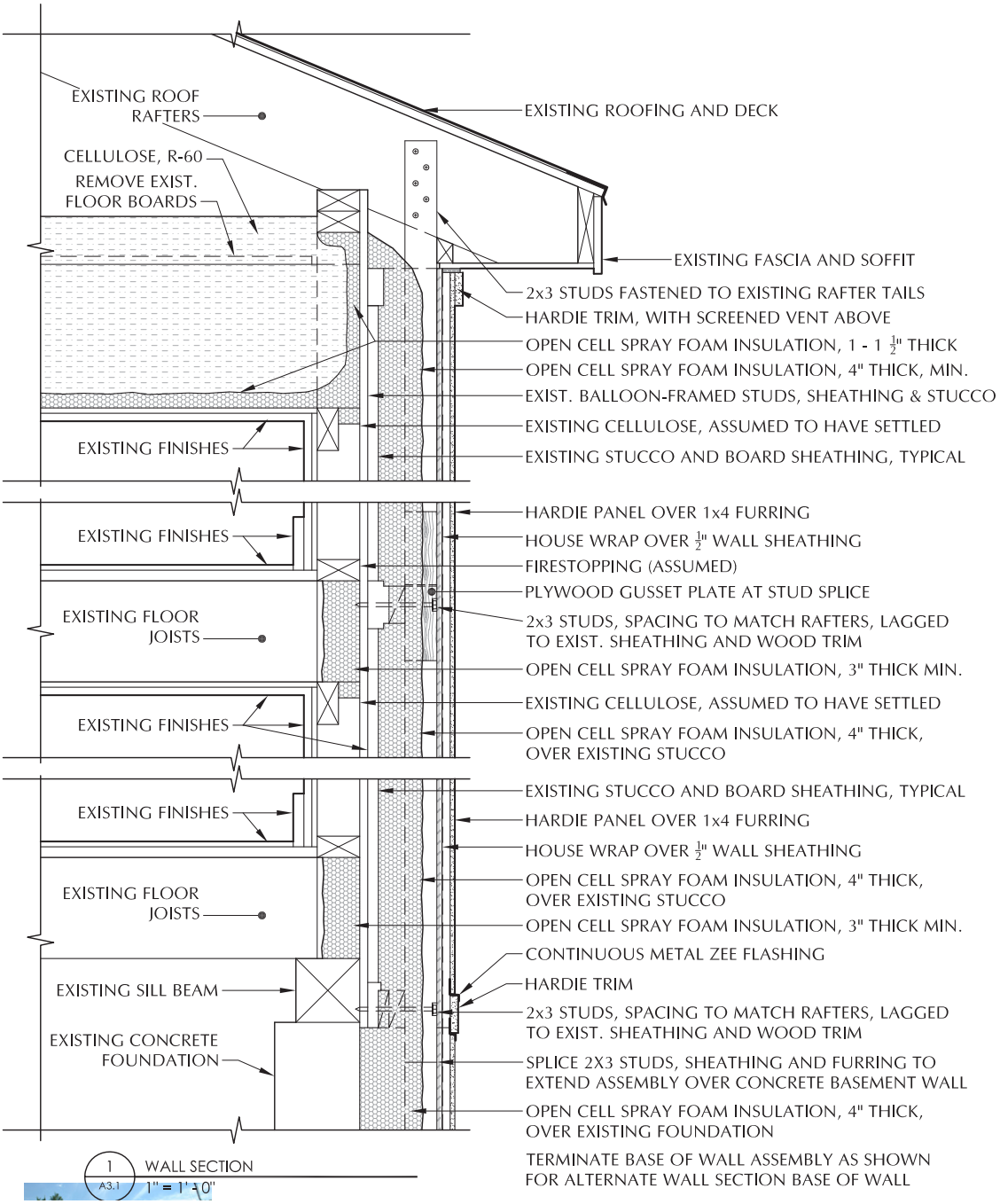
Hardi Panel precedents

Preliminary Front Elevations using Hardi Panel cladding, and showing an option of a future porch with an entry ramp.

2.5.2.2. FINAL BUILDING ENVELOPE

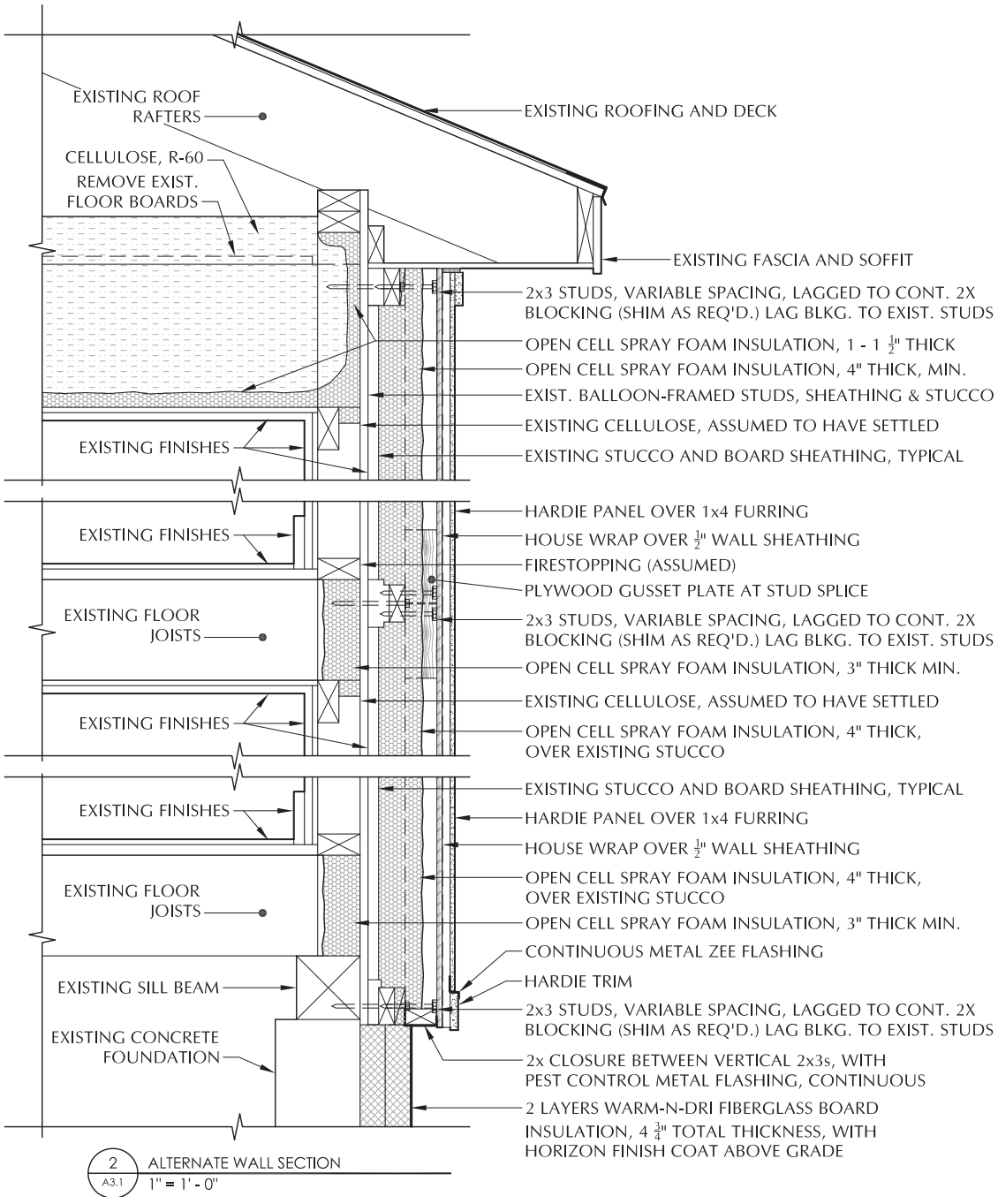
DEEP ENERGY RETROFIT - Wall Assembly Option 1

The wall section below shows an approach that leaves the existing stucco in place, while wrapping the building in spray foam insulation to achieve an air barrier with additional insulation. The structure for supporting the Hardi Panel siding is bolted to, and hangs from, the exposed rafters.



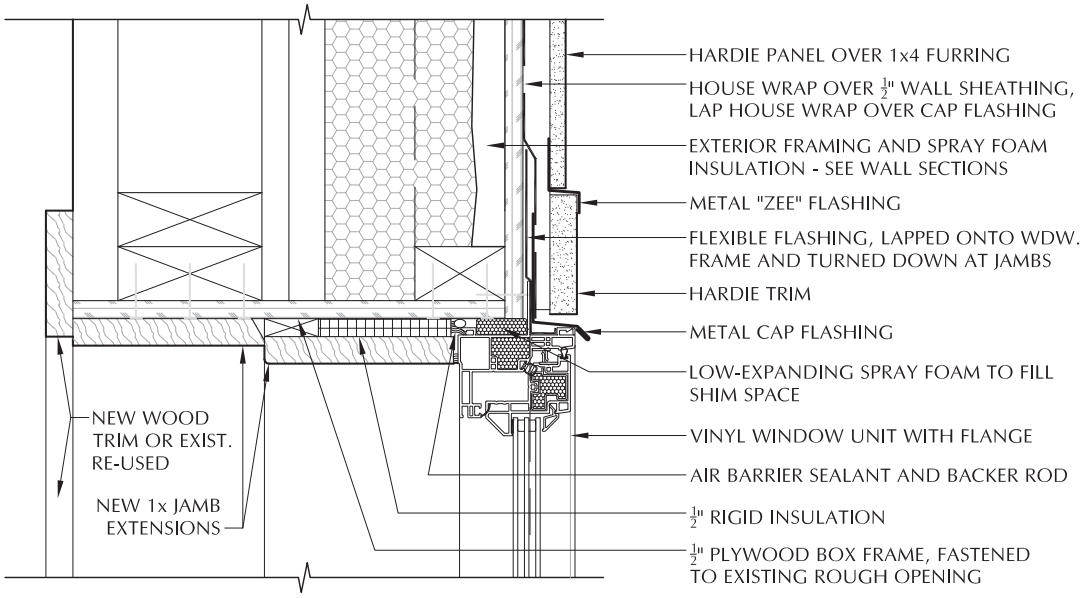
DEEP ENERGY RETROFIT - Wall Assembly Option 2

The following details a secondary approach to leaving the existing stucco in place. The structure supporting the Hardi Panel siding is bolted through the existing wall into the exterior sheathing.

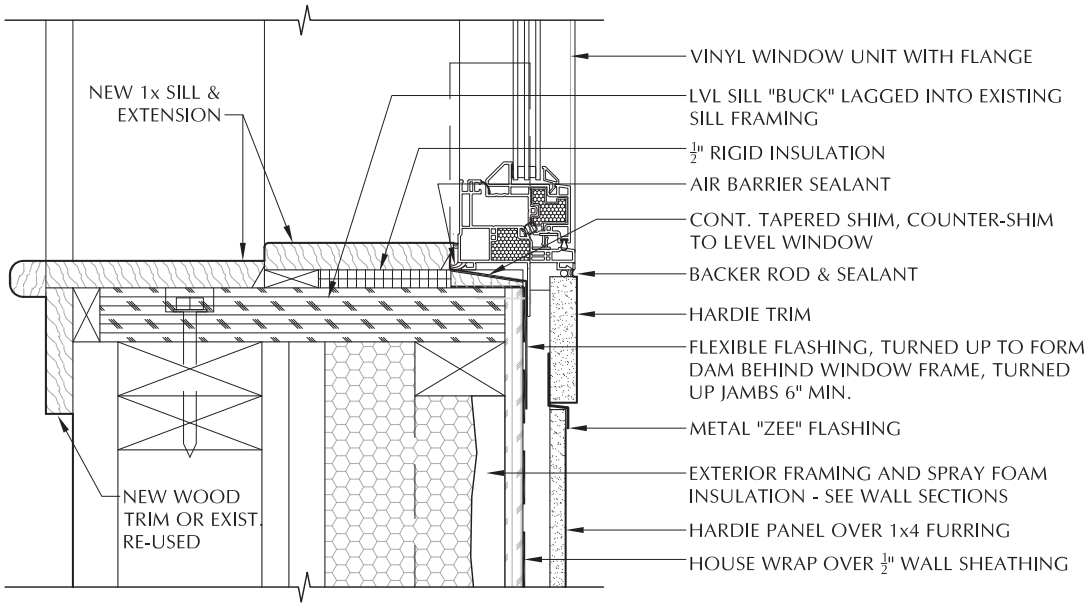


DEEP ENERGY RETROFIT - Window Detail

The following window sill and header detail brings the new windows flush with the Hardi Panel siding.



1 / A3.2 WINDOW HEAD DETAIL (DOOR SIMILAR)
3" = 1' - 0"



2.5.3. BUILDING SYSTEMS

Current building systems are inadequate to provide occupant comfort year round. The existing mechanical system for heating is a natural gas boiler with hot water distribution. Inadequate zoning of the heat distribution causes occupant discomfort in the winter. In the summer, air conditioning is from window air conditioning units on the second floor, which do not adequately supply cooling. There is a single mini-split unit on the first floor for only a portion of the building. There is no ventilation system in the building.

2.5.3.1. BUILDING SYSTEMS PROCESS

Different systems were evaluated with a focus on increased comfort for the building occupants. Minor improvements to the heating system are suggested in the short term to improve comfort. However, in the long term, new heating, cooling, and ventilation systems are recommended, and would greatly improve the occupant comfort. Regardless of heating and air conditioning choices, ventilation is recommended when (or before) the building enclosure is improved as it will be required for indoor air quality and required by code. When ventilation is added, heat and energy recovery is recommended. Electrical systems are also beyond their useful life and need upgrading to the current code.

2.5.3.2. FINAL BUILDING SYSTEMS

The final building systems proposed are an improved HVAC distribution system with air source heat pumps and a heat recovery ventilation system, which are both necessary for occupant comfort and productivity. The current demand for air conditioning is not adequately met with the window units, so an air source heat pump is the best investment for adding building wide air conditioning. The air source heat pump also has the capacity for heating, therefore it is the most prudent investment in the long term and will enable the building to be net zero.

However, the current low cost of natural gas shows little financial gain in annual operating cost savings in converting the building to a heat pump system. Significant capital expense is required for any well-performing, durable heating, cooling, and ventilation system. The expense in upgrading the HVAC systems will likely increase the value of the building as well as provide the potential for increasing rents from tenants.

The proposed ventilation and mechanical layouts are located in the Appendix.

2.6. BUILDING IMPROVEMENT ANALYSIS AND PRIORITIZATION

While the 50-year master plan is the eventual goal, the focus of this master plan was making concrete and cost effective building improvements in Phase 1 with a maximum budget of $250,000. Initial estimating determined that the 50-year master plan appeared well matched to the total project budget of $1 million (in current dollars). However, achieving the goals and objectives for Phase 1 were more challenging.

This section documents the process of prioritization, including challenges which led to modification of the Phase 1 budget into two sub-phases. The phasing prioritized workplace productivity and health, code requirements, energy and carbon analysis, building durability and maintenance, and environmental stewardship.

2.6.1. PRIORITIZATION PROCESS

To make the most prudent investment, a fine-grained analysis, careful prioritization, and ultimately a new implementation strategy was required. The process of prioritization was to sort potential building improvements into different building packages of components such as air source heat pumps, lift, wall upgrade, bathrooms, etc. The list of components is located in Section 2.6.2.

These components of improvements were then priced and assessed as to which project goals they contributed to, and for their importance for Phase 1. In order to categorize the components, they were grouped into four major revised project goal areas and carried through the analysis:

Workplace Productivity and Health

Code

Energy and Carbon

Building Durability and Maintenance

The original project goal of Environmental Stewardship was incorporated into all of the components above and therefore not prioritized separately.

2.6.2. COST ESTIMATING PACKAGE OF COMPONENTS

This cost breakdown shows the overall project cost of $1 million, which is consistent with the project master plan 50-year budget. Wright Builders provided the cost estimating. The full list to implement the master plan is shown below. A detailed description of each component is located in the appendix.

In the initial round of estimating, Category 3. Energy/Carbon was the main driver for energy improvements. However, with further consideration most building improvements contributed to multiple project goals and thus the allocations of costs to different goals categories is shown as the modified breakdown. Since the ERV and air source heat pumps are primarily increasing occupant comfort, approximately 80% of their cost is allocated to occupant comfort and 20% of their total cost is allocated to energy in the modified breakdown.

Category	Components	Initial breakdown	Modified breakdown
1. Workplace Productivity and Health	ERV Package First floor	-	$ 12,500
	ERV Package Second floor	-	$ 12,500
	First Floor heat pump (ducted central system)	-	$ 30,000
	Second Floor heat pump (wall mounted heads)	-	$ 40,000
	Finish New Second Floor bathrooms	$ 13,000	$ 13,000
	New small conference room at the top of the stair	$ 16,000	$ 16,000
	Remove stairs to attic, and make window in Rm 204	$ 10,000	$ 10,000
	Kitchen moved to Second floor Rm 208	$ 12,000	$ 12,000
	Vestibule Upgrade	$ 23,000	$ 23,000
	First Floor Shower	$ 6,000	$ 6,000
	First floor remaining renovation	$ 67,000	$ 67,000
	Second floor remaining renovation	$ 45,000	$ 45,000
	Demo existing bathrooms and make one office, one copy room	$ 11,000	$ 11,000
	Create open offices in Rm 201-210-209	$ 9,000	$ 9,000
	First floor lighting upgrade ($7/sf)	$ 19,000	$ 19,000
	Second floor lighting upgrade ($7/sf)	$ 13,000	$ 13,000
	Section Subtotal	**$ 244,000**	**$ 339,000**
2. Code	First Floor Access	$ 158,000	$ 158,000
	Electrical Renovations- (unknowns)	$ 22,000	$ 22,000
	Lift (1st and 2nd floor stops)	$ 40,000	$ 40,000
	Section Subtotal	**$ 220,000**	**$ 220,000**
3. Energy / Carbon	Attic Insulation Package	$ 26,000	$ 26,000
	Building Insulation -First and Second Floor	$ 214,000	$ 64,000
	Extend Exterior Insulation to basement level	$ 47,000	$ 14,000
	ERV Package First floor	$ 15,000	$ 2,500
	ERV Package Second floor	$ 15,000	$ 2,500
	First floor heat pump	$ 35,000	$ 5,000
	Second floor heat pump	$ 45,000	$ 5,000
	Section Subtotal	**$ 397,000**	**$ 119,000**
4. Building Durability & Maintenance	Tune up existing heating	$ 8,000	$ 8,000
	Building Skin -First and Second Floor	$ -	$ 150,000
	Extend Exterior Insulation to basement level	$ -	$ 33,000
5.Environmental Stewardship *(Incorporated in all work)*	**Section Subtotal**	**$ 8,000**	**$ 191,000**
Phased Project Budget	**All Sections Total**	**$ 869,000**	**$ 869,000**
NOTE: all costs are in 2014 dollars	50 Plan study	$ 20,000	$ 20,000
	12% design fee	$ 104,280	$ 104,280
	10% owner's contingency	$ 86,900	$ 86,900
	GRAND TOTAL	**$ 1,080,000**	**$ 1,080,000**

Two of the most significant areas in terms of reallocation of expenses from the initial to the modified breakdown were adding ventilation and air conditioning, which likely increases energy consumption while increasing comfort, and allocation of the building skin costs to durability rather than energy.

2.6.3. COST ESTIMATE ANALYSIS

The cost estimate breakdown by components was analyzed by the design team and building committee by looking at the project goals.

2.6.3.1. WORKPLACE PRODUCTIVITY AND HEALTH

Having a healthy, productive and inspiring workplace for employees was the top priority. The modified breakdown in section 2.6.2 reflects the realization that air conditioning and ventilation actually increases energy consumption so they are more appropriately placed in the workplace category rather than the energy category.

2.6.3.2. CODE

With the building code review it became clear that meeting accessibility requirements was a critical cost driver and a financial challenge for initiating building improvements. The Accessibility Code in the State of Massachusetts mandates full accessibility compliance when new construction is above $100,000 over 3 years, or more than 30% percent of the assessed value of the building is spent on construction improvements. Meeting the full accessibility compliance in Phase 1 would exceed the proposed budget of $250,000.

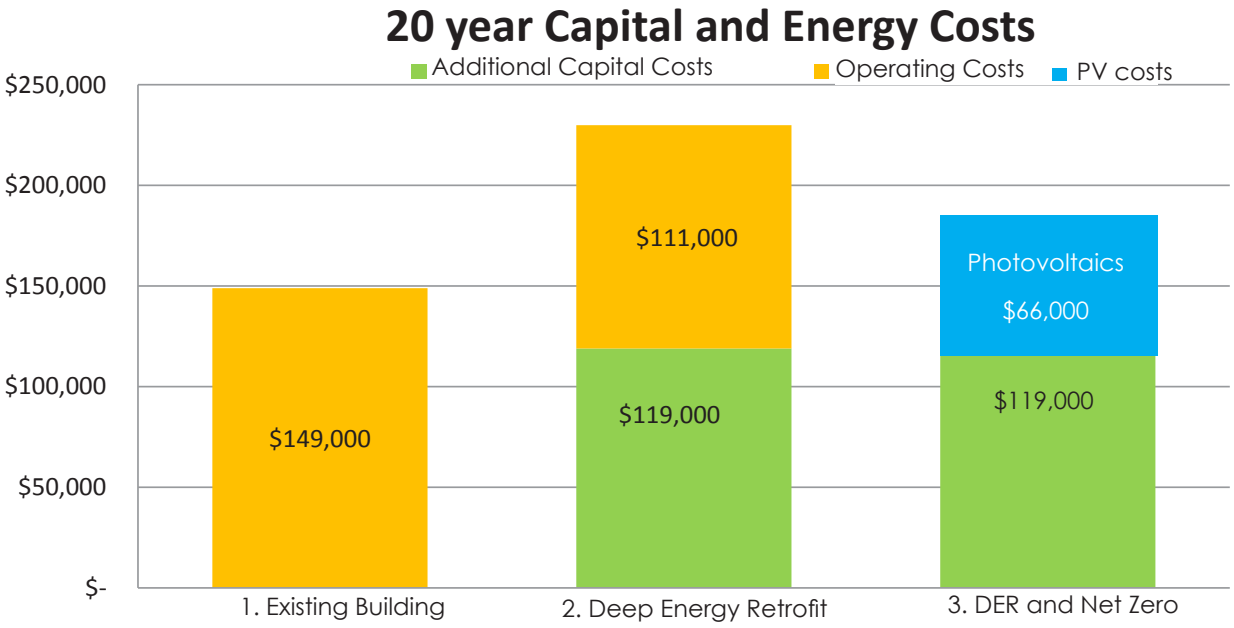
Therefore the Building Committee decided to break Phase 1 into small packages to keep the renovation costs under $100,000 over three years and incrementally work toward full accessibility and the final master plan.

The current assessed value of $325,900 from March 2009 would make the maximum spending $97,770. The Building Committee is investigating with the town the possibility of raising the assessed value of the building and increase this cap.

2.6.3.3. ENERGY / CARBON

Given NESEA's mission, energy is a critical priority for the project. Detailed energy modeling and financial analysis is included in the appendix. Highlights from the complete energy analysis include the following:

- Energy Use Intensity
  - Existing EUI is 37 kBtu/sf-yr
  - Net Zero Ready EUI is 13 kBtu/sf-yr (Well within the 10-20 kBtu/sf-yr recommended usage)
- Annual Carbon Generation
  - Existing carbon produced excluding PV is 37,244 lbs/yr
  - Net Zero Ready carbon produced excluding PV is 20,700 lbs/yr
- First year operating costs including all fuels, electricity and water
  - Existing operating costs are $5,900 / year
  - Net Zero ready operating costs are estimated to be $4,900 / year for a $1,000 savings/ year
- Additional cost for energy improvements $119,000
  - Energy improvements can be implemented incrementally
- Net Present Value of 20-year operating and capital costs
  - Existing building operating costs are estimated at $149,000 (See 1. below)
  - Deep Energy Retrofit completed year 1 estimated total costs are $230,000 (See 2. below)
  - Deep Energy Retrofit completed year 1 with Photovoltaics (assumed $4/watt installed) that cover entire building load is estimated to be $185,000 (See 3. below)
- Return on Investment of all energy improvements 0.77%



The building currently performs relatively well, so further energy improvements offer lower ROI's than a poorer energy performing building. The current building also performs better than might be expected due to inadequate heating and cooling for occupant comfort because of the current heating and cooling systems with no mechanical ventilation.

2.6.3.4. BUILDING DURABILITY AND MAINTENANCE

The existing building needs ongoing maintenance in a financially prudent manner. The existing exterior stucco, trim and windows need replacement and have exceeded their expected lifetime. When replacement occurs it is the perfect time to implement the full Deep Energy Retrofit and improved building envelope. While the degree of deterioration is unknown, it was agreed that this is not as important as code and workplace productivity items and therefore not included in the first phase of work.

2.7. PRIORITIZATION

The cost breakdown in Section 2.6.2. Cost Estimating Package of Components, indicates costs and breakdowns by goal for the entire 50-year master plan. The design team and building committee prioritized components for Phase 1. The initial Phase 1 and the modified Phase 1A and 1B are shown below.

2.7.1. INITIAL PHASE 1

Initially the phase 1 budget was $250,000, and the building committee recommended that Phase 1 consist of incremental improvements toward full building accessibility while providing workplace improvements. These improvements included the new accessible bathrooms on the first and second floor, access ramp to the building, and lift from the first to the second floor.

The design team and building committee reviewed the components and the cost estimates associated with each and pulled out the components that would comprise phase 1. These costs including design fees and the study totaled $309,000, which was $50,000 above the Phase 1 budget. The majority of the item costs were for accessibility, including the first floor bathrooms, access ramp, and lift. The initial phase 1 costs are indicated below:

	Category	Component	Phase 1	Maintenance
Phase 1	**1. Workplace Productivity and Health**	Lift (1st and 2nd floor stops)	$ 40,000	
		Finish New Second Floor bathrooms	$ 13,000	
	2. Code	First Floor Access	$ 158,000	
	3. Energy / Carbon	Attic Insulation Package	$ 26,000	
	4. Durability+Maintenance	Tune up existing heating		8,000

5.Environmental Stewardship *(Incorporated throughout all work)*

	Phase 1 Budget	Phase 1 Actual
Sub total	$ 196,000	$ 237,000
50 Plan study	$ 20,000	$ 20,000
12% design fee	$ 23,520	$ 28,440
10% owner's contingency	$ 19,600	$ 23,700
TOTAL	**$ 259,000**	**$ 309,000**

NOTE: All costs are in 2014 dollars

The initial Phase 1 components exceeded the budget and also exceeded the $100,000 in 3 years threshold that triggers full accessibility compliance. NESEA decided to divide improvements in Phase 1 into two sub-phases (1A and 1B) with Phase 1A being $100,000 or less. This way NESEA is able to move forward incrementally toward the 50-year master plan.

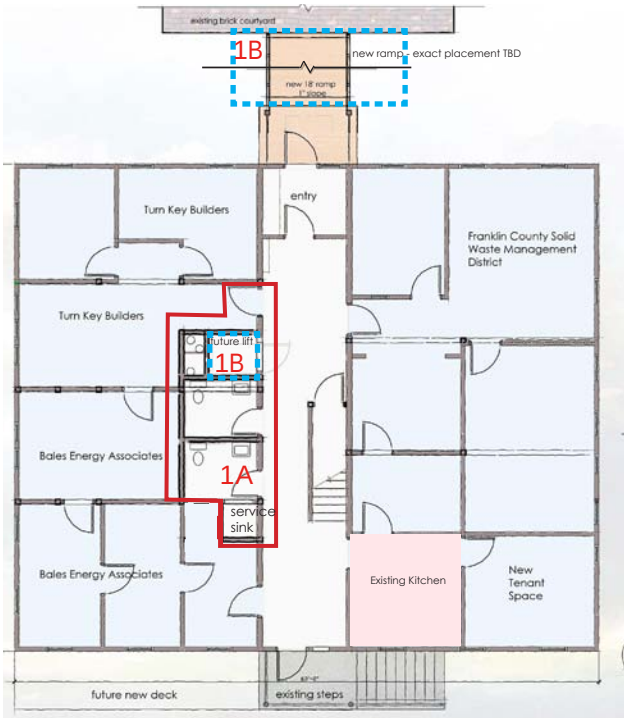
2.7.2. MODIFIED PHASE 1A AND 1B COMPONENTS

With the first $100,000 investment, NESEA building committee decided to implement the following components of Phase 1A:

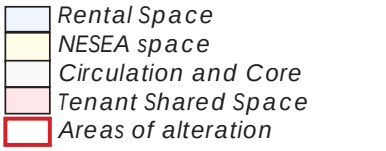
1. Construction of the central core of the two-plus-two toilet rooms on first and second floors together with the lift shaft (and large enough to accommodate an elevator for future options) prepared to accept either a lift or an elevator.
2. Removal of plumbing fixtures from the existing toilet rooms — leaving connection for future (staff kitchen) sink. Plumbing reorganization to achieve this.
4. Relocate or create three doors on the second floor to rationalize the offices that are affected by the new core.
5. If the budget allows the attic air sealing and insulation.

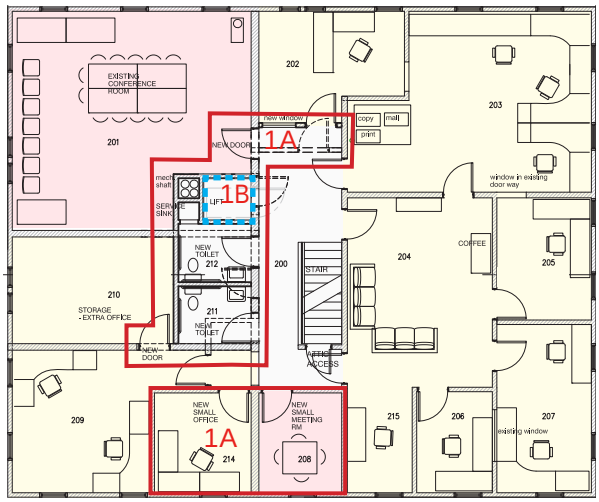
These items in Phase 1A omit the first floor access ramp and lift, which will be completed in Phase 1B.

Maintenance, floor finishes, painting, and certain fit-up would be outside these costs and could be completed by NESEA volunteers in coordinated work weekend(s) as have occurred successfully in the past. Therefore the project cost numbers, shown on the next page, likely will change and are a rough estimate at this time. Additionally, the Building Committee is looking into raising the building assessed value, which will increase the cap of Phase 1A and future phases.

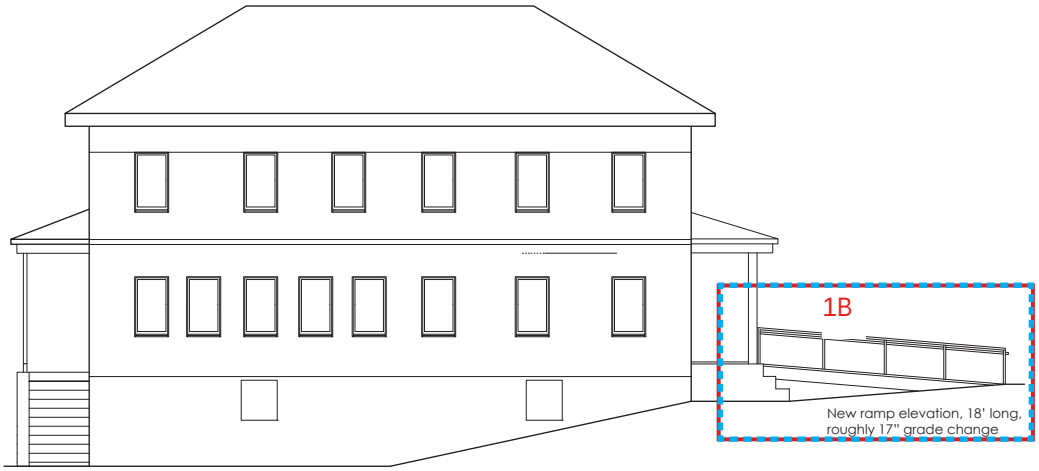


First floor phase 1A and 1B changes showing the new walls and new door placement into Rm 115





Second floor Phase 1A and 1B changes showing the new core and the three door changes adjacent to the core. Additionally the existing bathrooms on the south wall would be converted into offices.



East Elevation shows the Phase 1B access ramp to the front door

The following table breaks down the proposed Phase 1A and 1B costs.

	Category	Component	Phase 1A	Phase 1B
Phase 1	**1. Workplace Productivity and Health**	Lift (1st and 2nd floor stops)		$ 40,000
		Finish New Second Floor bathrooms		$ 13,000
	2. Code	First and second floor core and bathrooms, access ramp - possible member time donations to finish the bathrooms not included	$ 75,000	$ 83,000
	3. Energy / Carbon	Attic Insulation Package		$ 26,000
	4. Durability+Maintenance	Tune up existing heating	$ 8,000	

5.Environmental Stewardship *(Incorporated throughout all work)*

Project Budget	Phase 1A Budget*	Phase1A	Phase 1B
Sub total	$ 87,770	$ 83,000	$ 162,000
Initial 50 yr plan study not included			
12% design fee		$ 9,960	$ 19,440
10% owner's contingency	$ 8,777	$ 8,300	$ 16,200
TOTAL	**$ 97,000**	**$ 101,000**	**$ 198,000**

*exact budget TBD based on raised building assessment

All costs are in 2014 dollars and due to contingencies applied to component costs the final numbers vary slightly.

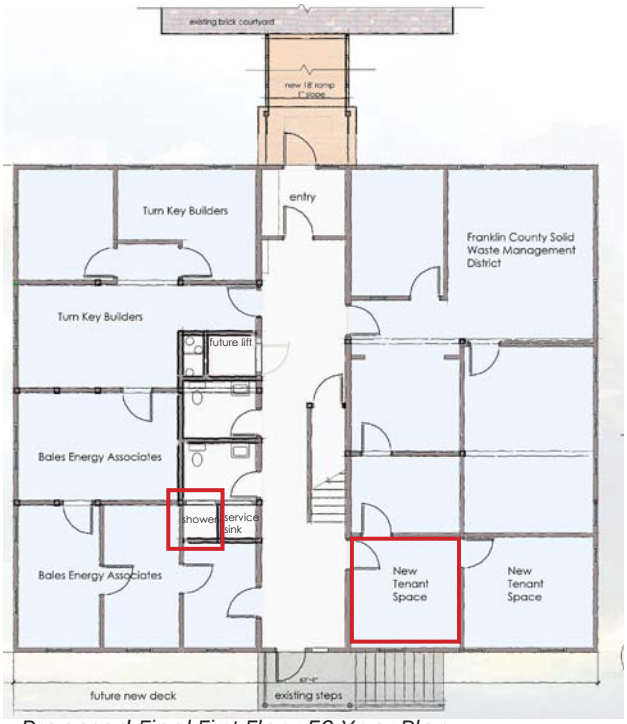
2.7.3. SUBSEQUENT PHASES

The second floor subsequent phases (images below) indicate possible ways for incremental improvements after Phases 1A and 1B. The plan show areas outlined in red that reflect the areas of work that can be done as separate projects or all together as a large renovation. The benefits of doing smaller areas of work is the staff can remain in the building and not be displaced during renovation.

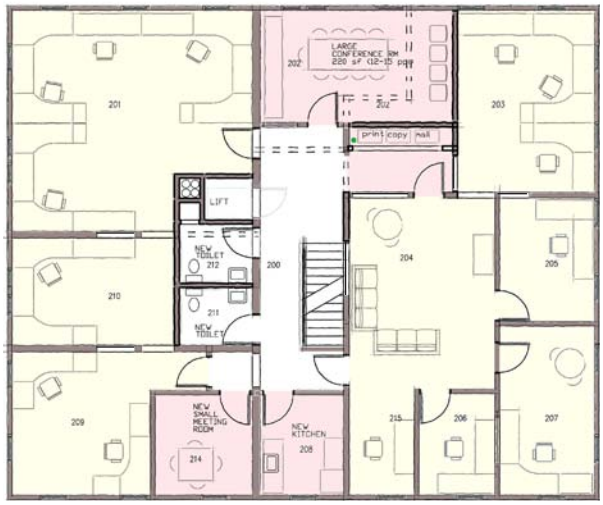
At the time of subsequent work to finish the master plan the building committee should re-examine to determine if the logic and phases should remain the same. There are also opportunities for NESEA member sweat equity to accomplish some of the upgrades.

The remaining components include opening Room 210 to create semi-open offices. The existing conference room would be converted to open offices and the current Room 202 would become a smaller conference room and copy/print area. The kitchen would also be relocated to the second floor.

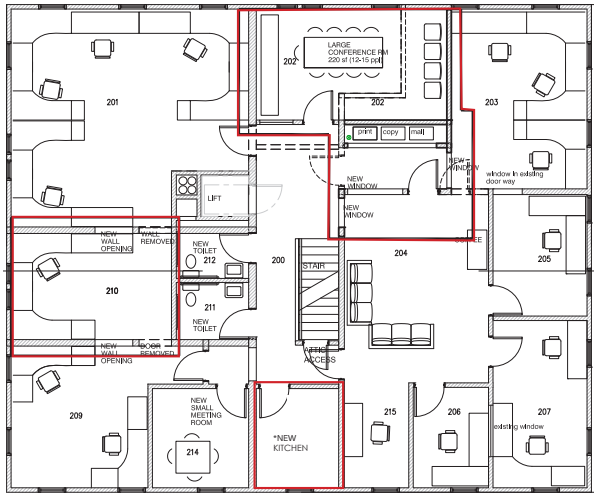
Rental Space
NESEA Space
Circulation and Core
Tenant Shared Space
Areas of alteration



Proposed Final First Floor 50 Year Plan



Proposed Final Second Floor 50 Year Plan



Second Floor subsequent phases areas of work to complete the 50 year master plan with new interior windows and circulation paths behind the core.

The costs of the components in the subsequent phases are estimated at $771,000 in 2014 dollars. This results in an estimated project total of all components and phases to be $1,080,000. This cost includes possible work done by NESEA members or in-kind donations, which if implemented would reduce the overall project cost.

	Category	Component	Final Phase	Donations
Final Phase/s	1. Workplace Productivity and Health	New small conference room at the top of the stair	$ 16,000	
		Remove stairs to attic, and make window in Rm 204	$ 10,000	
		Kitchen moved to Second floor Rm 208	$ 12,000	
		Vestibule Upgrade	$ 23,000	
		First Floor Access -add on A-Shower/bathroom	$ 6,000	
		First floor remaining renovation	$ 67,000	
		Second floor remaining renovation	$ 45,000	
		First floor lighting upgrade	$ 19,000	*Member sweat equity possible
		Second floor lighting upgrade	$ 13,000	
	3. Energy / Carbon	Building Skin -First and Second Floor	$ 64,000	
		Extend Exterior Insulation to basement level	$ 14,000	
		ERV Package First floor	$ 15,000	
		ERV Package Second floor	$ 15,000	
		First floor heat pump	$ 35,000	
		Second Floor heat pump	$ 45,000	
Donation	1. Workplace Productivity and Health	Demo existing bathrooms and make one office, one copy room		$ 11,000
		Create open offices in Rm 201-210-209		$ 9,000
Maintenance	4. Maintenance INCLUDED IN FINAL TOTAL PROJECT NUMBERS	Building Skin -First and Second Floor	$ 150,000	20,000 (possible window donation)
		Extend Exterior Skin to basement level	$ 33,000	
		Tune up existing heating	$ 8,000	
		Electrical Renovations- (unknowns)	$ 22,000	

5.Environmental Stewardship *(incorporated in all work)*

Subsequent Phases **Sub total**	$	632,000
50 Plan study	$	-
12% design fee	$	75,840
10% owner's contingency	$	63,200
TOTAL	**$**	**771,000**
Possible Donations/Materials and work by members	$	20,000
Total with donations	**$**	**751,000**

		Total Project Cost
All components and all phases: **Sub total**	$	869,000
50 Plan study	$	20,000
12% design fee	$	104,280
10% owner's contingency	$	86,900
TOTAL	**$**	**1,080,000**
Possible Donations/Materials and work by members	$	40,000
Total with donations	**$**	**1,040,000**

NOTE: All costs are in 2014 dollars

2.8. IMPLEMENTATION

NESEA BOARD APPROVAL

The NESEA Board approved in May 2014 to break Phase 1 work into Phase 1A and 1B and accepted to proceed with the $100,000 of work to establish the core building elements and work incrementally toward code compliance and workplace productivity.

- Create core renovations that provide new accessible bathrooms and a vertical shaft for a future lift
- Create effective improvements in energy efficiency
- Provide a meaningful improvement in workplace quality for NESEA staff
- Address critical deferred maintenance and repair issues

FUTURE RECOMMENDATIONS:

- Incremental implementation of the 50-year stewardship plan
- Operations and Maintenance manual update and plan for implementation
- Continue monitoring energy use

3.0. APPENDIX

3.1. BUILDING COMMITTEE QUESTIONNAIRE AND RESPONSE

The initial goals were determined from the responses to the questionnaire delivered to the Building Committee; their answers are shown below in bold italics.

NESEA HEADQUARTERS, 50 Miles St. Planning
Planning Committee Questionnaire – GOALS

NESEA Mission Statement:
NESEA advances the adoption of sustainable energy practices in the built environment

We as a community of professionals recognize and respond to the crucial connections between the generation and use of energy and the whole systems that sustain planetary health.
We envision energy systems that give more than they take:
That preserve and improve our air, water, resources, and ecosystems
That invigorate economies, building local and regional security and self-reliance

That improve the quality of all lives—and all life

1. What aspects of the NESEA mission statement should be prioritized and expressed in the headquarters?

   Strike a good balance rather than prioritize any.

2. Are there other important aspects to consider that are not included in the NESEA mission statement?

   An excellent working environment for staff.

3. What do you see as the most important outcome for NESEA's Headquarters at 50 Miles St?

   A building that appropriately serves the organization rather than becomes a major program of the organization. It should be a good example for what any non-profit can and should do with an older building—not a NESEA-specific treatment. A demonstration process, perhaps, but not a demonstration project.

4. Are there any certifications that NESEA will want to achieve? Or consider?

   No certifications

5. Do you want the headquarters to become net-zero in energy use? ***no***
6. If yes, what definition of net-zero do you want to use? ***N/A***
7. If on-site energy production is desired, where do you see energy production taking place on site?

   Possibly roof-mounted PV; possibly ground-mount system.

8. Do you want the building to be a net-zero water user? ***no***
9. Do you want the building to be a net-zero waste user?

   Even though we don't really know what this means, our answer is probably "no"

10. Other metrics to use?_____

    We're aiming for a net-zero hassle project.
    Source energy in Btus/occupant and Btus/sf
    Gallons of water/occupant
    Document baseline usage and develop aspirational metrics based on that baseline usage.
    At least initially consider 2030 Challenge goals for the project, despite the fact that it

may contradict answers provided above.
Goal is to acquire better data through thoughtful monitoring.

Energy (assuming net-zero energy)

11. Do you have a target EUI for the 1st phase of renovation? Or other prescriptive or performance standards?
    Needs more discussion; possibly in the range of 20% improvement.
    Would like to include simple monitoring (eMonitor, for instance) to disaggregate usage.
12. Do you have a target EUI for the end of the 50 year plan? Or other prescriptive or proscriptive standards?
    An energy consumption number in line with 2030 Challenge goals
13. Do you have any specific ideas/suggestions in terms of energy? (Production v. Consumption, building design strategies)
    Emphasize impact of occupant behavior. Otherwise we're looking to you for ideas here.

Materials/Durability:

14. How would you prioritize material selection? Environmental impact, occupant health, durability, other?
    Heath first, then durable; then environmental impact
15. Do you have a priority for material selection criteria from those mentioned above?
    Occupant health
16. Are there any "red listed" materials that you do not want in the headquarters?
    Let's be mindful of the list and ask questions when appropriate regarding alternatives.
17. Do you think Living Building Challenge red list materials should be considered in design decisions? ***See #16.***
18. How should the global warming potential of materials be considered? (particularly insulation)
    It should be one criterion we consider, in addition to cost, embodied energy, and performance.

Functionality and Adaptability

19. What is the future growth of NESEA staff in 5 years?
    Add 1 to 2 people to current staffing level, but we should really ask Jennifer.

- in 10 years? ***Add 2 to 3 people to current staffing, but we should really ask Jennifer.***
- in 50 years? ***Same as in ten years, but we should really ask Jennifer.***

20. Are there other large meeting space needs? ***no***
21. If NESEA doesn't use both floors, what other uses do you see in this building? (ex: conference, museum, public outreach) ***Rental space for like-minded organizations.***

Access / Community

22. How do you see transportation to NESEA in 10 year? In 50 years?
    Will continue to be cars; cars will become smaller and more efficient.
    Possible access to future passenger rail nearby.
23. How many activities with stakeholders, the public, and the broader NESEA community happen at the headquarters?
    2-3 a month, but we should really ask Jennifer.
24. What are the accessibility goals?
    Code-compliant, AAB

25. What connections to the Greenfield community occur at 50 Miles St currently? In 10 years?

    Not much change unless we start to allow local groups to use the space, post-project.

Budget

26. Are the $250,000 phase one cost, and $1Million (2013$) total project cost still appropriate budget numbers?

    For now, yes.

27. What are the current monthly finance costs related to the building?

    No current mortgage on the building. Cash flow analysis is available on request.

28. What are the expected monthly finance costs for phase I?

    Approximately $1500 per month.

29. Are there other finance considerations?

    Income from sale of on-site renewables. Hoped-for reduced operating costs post-improvement. Possibly lower tenant turnover and operating costs savings resulting from that outcome.

30. Is there anything else you would like to add?

    We're hoping to disentangle building systems as a general strategy going forward.

3.2. STAFF QUESTIONNAIRE

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NESEA HEADQUARTERS, 50 Miles St. Planning
Staff Questionnaire
Name:
Department:
Current Room location: *(or mark on floor plan)*
Affiliation:

NESEA Mission Statement:
NESEA advances the adoption of sustainable energy practices in the built environment

We as a community of professionals recognize and respond to the crucial connections between the generation and use of energy and the whole systems that sustain planetary health.
We envision energy systems that give more than they take:
That preserve and improve our air, water, resources, and ecosystems
That invigorate economies, building local and regional security and self-reliance
That improve the quality of all lives—and all life

1. What aspects of the NESEA mission statement should be prioritized and expressed in the headquarters?

2. Are there other important aspects to consider that are not included in the NESEA mission statement?

3. What do you see as the most important outcome for NESEA's Headquarters at 50 Miles St?

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CHOICES IN SUSTAINABILITY

FUTURE NEEDS

4. What is the future growth of NESEA staff in 5 years?

- in 10 years?

- in 50 years?

Energy

5. What equipment do you currently have in your work station?

6. How often, and for how long, do you use each piece of equipment?

Water – Current consumption:

7. What projected changes in current water use do you foresee in 5 years, 10 years?

Functionality and Adaptability

8. Describe your typical day or week, when and where do you do what?

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CHOICES IN SUSTAINABILITY

9. How do you spend your time in an average week?

	Current	Preferred
Percentage of Time Spent at Workstation:		
Working Alone		
Working with One or Two Others		
Performing Concentrated Work		
On the Computer		
On the Phone		
Working with Paper Documents		
Other - Please Describe Below		
	Current	Preferred
Percentage of Time Spent Away from Desk:		
Working Alone		
Working Alone on Concentrated Work		
With One or Two Other People		
In Confidential Meetings with One or Two Others		
With Three or More Other People		
In Confidential Meetings with Three or More Others		
On Conference Calls or Confidential Calls		
Meetings or Conferences Outside of the Office		

10. What current spaces are underutilized?

11. What current spaces are over utilized?

12. What spaces would you like that you do not have currently?

13. Are there other large meeting space needs?

Privacy

14. In your job function(s) and workspace setting how important is maintaining privacy vs. openness in completing your work? Do you have confidential meetings? If so, how much of your typical day is spent in private meetings?

15. Are there specific situations and times where you require private areas to do your work? and out in the open team oriented areas?

16. If so, do you require visual and/ or acoustical privacy? Please explain. How much quietness or visual privacy do you need?

17. How often do you need a quiet/private space for detailed work, such as report writing?

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Teams & Collaboration

18. Do you work with team(s)? Please describe their functions and roles. How many people? Are your teammates near you? On site elsewhere or off-site? Where and how often do you interact with your teams?

19. How important is face to face interaction between your key team members? If not face to face how do you coordinate working and meeting together?

20. How does your current space or work area support or hinder teamwork and collaboration? What could change to improve this? This could mean physical wall layout, furniture arrangements, lighting, proximity to technology, size of spaces, material qualities, cleanliness, organization, etc.

Productivity & Work Satisfaction

21. Does your work style match your work environment? If yes, how does it? If not, what could change? Are there operational changes which would support a more effective work style? Are there physical changes which could be made in your work area which could help you do a better job?

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22. Are there particular aspects of your work environment that you like and want to see remain as they are?

Project Ideas/Outdoor space

23. Where do you eat lunch?

24. What outdoor spaces to you use near to the building?

25. What outdoor spaces would you like to have next to or near the building?

26. How far do you travel to reach 50 Miles Street, how do you travel, and if you drive, do you drive alone?

27. Are there other office environments that you have admired? If so what are some of the features & qualities that you have liked?

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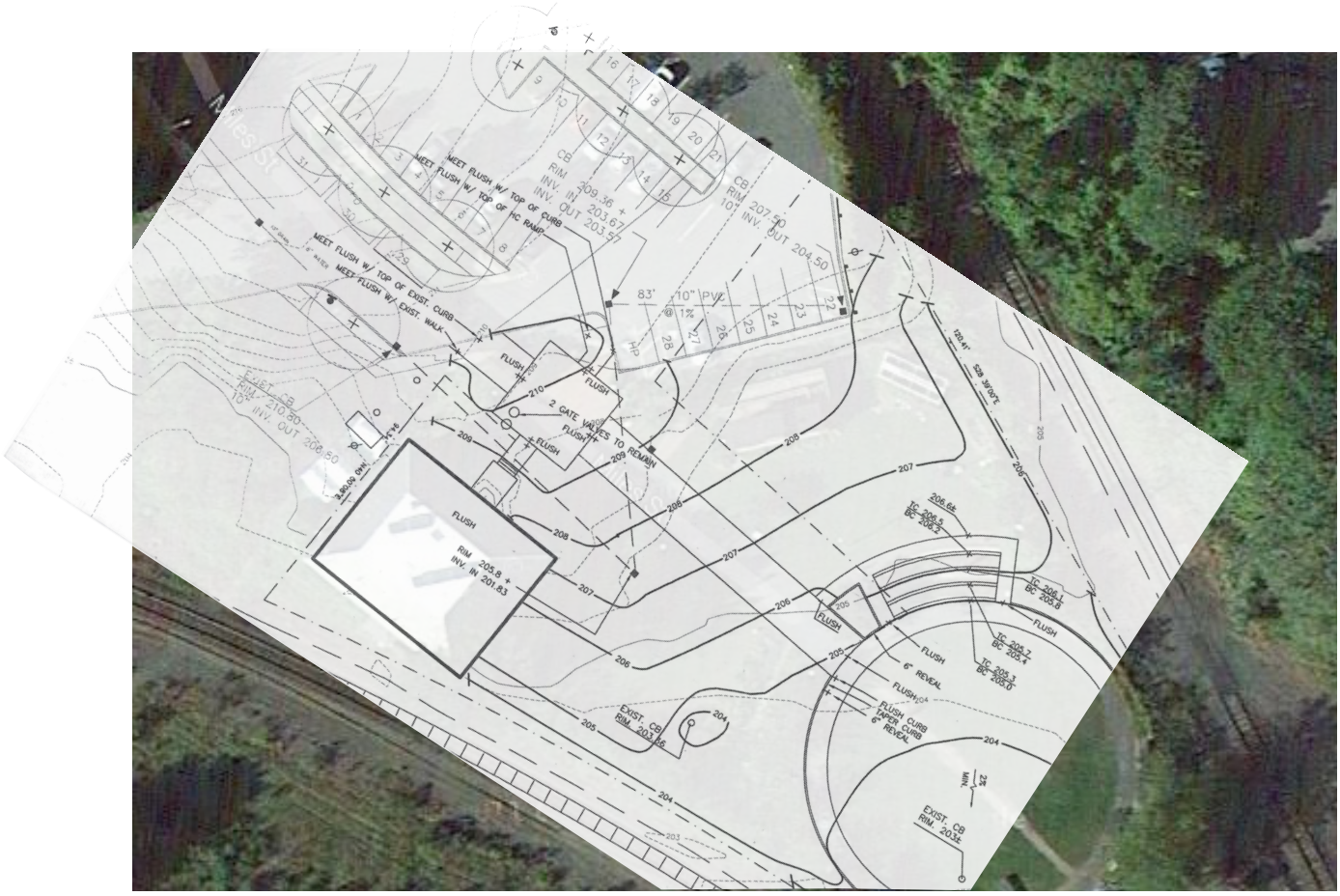
Do you have other ideas or concepts about the overall space and/or common areas? Submit sketches and/or photos of suggestions.

3.3. CIVIL EXISTING SITE PLAN



3.4. AKF PRELIMINARY DESIGN CODE REVIEW

November 14, 2013

Thomas M. Bodell
AIA, LEED AP, Senior Project Manager
50 Miles Street,
Greenfield MA, 01301

Att: Thomas Bodell

Re: 50 Miles Street
AKF Project No. B130331-000

Dear Thomas:

You have requested AKF Group to conduct a pre-design code review for the 50 Miles Street project in Greenfield, Massachusetts. This property is to be occupied by the Northeast Sustainable Energy Association (NESEA). The code requirements described in this letter are not specific to any building as the scope of the proposed work is not yet known. This document is intended to inform the decision-making process by clarifying the code implications of renovations, additions, and changes in use. This letter will attempt to address your concerns previously communicated and the various thresholds of the Massachusetts State Building Code, Access Code, Americans with Disabilities Act, and Massachusetts General Law will be covered.

WORK AREA METHOD

The work area method classifies alterations based on the scope of work being completed. Repairs include the patching, restoration, or replacement of damaged materials, equipment, or fixtures to maintain the existing systems in working order (IEBC 402.1). Level 1 alterations include the removal, replacement or covering of existing parts of the building (IEBC 403.1). Level 2 alterations include any reconfiguration of spaces including the addition or elimination of any door or window, changes to any system, or the installation of any additional equipment where the work area is equal to or less than 50% of the area of the building (IEBC 404.1). Level 3 alterations apply where the work area includes the reconfiguration of space in more than 50% of the aggregate area of the building (IEBC 405.1).

Note that the requirements of the Work Area Method are all inclusive as the Level of Alteration increases. For example, in addition to IEBC Chapter 7 for Level 2 Alterations, such

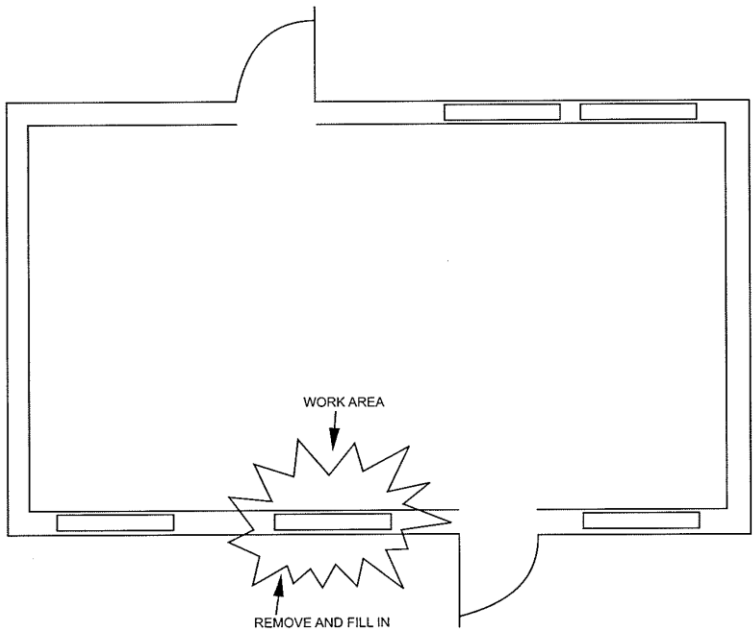
Re: 50 Miles Street.
AKF Project No. B130331-000

work must also comply with the provisions for Level 1 Alterations (IEBC Chapter 6). Likewise Level 3 Alterations must comply with the requirements for Level 1, 2, and 3 (IEBC Chapters 6, 7, and 8). This should be kept in mind while reviewing the following sub-sections.

The proposed changes to the NESEA will most likely exceed 50% of the aggregate building, which means the work will be classified as a Level III alteration. A level 3 alteration will follow all the requirements for Repairs, Level 1, Level 2 and Level 3 alterations listed below.

WORK AREA MEASUREMENT

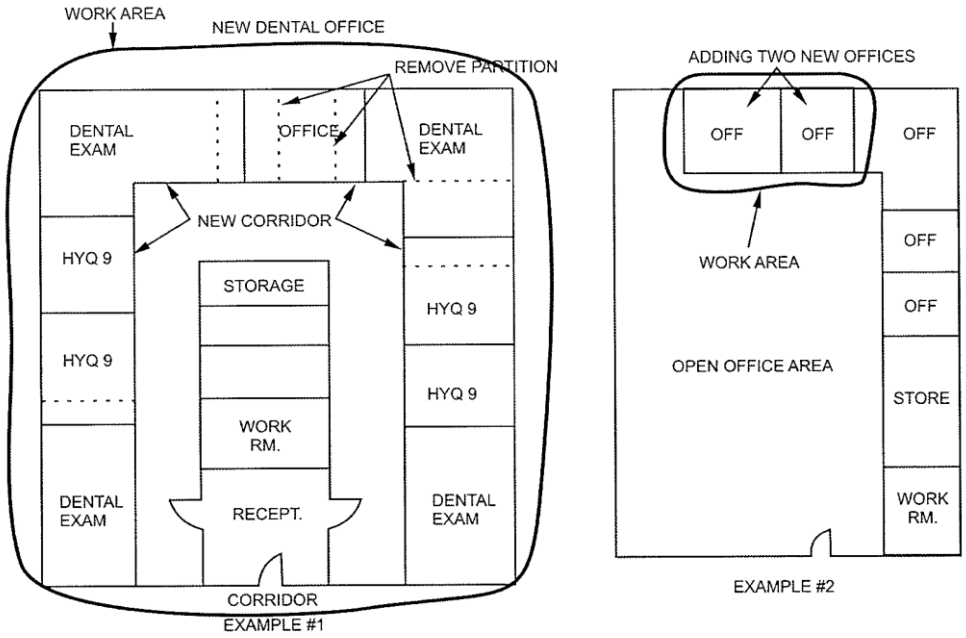
The work area is defined as the portion(s) of a building consisting of all reconfigured spaces as indicated on the construction documents (780 CMR Chapter 34 section202). The work area is the area of the building where the space is being reconfigured. For example if a window is being replaced or removed the work area would be that portion of the wall which would require alteration. The diagram below shows the work area for the removal of a window. The work area contains the window as well as the space around the window which would be affected by its alteration.



WINDOW WITH LIKE CONSTRUCTION
FIGURE 2-9(2)

Re: 50 Miles Street.
AKF Project No. B130331-000

In the office in example 1 (shown in the diagram below) the whole floor is part of the work area because there is a new corridor that runs throughout the floor as well as the removal and construction of partitions throughout the space. The second example shows that only two offices are being added, therefore only the area around the offices is part of the work area.



DETERMINING WORK AREAS
FIGURE 2-9(1)

REPAIRS

New and replacement materials must comply with the code for new construction, however like materials are permitted for repairs and alterations where the existing conditions are not considered an unsafe condition (IEBC 502.2). In general, the existing level of safety and protection throughout the building (i.e. fire protection, means of egress, mechanical systems, etc.) must be maintained when repairs are made. Structural repairs must be reviewed with a structural engineer for compliance with IEBC 506.1.

LEVEL 1 ALTERATIONS

Re: 50 Miles Street.
AKF Project No. B130331-000

Similar to repair work, the existing level of safety and protection throughout the building regarding fire protection and means of egress must be maintained for Level 1 Alterations.

Interior Finishes

All newly installed interior trim materials, and interior wall, ceiling and floor finish (including new carpeting) must comply with the code for new construction based on Use Group and whether or not the building is sprinklered (IEBC 602).

Finish Characteristics

Element	Test Method	Criteria
Wall & Ceiling Finishes	ASTM E84 or UL 723	Class A = FSI 0-25; SDI 0-450
		Class B = FSI 26-75; SDI 0-450
		Class C = FSI 76-200; SDI 0-450
Floor Finish	NFPA 253	Class I = 0.45 W/cm^2 or greater
		Class II = 0.22 W/cm^2 up to 0.45 W/cm2
	DOC FF-1	Pass

Notes:
FSI = flame spread index
SDI = smoke-developed index

Table 803.9 Interior Wall and Ceiling Finish Requirements by Occupancy

Use Group	Walls & Ceilings			Floors	
	Exit enclosures and exit passageways	Corridors	Rooms and enclosed spaces	Exits and corridors	Other spaces
B, E	A	B	C	II	DOC FF-1
B, E (Sprinklered)	C	C	C	DOC FF-1	DOC FF-1

Note that where corridors and exit enclosures are shared by more than one occupancy, the most restrictive finish must be used.

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Energy Conservation

Alterations are permitted without requiring the entire building to comply with the 2009 IECC (IEBC 607.1). Only those systems or portions of the building that are altered are required to comply with the energy conservation requirements for new construction.

LEVEL 2 ALTERATIONS

In addition to the requirements for repairs and level 1 alterations, the following provisions apply to Level 2 Alterations.

Interior Finish

Interior finish of walls and ceilings within the work area must comply with the code for new construction (IEBC 703.4). Where the work area on any floor exceeds 50% of the floor area, the interior finish requirements apply to all exits and corridors serving the work area (IEBC 703.4.1).

Guards

Guards must be provided within the work area where any portion of the floor is more than 30 inches above the floor or grade below and guards are not currently provided or where existing guards are in danger or collapse (IEBC 703.5).

Corridors

Where the work area is located on a floor that is provided with sprinkler protection, the required fire resistance rating of the corridor walls may be reduced in accordance with the code for new construction. The sprinkler coverage must also include the stairwell landings serving the floor and the intermediate landings immediately below (IEBC 704.1.1).

Fire Protection

The following fire protection systems are required within the building as noted.

Re: 50 Miles Street.
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- Sprinklers –Sprinkler protection is required within the work area where the work area exceeds 50% of the floor (IEBC 704.2.2).

Structural

Existing structural elements supporting any additional gravity loads above 5%, including the effects of snow drift, shall comply with the IBC. 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 structural requirements specified in IEBC Section 807.4. Any structural renovations must be reviewed for code implications with a structural engineer.

Mechanical

All reconfigured and converted spaces intended for occupancy in any work area must be provided with natural or mechanical ventilation in accordance with the International Mechanical Code (IEBC 709.1). In existing mechanically ventilated spaces, existing mechanical ventilation systems that are altered, reconfigured, or extended must provide not less than 5 cfm per person of outdoor air and not less than 15 cfm of ventilation air per person or not less than the amount of ventilation air determined by the Indoor Air Quality Procedure of ASHRAE (IEBC 709.2).

LEVEL 3 ALTERATIONS

In addition to the requirements for level 1 and level 2 alterations, the following provisions apply to Level 3 Alterations.

Special Use and Occupancy

- Boiler & Furnace Rooms - Boiler and furnace equipment rooms adjacent to or within multiple dwellings (i.e. dormitories) must be enclosed by 1-hour fire resistance rated construction, unless one of the following exceptions are met (IEBC 802.2):
  1. Furnace and boiler equipment of low-pressure type, operating at pressures of 15 pounds per square inch gauge (psig) (103.4 KPa) or less for steam equipment or 170 psig (1171 KPa) or less for hot water equipment, when installed in accordance with manufacturer recommendations.

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2. Furnace and boiler equipment of residential R-3 type with 200,000 British thermal units (Btu) (2.11 x 108 J) per hour input rating or less is not required to be enclosed.
3. Furnace rooms protected with automatic sprinkler protection.

Interior Finish

Interior finish in exits serving the work area must comply with the code for new construction from the highest work area floor to the floor of exit discharge (IEBC 803.3).

Fire Protection

The following fire protection systems are required within the building as noted.

- Sprinklers – Rubbish and linen chutes located within the work area must be provided with sprinkler protection where required by the code for new construction (IEBC 804.1.2).
- Manual Fire Alarm – A manual fire alarm system must be provided throughout the work area where required by the code for new construction (i.e. Use Group A, B, E, and M). Alarm notification devices must be provided on such floors and must be automatically activated in accordance with the code for new construction (IEBC 804.2.1).

Means of Egress

The following provisions apply to Level 3 Alterations (IEBC 805.1 & 705.1).

- Exit Signs & Means of Egress Lighting – Exit signs and means of egress lighting must be provided from the highest work area floor to the level of exit discharge in accordance with the code for new construction (IEBC 805.2 & 805.3). Exit signs and egress lighting must be provided with emergency power to ensure the continued illumination for 90 minutes in the event of primary power failure (780 CMR 1006.3 & 1011.5.3).
- Handrails - Handrails must be provided on at least one side of the stair run of every required exit stairway serving the work area that is not provided with at least one handrail or in which the existing handrails are considered in danger of collapse (IEBC 705.9.1). This requirement applies to the handrails from the highest work area floor to the level of exit discharge.

Re: 50 Miles Street.
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- Guards - Guards must be provided at every open portion of a stair, landing, or balcony that is more than 30" above the floor below where guards are not currently provided or are considered in danger of collapse (IEBC 705.10.1). This requirement applies to the guards from the highest work area floor to the level of exit discharge but shall only apply to the egress path of any work area.

DEFINING "PUBLIC"

521 CMR defines a public building as being a facility that is "open to and used by the public" or "a building that is constructed by the Commonwealth and used by the public." 521 CMR does not consider areas used exclusively by employees as 'public' areas. At detention facilities, the public includes detainees as well as visitors and consultants who are not employees of the correctional system. This could include, for example, special consultants meeting with detainees or staff.

The 2010 ADA Standards define 'public use' areas as facilities used by the public (just like 521 CMR) as well as' common use employee areas' such as employee parking areas, entrances, locker rooms, and break rooms. Under the ADA, employees are considered the public. The 2010 ADA Standards for 'common use areas' used by employees differ from those that apply to ' employee work areas'. The common use employee areas must conform to the same standards as other 'public areas.' Accessible design standards for work areas are limited to an accessible route to 'approach, enter, and exit' the work areas, and, in some larger work areas, to reach a second means of egress. If an element is required to be accessible under the ADA Standards but not 521, accessibility must be provided in accordance with the ADA.

When considering the application of both 521 CMR and the ADA, public areas include (but are not limited to) the following:

	521 CMR	ADA Stds.
Public Parking	✓	✓
Employee Parking		✓
Public Entrance(s)	✓	✓
Employee Entrances		✓
Accessible Routes (Int. & Ext.) not restricted to employees	✓	✓
Visitors Facilities	✓	✓
Offices (no clients/visitors)		✓

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Visitor Toilet Rooms	✓	✓
Employee Toilet Rooms		✓
Employee Break Rooms		✓
Employee Locker Rooms		✓
Kitchen	✓	✓
Library	✓	✓
Storage & Mechanical Rooms		✓

The occupancy of this building qualifies as public use, therefore any new construction must comply with 521 CMR, the regulations of the Architectural Access Board.

521 CMR THRESHOLDS

As per Massachusetts Architectural Access Board Regulations (521 CMR) all new work in all buildings and spaces open to the public (i.e. students, visitors, etc.) must be designed in accordance with 521 CMR. Additionally, accessibility improvements may be required outside of the project scope of work based on the cost of work being completed (521 CMR 3.3). The following thresholds summarize the extent of accessibility upgrades for existing buildings undergoing alterations or repairs:

a.) If the cost of work is less than $100,000, only new work must comply.

b.) If the cost of work is at least $100,000 but less than 30% of the assessed building value, in addition to all new work, an accessible public entrance, accessible toilet rooms, telephone, and drinking fountain must be provided (where the building contains public toilets, telephones and drinking fountains).

c.) If the cost of work exceeds 30% of the full and fair cash value of the building, the entire building must be brought into compliance with 521 CMR.

FULL AND FAIR CASH VALUE

The full and fair cash value has been defined by the Massachusetts Supreme Judicial Court as "fair market value", which is the price an owner willing but not under compulsion to sell ought

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to receive from one willing but under compulsion to buy. The fair cash value is the value the property would have on January first of any taxable year in the hands of the owner. [1]

The value of the property is currently listed as $324,100[2] on the town of Greenfield's database. Therefore the approximate threshold for the 30% rule would be approximately $97,230.

Note that all work completed within a 3-year period is considered in determining the applicability of 521 CMR 3.3. Major implications of the 30% threshold and full compliance with 521 CMR include an accessible entrance, toilet rooms, handrails, vertical access throughout the building (i.e. a compliant elevator), maneuvering clearance at all doors, etc.

Note that employee-only spaces are not subject to the provisions of 521 CMR, including any buildings that are not open to the public.

AMERICAN'S WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG)

The 2010 American's with Disabilities Act Standards require that employee-only spaces must be designed such that individuals with disabilities can approach, enter, and exit the work space (ADAAG 4.1.1(3)). Further, if the altered areas are open to the public, accessibility improvements are required to the path of travel to primary functions areas which are altered. However, note that accessibility improvements are not required to exceed 20% of the cost of the alterations, but are expected to be included up to the 20% amount (ADA §35.151(b)).

The existing building will not require to be fitted with an elevator unless 30% of the total building value is exceeded within any consecutive 3 year period.

MEANS OF EGRESS

Per the MA amendments to IEBC 102.2.2, the following non-conforming existing means of egress conditions must be corrected in all existing buildings regardless of whether repairs or alterations are being completed:

---

1 http://www.mass.gov/dor/local-officials/dls-newsroom/dls-publications/new-growth/municipal-finance-glossary/municipal-finance-glossary-d-through-h/full-and-fair-cash-value-ffcv.html

2 http://www.mainstreetmaps.com/MA/Greenfield/property.asp?TY=0&PID=29-35A#

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a. Less than the minimum number of exits serving every space and/or story;

b. Less than the required exit capacity to accommodate the occupant load of the building;

c. Any building or space which is not provided with a safe and adequate means of egress including exit signage and emergency lighting.

OPEN STAIR

Open stairs are permitted for egress where the open stair is:

- Not in Use Group H and I
- The Travel distance from the most remote point to an exit must comply with Table 1016.1
- The opening is a maximum of 2 stories.

Depending on the occupant load and the travel distance from the second story the exits open stair would comply with the code. Because there is a single means of egress the occupant load of the second floor would be limited to 49 people in a Use Group B or E occupancy (780 CMR Table 1015.1).

Please let me know if you have any questions regarding these matters.

AKF

A. Vernon Woodworth

Vernon Woodworth AIA, LEED AP

3.5. OUTLINE SPECIFICATION

OUTLINE SPECIFICATION
NESEA 50 Miles Street Planning
Greenfield, MA
January 23, 2014

Note: This specification is provided for cost estimating purposes, not for construction.

Contract Requirements

- A107 Standard Form of Agreement Between Owner and Contractor
- A201 General Conditions for the Contract of Construction
- Bonds: Bid Bond and Performance and Payment Bond
- Taxes: The project is tax exempt.
- Davis Bacon Wage rates do not apply to this job

DIVISION 1 – General Requirements

01 0000 General Construction Requirements

- Project Management, site supervisor, office overhead, secretarial and miscellaneous labor are to be included in contract cost.
- Project Manager and site supervisor will be available by cell phone and e-mail.
- Provide job trailer, scaffolding, temporary fencing, equipment as indicated or as required.
- Job sign – Installed by contractor, provided by Owner
- Provide temporary heat and electrical power during construction until substantial completion. No moisture-producing heating equipment allowed.
- Provide temporary job phone and fax on site.
- Securely lock up building at the end of each day.
- Provide daily and Final Cleaning
- Provide temporary fire extinguishers.
- Provide rain and snow protection tarpaulins.
- Provide temporary job toilet and waterless handwash or wash-up sink.
- Contractor is responsible for safety and follow-up of any incidents on site.

01 1000 Summary of Work

- Site work to include construction of HC accessible exterior ramp and heat pump pads and related site work.
- Building improvements to include exterior envelope improvements, interior renovations, mechanical system upgrades and minor renovations to other systems, including fire suppression and electrical.

01 1500 Environmental Goals

- Primary Energy usage (Current building use is 37.4 kBtu/sf-yr based on 6000 sf)
  - Metric: develop metrics based on that baseline usage (Such as 10-20 kBtu/sf-yr as goal)
  - Strive for 2030 goals – 70% reduction 2015, 80% reduction 2020, 90% reduction 2025, Carbon Neutral 2030.
  - Consider Site + Source energy in Btus/occupant and Btus/sf
  - Acquire data through thoughtful monitoring

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- Water usage (Currently 137 gallons/day @ 20 occupants = 6.85 gal/day/person, 15 occupants = 9.13 gal/day/person)
  - Metric: Gallons of water/occupant
  - Low flow fixtures
  - Possible composting and/or cistern with rainwater collection in future
- Indoor air quality
  - Material selection to prioritize occupant health
  - Ventilation system
  - Building envelope designed with building science to minimize moisture
- Durability/maintenance costs
  - Lifetime of material choices is important, but is 2nd to health impacts
- Functionality/adaptability/space planning
  - Disentangle systems so it's easy to move around (chases)
  - Occupant manual
  - AAB compliant
  - Code compliant
  - Healthy/Fabulous/Inspiring workplace!

01 2100 Allowances

1. TBD

01 2200 Unit Pricing

1. None

01 2300 Alternates

1. Alternate #1: All wood used in the project to be local and sustainably harvested wood, or FSC-certified wood.
2. Alternate #2: Provide Paperstone Sustainable Composite Surfaces (see Division 12 below)

01 3100 Project Coordination

- Owner to obtain local and state regulatory permits.
- Power Company Charges – connection fees to be paid by Owner, usage charges to be paid by Contractor.
- All other permits and fees to be by contractor, including inspections, fees, and approvals required for all other utility connections, sprinkler piping, construction and occupancy. Contractor to coordinate obtaining of permits with sequence of work and schedule.
- Contractor to make subcontractors responsible for fees specifically related to their subtrade(s).
- Provide insurance for workers compensation (statutory), employee liability ($100,000 per person), bodily injury liability ($1,000,000), and property damage ($1,000,000).
- Builders Risk and Property Insurance to be provided by Owner
- Contractor to maintain redline set of as-built drawings and allow Architect access for periodic review.

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- Prior to commencement of construction, a project meeting schedule will be set by owner, builder and architect, including preconstruction, preinstallation and progress meetings.

01 3300 Submittals
- Provide submittals for manufactured products noted to be submitted in final specifications or for all manufactured products. Provide list of manufactured items not noted to be submitted for review by Architect and Owner.
- Provide application for substitution to Architect only where specified item is no longer manufactured or where requested by Architect/Owner. Provide submittals for substitutions requested by Architect/Owner.
- Provide submittals for waste management plan.

01 4250 Codes and References
- Massachusetts Fire and Building Safety Codes
- Massachusetts Building Energy Codes
- Accessibility: MA Architectural Access Board Regulations, 521 CMR
- All work shall be performed in accordance with above-referenced codes and all other applicable codes and regulations.

01 7419 Construction Waste Management
- Divert waste from landfills and incinerators.
- Submit recycling and waste management plan. Recyclable materials to be separated on-site (wood, gypsum board, cardboard).
- Distribute approved waste management plan to all workers when first beginning work on site and review procedures established or to be established.

01 7800 Project Closeout
- Provide 3 copies Owner's Operations and Maintenance manual including maintenance instructions and safety procedures and warranties.
- Provide as-built site, architectural and engineering drawings including dimensioned map of underground services, piping and wiring. Underground locations to be dimensioned from two locations - corners of building or other permanent structures.
- Clean all surfaces to remove all stains, dust and dirt; HEPA vacuum, mop, wax floors as required. Remove all tags and labels, clean all windows, mirrors, and other glass, inside and out.
- Exterior – clean the site thoroughly, remove all nails, sweep and rake. Remove dumpsters promptly.
- Retain one window performance label for each type of window and provide to Owner.
- Final Inspection procedures – the Owner and Architect will "punch" the building twice. The Owner reserves the right to charge the contractor for Architect's time for any additional inspections as required to complete the project.

DIVISION 2 – Site Work

02 2000 Site Clearing

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- Removal of all trees, shrubs, stumps and roots within the project excavation limits. All trees to remain to be protected from machinery to the limits of drip line with storm fencing.
- Grind stumps or remove stumps offsite.
- Do not bury wood on site. Do not burn wood on site. Dispose of all material in accordance with applicable regulations.

02 3000 Earthwork: Excavation, Backfill & Compacting

- Call Dig Safe prior to any excavation work.
- Remove and stockpile topsoil and gravel.
- Provide all earthmoving, excavation, trenching, rough and finish grading required to complete new work.
- Backfill foundations with granular borrow that consists of stone and sand reasonable free from loam, silt, clay and organic material (20-100% passes through #4 sieve , 0-12% passes through #200 sieve and the maximum size of stone particles shall not exceed 67% of the thickness of the layer being spread) to 6" of surface. Install impermeable or tight soil layer on top.
- Compact backfill to 95% proctor density in 6" lifts.
- Provide all necessary materials and removal of excess materials for restoration of site.

02 4100 Demolition

- Remove carefully and place in protected storage those items indicated for re-use on drawings.
- Remove walls, finishes, windows, doors, plumbing, mechanical, electrical, etc. as shown and salvage, recycle or dispose of off site. (See Division 1, Construction Waste Management.) Remove all existing items as required to facilitate new work, even where not shown.
- Lead testing will be performed in advance of construction by Owner. It shall be assumed that lead paint will be found to exist in the existing building and that handling and disposal will be performed by contractor's certified personnel and in accordance with applicable state and federal law.
- Asbestos testing and abatement, if required, will be performed in advance of construction by Owner.

02 7800 Unit Pavers

- Reinstall brick pavers at end of HC accessible ramp where disturbed by ramp construction. Install sub-base and sand base, if applicable, to match existing.

02 9000 Landscaping:

- Seed lawn areas to match existing and mulch with straw or hydroseed.
- If supplemental topsoil is required, provide 6" screeded loam topsoil with minimum 15% organic content by volume.
- Keep all seeded areas watered and in good condition, reseeding if and when necessary until a good, healthy, uniform growth is established over the entire area.

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DIVISION 3 – Concrete

03 4000 Pre-Cast Concrete

- Miscellaneous concrete piers with enlarged bases for exterior HC accessible ramp.

DIVISION 4 – Masonry

Not used

DIVISION 5 – Metals

05 5210 Pipe Railings

- Provide and install 1-1/2" diameter metal handrails at exterior ramps, both sides, to comply with ADA.
- Install hand rails at 36" above walking surface of ramp, with 1 ½" clearance between rail and walls, posts, or protruding objects, and 12" level extension beyond ends of ramp.
- Provide exterior pipe railings and brackets with hot-dipped galvanized finish, prepped for painting.

DIVISION 6 – Wood and Plastics

06 0000 – General

- Alternate #1 - Use local and sustainably harvested wood, or FSC-certified wood

06 1000 Rough Carpentry

Framing

- 2x4 studs @ 16" O.C. interior except where otherwise shown on plans.
- Joists for HC accessible ramp: 2x12 at 12" o.c., with 2x14 "stringers" at edges. Install stringers to project 2" above top of typical joists.
- Framing at exterior locations or in contact with concrete or ground to be #2 or better, treated with ACQ or CDDC. Use only stainless steel or hot-dip galvanized fasteners with preservative-treated wood.

Sheathing

- Walls: Provide 1/2" CDX APA-rated exterior grade plywood – no OSB/Aspenite sheathing.

Strapping

- 1x3 wood strapping, fastened to framing.

Miscellaneous

- Underlayment: P.T.S plywood to be used for all underlayment, 3/8" thick, unless otherwise noted. Do not use luan. All underlayment shall be glued to subfloor and nailed every 6" along seams and every 8" elsewhere. Countersink all nail heads.
- Fasteners: Provide nails, screws, and other fasteners as required, galvanized at exterior or where exposed to moisture. Where in contact with pressure treated material, use stainless steel or hot-dipped galvanized.
- Special Fasteners: Provide Hilti or equivalent
- Connectors: Provide Simpson or equivalent, galvanized at exterior or where exposed to moisture. Provide hot-dipped galvanized at post bases.
- Construction Adhesive: Titebond solvent-free or equivalent low-VOC adhesive.

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06 2000 Finish Carpentry

Exterior

- Standing and running trim: HardieTrim cementitious trim by James Hardie, or equivalent. Provide 3/4" thickness, width as indicated on drawings.
- Siding: Hardie Commercial cementitious reveal panels by James Hardie, or equivalent, with joint treatments, flashings and other accessories.
- Posts, to support metal pipe handrails: 4x4 p.-t., attached to ramp "stringers" at 4' to 5' o.c.
- Decking: Trex or equivalent plastic/wood composite, 2x6, smooth texture, with concealed fastening.

Interior

- Standing and running trim, jamb extensions: provide 1x poplar, or pine with knots sealed with two coats B-I-N sealer or equal before painting.
- Provide painted wooden shelf and pole in coat closets.

DIVISION 7 – Thermal and Moisture Protection

07 0000 General

- All flashing, moisture barrier material, etc. to lap for drainage to the exterior.

07 2100 Building Insulation

Foundation

- Basement walls at exterior side, more than 8" above grade: same as exterior retrofit wall assembly.
- 8" above to 2' below finish grade: Two layers 2 3/8" Warm-N-Dri fiberglass board insulation (4 ¾" thick, total.)At exposed exterior basement insulation above grade: provide Horizon finish or other protective cover TBD.

Exterior Walls

- Vapor retarder: None – existing finishes to remain.
- Existing wall cavity insulation: top off existing insulation with blown-in dense-pack cellulose, installed to density of 3.5 1b/cf. Cellulose to be National Fiber, with manufacturer-provided quality control and testing services during installation, or other manufacturer providing same services.
- New framed cavity wall on exterior side of existing stucco finish: provide open cell spray foam - Thermoseal 800 by Spray Foam Polymers, 0.8 lb. density spray foam (no CFCs, HCFCs, VOCs or formaldehyde.)

Rim Joists

- Second floor framing: Apply Thermoseal spray foam insulation (see above), 3" thick minimum.
- First floor framing: Apply Thermoseal spray foam insulation (see above), 3" thick minimum.

Attic

- Move/remove existing cellulose insulation to expose attic. After completion of MPE work that penetrates existing ceiling, spray 1 – 1 ½" open cell spray foam by Thermoseal (see above) continuous over existing ceiling to air seal. Extend spray foam on inside face of existing sheathing to wall top plate.
- Provide combination of new and existing (if suitable) cellulose to provide R-60 after settling (17" minimum) over entire attic floor.

Sound Attenuation

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- At new walls around and between bathrooms and meeting rooms, install 3 ½" unfaced fiberglass batt, formaldehyde-free, friction fit.

Windows and Doors

- At shim spaces: install continuous spray foam, low-expanding type, by "Pur Fill", "Hilti", "Touch-N-Foam" or approved equivalent.

07 2500 Weather Barriers

Drainage Plane Moisture Barrier

- Dupont Tyvek or Typar housewraps. (See below where it also serves as an air barrier.) Lap for drainage and tape seams, transitions and penetrations as recommended by the manufacturer.
- Flexible flashing
  - Dupont FlexWrap NF (for No Fastener required) or SIGA Wigluv tape at all opening heads and window sills, to overlap corners. Head flashing to overlap jamb flashing below.
  - Dupont StraightFlash, Tescon Vana tape or SIGA Wigluv tape at opening jambs, to overlap sill flashing below.
  - At windows with flanges, jamb and head flashing are to lap onto flanges and adjacent edges of window frames.
  - At windows, undersize frame size to allow for installation of ½" continuous tapered shim in existing opening under flexible pan flashing, for positive drainage. Install plastic reverse-tapered shims to level window.
- See below for other flashing requirements.

Air barrier

- Install continuous around building envelope to control entry of interior moisture-laden air into building cavity.
- Exterior walls: Install SAWM to provide transition from ceiling at attic to exterior face of stucco adjacent to new spray-foam-filled wall cavity and from bottom edge of stucco to concrete basement walls. Spray-foamed cavity to provide air barrier in walls.
- Ceiling at attic: Use continuous layer of open cell spray foam to air seal ceiling (see Insulation above.)
- At window and door frames: install air barrier sealant and backer rod at interior edge of door and window frames, sealing frame to self-adhering flexible flashing membrane or rough framing that has been air-sealed. Provide Tremco Spectrem 1 silicone sealant or equal for air barrier sealant.
- At exterior wall penetrations: install spray foam to seal around pipes or other penetrations. Install elastomeric sealant at penetrations through exterior sheathing and interior finish.
- Air leakage testing: provide blower door specialist to conduct progress and compliance air leakage testing.
  - Progress testing – depressurized/pressurized theatrical fog testing and infrared scanning, to assist and inform the air barrier installation early in the process. Perform progress testing after completion of first instance of the following:
    - Door
    - Window
    - Wall corner
    - Wall/floor/basement wall connection

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        - Wall/attic floor/eave connection
    - Compliance testing - perform air leakage compliance test following completion of air barrier and prior to installation of insulation or finishes that will limit access to air barrier. Compliance test to achieve less than 0.15 cfm per square foot of total surface area at 50 Pa pressure. Architect will provide requirement in CFM50 for compliance test.

07 6000 Flashing

- See Weather Barriers above for flexible flashing requirements.
- Metal flashing to be 0.025 in. aluminum minimum with 70% min. Kynar finish, fastened with aluminum nails. Color to be selected by Architect from manufacturer's standard colors.
- Cap flash all head conditions of windows, doors, louvers and trim blocks.
- Provide zee flashing above horizontal trim bands that are not shingle-lapped. Horizontal leg of zee flashing to be pitched to drain. Extend zee flashing and horizontal trim at corners (interrupting corner trim.)
- Continuous flashing to have watertight joints. Lap all flashings 4 inches min. using bayonet joints. Prior to installing joint, apply double rows of non-skinning butyl sealant along entire joint lap including both horizontal and vertical surfaces.
- Provide for thermal expansion of exposed metal flashing and trim. Space movement joints at maximum 10 feet intervals, with no joints allowed within 24 inches of a corner or intersection. Where bayonet-type expansion joints cannot be used, form expansion joints with intermeshing flat hooked flanges filled with mastic or butyl sealant (concealed within joints.)

07 9000 Joint Sealants

- Seal all cracks and joints with caulk and joint fillers. Do not caulk above flashing, as this prevents drainage.
- See air sealing above for air barrier sealing requirements.
- For exterior use: provide Tremco Dymonic polyurethane or equal. Color to be selected by Architect from manufacturer's standard colors.
- For interior use at top and bottom plates and around electrical boxes of acoustically-insulated partitions: provide acrylic-based acoustical sealant, Owens Corning Quiet Zone or equal.
- For interior use at baths, countertops, toilets, sinks, drinking fountains: provide siliconized acrylic latex sealant, Premium Tile and Fixture Caulk by Color Caulk, or equal, unless indicated otherwise. Color to be selected by Architect from manufacturer's standard colors.

DIVISION 8 – Doors and Windows

08 1000 Doors

Exterior:

- Match existing doors where new required.

Interior:

- Re-use existing doors.

08 3100 Access Doors and Panels

Interior attic access door –

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- Spring- or weight-assisted hatch over existing stair, insulated to R-45 and weatherstripped, with latch and cylinder lock.

08 6100 Windows

- Vinyl windows, by Paradigm or approved equal, casement or awning type, sized to fit existing rough openings.
- Provide with low-e, argon-filled double glazing.
- Provide insect screens with all operable windows.
- Colors to be selected by Architect from Manufacturer's standard colors

08 7100 Door Hardware

Thresholds

- Provide thermal break threshold at all exterior doors, with thermal break aligned under door bottom.
- All exterior doors to have ADA-compliant thresholds.

Weatherstripping

- Manufacturer-provided at pre-hung doors. Do not notch weatherstripping for any reason.

Latchsets/locksets

- At bathrooms, provide thumbturn deadbolts with occupancy indicators, Falcon D271 or equal, in addition to passage latchset.
- Provide new lever handles to comply with ADA where required to provide an accessible route to work spaces, trim style TBD
- Other hardware latchsets/locksets – reuse existing.
- Provide new locksets ANSI Grade 1 at high use public areas, Grade 2 at private spaces (meeting rooms and offices.) Provide by Schlage, Falcon or Sargent.

Miscellaneous Hardware

- Other: All other miscellaneous hardware including door/floor bumpers at all doors and closers at exterior doors.

DIVISION 9 – Finishes

09 2116 Gypsum Board Assemblies

- Provide for new walls and ceilings: 5/8" GWB.
- Provide fiberglass-mat-faced GWB at all bathrooms, GP DensArmor Plus or equal.
- Provide Level IV finish, typical. Provide Level V at fiberglass-mat-faced GWB (or use two coats high-solids primer before painting.)

09 5600 Wood Strip Flooring

- At gaps in carpets where existing walls have been removed and at floor material transitions: provide local hardwood, species and board width to be determined, clear finish. Match thickness to adjacent carpet and pad thickness and provide eased edges.

09 6500 Resilient Flooring

- Install resilient flooring over underlayment. See Section 06 1000
- Floor prep shall include the filling of all seams, nail heads, and any other imperfections.

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- Provide inlaid composition sheet vinyl by Armstrong, Mannington, Congoleum, Tarkett or approved equivalent, .080" total thickness, .050" wear layer thickness, minimum, with "No Wax" coating.
- Install with water based, water resistant adhesive with no V.O.C.s, as recommended by the manufacturer of material being installed.
- Provide vinyl base at resilient flooring: Johnsonite or approved equal, 1/8"x4" vinyl cove base.

09 6810 Carpet with Pad
Not used (existing to remain)

09 7700 Special Wall Surfacing
Fiberglass-reinforced plastic panels
- At janitorial sinks, three sides, floor to ceiling: provide 0.090" thick, smooth finish, with extruded PVC corner and edge mouldings.
- Install with water-based, water-resistant construction adhesive.
- Seal joints with clear silicone sealant.

09 9000 Paint/Stain:
Exterior
- Allow for three colors
- For exterior trim and panels or siding: use latex primer and two coats of acrylic latex paint, satin sheen.
- For doors: paint with two coats latex paint, satin sheen, over factory primed base.
- For exterior metals: paint with latex primer and two coats latex enamel, satin sheen. For galvanized metals, pre-treat galvanizing for painting and prime with primer suitable for galvanized finish.

Interior
- Paint all walls and ceilings, trim, doors, etc.. In finished areas, paint all exposed conduit, boxes, piping, brackets, ductwork, etc., unless fully factory finished or otherwise indicated.
- Colors – allow for three colors: ceiling = one color, walls = two colors – one basic color, one accent.
- Provide highest Quality, latex, Green Seal or SCAQMD rule compliant low VOC paint and primer.
- At fiberglass-mat-faced gypsum board, in lieu of Level 5 finish, may provide two coats high-solids-content primer (meeting MPI 137 - 37% solids min. by volume) before painting.
- Paint trim/woodwork: primer and two coats, semi-gloss sheen
- Paint walls, other than bathrooms: primer and 2 coats eggshell finish
- Paint walls, bathrooms: primer and two coats washable semi-gloss finish
- Ceilings – Primer and one coat flat finish.
- Window Sash and Frames: Prefinished

DIVISION 10 – Specialties
10 1400 Signage
- Provide ADA-compliant signage at all public toilets.

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10 2800 Toilet, Bath and Laundry Accessories

At each bathroom provide:

- Toilet grab bars – ASI 3100 Series with peened non-slip surface, one 36" long (back wall) and one 42" long (side wall) each location.
- Mirror with stainless steel channel frame, 24" x 36", mounted with bottom of glass at 40" max. a.f.f., American Specialties, Inc. 0600 or equal.
- Toilet Paper Holders - ASI 7305-2B double roll holders (side-by-side)
- Paper towel dispensers and integral waste disposal, semi-recessed.

At each bathroom with shower, provide:

- Shower curtain rod - ASI 1204 Extra Heavy Duty, 1 ¼" diameter, 3" flanges.
- Shower curtains by Owner

At each janitorial sink, provide:

- Mop hanger with 8" deep utility shelf, stainless steel.

10 4400 Fire Protection Specialties

- Provide and install fire extinguishers at each floor, in semi-recessed cabinets with clear glass doors and applied vertical lettering.
- Provide 5-lb., multi-purpose dry chemical, Class A:B:C extinguishers.
- Locate fire extinguishers such that horizontal travel distance does not exceed 75 feet from any point in the building.

DIVISION 11 – Equipment

Not used.

DIVISION 12 – Furnishings

12 3200 Manufactured Wood Casework

Office storage cabinets

- Provide plastic laminate-faced face frames and doors, particle board with melamine facing for interiors.
- Provide base cabinet height to provide finish counter height at 34" for HC accessibility. Provide base cabinets with standard 4" high toe kick.
- Provide all drawers and doors with "D" pulls.

Countertops at office storage cabinets

- Wilsonart, Formica, or equivalent plastic laminate.
- Provide with 4" semi curve backsplash and D90 front edge on medium density particleboard.
- Size 25"x1 ½", except where other size shown on plans. Color to be selected from range of manufacturer's standard line not including metallics.
- Alternate #2: Provide Paperstone Sustainable Composite Surfaces w/ factory texture. Exposed edges to be built up, 1 ½" thick, and fabricated with ¼" roundover top and bottom. Provide 4" x ¾" thick matching Paperstone backsplash with 1/8" roundover top edge.

DIVISION 13 – Special Construction: (not used)

DIVISION 14 – Conveying Systems:

14 4200 Vertical Wheelchair Lift

- Provide lift with 36" wide by 54" long platform, Savaria V-1504 or approved equal, with all associated controls.
- Shaft doors, frames, closers and other door hardware to be provided by lift manufacturer.
- Shaft wall framing to be reinforced per manufacturer's requirements.
- Recess floor below platform to allow platform to be flush with finish floor

DIVISION 21 – Fire Suppression

21 0000 Fire Suppression

- Provide modifications to existing fire suppression system as required to accommodate floor plan revisions indicated on drawings.
- Provide shop drawings for approval by architect.
- Acquire all permits, testing, and inspections necessary for all sprinkler work.

DIVISION 22 – Plumbing

22 0000 General

- Sterilize potable plumbing system.
- Acquire all permits, testing, and Inspections necessary for all work.

22 1000 Plumbing Piping

- Supply – Copper or PEX for concealed piping.
- Waste – Cast iron or ABS drain/waste lines where acceptable by code.
- Provide insulation for all plumbing piping for heating systems and domestic hot water supply lines to meet or exceed energy codes. All valves and fittings shall be insulated with pre-molded pipe covers.
- Provide jacketed insulation for supplies and waste under all HC accessible sinks.

22 2000 Plumbing Fixtures

- All fixtures to be lead-free.
- Fixtures to be white, unless otherwise noted.
- Bath Lavatories – provide wall-hung, ADA-compliant sink, with concealed, floor-mounted bracket. Reinforce wall studs as required.
- Lavatory Faucet – provide ADA-compliant lever handle faucet
- Toilets - provide 1.6 gallon toilets: by Toto or approved equal.
- Shower - provide gelcoat fiberglass shower stall by Aquatic or equal, 36" x 36" x 72", with integral ADA grab bars and soap dish. Shower fixture/fittings to be ADA-compliant. Provide pressure-balancing mixing valve and low-flow shower head (1.5 gpm).
- Low flow/high efficiency aerators (.5 gpm lavatories, 1.5 gpm showers)
- Janitor Sink – provide molded floor sink, size as indicated on drawings. Provide service faucet with vacuum break, Fiat 830-AA or equal.
- Floor drain – provide floor drain with trap primer outside of shower stall.

DIVISION 23 – Heating, Ventilating and Air Conditioning

23 0000 General

- Acquire all permits, testing, and inspections necessary for all work.
- Provide shop drawings to the architect for approval.

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23 3000 Ventilation

- General – see Occupancy and Ventilation table below.
- Bathroom ventilation - provide a Panasonic Whisper Green ventilation fan for each bathroom, vented to exterior wall, to run at constant low volume with motion-detector-activated fan speed boost. Insulate duct within 48" of exterior wall to R-38.
- ERV Equipment
  - EV450IN ECMRenewaire, one per floor
  - Locate one in second floor over bathrooms and one in basement
- Controls
  - First floor, on timer with 2 hr push button timer to turn on off hours.
  - Second floor on timer with 2 hr push button timer to turn on off hours. Second floor speed operates on pressure in ducting. Conference room has normal 30 cfm from fixed register plus 2 hr push button timer* that activates one damper to a second, larger supply register to supply additional 80 cfm to conference room (pressure control will automatically boost fan speeds). Normal speed 270 cfm. Boost to 350 when adding 80 cfm to conference room. *(Alternate is CO2 sensor in conference room – add $500)
- Ducts and Grilles
  - First floor Run main supply trunks in basement in pattern for future wall locations and run from there to floor registers for now with flex duct. Insulate ducts in basement. Provide returns from kitchen, lobby/hall and bathroom(s).
  - Second floor run through attic BEFORE attic insulation and air sealing! All hard ducts, air seal all seams. Locate ceiling registers for final floor plan, and add others only if needed for existing rooms that would not be served by final plan (those can be blocked off later). Provide return ducts and grills from copy room and two bathrooms. Provide transfer grill from conference room for 100 cfm to hall.
  - Undercut doors ¾" AFF for return in offices or other rooms with doors.
  - Install louvered grill in bathroom doors and in kitchen door.
  - All ductwork designed to 0.1" external static.
  - Outside intake and exhaust ductwork in basement through existing window opening – not on train side! Outside intake and exhaust for second floor through wall below attic. Provide indoor spring-loaded dampers on exhaust and supply. Exhaust ducts insulated flex OK up to 10 ft, which should do it.
  - All supply and exhaust grills to be provided with balancing dampers in grills.

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NESEA Occupancy and ventilation
for price estimating not for construction

						per sq.ft.	per person		
						0.06	5		
name	floor	Rm no.	sq.ft.	# people max > 1 hr		area vent	people vent	total supply cfm	exhaust
2nd flr conference	2		577	15		35	75	**110**	**Note***
Intern space	2		400	3		24	15	39	
Office 1	2		170	1		10	5	30	
Office 2	2		123	1		7	5	30	
Office 3	2		82	1		5	5	30	
Office 4	2		73	1		4	5	30	
Office 5	2		257	2		15	10	30	
Office 6	2		212	2		13	10	30	
Copy	2		168	0		10	-		50
Coffee	2		293	0		18	-	20	
Mens room	2		73	0					150
Womens room	2		82	0					150
				coincident					
2nd floor subtotal			2510	26				349	350
Office 1	1		225	2		14	10	30	
Office 2	1		225	2		14	10	30	
Office 3	1		225	2		14	10	30	
Office 4	1		225	2		14	10	30	
Office 5	1		225	2		14	10	30	
Office 6	1		225	2		14	10	30	
Office 7	1		225	2		14	10	30	
kitchen	1		225	0					60
lobby/hall	1		450	0					60
unisex bathroom	1		200	0					90
1st floor subtotal			2450	14				210	210
Whole building			4960					559	560

* normal supply to conference room is 30; cfrm boost supplies additional 80 cfm

23 5000 Heating and Cooling Equipment

- Provide an air-source heat pump system by Mitsubishi or approved equal, sized for heating and cooling loads.
- Install exterior compressor/condenser units on exterior concrete slab.
- Provide insulated copper refrigerant tubing and all accessory equipment as required.
- Distribution
  - Provide four (4) ducted units in basement, one for each first floor tenant.
  - Provide six (6) to nine (9) wall-mounted blower/distribution units at second floor, number to be determined by final floor plan.
  - Ducting, general
    - All ducting to be rigid with exception of short insulated flex connectors (<24"), if needed, to register boots.
    - Mechanically fasten and seal all seams and connections in ductwork.

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    - Insulate all ducting to R-10, with foil-facing, carefully sealing all joints in foil-facing with tape provided by manufacturer.
    - Duct to minimize pressure drop, to be able to select low-wattage/low-pressure ducted indoor units.
- Provide and install hard-wired 7-day programmable, non-mercury thermostats for each zone (confirm thermostat layout with Owner.)
- Provide condensate lines to feed to drain. Coordinate drainage with architect.
- Instruct owner in controls and maintenance.

DIVISION 26 – Electrical

26 0000 General

- Acquire all permits, testing, and inspections necessary.
- Install all electrical receptacles, switches, other devices and wiring to meet applicable codes. Provide GFI in bathrooms and as required. All receptacles, switches and plates to be white.
- Install all wiring in exposed conduit, to be painted.
- Wire for all interior and exterior lighting, outlets, appliances, mechanical and ventilation equipment, fans, conveying systems and sprinkler and alarm systems. Coordinate with conveying system and HVAC requirements as necessary.
- All lighting fixtures to be combination direct/indirect with Super T8 lamps 3000K CR >82.
- Provide two-level lighting, 50%/100%, 30 fc at 100%. (Additional task lighting provided by Owner.)
- Provide occupancy sensor controls. Provide manual on/auto-off in all spaces except corridors.

DIVISION 28 – Electronic Safety and Security

28 3000 Electronic Detection and Alarm

- If alterations affect more than 50% of the aggregate building floor area, install a complete new fire alarm system to be fully compliant with code.

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3.6. COMPONENT DESCRIPTION

The following chart describes the items packaged into each component.

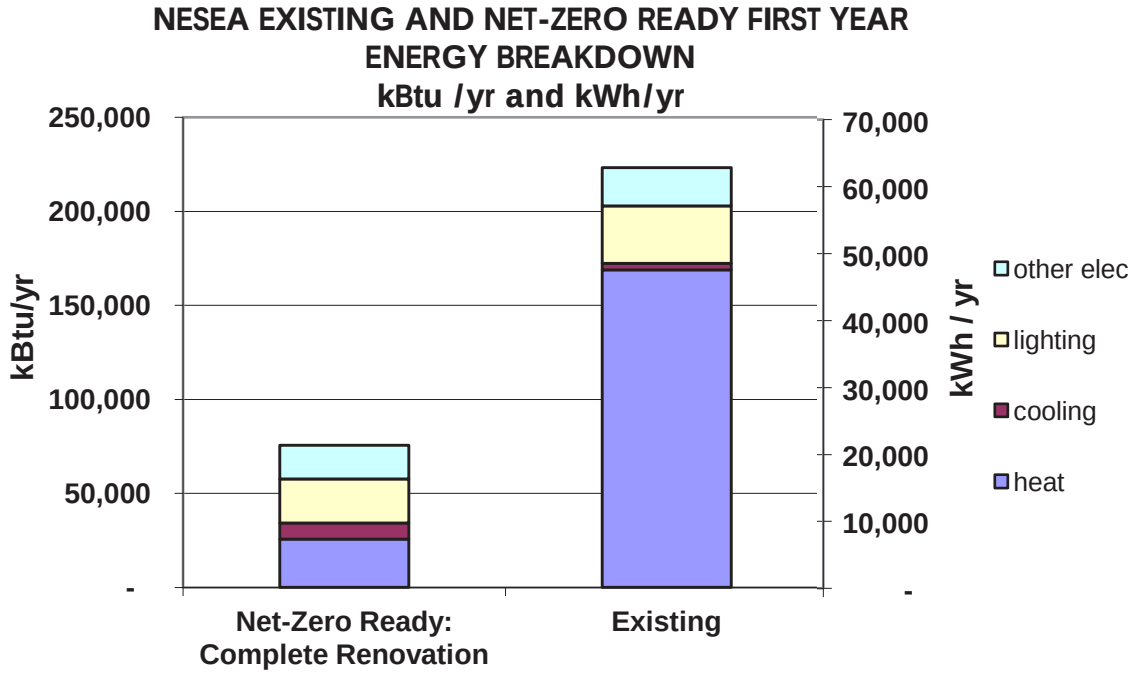
Component	Description
Attic Insulation Package	Including eave insulation dams, disabling of obsolete wiring, removal and replacement as needed of any substandard wiring, removal of obsolete equipment, installation of R-45 weighted lift hatch on stair opening, and installation of additional cellulose to R-60. (Include removing or moving insulation to air seal attic floor prior to insulating.)
Building Skin DER -First and Second Floor	This new assembly with the stucco in place comprised of PVC standoff, 2 x 4 vertical continuous stringers recurred to sheathing and to rafter tails. 7/16"OSB, rain screen, hardi panel clapboard and panel siding, Boral Trim, all painted. Included in this work are tree removal, Also included is full prime window replacement, with RFP to Marvin – Integrity, Pella, and Intus. Remove and replace interior trim to meet new extension bucks. Full staging of building. Need to include IR check and tune-up of existing wall insulation under allowance. Infill 12" pipe opening at South Basement wall/floor, remove and infill NE cellar window, spray foam interior of band joist area. Note: This assumes a 4" total thickness of standoff framing and foamed in assembly, plus sheathing and siding.
Extend Exterior Insulation to basement	Remove exterior rear steps, replace with wood units, *BC suggests this item may not be necessary – that exit is not required.* new rear doors, Continue above grade skin system from Level 1 over basement walls to 12" above grade. Siding down to approximately 12" above grade, then cover stock to be determined. 4" foam package 2' below grade, board stock cover. Removal of asphalt and debris.
Tune up existing heating	Minor piping changes to achieve reverse return piping; four new thermostats, tune up non-electric zone valves, including piping, electrical. $7500
Electrical Renovations	Electrical renovations to remove or abandoned antique wiring. Allowance $22,000 –
First Floor Access	First Floor accessibility including entry ramp, with pipe railing to existing front porch. Two new accessible bathrooms, with one service sink. Electrical and mechanical upgrades as required. Include necessary sprinkler modifications. Move door to Rm 115. Lift and mechanical shaft roughed out, including, as applicable, carpentry, sprinkler, heating, ductwork, electrical, radon remediation, ceilings, lighting, IT, doors, and finishes. (See Outline Spec for more detail) Second floor - Roughed out two new accessible bathrooms, with one service sink. Electrical and mechanical upgrades as required. Include necessary sprinkler modifications. Move one wall and provide new door to conference Room 201. Provide new door to Rm 210. Lift and mechanical shaft roughed out, including, as applicable, carpentry, sprinkler, heating, ductwork, electrical, radon remediation, ceilings, lighting, IT, doors, and finishes. (See Outline Spec for more detail)
First Floor Shower	Shower adjacent to unisex bathroom, see outline specs and First floor plan-Add-on B.
Finish New Second Floor bathrooms	Finish bathroom based on outline spec, direct vent exhaust from each bathroom.
Demo existing bathrooms and make one office, one copy room	Remove existing bathroom fixtures, Finish Rm 214 for private office, finish Rm 209 for possible future kitchen and current copy room.
New small conference room at the top of the stairs	Reconfigure the walls of Rm 202 at the top of the stairs to make a smaller conference room and new mail/copy area that are accessible to the building tenants and not in the NESEA office space.
Second Floor create open offices in Rm 201-210-209	Make RM 201-210-209 open offices, with a circulation path behind the new bathroom core and making two new openings in the existing walls as shown in the rendering and interior detail, leaving most of the wall as is.
Remove stairs to attic and make window in Rm 204	Remove the stair to the attic, build hatch, and insert a new security window between RM 204 and the stair corridor.
Kitchen moved to second floor Rm 208	Making the Rm 208 into a new kitchen area, remove kitchen on first floor. Turn existing kitchen on first floor into office rental space
First floor lighting upgrade	Based on 2680 sf untouched floor area with renovations complete, applied: the fixture cost for direct/indirect was 14 sq' for renovation construction. This is a very nice quality lamp with adjustable light levels.

3.7. ENERGY AND FINANCIAL ANALYSIS

Energy assessment and prioritization was accomplished by evaluating existing energy consumption and costs and comparing that to energy consumption and captial and operating costs for net zero ready and net zero options.

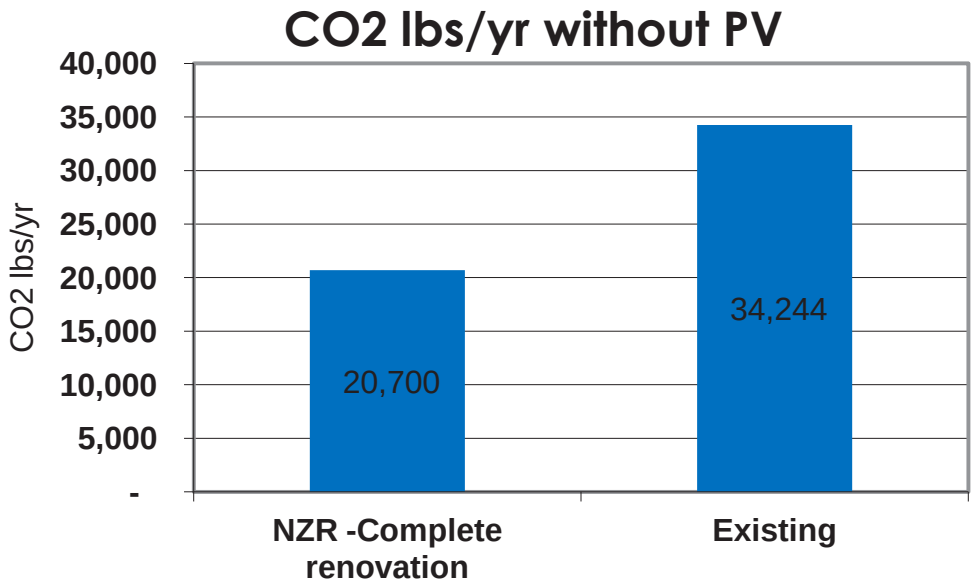
In addition the overall carbon use of the existing building was compared with the completely renovated net zero ready building. The energy use was additionally broken down by end use and depicted in the top graph: NESEA Existing and Net-Zero Ready First Year Energy Breakdown.

- Existing Energy Use 37 kBtu/sf-yr
- Net-Zero Ready Complete Renovation Energy Use 13 kBtu/sf-yr



Disaggregated Energy Usage in kBtu

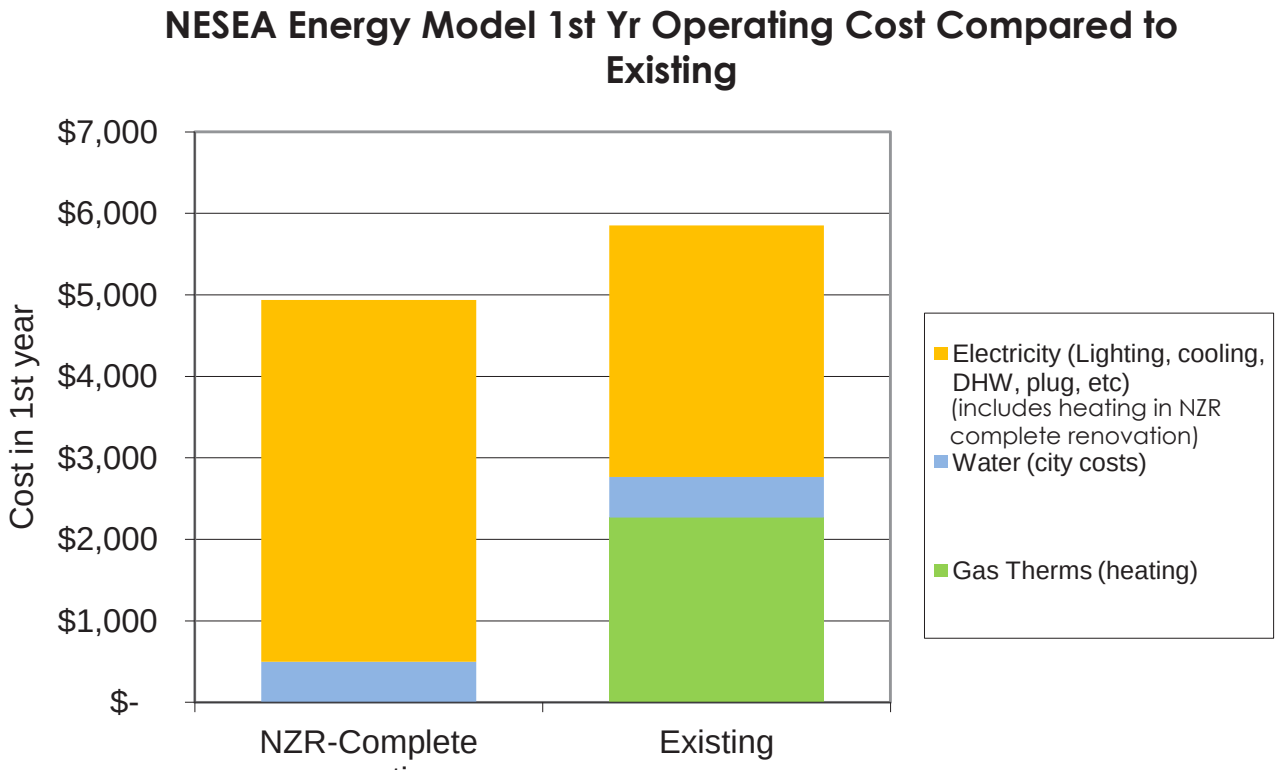
	heat	cooling	lighting	other elec	Total
Net-Zero Ready: Complete Renovation	25,658	8,503	23,475	17,974	75,610
Existing	168,866	3,412	30,708	20,404	223,389



Carbon use assumes 11.7 CO2 lbs/therm gas ,and 0.9 CO2 lbs/kWh

FIRST YEAR OPERATING COSTS

Through initial financial analysis the first-year operating costs were examined for the exisiting building and the net zero ready building as shown below. Due to the inexpensive cost of natural gas the total annual operating costs for the existing building is $5,900. The one year operating costs for the net zero ready building is $4,900, for a savings of $1,000/year.



Total Existing and Porposed Energy Cost and Renewables Needed

	Peak heat, kBtu/hr		Gas	Water	Elec Use	First Year Operating	PV's needed
	heating	cooling	Therms	gallons [4]	kWh/yr [3]	Cost [2]	kW-p [1]
Net-Zero Ready Complete Reno	69	75	-	49,800	23,000	$ 4,900	21
Existing			1,700	49,800	16,000	$ 5,900	15

Notes

[1] fixed array, to equal annual electricity consumption,and does not cover gas use for existing building

[2] energy cost at current NESEA rates averaged over the last two years -- assuming no PV

[3] Assumes non-heating, non-cooling electric use can be reduced with lighting and equipment improvements.

[4] No change to total water use assumed in renovation

FINANCIAL ANALYSIS

Our initial breakdown of components included all aspects of the building envelope improvements for the first and second floor as a $214,000 capital energy cost. Upon further investigation it was clear the new Hardi panel siding was a maintenance item and not an energy related item. Additionally the ERV and Heat Pumps contributed substantially to the workplace comfort by providing ventilation to occupied space as required by code, and building wide cooling from the heat pumps. The modified breakdown in the far right column, distributes the cost for these components to more than one category, and hence reduces the total capital costs associated with the energy improvements.

While the payback on energy improvements is not economically compelling (119 years), the plan does achieve a Net Zero ready building for roughly $170 per sf, which is a major achievement. The reason for the low return on investment is due to the building's relatively good energy performance based on past NESEA upgrade investments and the low cost of natural gas.

			Initial Breakdown	Modified Breakdown
Building Component	**Existing**	**Net-Zero Ready Completed Renovation**	**Total cost of Items that include energy improvements**	**Cost of just energy Improvements**
Envelope 1st and 2nd floor	no change	building cladding, exterior insulation, new windows, R32 wall, R-5 windows	$214,000	$64,000
Envelope basement	no change	skin, insulation R 18 to 2 ft below grade	$47,000	$14,000
Attic Insulation	Existing blown in Cellulose	air seal attic floor and install blown in cellulose to R 60	$26,000	$26,000
ERV	no ventilation	ERV (1 per floor)	$30,000	$5,000
HVAC	Gas boiler, A/C box units	Full building cooling and heating using Heat Pumps	$80,000	$10,000
		Total Added Cost	**$397,000**	**$119,000**
		Total Added Cost Per Square Foot	**$66.17**	**$19.83**
		Total Added Cost As A Percentage Of Total Construction Cost	**38.17%**	**11.44%**

NOTE: All costs are in 2014 dollars

Simple Payback	119 years
Return on Investment (ROI)	0.840%
Net Present Value (NPV) Low	($92,706.32)
Net Present Value (NPV) High	($76,944.35)

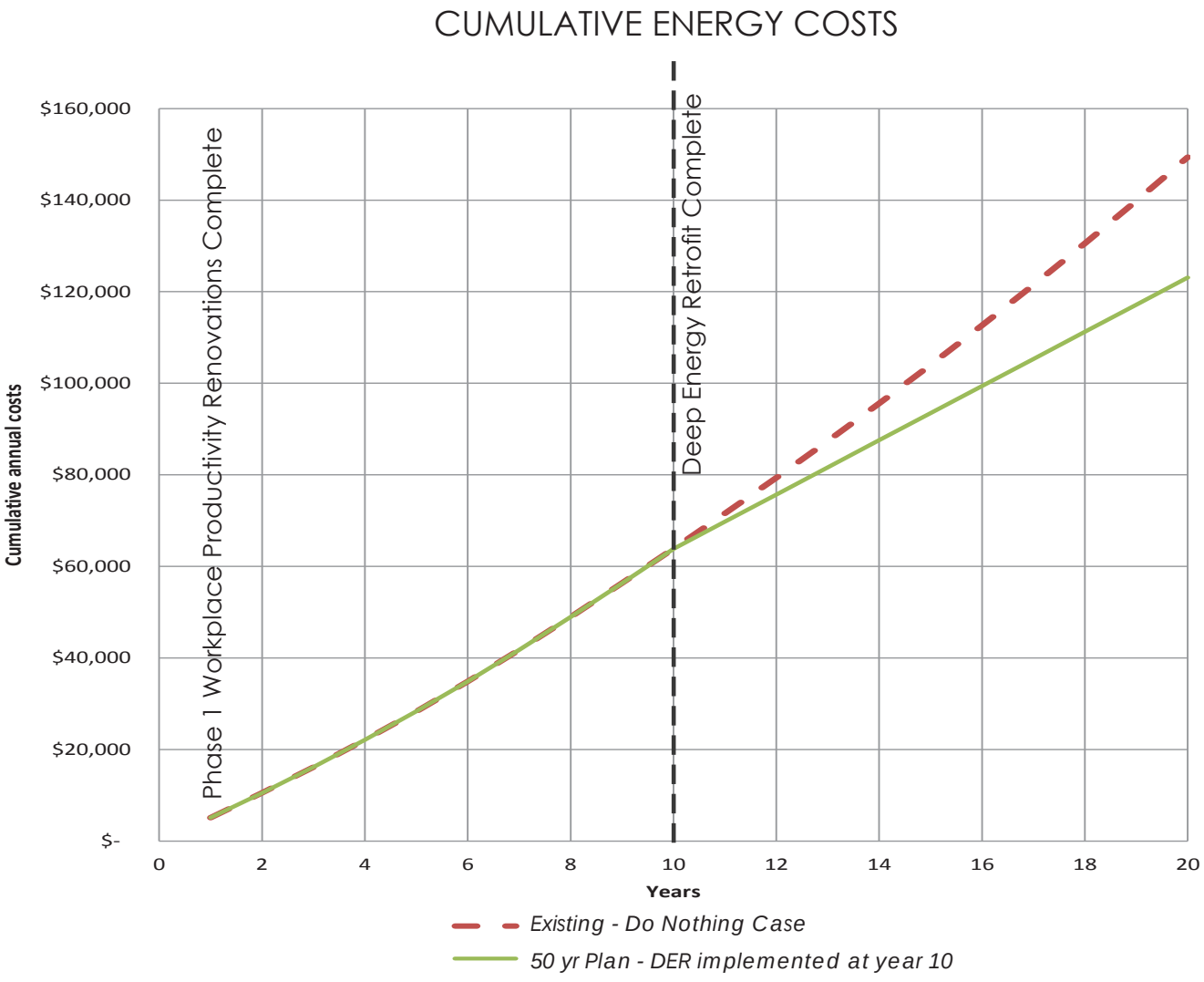
CUMULATIVE ENERGY COSTS

The following cumulative energy costs graph is based on implementing the 50 year stewardship plan in two phases and assumes a 5% fuel escalation rate. The Phase 1 improvements to workplace productivity do not change the building operating costs. The subsequent phases include the Deep Energy Retrofit, including air source heat pump and an HRV, are shown here occurring in year 10 (a potential time frame for implementation but not necessarily the path NESEA will follow).

Based on the decisions by the Building Committee the Deep Energy Retrofit would not be implemented in Phase 1, therefore the annual cumulative operating costs are equal in the Existing "do nothing case" and the 50 year plan "DER implemented at year 10" for the first ten years. This graph shows the DER occurring in year 10 and reducing the operating costs (green) from year 10 thru 20.

Initial Building Committee ideas included using the existing building as an asset to borrow against, and at year 10 the first loan could be paid off, the building could be reassessed, and an additional loan could be taken out to complete the subsequent phases of the 50 year plan. Actual cumulative annual energy costs will need to be recalculated based on the actual implementation of the DER during the 50 year plan.

The DER would reduce the operating costs after the year it's implemented (year 10 in this graph) and is shown as the green line below. The do-nothing case (red dotted line) shows the operating costs increasing based on existing operating energy requirements today. Additional financial analysis and options should be explored as decisions are made to implement portions of the 50 year master plan.

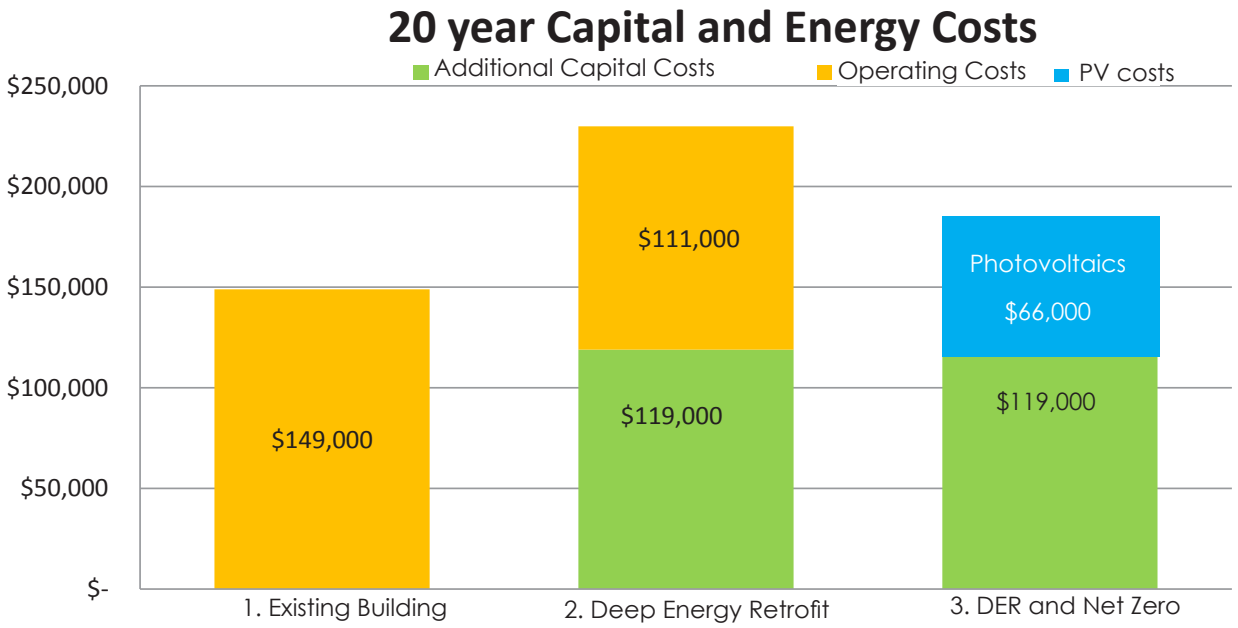


20-YEAR CAPITAL AND ENERGY COSTS

The graph below shows the 20 year capital (green), operating (yellow), and Photovoltaic (blue) costs for the three building conditions outlined below at 5% fuel escalation rate.

1. The existing NESEA headquarters with no energy improvements
2. The Deep Energy Retrofit occuring on year one with $119,000 additional capital costs for energy improvements
3. The Net Zero building with additional PV to cover the entire building electric load on an annual basis

The PV cost of $66,000 assume an additional 16.5 kW to make the total PV on site 21 kW and will offset the building's energy use after the full master plan is implemented. The PV cost is calculated at $4/watt installed in 2014 dollars.



STRATEGIC ENERGY MASTER PLANNING

In order to work toward the goal of net zero energy, a strategic energy master plan is proposed. This outlines the existing PV size system, determines the master plan building energy consumption, sizes PV to cover the future load, and then incrementally works toward that total PV size as opportunities arise.

The following energy master plan is proposed:

The PV sized for future all electric energy load is 21 kW.

- Currently there is1.5 kW on roof, and 3 kW in park producing ~5,000 kWh/yr
- Total new PV required = 16.5 kW

If the opportunity arises to install PV before the deep energy retrofit occurs it is advised to not exceed the existing building electric use of 15 kW.

- Install up to 10.5 kW additional now to offset existing electric use
- Install the remaining 6 kW once DER is complete to make the building a net zero energy consumer

The existing 1.5 kW roof top PV

The existing 3 kW park PV system

3.8. VENTILATION NARRATIVE AND DRAWINGS

NESEA ventilation – ***for price estimating not for construction***
January 10, 2014
Andy Shapiro, Energy Balance

1. Equipment: EV450IN ECM Renewaire, one per floor
    a. locate units in basement
2. Controls:
    a. First floor, on 7-day/24 hr timer. Provide timer cutsheet for Architect's approval. Locate a push button digital timer* in central hallway with permanent label above that says "push button for ventilation."
    b. Second First floor, on 7-day/24 hr timer. Provide timer cutsheet for Architect's approval. Locate a push button digital timer* in central hallway with permanent label above that says "push button for ventilation."
    c. Large conference room on 2nd floor has 30 cfm from fixed register plus digital timer* that activates one two-position damper to a second, larger supply register to supply additional 60 cfm to conference. (This will decrease flow to other rooms during this time.) *Wattstoper TS-400 Digital Time Switch – Set default setting to 2 hrs. Provide permanent sign above TS-400 in conference room that says "Activate timer for additional ventilation" http://www.wattstopper.com/products/time-based-controls/timers/ts-400.aspx#.UtBaNeI7k1d
3. Ducts:
    a. Spiral exposed ductwork. See plan for register locations.
    b. Provide transfer grill from 2nd floor large conference room for 100 cfm to hall. Tamarack Technologies RAP 12"x12" http://www.tamtech.com/userfiles/RAP_3%20tri-fold%20march%202012.pdf
    c. Undercut doors 1" AFF for return in all offices and other rooms with doors.
    d. Install 2 sq.ft. minimum louvered grill in bathroom and shower doors
    e. All ductwork designed to <0.1" external static.
    f. Use all smooth transitions, elbows and tees. No exceptions. Not shown on drawings.
    g. Outside intake and exhaust ductwork in basement through existing window openings – not on train-track side of building!
    h. Provide motorized low-leakage dampers inside fixed exterior louvers on outside exhaust and outside air intakes.
    i. Connect all ducts to ERV's with flex connection.
    j. Use 10" round or 8" x 12"hard duct to outside air intake and outside exhaust from ERV's.
    k. Insulate outdoor air intake and exhaust to outdoor from ERV to R-20, with foil/scrim vapor barrier, all joints taped with UL listed tape.
    l. Seal all hard duct joints with duct mastic, flex to rigid with UL tape + mechanical clamp.
    m. Prep and paint duct with color by architect
4. Hang ERV's near ceiling with vibration absorbing hangers.
5. Provide supply and exhaust grills with locking balancing dampers in grills.

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6. Balance system by first setting all grills fully open, and setting speed of EC motor to provide total cfm required. ***Minimize motor speed to meet flow. Do NOT set motors to full speed.*** If motors found at full speed, contractor to rebalance at contractors expense.
7. Use low-flow-capable flow hood or pressure pan to measure low flows at grills.
8. Provide balancing report, including spec of flow measurement device.

NESEA Occupancy and ventilation
for price estimating not for construction

						per sq.ft. 0.06	per person 5	
		floor	sq.ft.	# people max > 1 hr	area vent	people vent	total supply cfm	exhaust
name	Rm #							
NW corner office	201	2	487	2	29	10	40	
Large conference	202	2	218	16	13	80	**30**	**Note***
NE office	203	2	246	2	15	10	30	
work area	204	2	180	2	11	10		50
small meeeting'	205	2	109	4	7	20	30	
south office	206	2	164	2	10	10	30	
SE corner office	207	2	157	2	9	10	30	
lounge	208	2	98	1	6	5	30	
SW corner office	209	2	302	3	18	15	30	
West office	210	2	178	1	11	5	30	
shower	211	2		0				110
Toilet	212	2		0				110
				coincident				
2nd floor subtotal			1652	35			**270**	270
Turnkey	101	1	158	1	9	5	25	
Turnkey	102	1	87	1	5	5	25	
Solid Waste	103	1	119	1	7	5	25	
Solid Waste	104	1	265	2	16	10	25	
Corridor	105	1	362	0	22	-	-	
Solid Waste	106	1	106	1	6	5	25	
Solid Waste	107	1	256	2	15	10	25	
	108	1	94	1	6	5	25	
Kitchen	109	1	128	0	8	-	25	
Bales	110	1	150	1	9	5	25	
Bales	111	1	107	1	6.42	5	25	
Bales	112	1	114	1	6.84	5	25	
	113	1	121	1	7.26	5	25	
	114	1	190	2	11.4	10	25	
Turnkey	115	1	177	1	10.62	5	25	
New Lav	116	1	45	0	2.7	-		175
New Lav	117	1	45	0	2.7	-		175
Whole building			1766				**350**	350

* normal supply to conference room is 30; cfrm boost supplies additional 60 cfm
This will reduce supply to other rooms temporarily

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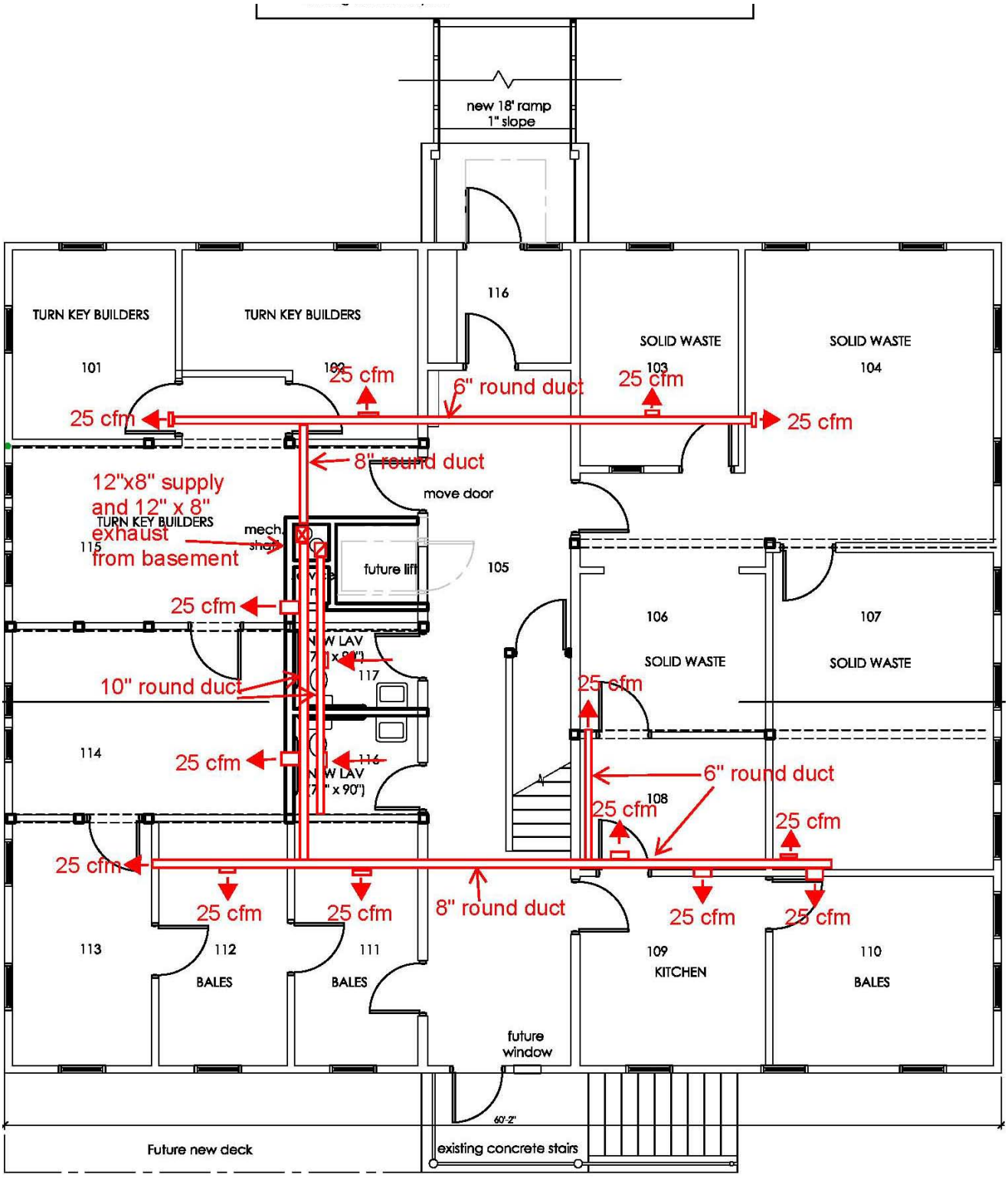
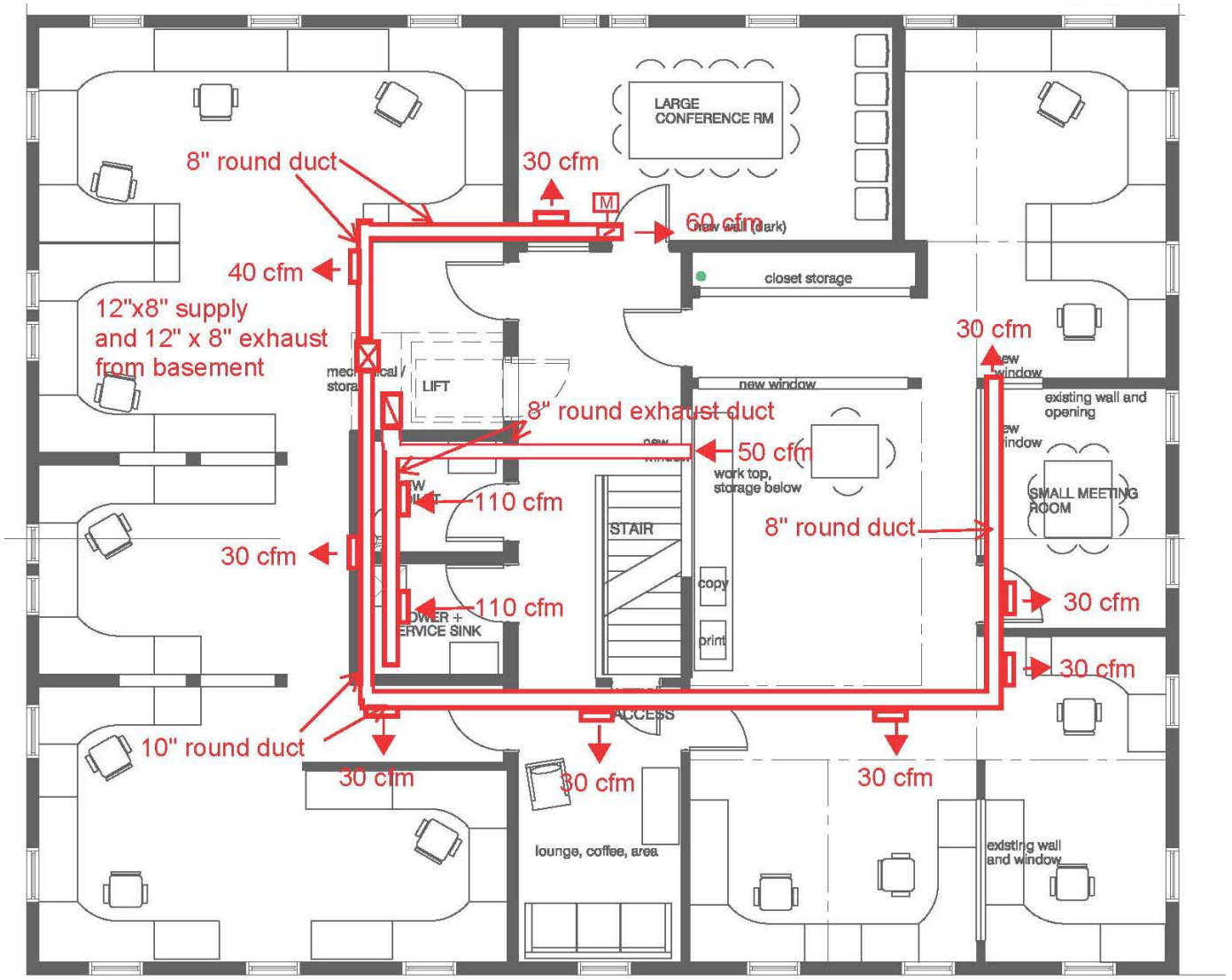


Proposed ventilation layout for the 1st Floor

NESEA Ventilation Plans
For Pricing, not for construction
EN 10 Jan 13



1 / A3 SECOND FLOOR PLAN
1/8" = 1' - 0"

1/7/14 Level 2 plan with hatched walls

Proposed ventilation layout for the 2nd Floor

NESEA Ventilation Plans
For Pricing, not for construction
EN 10 Jan 13

3.9. HEAT PUMP NARRATIVE AND DRAWINGS

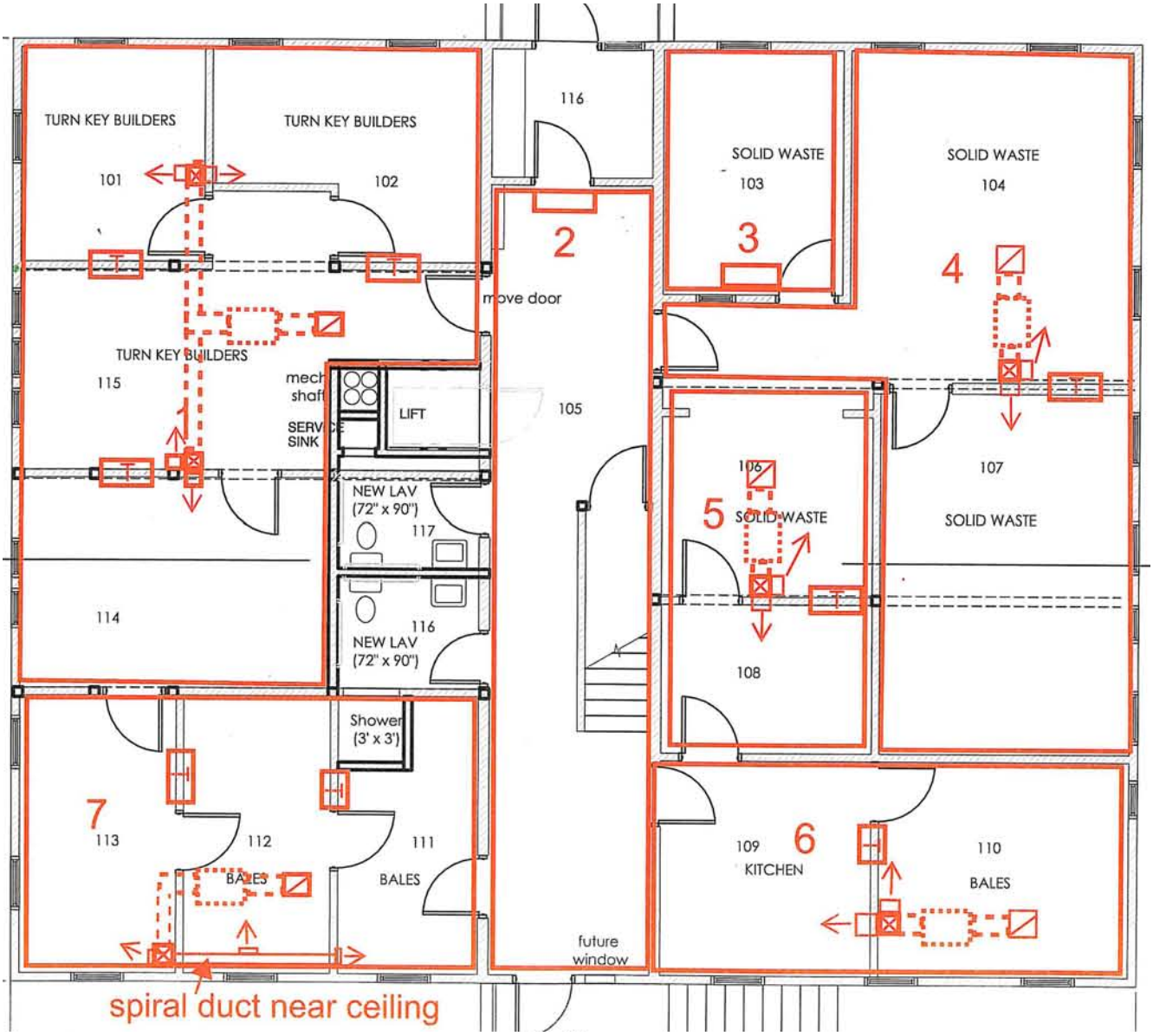
The heat pump size requirements shown on the attached pages are outlined below by Energy Balance.

NESEA Offices

Heat Pump Sizes

Floor	Zone	Btu/hr heating	Unit type
2	1	7,900	Wall mount
2	2	2,800	Wall mount
2	3	2,800	Wall mount
2	4	2,800	Wall mount
2	5	2,800	Wall mount
2	6	5,600	Wall mount
2	7	3,600	Wall mount
2	8	8,700	Wall mount
2	9	2,800	Wall mount
2 Total		39,800	
1	1	18,300	Ducted
1	2	5,500	Wall mount
1	3	5,100	Wall mount
1	4	18,300	Ducted
1	5	1,800	Ducted
1	6	11,000	Ducted
1	7	13,200	Ducted
1 Total		73,200	

3-Phase power available in building



The first floor heat pump layout for pricing purposes by Energy Balance

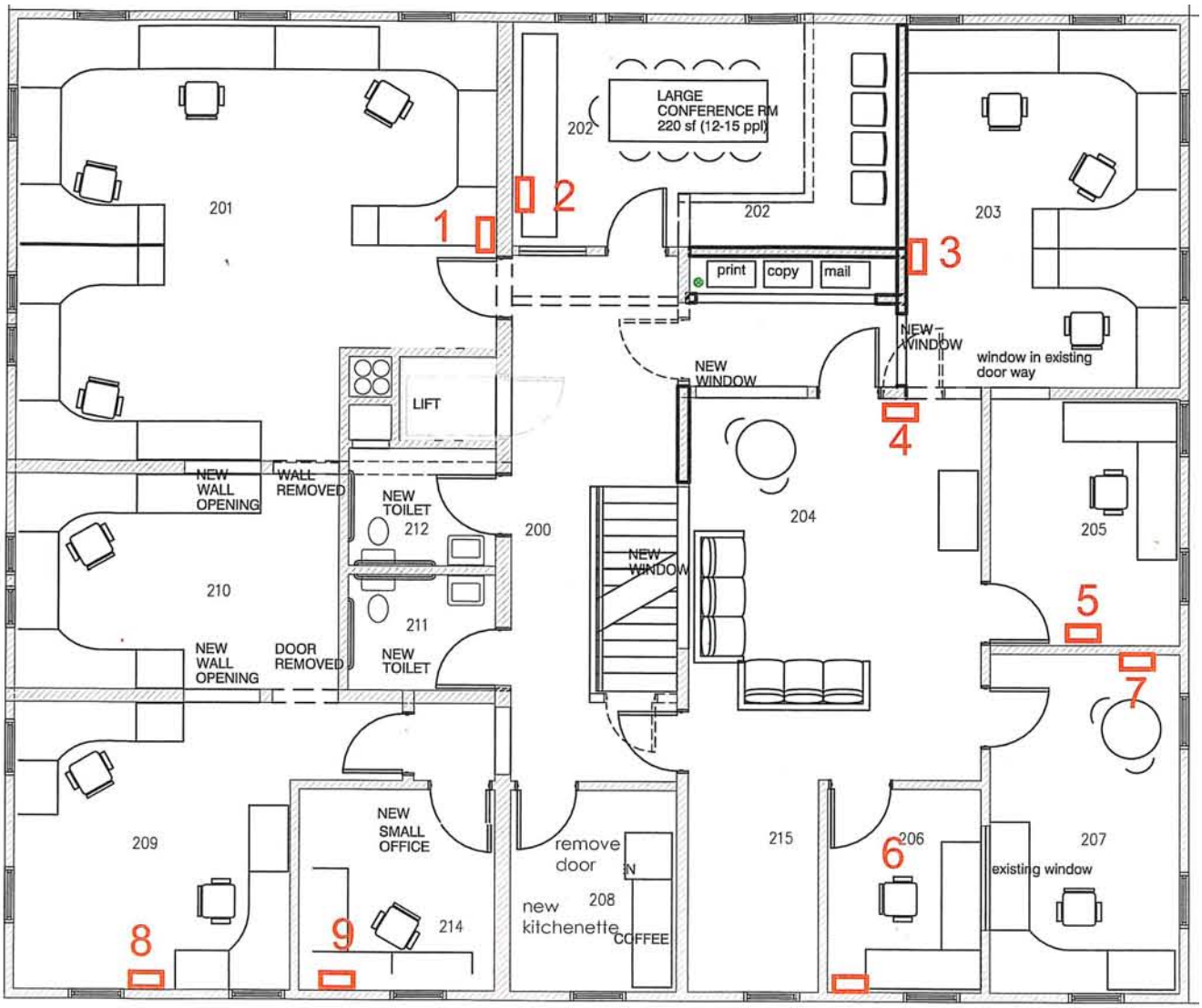
NESEA Heat pump indoor unit location and ducting
FOR COSTING PURPOSES ON 30 Jan 14

- HP indoor unit in basement
- Ducting in basement
- Supply Rise
- Supply Register, near ceiling
- Transfer grill, near floor
- Return grill in floor
- Wall mount indoor unit

Notes:
R-20 insulation on all supply and return ductwork in basement
R-10 insulation on all riser ductwork
Transfer grills to be sound attenuating type

NESEA Heat pump indoor unit location
FOR COSTING PURPOSES ONLY
30 Jan 14

Wall mount indoor unit



The second floor heat pump layout for pricing purposes by Energy Balance.

HOMANS ASSOCIATES

MITSUBISHI ELECTRIC

*****QUOTATION*****

4 ARMAND LANE WILLISTON, VT 05495

Check Box if Design Build Job ☐

Customer: Energy Balance **Quote:** MJC-13114

Attn: Andy Shapiro

Job Name: NESEA Offices **Date :** 1/31/2014

QTY	Description	Part Number		
1	HHI Y-series Outdoor Units	PUHY-HP144TSJMU-A		
	Outdoor Units (R410A)	**Total Qty**		1
9	Wall-mounted Indoor Unit	PKFY-P06NBMU-E2		
2	Wall-mounted Indoor Unit	PKFY-P08NHMU-E2		
1	Ceiling-concealed Ducted	PEFY-P06NMAU-E2		
2	Ceiling-concealed Ducted	PEFY-P12NMAU-E2		
2	Ceiling-concealed Ducted	PEFY-P18NMAU-E2		
	Indoor Evaporators	**Total Qty**		16
	Branch Controllers (R410a) PURY, PQRY only	**Total Qty**		-
	Branch Controllers for MXZ-8B48NA only	**Total Qty**		-
	1230	**Total Qty**		-
16	Simple MA Remote Controller	PAC-YT53CRAU-J		
	Remote Controllers	**Total Qty**		16
1	TC-24B Standard Package	TC-24B-Standard		
	Centralized Controllers	**Total Qty**		1
	Software options for Centralized Controllers	**Total Qty**		-
	Other Controls	**Total Qty**		-
3	Filter Box with MERV 13 Filter	FBM2-1		
2	Filter Box with MERV 13 Filter	FBM2-2		
	R410a Accessories	**Total Qty**		5
*	Quote includes factory authorized & supervised "start-up" assistance.			

Sub-Total	Taxes not included:	**$43,427**
Additional Items		
QTY Description		
BID TOTAL with Additional Items	Taxes not included:	**$43,427**

Notes

* Homans Associates requires a minimum of 3 weeks notice for scheduling of start-up assistance!

* GB-50ADA & GB-24 central controllers require use of PC for monitor/operation of systems. (To be provided by others!)

* It is the responsibility of the CONTRACTOR to insure that all counts, components and selections with-in, meet the intent of the project and specifications.

* All disconnects for equipment components to be provided by others!

This is a materials only cost. Double this amount to include labor.

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