

Brookline

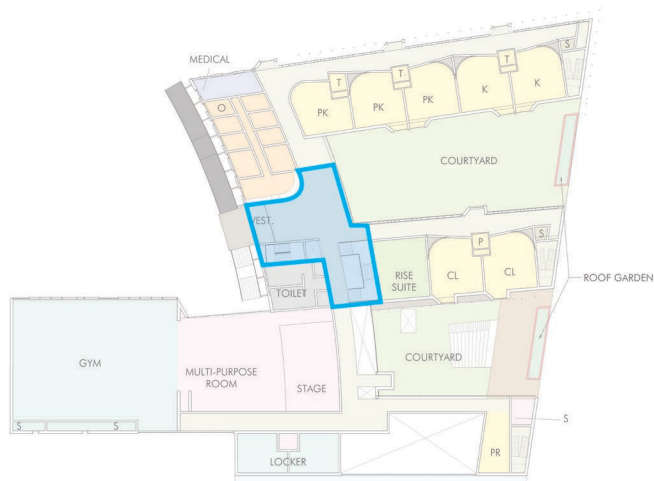
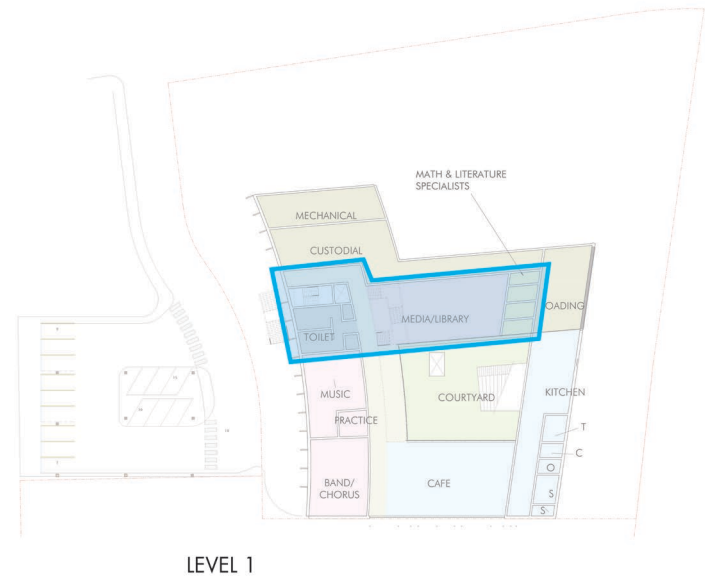
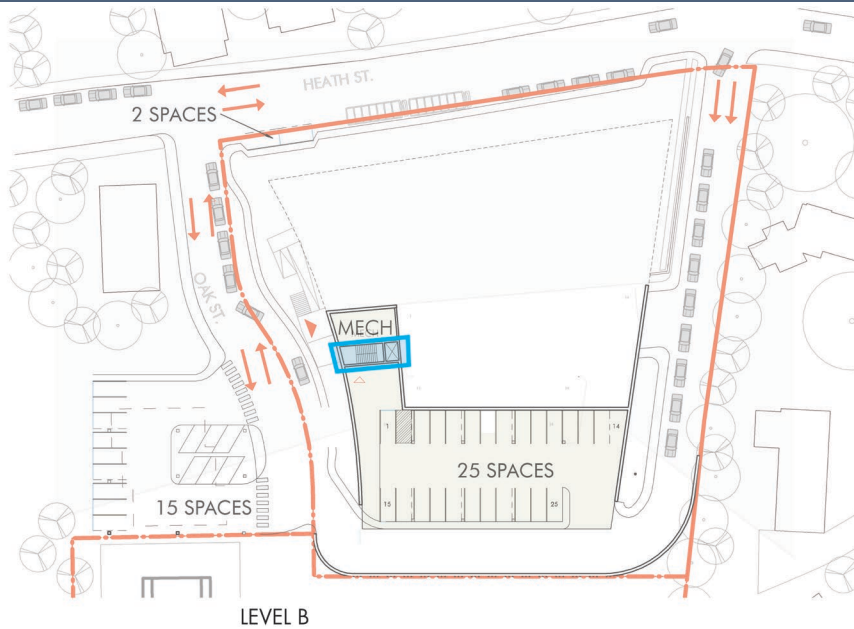
BALDWIN SCHOOL EXPANSION

School Building Committee
January 31, 2019

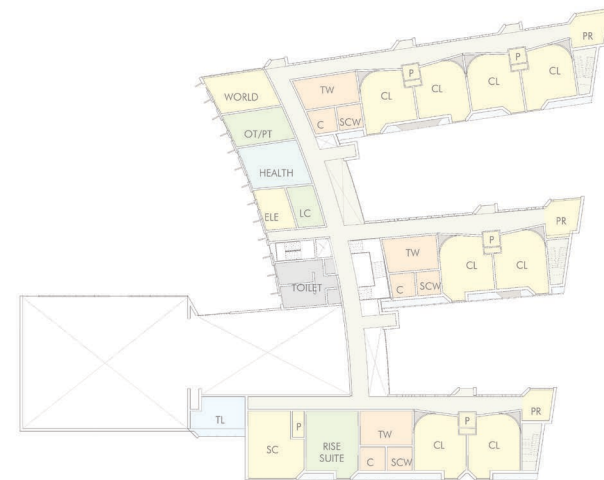


Jonathan Levi Architects

Modes of Operation

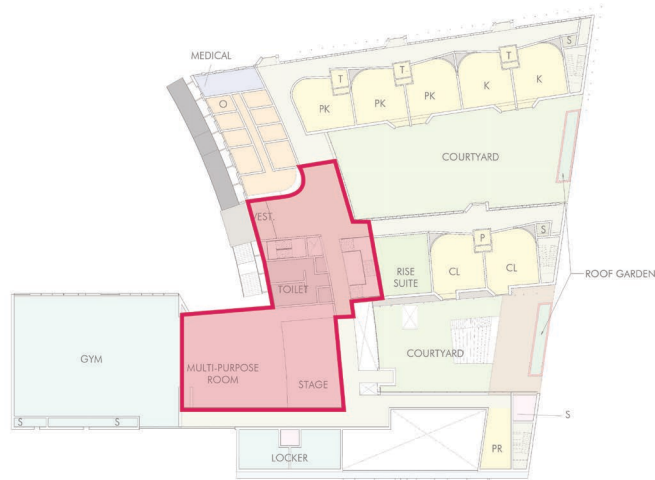
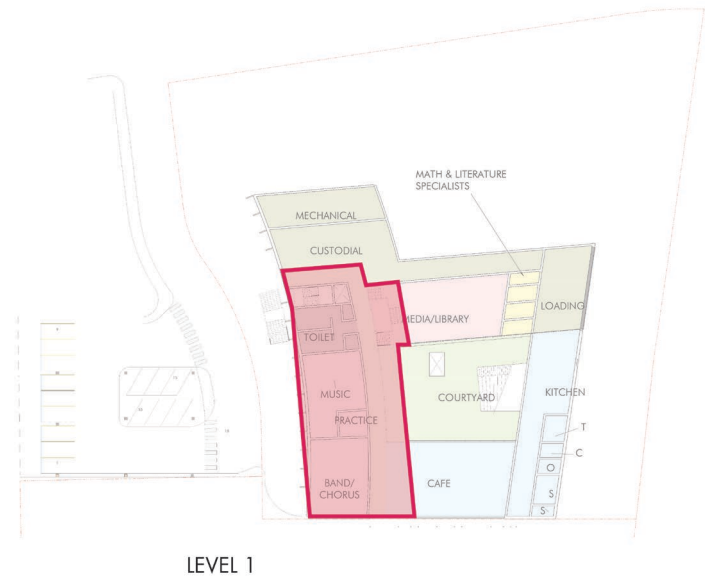
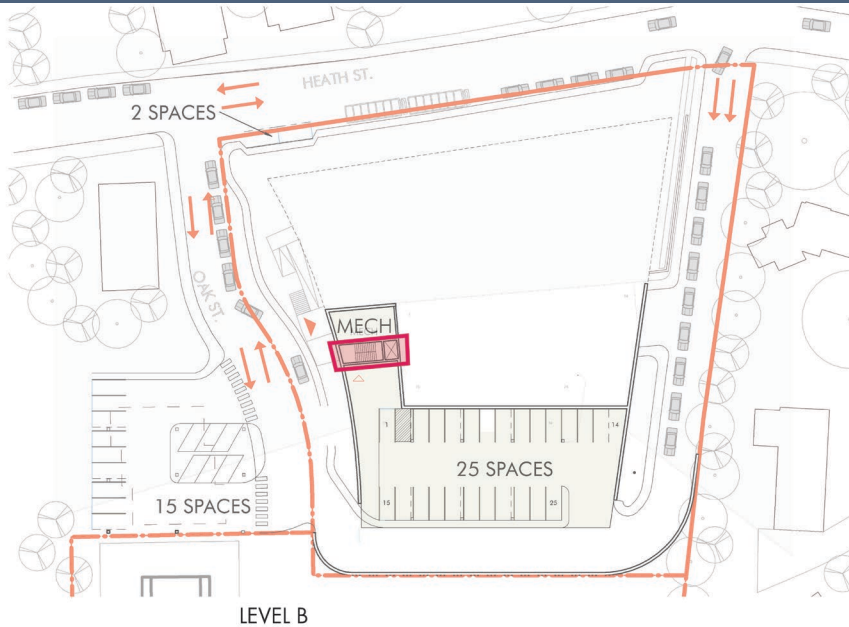


MEDIA / LIBRARY



LEVEL 3

Modes of Operation

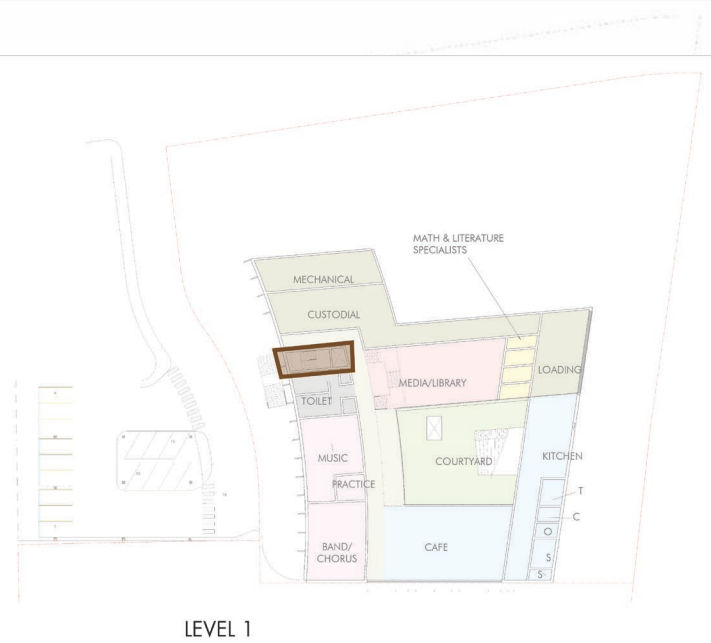
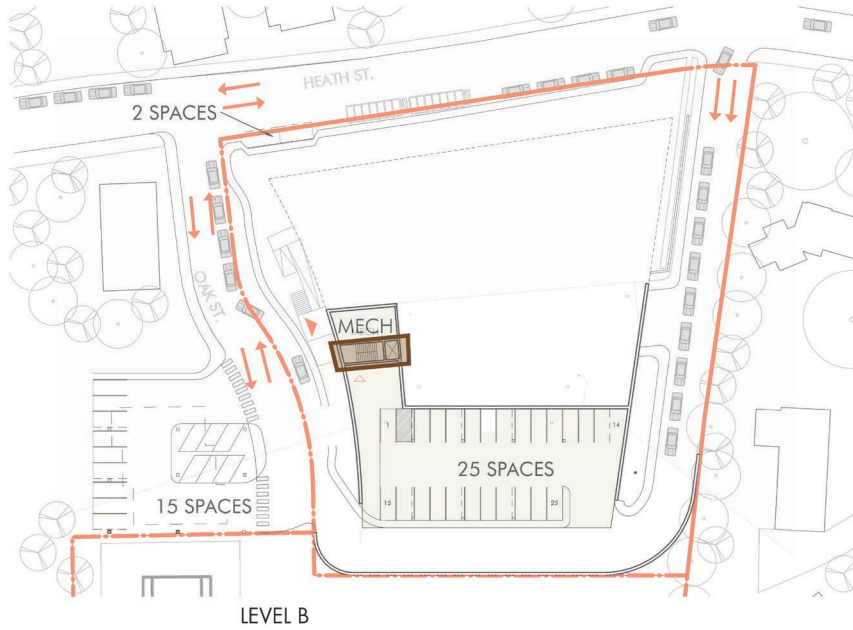


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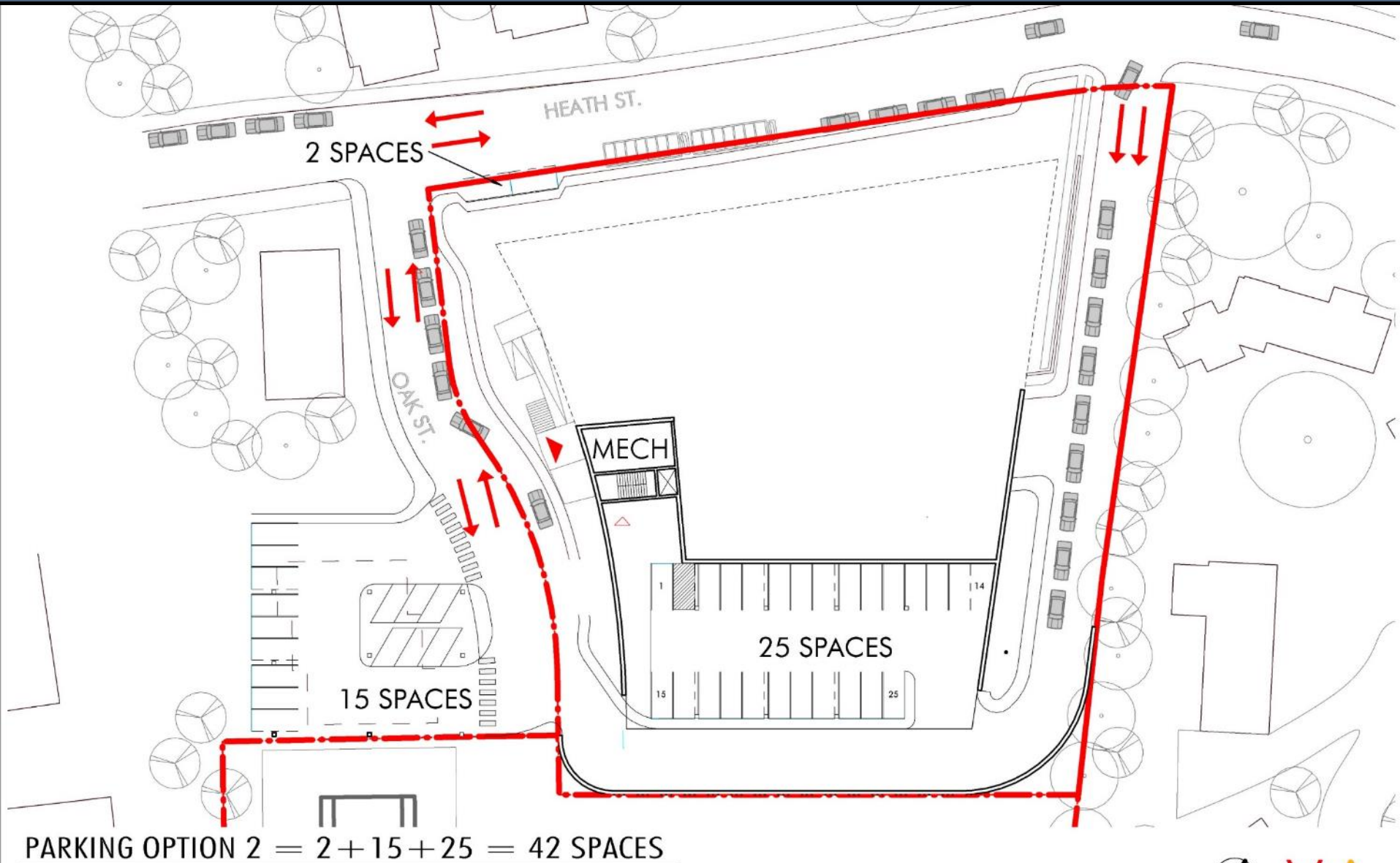


LEVEL 3

Modes of Operation



Parking Options



ARTICLE 2

ADVISORY COMMITTEE'S SUPPLEMENTAL RECOMMENDATION

SUMMARY:

On December 10, 2018, the Advisory Committee met to potentially reconsider its recommendation on Article 2, which would appropriate schematic design funds for the Driscoll School. The item was placed on the agenda so that the Advisory Committee could consider and respond to the Select Board's Article 2 recommendation, which differed from the Advisory Committee's recommendation. At the December 10 meeting, the Advisory Committee voted against reconsideration and therefore continues to recommend that Article 2 include language that would prevent using funds to design building systems that use fossil fuels, except for emergency systems.

BACKGROUND:

As reported in the Combined Reports for the December 13, 2018, Special Town Meeting, the Advisory Committee on December 4, 2018, voted to recommend an amendment to the Driscoll schematic design motion offered by the Select Board. The amended version of that motion includes a recommendation imposing a condition on how the appropriated funds could be spent. This condition would only allow spending schematic design funds to design fossil fuel-free building systems (e.g., heating), allowing an exception for emergency back-up systems.

DISCUSSION:

The Advisory Committee voted and affirmed its Article 2 "no fossil fuel" recommendation for the following reasons.

First, the Advisory Committee recognizes that Brookline needs to make a commitment to using non-fossil fuels. Fossil-fuel-free systems are the only justifiable path forward. The Town has as its policy, established in 2012, the reduction of gas emissions to 80% below 1990 levels by 2050. The Intergovernmental Panel on Climate Change (IPCC) recently reported that to avoid massive environmental consequences, greenhouse pollution must be reduced by 45 percent from 2010 levels by 2030, and 100 percent by 2050. These findings on climate change will require that emissions decline far more rapidly, and we must make our new and renovated schools fossil-fuel-free if we are serious about achieving town-wide emissions reductions. It would be fiscally and environmentally irresponsible to build a school now, which we expect to be in use to the next 70 years, that we know won't make the grade in 2050.

Second, buildings, which use nearly 40% of energy, are one of the most obvious places to focus in our efforts to reduce greenhouse gas emissions.

Finally, other communities are already building fossil-free schools. The Maria Hastings Elementary School in Lexington and the King Open and Cambridge Street Upper School in Cambridge are examples. If Lexington and Cambridge are building fossil-free schools now, so can Brookline.

On December 10, 2018, the Advisory Committee considered the concerns of Planning and Building Department staff that there are multiple all-electric engineering solutions, each with different technological benefits and drawbacks and financial implications, which must be assessed via a comprehensive analysis. The Advisory Committee's motion not only allows for, but assumes that such an analysis will be carried out to determine the best design for the particular building. The Advisory Committee motion requires only that the building systems be designed without the use of on-site combustion of fossil fuels, except for emergency back-up systems.

Some members of the Advisory Committee pointed out Article 2, including the Advisory Committee's amendment, only applies to the schematic design phase. During that phase, it makes sense to include the parameter that only fossil-fuel free systems be considered.

RECOMMENDATION:

On December 10, 2018, a motion to reconsider the Advisory Committee's recommendation under Article 2 failed by a vote of 10–11–3.

The Advisory Committee thus continues to recommend FAVORABLE ACTION on the following motion under Article 2:

VOTED: That the Town appropriate \$1,500,000, to be expended under the direction of the Building Commissioner, with any necessary contracts to be approved by the Select Board and the School Committee, for the schematic design services to construct or expand the Driscoll School, *with the condition that no funding may be used for the design of non-emergency fossil fuel–operated building systems*, and to meet the appropriation transfer \$1,300,000 from the overlay surplus account and \$200,000 from free cash

Italics denote additional language that the Advisory Committee proposes to add to the Select Board's motion.

This vote in favor of this recommendation was 24–1–0 at the December 4, 2018, meeting of the Advisory Committee.

Some members of the Advisory Committee pointed out the Jonas amendment to Article 3 would not address the problem of carbon emissions from vehicles used to take students to and from the proposed Baldwin School. Others replied that Article 3 only applies to the building system. It would not make sense to oppose a fossil-fuel free building system on the grounds that the Article does not also address vehicle emissions.

RECOMMENDATION:

On December 10, 2018, by a vote of 12–10–2 the Advisory Committee recommended the following *conditional* amendment to the Select Board motion under Article 3 (amendment italicized and in bold print):

VOTED: That the Town release for expenditure the \$1,500,000 appropriated under Section 13, Special Appropriation No. 65 of Article 7 of the 2018 Annual Town Meeting as provided in said appropriation for Schematic Design Services for the Baldwin School, ***with the condition that no funding may be used for the design of non-emergency fossil fuel-operated building systems.***

This recommendation only applies if Town Meeting does not vote Favorable Action on the “Doggett amendment,” which the Advisory Committee is recommending under Article 3. If the “Doggett amendment” fails, the Advisory Committee recommends the Jonas amendment.

ARTICLE 21

TWENTY-FIRST ARTICLE

Submitted by: Werner Lohe, Alan Christ, and Kathleen Scanlon

A RESOLUTION REGARDING A NET ZERO ENERGY NINTH ELEMENTARY
SCHOOL AND THE EXPANSION OF BROOKLINE HIGH SCHOOL

To see if the Town will vote to adopt the following resolution:

Whereas our town, the nation, and the world are increasingly aware of the need to address climate change and of the importance of better protection of the environment in general, and

Whereas Net Zero Energy LEED Platinum schools create an environment that supports student learning and health through improvements in daylighting, indoor air quality, thermal comfort, acoustics, and classroom design, all of which have an impact on a child's ability to learn and a teacher's ability to teach, while saving energy, resources, and money, and

Whereas Net Zero Energy LEED Platinum schools increase energy efficiency, thereby reducing greenhouse gas emissions, cost less to operate, utilize durable materials, reduce water and energy use, and provide other benefits; while providing an educational experience that transcends the classroom by creating opportunities for curriculum innovation and hands-on, project-based learning in which the building itself becomes an interactive teaching tool, and

Whereas decisions made now about the design of the Ninth Elementary School at Baldwin and the expansion of Brookline High School will determine each school's environmental footprint, particularly greenhouse gas emissions, for decades to come, and

Whereas the technical ability to create energy-efficient, high performing buildings has increased significantly by incorporating systems thinking into design processes, and

Whereas construction of new schools in Massachusetts and around the nation during the past five years has shown the feasibility and desirability of Net Zero Energy schools, that is, schools in which the amount of energy used on an annual basis is equal to the amount of renewable energy created on the site, and

Whereas an international standard known as LEED (Leadership in Energy and Environmental Design) allows for a building's environmental and energy performance to be accurately measured and provides a benchmark to assist in designing a Net Zero Energy building,

Whereas the most accurate measure of energy efficiency for a building is EUI (Energy Use Intensity), calculated by dividing total energy consumed annually by the gross floor area of the building,

Now therefore be it Resolved that in order for the Ninth Elementary School at Baldwin to be a Net Zero Energy school, it shall be designed to obtain LEED v4 certification at the Platinum rating level, and in addition, specifically, to achieve 16 of the possible 16 points available in the Optimize Energy Performance category and to achieve an EUI of 25 kBTU/sq.ft.,

And, be it further Resolved that while overall net zero energy consumption is unlikely to be achieved for Brookline High School and even the degree to which the as-of-yet-undefined, expanded portion of the school can approach Net Zero Energy is currently uncertain, nevertheless, Net Zero Energy principles shall be applied, to the extent feasible, during all design phases of Brookline High School,

or act upon anything relative thereto.

PETITIONER'S ARTICLE DESCRIPTION

Brookline was one of the first communities in Massachusetts to address climate change, adopting its first Climate Action Plan in 2002. In 2012, it accepted Massachusetts' target for greenhouse gas emissions—the reduction in emissions to 80% below 1990 levels by 2050. See “2012 Climate Action Plan,” p. 9 (<http://www.brooklinema.gov/DocumentCenter/View/2402>). In part in response to this statement of our community's environmental values, recent school construction (i.e., the Runkle School and the Devotion School) has achieved high standards of energy efficiency. Similarly, in the Educational Plan for the Ninth Elementary School at Baldwin, the School Committee has stated its strong commitment to a state-of-the-art school.¹ Nevertheless, overall town-wide progress toward reduced emissions has been

1. “Building a new school in the early 21st century when our community and society are more conscious than ever of the delicate balance between environmental sustainability and ongoing development provides an opportunity to have the physical plant itself play a significant role in the culture, educational approach and daily lives of students and teachers. Whether it's through monitoring waste water, understanding the science behind passive and active solar power, or studying conservation measures built into the new building, the physical plant can be used to help students learn about science, sustainability, and taking care of the environment. For example, signs and working exhibitions created by students could identify design elements that demonstrate architectural, structural, mechanical, and green building strategies. Student tour guides could be trained to introduce visitors to the building's features. Back-of-the-house spaces could be used as instructional spaces for students and staff, and could be used by town building and maintenance staff for hands-on training. *Brookline's new elementary school could stand as a physical demonstration of environmental stewardship and innovation, providing a local case study for sustainable school construction.*” 9th Elementary School Educational Program (11/29/16 draft), p. 13 (emphasis added). <http://www.brookline.k12.ma.us/cms/lib8/MA01907509/Centricity/Domain/722/Draft%209th%20School%20Ed%20Plan%20-%2011.29.2016.pdf>

slow, not yet approaching the rate needed to reach our goal. See, generally, "Selectmen's Climate Action Committee Report to Town Meeting, Spring 2015," p. 2 (<http://www.brooklinema.gov/DocumentCenter/View/8158>).

New construction of any sort inevitably leads to a slight increases in emissions. Therefore, communities throughout Massachusetts and New England have begun to address that reality by designing "Net Zero Energy" (NZE) schools, that is, schools that minimize on-site energy use as much as possible, and offset that energy use with renewable energy generated on site, with the goal of equalizing, on an annual basis, energy consumed and renewable energy generated on site. (Examples of such schools are the Martin Luther King School, Cambridge, MA, the King Open School, Cambridge, MA, and the Pell Elementary School,² Newport, RI.) Schools such as this not only address climate change, but typically save money by reducing energy costs. See below. Brookline now has an opportunity to design its own NZE school.

About ten years ago, Brookline improved its design process for municipal buildings by including consideration of "environmental and sustainability goals and objectives, includ[ing] design and construction practices that explicitly consider Green technologies." Bylaws, § 7.3.2(a). Because of the Town's sound design practices and the Massachusetts School Building Authority's (MSBA) standards, the Runkle and Devotion projects have good energy performance, though they are not NZE. The Ninth Elementary School at Baldwin, however, is not subject to MSBA requirements, and no specific standards for energy performance have been set. This resolution provides direction to the design architects, under the supervision of the School Committee, the Building Commission, and the Board of Selectmen, by establishing Net Zero Energy as the community's goal for its new school. This goal encourages energy efficient building design, places a major focus on energy, and encourages building users to reduce their energy needs without compromising building programs or mission.

Mechanism for Assuring a NZE Design

The most widely used and accepted rating system in the United States and in the world for green buildings is LEED v4 (Leadership in Energy and Environmental Design, version 4). See <http://www.usgbc.org/LEED>. Building performance is measured by awarding up to a total of 110 checklist points in eight categories and 57 sub-categories. The single sub-category in which the most points are available—with 16 points—is Energy and Atmosphere: Optimize Energy Performance. Consultation with architects and energy efficiency consultants familiar with schools, NZE principles, and LEED indicates that the realistic goal for achieving NZE for the Ninth Elementary School at Baldwin is 16 Optimize-Energy-Performance points with certification at the Platinum rating level with Energy Use Intensity (EUI) of 25 kBtu/sq.ft.

2. "The Pell School is... considered a net-zero-ready building. With the addition of a 1,100-kW photovoltaic system in the future, the school will be an actual net-zero building." <https://webspm.com/Articles/2014/08/01/Net-Zero-in-School-Design.aspx>. Binghamton, NY designed a NZE school, the MacArthur Elementary School, that is not only NZE, but also "fossil-fuel-free." *Building Energy*, vol. 36, no. 1 (2017), p. 12,

Cost

NZE schools, in addition to addressing climate change, typically save money by reducing energy costs. See <https://www.districtadministration.com/article/net-zero-schools-save-big-energy-costs>. Further, the Town and its architect are committed to “integrated design,” which is the most effective process for ensuring not only energy efficiency, but also cost savings. See <http://www.facilitiesnet.com/facilitiesmanagement/article/When-talk-is-cheaper-Integrated-design-and-better-buildings-Facilities-Management-Facilities-Management-Feature--2138>.

Integrated design relies on careful planning and goal setting early in the design process. Project costs and savings are evaluated during the schematic design phase of the project. Thus, the savings (or costs) that may be realized by designing an NZE school cannot be accurately assessed at present since schematic design has not yet been authorized by Town Meeting. But, consistent with best practices, an important provision in the Town’s bylaw requires that “the consultant [(the architect) prepare] a cost estimate for the project (including life-cycle costs) [and] consider the investigation, cost-benefit analysis, and recommendation of appropriate options that address the environmental and sustainability goals and objectives....” Bylaw, § 3.7.2(b).

The bylaw does not specify the methodology to be used in the cost-benefit analysis. The Town has frequently used “simple payback period” methodology. But, because of the complexity of the design of a large project such as the Ninth Elementary School at Baldwin and the desire to achieve the goal of NZE, financial analysis of energy-related features such as geothermal HVAC, solar PV panels, triple-glazed windows, and the like should include a Discounted Cash Flow (DCF) analysis, considering Internal Rate of Return (IRR) or Net Present Value (NPV) or both, based upon the life of the features,³ and should also consider the Social Cost of Carbon.⁴

3. Funding for the Ninth Elementary School at Baldwin will be provided by the issuance of municipal bonds. Energy-related features whose nominal rate of return, as compared to baseline conventional features, are projected to exceed the Town’s cost of capital in the municipal bond market should be chosen because they are the more fiscally responsible alternative.

4. See “Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866” published by the Interagency Working Group on Social Cost of Carbon, United States Government, in May 2013, and revised in November 2013 and July 2015.

SELECTMEN'S CLIMATE ACTION COMMITTEE RECOMMENDATION

At its April 24, 2017 public hearing, the Selectmen's Climate Action Committee (SCAC) voted unanimously to support Warrant Article 21 proposed by citizen petitioners Werner Lohe, Kathleen Scanlon, and Alan Christ with amendments recommended by the Advisory Committee's Schools Subcommittee.

The first step toward achieving a Zero Energy Building is designing for the lowest possible Energy Use Intensity, a ratio of energy consumption divided by building gross floor area. Because major School Department construction projects involve evaluating a wide range of objectives by several stakeholders, the range of metrics set forth in the resolution will ensure that ambitious but achievable energy efficiency standards are considered among the priorities communicated to all stakeholders.

SELECTMEN'S RECOMMENDATION

Article 21 is a Resolution regarding the pursuit of Net Zero Energy LEED Platinum designation in a Ninth K-8 School and in the expansion of Brookline High School. Net zero energy schools are buildings for which all of the energy the building uses is less than the amount of offsetting energy produced by the building. Net Zero energy buildings typically employ a solar PV array as a means of providing an offsetting energy source. There are a wide range of understandings and definitions for how to calculate the actual net zero energy budget of a building.

The Selectmen understand the pursuit of sustainability goals and lessening the energy usage of our public facilities, but were hesitant to vote in "requirements" for the construction of the buildings. The uncertainty was associated with the potential increase in building costs due to energy efficiencies, with no clear funding source. The original resolution presented multiple requirements, which the petitioner felt were necessary to set real energy efficiency goals. However, the petitioner revised the resolution, along with School Department and Building Department staff, to change the requirements to goals to be sought after.

The Selectmen were enthusiastic about pursuing a minimum of LEED Silver rating level, with a goal of achieving the LEED Platinum rating level, and will seek 13 of the possible 16 points in the Optimize Energy Performance category at the Ninth Elementary School.

Selectmen voted 5-0 Favorable Action on the following motion:

VOTED: That the Town adopt the following resolution:

A RESOLUTION REGARDING A NET ZERO ENERGY NINTH ELEMENTARY SCHOOL AND THE EXPANSION OF BROOKLINE HIGH SCHOOL

Whereas our town, the nation, and the world are increasingly aware of the need to address climate change and of the importance of better protection of the environment in general, and

Whereas an international standard known as LEED (Leadership in Energy and Environmental Design of the United States Green Building Council) allows for a building's environmental and energy performance to be accurately measured and provides a benchmark to assist in designing a net zero energy building, and

Whereas net zero energy LEED Platinum schools create an environment that supports student learning and health through improvements in daylighting, indoor air quality, thermal comfort, acoustics, and classroom design, all of which have an impact on a child's ability to learn and a teacher's ability to teach, while saving energy, resources, and money, and

Whereas net zero energy LEED Platinum schools increase energy efficiency, thereby reducing greenhouse gas emissions, cost less to operate, utilize durable materials, reduce water and energy use, and provide other benefits; while providing an educational experience that transcends the classroom by creating opportunities for curriculum innovation and hands-on, project-based learning in which the building itself becomes an interactive teaching tool, and

Whereas decisions made now about the design of the Ninth Elementary School and the expansion of Brookline High School will determine each school's environmental footprint, particularly greenhouse gas emissions, for decades to come, and

Whereas the technical ability to create energy-efficient, high performing buildings has increased significantly by incorporating systems thinking into design processes, and

Whereas construction of new schools in Massachusetts and around the nation during the past five years has shown the feasibility and desirability of net zero energy schools, that is, schools in which the amount of energy delivered on an annual basis is less than or equal to the amount of renewable energy exported from the site, and
Whereas the most accurate measure of energy efficiency for a building is EUI (Energy Use Intensity), calculated by dividing total energy consumed annually by the gross floor area of the building,

Now therefore be it Resolved that, in order for the Ninth Elementary School be a significant advance toward a net zero energy school and consistent with the projected energy efficiency results at the new Devotion School, the Ninth

Elementary School shall seek to obtain LEED v4 certification at the Silver rating level, with a goal of achieving the Platinum rating level; and in addition it shall prioritize achieving points in the Optimize Energy Performance category, with a goal of 13 of the possible 16 points available in the that category, with the goal of achieving 16 of the possible 16 points available in that category; and, finally, it shall seek to achieve a minimum EUI of 30 kBTU/sq.ft., with the goal of achieving an EUI of 25 kBTU/sq. ft./yr.

And, be it further Resolved that while overall net zero energy is unlikely to be achieved for Brookline High School and, even the degree to which the as-of-yet-undefined, expanded portion of the school can approach net zero energy design is currently uncertain, nevertheless, net zero energy principles shall be appropriately applied, to the extent feasible, during all design phases of Brookline High School,

ADVISORY COMMITTEE'S RECOMMENDATION

A report and recommendation by the Advisory Committee under Article 21 will be provided in the Supplemental Mailing.

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