Belmont Citizens Forum

Belmont's Zoning Needs Rethinking

By Chris Arthur

The current Belmont zoning bylaw produces inconsistent and haphazard results. It requires vastly different paths to get a permit, and those paths produce vastly different results. Changes to the zoning bylaw can produce more consistency, greater fairness, and be in line with neighboring towns' zoning bylaws, which have been updated over the past 10 years.

Cleaning up the Belmont zoning bylaw to create more consistency and clarity will also help the town's coffers by reducing the hours that the Belmont Planning staff spend on special permits and Zoning Board of Appeals (ZBA) projects, so that there is more time to focus on permitting and inspections.

How zoning works

Zoning is used to nurture the built environment toward the goals of a town. Zoning includes a map and bylaws. The map shows the different "districts" that have been created because they have a "likeness of similar types of structures within an area," and the zoning bylaws define how one can build and which uses are allowed. The zoning bylaw's core is often in the Schedule of Dimensional Regulations, which usually outlines all the requirements for a property.

Suppose an existing home, garage, or lot does not follow one part of the requirements. In that case, the property is considered "nonconforming," which significantly changes the owner's ability to add onto their home. According to a previous town planner, the nonconforming designation covers more than 50% of homes in Belmont.

Towns have used this designation of "nonconforming" to have greater design oversight on projects. In Belmont, this designation produces unfair and inconsistent results. Those with a conforming property can build to the town's allowable zoning requirements. Owners who have a nonconforming property cannot build to the zoning requirements without going through a harrowing public process which hardly ever achieves what the zoning code purportedly intends or allows.

Nonconforming lots on Davis Road.

Belmont's current zoning bylaw

Here's an example of how Belmont's zoning bylaw produces incon-

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sistent results. Suppose there are three properties side by side in the Single Residential-C (SR-C) district, and each homeowner wants to add on to their homes without going through the Planning Board or the ZBA. Each lot is about 9,000 square feet (sq. ft.).

The first property conforms and has an existing one-and-a half story home with a 1,500 sq. ft. gross floor area (GFA).

That owner can build to the maximum allowed by the zoning laws, which is a two-and-a-half story home with 25% lot coverage (percentage of total lot area covered by structures or roofed) and a connected garage that can allow an estimated 5,900 sq. ft. GFA home. That's a very large home compared to the existing one, and that GFA number does not include a full-height cellar, open-roofed porches, or free-standing garages.

The second property's lot is 8,999 sq. ft., just shy of the 9,000 sq. ft. required in the SR-C district, making the property nonconforming. However, the owners can add 30% GFA as of right ("as of right" means development may proceed under a zoning ordinance or bylaw without the need for a special permit or other discretionary zoning approval) while maintaining all of the requirements for the zoning laws. The existing home is a 3,000 sq. ft. GFA home, and the owner can add on 900 GFA sq. ft., creating a 3,900 sq. ft. GFA home. This home ends up about two-thirds the size of the first home.

The third lot is the same size as the second example, just under 9,000 sq. ft., and also nonconforming. On this lot, the existing house is a 1,500 sq. ft. GFA home, and the owners can add on 450 sq. ft. of GFA, which results in a home with a GFA of 1,950 sq. ft. This home is about one-third the size of the first home.

All are as of right but markedly different. The nonconforming projects can go through the Planning Board to get some relief, but this will take months, if not years, and much more money. They require lots of changes by the architect and builder throughout the process, as well as neighbors' approvals, and for the most part, not permit what a conforming lot is allowed by right. And the difference between the three properties is 1 sq. ft. of lot area.

Lexington's example

Other towns, such as Lexington, do not relegate so many owners onto a different permitting path based on an existing condition of their property. They don't have different requirements for nonconforming properties except that one cannot increase the nonconformity.

Looking at the three houses in the example, Belmontians and the Planning Board might come to the conclusion that what is allowed by right is too large, as exemplified by the 5,900 sq. ft. GFA home on a 9,000 sq. ft. lot. In that scenario, the zoning laws can be changed to allow a maximum GFA, as is done in other towns like Lexington. Lexington also adds a sliding scale based on the lot size.

Citizens' concerns about giant houses or massive additions would be assuaged through zoning a maximum GFA based on lot size. There would be more confidence in the process and the results. The law is instantly more fair and more equitable for all owners.

Here is Lexington's calculation for this lot:
5375 + .23(lot area-7500) = 5720.

ANN COIT SIFNEOS

Gross Floor Area

The Belmont zoning bylaw defines gross floor area (GFA) as: "The sum of the horizontal areas of the several floors of all buildings on the same lot, measured from the exterior face of exterior walls, including basements and any interior parking and loading areas, but not including cellars or areas having less than six feet floor-to-ceiling height."

This number seems like it is just a bit smaller than Belmont's largest option above, but it actually leads to a home similar to the second option. That is because in Lexington, the GFA definition includes covered entrances, covered porches, and full-height basements that Belmont would term "cellars," and unattached garages.

The Planning Board's collective decision-making could guide a move to a nuanced code like Lexington's. The board could create a grid of all the changes that they require or have required to see where they consistently rule against permitting what would be allowed by Belmont's zoning bylaw for a conforming project.

The issues of height, the half story, and lot coverage are all almost always brought up by the Planning Board. Perhaps the Planning Board's concerns might be remedied with a sliding-scale maximum GFA, changing the definition of GFA to match Lexington's to further reduce the size of a project, and a smaller allowance for the half story.

Requiring so much oversight of more than half of the homes in Belmont based on an existing nonconforming issue with their property produces haphazard results.

Creating a zoning code that works for all Belmontians will produce better, more consistent results. It will strengthen the zoning bylaw and allow more time for our zoning officials to spend on permitting and inspections rather than on moving projects through the very circuitous process of submitting to the ZBA or the Planning Board for approvals.

Chris Arthur is an architect and a Belmont resident.

Belmont's Zoning Should Reflect Actual Use

By Max Colice

The intensity and use regulations of Belmont's zoning bylaws don't reflect how most land in Belmont is actually used. Changing the bylaws to match how land in Belmont has been developed and used would reduce the burden on town officials, promote growth while preserving character, and lead to fairer, more predictable outcomes for homeowners looking to renovate or expand their homes. It would also preserve open space, allow for small-scale development of more affordable housing, and remove obstacles to small-scale commercial development.

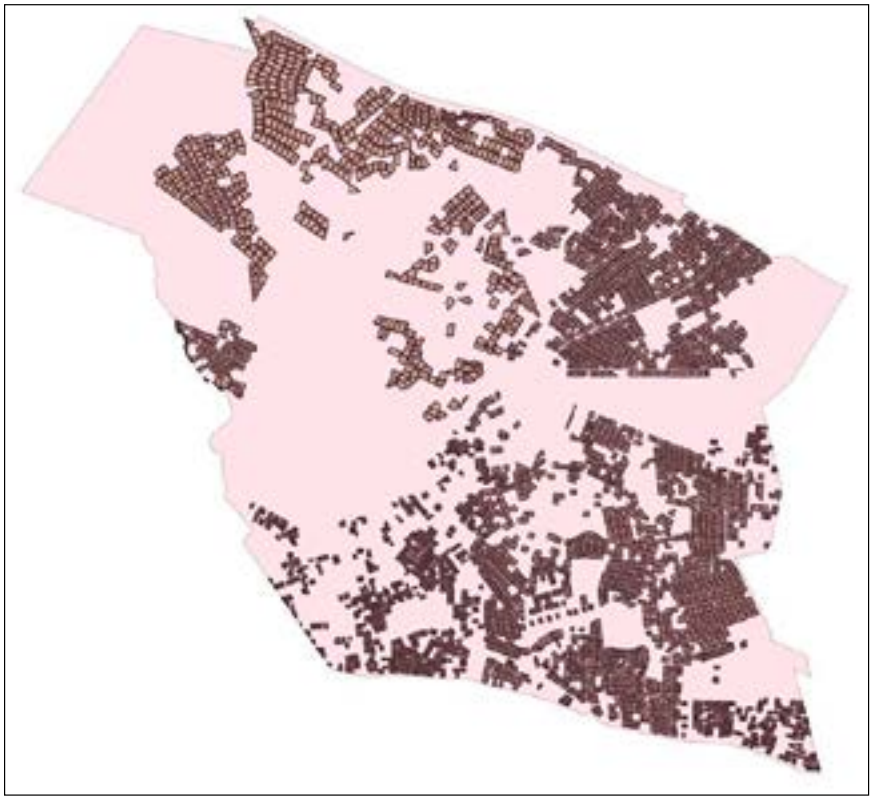
Belmont's zoning bylaw divides the town into different zones or districts; it permits varied uses, lot sizes, and building sizes in each district. Most of Belmont is zoned as single residence, with one single-family house allowed per lot. Belmont's General Residence district is zoned for single-family homes with two- and three-family dwellings allowed with special permits. Several smaller sections of town, including Belmont Center, Cushing Square, and Waverley Square, are zoned for commercial use. A few overlay districts and other special districts, including the McLean district and an Apartment Housing district encompassing the Hill Estates, allow for specialized use, such as research and development or apartment housing.

Belmont's zoning bylaws set out minimum allowable lot sizes for the residential districts. According to Belmont GIS data, there are roughly 7300 lots in Belmont, and more than 4500 are smaller than allowed by the current zoning bylaws. In other words, more than 60% of the lots in Belmont don't conform with the zoning bylaw. Because these lots are nonconforming, if the lot owners want to build or renovate, they often must apply for special permits, increasing the burden on town planning staff and incurring delays and expenses.

Nonconforming Lots in Belmont

This gross mismatch between allowed and actual lot sizes is by design. To limit growth, Town Meeting imposed new lot size requirements or increased existing lot size requirements in 1933, 1950, 1964, and 1987. Each time, the new lot size requirements turned previously conforming lots into nonconforming lots in an effort to prevent new development despite protests by Town Meeting members whose lots would become nonconforming or who had hoped to develop their land. In 1950, Selectman Flett allayed these misgivings by reassuring Town Meeting members that "the town cannot provide whether your house be large or small, whether it be white or black. If it is the house you want, you can build it." But that is no longer the case, and most Belmont homeowners are forced to apply for special permits if they want to build or renovate their homes.

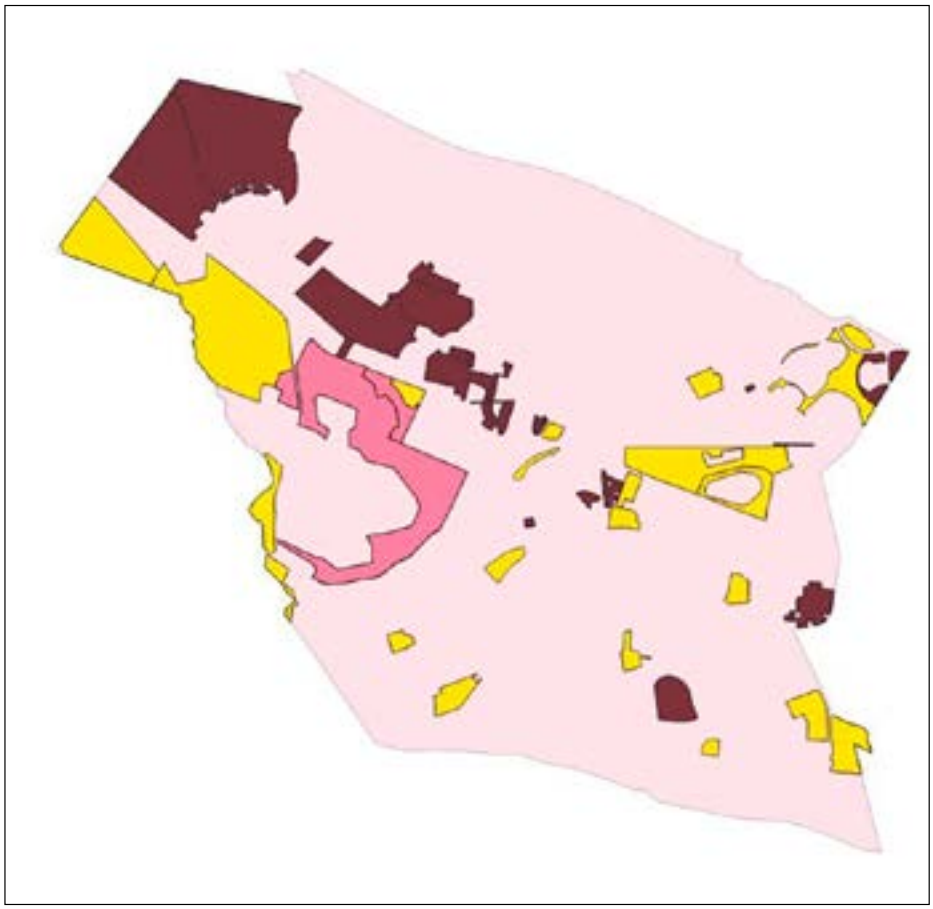
Special permits are also required for two- and three-family homes, despite the fact that the Belmont Assessors Database lists roughly 1500 two-family homes and more



MAX COLICE

Map of the 4500 lots in Belmont which are smaller than allowed by current zoning laws.

than 100 three-family homes in Belmont already (about one-quarter to one-third of Belmont's housing stock, depending how you count). Almost all of these homes were built before 1940, well before current zoning regulations were in place, but none of them could be built today without a special permit, even if the neighboring structures are two- or three-family homes. This requirement for a special permit makes it more difficult to build small-scale, affordable housing in Belmont in a manner that replicates the character of a large swath of Belmont. If Belmont is to comply with the new MBTA zoning requirements, then it will have to remove this barrier (See "MBTA Zoning May Change Belmont," BCF *Newsletter*, November/December 2022.)



MAX COLICE

Open space and recreational land in Belmont. Dark pink indicates publicly land zoned as open space (Lone Tree Hill).

Belmont's zoning bylaws also prevent replication of existing commercial structures. Commercial structures can't be more than two-and-a-half stories (28 feet) tall even though the bylaws permit taller residential structures. There are several older buildings in Belmont Center that are taller, including some of Belmont's most valuable (and profitable, from a tax revenue perspective) real estate. (See "Is Belmont Sitting on a Fiscal Cliff?" BCF *Newsletter*, September/October 2022).

Town Meeting imposed this height restriction to the bylaw in concert with continuing a moratorium on new commercial construction. The net result of this restriction on commercial real estate is a smaller commercial property tax base and fewer places to shop or work for Belmont residents.

There are other gross mismatches in Belmont's zoning bylaws. Right now, there are about 650 acres of open space and recreational land in Belmont, including more than 270 acres of privately owned open space and recreational land. But there are only about 120 acres in Belmont zoned as open space. Almost all the rest is zoned for residential use, including Habitat and the Belmont Country Club, with about 50 other privately owned acres subject to conservation restrictions. Changing the zoning for this property from single residence to open space would discourage future development and bring the zoning in line with the property's actual use. And because the property owned by the government or nonprofit organizations or subject to conservation restrictions is tax-exempt, the change should not affect Belmont's property tax revenue.

Belmont's zoning bylaws were intended to limit growth. They have succeeded, perhaps too well, by stifling small-scale affordable housing and commercial growth and increasing the burden on Belmont and its residents without preserving open space.

Max Colice is a Belmont resident.

School Claims Parking is "Educational Use"

By Justin Roe

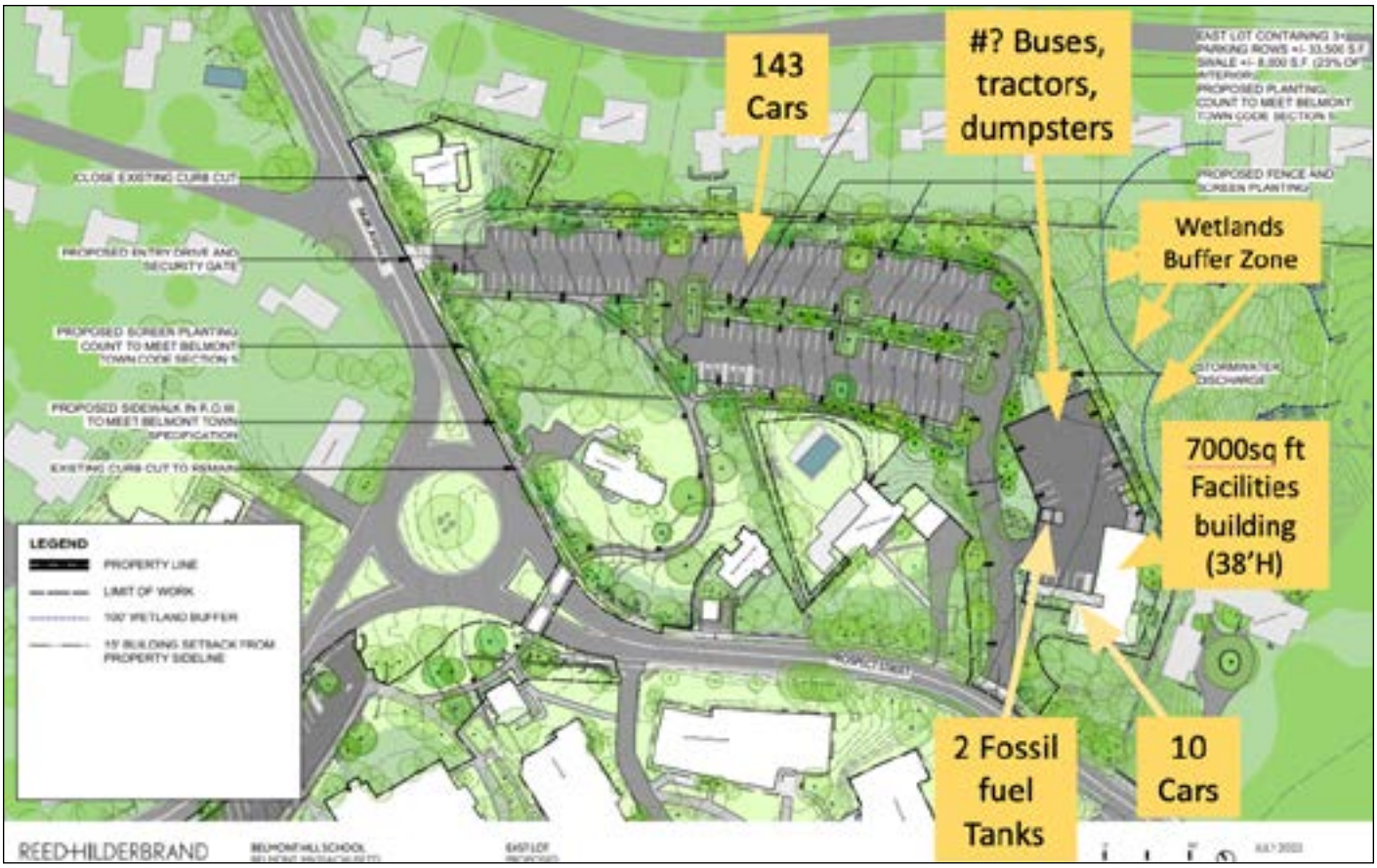
Belmont Hill School submitted their long-awaited plan for the Belmont Hill woodlands area to the planning board in October. The response from Belmont's residents was instantaneous and overwhelming in opposing the proposal.

Within three weeks, Belmont's Select Committee and Planning Board have received hundreds of letters voicing town opposition to the project. A petition in opposition has attracted over 2,200 signatures, and hundreds of lawn signs and banners are popping up in every district in Belmont. School action groups from Lexington and Waltham are taking an active role. All within a few weeks.

The school presented its plan to the Belmont Planning Board on November 15. The full proposal was posted on the town website at bit.ly/BCF-BHS-application: images from the plans are available at bit.ly/BCF-BHS-Drawings. The school plans to raze a significant portion of the seven-acre woodland on Belmont Hill, leaving only 28 trees and creating a a 153-car parking lot, a 7,000 sq. ft. building, two large above-ground fossil-fuel tanks, and an area for buses, tractors, and dumpsters.

No residential or commercial enterprise would be allowed to implement such a plan. It contravenes Belmont's sustainability objectives and the Single Family Zoning. The school is claiming its planned use is "educational," which gives it the right to perform this construction under the state's Dover Amendment. However, for the Dover Amendment to apply, the educationally significant goal must be the "primary or dominant" purpose for which the land or structures will be used.

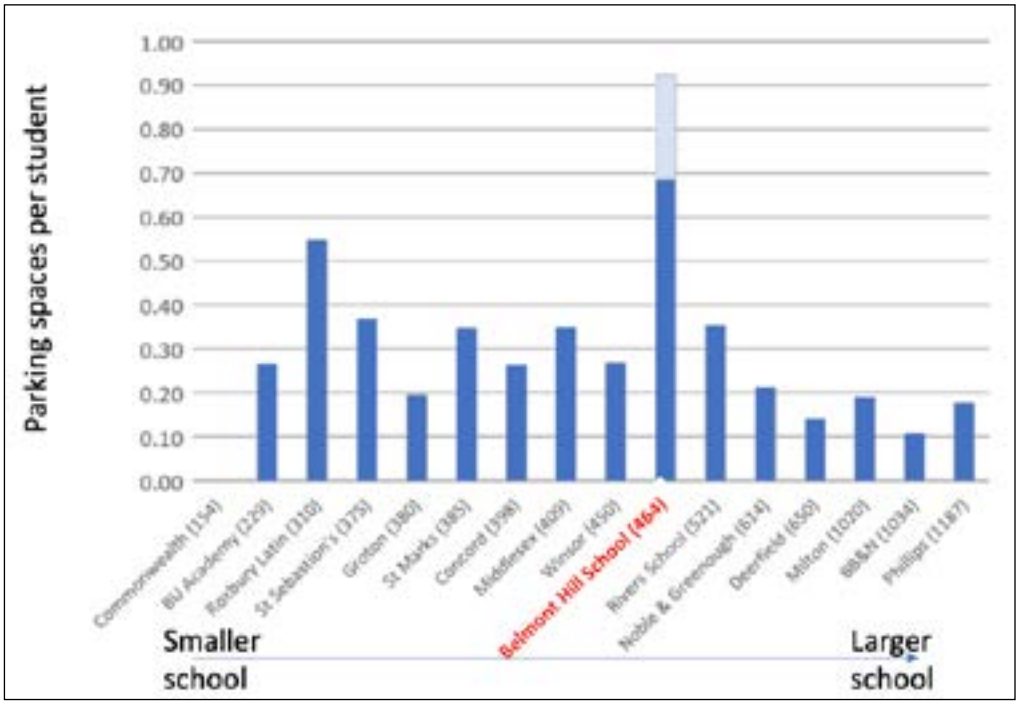
The school also has an obligation to show a reasonable need. Belmont Hill is claiming that additional parking, facilities building, and depot and fossil-fuel tanks are essential to properly fulfill their educational mission, even though the



JUSTIN ROE

Figure 7 from page 59 of the Belmont Hill School's August application to develop seven acres of woodlands with the author's annotations.

school is not increasing enrollment. Let's look at each of the school's claimed needs.



JUSTIN ROE

Parking spaces per student at Massachusetts private schools.

Parking

According to the proposal, Belmont Hill School currently has 318 parking spaces (268 on campus and 50 on the opposite side of Route 2 in Arlington). It has 464 students from 5th to 12th grade and 153 faculty and staff. The proposal states that "there is not adequate student parking under existing conditions," yet when pressed by the planning board on November 15, the school admitted that currently, if all eligible students and all faculty/staff need to park at the same time on the same day, they would be 29 spaces short in their on-campus lot and would have to resort to using their 50-space satellite parking on the other side of Route 2, a 13-minute walk away.

It turns out that Belmont Hill School's parking-space-to-student ratio is already by far the highest among its peers, yet they claim to need an additional 153-car parking lot, roughly equivalent in size to Belmont's Star Market parking lot.

Facilities yard and maintenance building

The second element of the proposal is the location of a maintenance building and facilities yard in the area zoned for single-family homes. It towers a staggering 38 feet tall with an 11-foot concrete wall at its highest point. The facilities building will service the campus and playing fields, yet the maintenance building is located on the opposite side of Prospect Street. We already see unregistered Belmont Hill School vehicles, maintenance machinery, and golf carts traveling on Belmont roads and sidewalks. Does it make sense to have these unregistered vehicles constantly crossing a busy street?

The facilities yard will contain dumpsters, trash, buses, trailers, boats, maintenance vehicles, salt, and sand, all about 10 feet from the wetlands buffer zone. There is a designated "snow removal gate" specifically to push all this snow, salt, spilled fuel, and pollution off the end of the yard and into the very steeply graded area that supplies the wetlands. "Snow storage for the Facilities Yard is the vegetated area located north of the paved yard," according to the application.

Fossil-fuel tanks

The plan's third major element is two fossil-fuel tanks. Belmont has taken sustainability very seriously. *Boston Magazine* puts Belmont in the Top 10 greenest towns in Massachusetts and the Mass Climate Network at #2 because of its energy-sustainability programs. However, by proposing fossil-fuel tanks, the school seems remarkably tone deaf to Belmont residents' sustainability and safety efforts.

Belmont residents have been vocal about demanding that the Belmont Department of Public Works (DPW) put its fuel tanks below ground when within 300 feet of neighboring properties, which the DPW agreed to do.

Belmont Hill is seeking to place above-ground fuel tanks approximately 130 feet from the nearest neighbor, well short of the minimum

safety recommendation of 300 feet. The school has never in its history had fossil-fuel tanks, but it feels that now is the right time to introduce them.

JUSTIN ROE

Belmont Hill School maintenance vehicle on Prospect Street.

Climate change

This proposal would entirely clear-cut the woodland and wildlife refuge. The land would be regraded with many tons of landfill, with possible ledge blasting. The proposal has a weak plan to replace the enormous loss of mature canopy with saplings and bushes. The Belmont Hill trees would be replaced with an out-of-proportion and unnecessary parking lot, fossil-fuel tanks, a maintenance depot, and a facilities yard. For more information about the health and environmental benefits of trees, see "Urban Trees Improve Everyones' Lives," BCF *Newsletter*, November 2021.

So how can Belmont Hill School claim that this development is educational? First, don't be fooled by the fact they call it "East Campus". There is not one single educational element of this plan. Calling it educational is a brazen claim to move everything dirty, smelly, environmentally damaging, and noisy off their pristine campus and dump it onto a new plot of land away from their campus, and among local residents.

Belmont Hill School claims to be surprised and upset by the town's reaction to their proposal. Could they not have predicted that this would be very unpopular in a town with one of the state's best sustainability records? Or is the truth that they hoped to get this proposal through and begin clear-cutting before anyone took notice?

The school seems to have forgotten its obligation as a responsible neighbor in our community. There are many other ways to achieve what they want, like reducing parking spaces, interspersing the car spaces among the existing trees and retiring fossil-fuel vehicles and land maintenance tools. It may cost slightly more, but with a $100 million-plus endowment and some very wealthy donors, a much better solution can be found.

It's time to rethink the whole project. It's the school's obligation to the town and to the next generation that they are teaching.

Learn more

Attend a Planning Board meeting, usually held on Tuesdays at 7 pm. Access is by Zoom only, and the link and meeting schedules are posted at www.belmont-ma.gov/planning-board. You will have an opportunity to comment at the meeting, but just attending keeps you informed and sends a message of concern and scrutiny to the planning board and the school.

Upcoming Planning Board meetings

January 17: Environmental and stormwater concerns

February 7: Peer review feedback; close public hearing and begin deliberations

February 21: Continued deliberations up to and approval of a final decision

Visit www.belmontwild.org for more information about the project. You can find the petition opposing the project at www.belmontwild.org/signing.

Justin Roe is a 26-year Belmont resident.

Preserve Belmont's Leafy Leviathans

By Fred Bouchard

Tawny branches reach skyward around its diminished crown like a monk's tonsure. Strafed by ligneous crows' feet and tagged with a bowie knife by "Oliver" (World War veteran?), its trunk is knobbled with rusts and growths. Golden wreaths of lichen encrust its bolus. The copper beech standing sentinel opposite the stone rail trestle in Belmont Center bears silent witness to a century and a half of local history.

It was a mere sapling, perhaps part of the project when H. H. Richardson's firm rebuilt the Unitarian Universalist Church in 1890. Wellington Station marked the adjacent train stop in 1900. The original B&M Railroad station (long the Elks Club) and the Cyclopean underpass date from 1906.

Town tree wardens have spent time and effort treating this showcase giant's ailments over the decades. Each of its twice-annual sprayings against that shiny scarab, the emerald ash borer, costs $200. The giant black ash tree in the Grove Street playground, another signature meeting spot, has received similar injections.

Other majestic copper beeches attest to the species' century-plus longevity: the goliath at Somerset and Wellington; 75 Fletcher Road; 4 Pine Street and Trapelo Road; several along Common and Pleasant Streets (notably at the Belmont Women's Club). Yet some copper beeches—and many other hoary but redoubtable aged trees in town—have been less fortunate.

Will our graybeards survive the century?

Many of our venerable trees now succumb to the whims of worried, defensive, or callous homeowners. Within the past two years, I've noted with dismay that several sturdy trees in my immediate (half a block) neighborhood had been cut down for reasons other than poor health: insurance denial, acorn and leaf litter, revenge for a fallen limb that dents a car or shatters a fence, property line impingement, impeded sight lines, sheer cussedness, and yes, even unsightly old age.

Meanwhile the naturalists, aesthetes, and conservationists among us trumpet that trees are vital to our very existence. (See "Urban Trees Improve Everyone's Lives," BCF *Newsletter*, November 2021.)

You can scientifically quantify one tree's contribution to our health and welfare with online metrics that calculate its sequestration of carbon emissions (itreetools.org) and assess the collective benefits of shade and canopy afforded by urban parklands (treeequityscore.org). Or you can simply take a stroll, breathe deep, and eyeball appreciatively these wondrous branchy beings that share and bedazzle our biosphere.

Sure, trees are good for everyone in every way. Except, that is when they become nuisances: contributing leaf litter, crunchy acorns, stinky

JEFFREY NORTH

Gingko tree outside Belmont Woman's Club.

SARAH MCCABE

Beech tree, Belmont Senior Center.

fruit, fallen limbs, or offering unwanted shade, blocking solar panel exposure, or obstructing new building projects.

I chanced to peek into a neighbor's yard when, after summer travels, I noticed a grounds crew parked out front. I was astonished to see that the 65-foot copper beech that had graced and shaded their spacious yard (since long before it was a yard) had been obliterated: cut down, logged, and carted off, its stump ground flat. In its place a stone patio.

I asked what had precipitated such a shocking change. "Oh," they deflected dismissively with a vague litany of common complaints, "Squirrels, fall leaves, too dark in the summer.." Other neighbors have varied experiences. One cut down two mature oaks in fear after a large storm-blown limb seriously damaged his car. By contrast, a tree-loving neighbor opted to plant a sidewalk red maple, which, even as a sapling, showed famously, enduringly russet in this past banner autumn.

Are we doing all we can to accommodate these stolid, silent, defenseless elderly citizens that bring quiet beauty into our lives and do so much to balance our fragile biosphere? I freely admit being an unabashed tree-hugger: a 40-year birdwatcher, woods-hiker, butterfly admirer, gardener, and nature buff. Whenever chainsaw-wielding tree surgeons clatter up in their cherry picker trucks, I grimace, hastily pack a bag, and set out for the day. It hurts my ears and breaks my heart to watch these gentle giants come crashing down.

Town of Trees?

Belmont is famed as a Town of Homes, and is at work to merit, as Weston has done, the moniker "Town of Trees," designated by the National Arbor Day Foundation. A town-wide tree plan has ramped up again since COVID-19-era setbacks of canceled plantings and under-supplied nurseries. The Belmont Department of Public Works (DPW) has resumed plans for a 120% replacement of plantings over cut-downs. Belmont's tree census—the first in decades—is now underway thanks to a $55,000 capital budget award from Town Meeting. An additional $25,000 was granted to plant trees, which will contribute a green investment towards a century-long legacy.

"It's the first budget for trees since the retirement of Tom Walsh, town tree warden," said Jay Marcotte, who has taken over as tree warden. "Belmont has been woefully under-funded. The effects of the summer drought are noticeable, as some trees defoliate without changing color and show other signs of stress. The DPW is watching them for potential removal or pruning by spring. The DPW and Belmont Light have shared responsibilities for pruning dead limbs and those encroaching on power lines. Storm crews are called in as needed."

Budding Tree Program

A citizen-funded Memorial Tree Program is also taking off, where residents contribute $500 for a tree to be planted on (or adjacent to) their property. Over 20 trees are slated to be planted this fall and another 20 or more next spring. Find out more at www.belmont-ma.gov/

dpw-parks-cemetery-division/pages/memorial-tree-program.

Marcotte continued: "We work with participants and vendors to plant the right way. We choose reliable trees for urban settings: katsura, zelkova, red maple, London plane [aka sycamore], basswood, gingko, and others. We select the right tree (by size or species) for the right location and conditions. Overhead wires, for example, are an issue; we'd choose one of the smaller varietals there.

"It's also important to avoid lifting sidewalks. Zelkovas [aka Japanese elms] fit nicely in some narrow spots, as they root deeply, unlike the maple's broad root system." They thrive in open spaces and grow prodigiously with a pretty burgundy oval leaf. Several saplings that adorn the triangular parklet in front of the M+T Bank on Leonard Street have become favored shade spots for the after-school set. My neighbors happily planted a zelkova sapling in the middle of their grassy yard and have joyfully watched the slender trunk shoot up almost two feet per year.

Favorites to visit

Your reporter chooses the 90-foot tulip tree towering over 24 Clover Street. Tree warden emeritus Tom Walsh votes for sugar maple, admitting that you have to pick the right spot: "You just can't plant a sugar maple by the side of the road. Sidewalk trees must be tolerant of soil compaction and road salt and require watering." Choose your own favorite from the town website's Notable Tree List at bit.ly/BCF-123-Trees

Tree Enemies

National arboreal data indicate that one in six tree species in the lower 48 states is at risk of extinction due to predations of rapacious insects, invasive fauna, and climate change.

Marcotte states that Belmont "has no local data as yet on species at special risk. None are endangered." Nevertheless, many trees are at some risk from natural pests. Here is the DPW's wanted list of harmful bugs. If you spot these afflicting critters, contact the DPW. At present, no official town-wide or home treatment is recommended.

Winter moths feed on and defoliate deciduous trees and shrubs, including oak, apple, elm, maple, ash, crab apple, cherry, and blueberry.

Woolly adelgids, introduced from Europe a century ago, have colonized widely in New England and have devastated Eastern hemlocks. .

Emerald ash borers are iridescent Asian jewel beetles that have spread widely in Middlesex and 10 other counties. A national quarantine zone limits the movement of all ash species plant materials (hardwood, firewood, green wood, nursery stock) to curtail its widespread predation. The DPW sprays notable keynote individual trees.

Asian longhorn beetles were confined to Worcester and Suffolk Counties through 2018. This scary-looking striped beetle now assaults ash trees in town. They can fly a mile a day and can attack all foliating trees.

Spotted lanternflies are gaudy red Asian planthopper pests. They have been creeping northward from Pennsylvania and have now been spotted in Middlesex County.

What to do and not do

What can readers do? Water your shrubs and trees in dry times. Raise awareness. Check for signs of insect tell-tales and call the DPW if you notice anything unusual about leaf-drop and other signs of stress: chewed, spotted, or limp foliage; holes in the bark; or shedding bark.

Adopt a tree in your neighborhood. Especially in drought years, trees need a little wet love. The Belmont Garden Club has supplied young and vulnerable trees with Treegator bags for over 150 trees around town; arrange to adopt one and water it appropriately.

Join an organization that celebrates, plants, and protects trees, such as the Arbor Day Foundation (arborday.org) or Speak For The Trees (treeboston.org).

Respect our elder, sentient neighbor beings. Do not rush to maim (haphazardly prune) or destroy (contract to poison or cut down) an "offending" tree on your property. Instead, discuss with abutting neighbors, an arborist, or contact the DPW.

Fred Bouchard is a Belmont resident and a member of the Belmont Citizens Forum Newsletter Committee.

Belmont Community Path Phase 1 Funded

By Jarrod Goentzel and Sara Smith

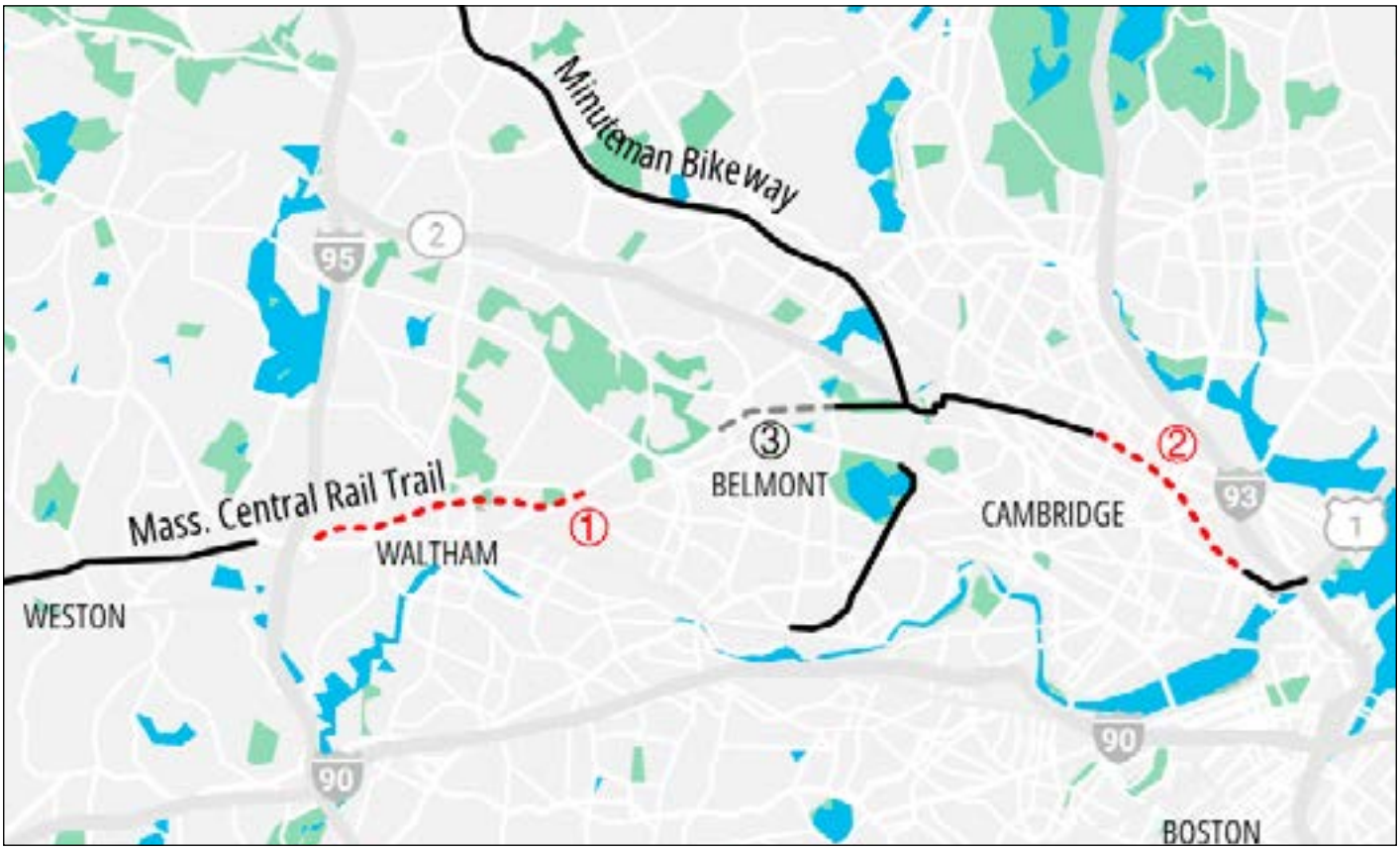
The Belmont Community Path is becoming a reality. Full funding was secured for Phase 1 construction. Phase 1 includes the MBTA underpass from Alexander Avenue to the Belmont Middle and High School campus.

Design is underway for Phase 2 that completes Belmont's two-mile segment of the Mass Central Rail Trail (MCRT), which will eventually connect Boston and Northampton via 104 miles of off-road paths. The Belmont Community Path will help fill a critical gap along the MCRT as construction east and west of Belmont actively moves forward.

Belmont's TIP Funding

This spring the Belmont Community Path received major support from the Boston Region Metropolitan Planning Organization Transportation Improvement Program (TIP). The TIP's $21 million commitment is enough to cover the entire construction cost of Phase 1. No Belmont town funds will be required to construct this community asset. Phase 1 includes the portion of the path from the Cambridge border through Belmont Center to the Clark Street bridge as well as a pedestrian tunnel under the commuter tracks from Alexander Avenue into the new Middle and High School campus.

In a show of extraordinary local support, it took 16 pages of the final TIP document to list all the people who endorsed the project during the public review period in May. The TIP lists support from 35 individual and group letter writers and 707 petition signers (which closed



A map of Mass. Central Rail Trail projects in the greater Boston region as of July 2022. Solid black lines indicate existing off-street paths in the Mass. Central Rail Trail network; dotted red lines indicate projects currently under construction: (1), the Waltham Wayside Trail project, and (2), the Somerville Community Path, being built as part of the Green Line Extension project. The dashed gray line marked (3) in Belmont is the first phase of the Belmont Community Path, which could go under construction in 2026. Source: mass.streetsblog.org.

with 748 signatures: bit.ly/bcpfunds), with only two letters in opposition.

With funding scheduled for federal fiscal year (FFY) 2026, construction of Phase 1 could begin October 2025. The MPO reviews the status of all budgeted projects on a rolling five-year horizon. Depending on the status of other TIP-funded projects and Belmont's Phase 1 readiness, funding could potentially move up one year such that construction could begin as early as October 2024. Readiness involves finalizing the design, environmental permitting, and formally securing the right of way (ROW) with no-cost leases offered by the MBTA and Belmont Citizens Forum.

Nitsch Engineering, the firm designing the BCP, is responding to comments from MassDOT and the MBTA on its 25% design of Phase 1. Once resolved, MassDOT will schedule the 25% design public hearing, likely early in 2023; check belmontcommunitypath.com for the announcement.

Nitsch indicated to the town's Community Path Project Committee that the next design milestones (75% and 100%) will progress more quickly, conceivably reaching 100% by December 2023. These final design stages focus on amenities, plantings, and the general user experience. Public feedback and suggestions on these important details can improve the community space for all. Information about the project design and upcoming public meetings can be found at belmontcommunitypath.com.

To complete the Belmont Community Path, the town's Select Board expanded the charge for the Community Path Project Committee (CPPC). The initial charge only specified Phase 1. The new charge includes development of Phase 2, the section of the path from the Clark Street Bridge to the border with Waltham.

In 2022, Belmont Town Meeting allocated $200,000 of CPA funds for Phase 2 design and the MassTrails Grant Program provided $200,000. State economic development bill H5250 provides an opportunity to appropriate an additional $250,000 for design. With these funding sources in place, the CPPC decided on October 21 to pursue a contract with Pare Corporation for Phase 2 design.

MCRT Progress

While the Belmont Community Path has taken important steps in 2022 toward construction of its section of the MCRT, other key segments of this important regional path are taking place at points east and west.

Green Line Extension: The Somerville Community Path Extension, which completes the MCRT connection from the Belmont line to the Charles River in Boston, is near completion and is expected to open in 2023 as the new Medford branch of the Green Line opens to passengers.

Waltham: This summer, Waltham began construction on a 2.7-mile segment that runs from commercial developments just east of Route 128 to Beaver Street near Belmont. Work remains in designing the Waltham path east from Beaver Street to connect with Phase 2 of the Belmont Community Path.

Waltham to Weston: The Department of Conservation and Recreation (DCR) is actively planning a path to fill a gap between the west side of the current Waltham construction and a 5 mile section built in 2019 through Weston and Wayland.

Further west: Construction is underway on a 9 mile Eversource-DCR project that extends from the current Wayland section through Sudbury to the Assabet River Rail Trail in Hudson.

Now is an important time to be involved in implementing this crucial piece of transportation, economic, and recreational infrastructure. The Friends of Belmont Community Path is committed to engaging volunteers and stakeholder groups to support completion and ongoing stewardship of the path. As Belmont moves forward in designing this community space, there will be many opportunities to provide input.

If you would like to receive occasional updates and notices about how you can provide feedback, or if you would like to volunteer, please email us at belmontpath@gmail.com.

Jarrod Goentzel and Sara Smith lead the Friends of the Belmont Community Path.

Waltham Preps Rail Trail Segment

JOHN DIECKMANN

Path paving near Waltham's Garden Crest apartment complex west of the Linden Street bridge.

By John Dieckmann

The city of Waltham issued the notice to proceed with construction of the central Waltham segment of the Mass Central Rail Trail (MCRT) in May 2022. This segment runs 2.7 miles from Beaver Street by the commuter rail crossing west to Main Street at the Market Basket store. By mid-September, the tracks and ties had been removed and grading of the right of way had largely been completed with the exception of the short stretch from Linden Street to Beaver Street.

As of early December, the first course of paving was complete from the Garden Crest apartment complex, about 1,000 feet west of the Linden Street bridge, to Main Street. The remaining section from Garden Crest to Beaver Street includes two bridges that require rehabilitation and will take longer to complete.

The trail is still closed. The final top coat layer of pavement needs to be completed along with landscaping, guard rails, signage, and road crossings. Construction should end in 2023.

The two quarter-mile segments at either end of this central segment are still in the design phase. The western segment, which connects the trail at Main Street to the existing trail in Weston, is being designed by the Massachusetts Department of Conservation and Recreation. It follows the Central Massachusetts Railroad right of way, crossing Route 128/I-95 on the existing railroad overpass (which is in excellent condition) between Route 20 and Main Street. Construction will be funded with state and federal highway funds, allocated through Boston Region Metropolitan Planning Organization Transportation Improvement Program funds.

The eastern segment, from Beaver Street to the Belmont town line seems to be dormant for the time being, to be addressed when construction of the central segment is finished next year.

John Dieckmann is a director of the Belmont Citizens Forum.

Farewell to Royal Road's Dirt Jumps

By Vincent Stanton, Jr.

In late July 2022, the town dismantled the dirt bike track built by Belmont teens on town land between Royal Road and the Fitchburg Line (see "Whither the Royal Road Woods?" BCF *Newsletter*, January/February 2022.)

The bike track, originally constructed in 2020 shortly after the parks were closed because of the pandemic, was expanded in 2022 by a different group of teens. After winter and spring storms, which eroded the earthen jumps, it needed a complete rebuild. The 2022 bike track network at one point extended across the wetlands at the bottom of Royal Road (a feature removed by neighbors in coordination with the Department of Public Works (DPW.)

Other features included a tire swing, a 150-foot zip line connecting two trees along upper Royal Road, an improvised play structure, and a hut along the far west edge of the property near the Clark Street bridge. A very steep drop near the bridge ending in a series of moguls became a popular ride.

Injured biker at Royal Road Woods, May 2022

The DPW used heavy equipment to dismantle the existing jumps and to remove the other structures. To make clear to all residents that that use of the land would require town permission, six signs were posted along Royal Road in August.

The July 2022 dismantling followed an earlier, less extensive cleanup by the DPW in April 2021, accompanied by a warning from the Select Board that the Royal Road dirt bike path was "not an approved Town activity, [and that] the Town could be liable for injuries." Indeed, injuries have occurred. However, the 2021 intervention did not stop use of the dirt bike track.

Dirt bike proponents have not advanced a plan for the town to consider. Perhaps that is because a town-sanctioned and regulated activity would not have the spontaneous, kid-directed quality that has characterized the dirt jumps.

Dirt track obliterated by DPW backhoes.

Vincent Stanton, Jr., is a Royal Road resident and a director of the Belmont Citizens Forum. Stanton provided all images accompanying this article.

Lone Tree Hill Restoration Hit 2022 Milestones

By Jeffrey North

In 2020, the Land Management Committee for Lone Tree Hill (LMC) and the Judy Record Conservation Fund began a multi-year campaign to restore native plant communities in prioritized areas of the Lone Tree Hill conservation land. Step one in the restoration was to bring the invasive plant species under control. Planting natives would be a wasted effort and expense if they cannot compete with the pernicious plants that have come to occupy large swaths of our conservation lands and private yards.

The work began with a broad brush, property-wide restoration survey conducted by ecological design professionals in the 2020 Invasive Plant Management and Native Plant Restoration Plan, which was generously underwritten by the Judy Record Conservation fund. The Belmont Citizens Forum *Newsletter* has reported on these invasive species control and ecological restoration initiatives since their inception.

Second restoration year actions

The scope of work for 2022 included herbicide and manual treatments to re-emerging invasive species including glossy and common buckthorn, garlic mustard, black swallow-wort, and Asiatic bittersweet. Herbicide application methods consisted of a cut-and-dab method for previously cut woody plants and a foliar spray for re-sprouting shoots on herbaceous and woody target plants. Mechanical removal methods were employed in areas where they were more effective and efficient.

None of these control measures will bring the invasives under permanent control in just one season. Some are more resilient than others, but they all have biological tricks that strengthen their capabilities for survival and spread.

Several patches of Japanese knotweed were added to the program in 2022, notably about 4,000 sq. ft. between the Meadow Edge Trail and Summit Road and another 1,000 sq. ft. of nasty knotweed near the Concord Avenue cell tower. This area will require repeated visits by the contractor over several years, as knotweed is notorious for its ability to come back seemingly from the dead after treatment.

In the Great Meadow, re-emergence of black swallow-wort, purple loosestrife, and porcelain berry was addressed with herbicide and hand pulling in early 2022 after two herbicide treatments in 2021.

In late 2021, to create a new pollinator meadow, the contractor mowed an area near the Mill Street parking lot and prepared the soil for planting a mix of wildflower seeds. In early 2022, ecological field technicians selectively sprayed targeted weeds with herbicide during active growth and likely weed invasion. Unfortunately, few wildflowers appeared, probably due to drought conditions and thin

PARTERRE ECOLOGICAL SERVICES

Parterre employee applying herbicide to invasive plants on Lone Tree Hill.

PARTERRE ECOLOGICAL SERVICES

Spotted wintergreen at Lone Tree Hill.

soil atop this disturbed patch of ground. Parterre declared the work unsuccessful, and in December, field technicians amended the soil with four cubic yards of a compost and loam mix. They seeded the area with a combination of local seeds collected at other sites and a commercial semi-shade forb mix. Parterre covered all of the extra work under warranty.

Volunteers attack buckthorn

In 2021 and 2022, volunteers cut buckthorn by hand in areas totaling 10 acres. The contractor followed the volunteers' work with herbicide treatment of resprouting buckthorn in a one-two punch to this pervasive invasive. Controlling the buckthorn in edges and forested areas enhances the property's aesthetic value, opening new vistas and clearing space for dogwood, pine, hickory, and oak trees to return to their ancestral land.

The Invasives Working Group

A new working group was appointed and charged by the LMC to plan invasive species treatment and oversee contractors. The immediate goal of the Invasives Working Group is to advise the LMC in developing a program for sustainable long-term land management practices, initially through 2030. The group is dedicated to Lone Tree Hill, although in the future it may assist the town with activities conducted by vendors, town employees, and volunteers to control the proliferation of invasive plant species. The current Invasives Working Group members are Joe Hibbard, Leonard Katz, and Jeffrey North. To learn about volunteer opportunities, please contact Leonard at ldkatz86@gmail.com.

2022 observations

More native plants were observed in Lone Tree Hill this season compared to years past, including various goldenrod species, chokecherry, Virginia creeper, false Solomon's seal, Eastern woodland sedge, Ribes (currants), wild sarsaparilla, Jack in the pulpit, Solomon's seal, and staghorn sumac. It is exciting to see many natives returning and becoming established. For example, canadensis, altissima, and rugosa goldenrod species are quickly establishing themselves in the open meadow and will continue to spread by rhizome and seed.

Invasive plants still on site include black swallow-wort, common and glossy buckthorn, porcelain berry, bittersweet, yellow rocket, dames rocket, bittersweet nightshade, multiflora rose, bind weed, honeysuckle, Norway maple, and ailanthus. Black swallow-wort, garlic mustard, and knotweed are still present but in much lower quantities compared to last season. The areas of dense invasion will require more time to restore, but the stewards of Lone Tree Hill will prevail.

Future steps

The Invasives Working Group will meet with the LMC in January to review the progress made in 2022 and plan the next season's initiatives. The Invasives Working Group eagerly anticipates the planting of native species in specially selected areas to establish mother colonies of chosen plant species such as *Pycnanthemum muticum* (mountain mint), *Monarda fistulosa* (bee balm), *Heliopsis helianthoides* (false sunflower),

Rudbeckia laciniata (cutleaf coneflower), *Vernonia glauca* (tawny ironweed), *Symphyotrichum novae-angliae* (New England aster), *Solidago speciosa* (showy goldenrod), *Sorghastrum nutans* (Indiangrass), *Panicum virgatum* (switchgrass).

Thank You

The LMC and visitors to the conservation land are once again grateful for the continued financial support and sage guidance from the board members of the Judy Record Conservation Fund: Roger Wrubel, executive director; Eugene Record, treasurer; and David O'Neill, president of Mass Audubon.

Jeffrey North is the managing editor of the Belmont Citizens Forum Newsletter and the 2022 chair of the Invasive Working Group, a subcommittee of the Land Management Committee for Lone Tree Hill.

PARTERRE ECOLOGICAL SERVICES

Praying mantis, Lone Tree Hill

JEFFREY NORTH

Lone Tree Hill visitors: Anne-Marie Lambert led a poetry walk on the site in November 2022.

'Chickadee Tree' Sings on Lone Tree Hill

The Belmont Citizens Forum and the Land Management Committee for Lone Tree Hill (LMC) would like to remind readers that the installation of objects, decorations, signs or messaging of any kind on conservation or public land is prohibited without prior written permission of the LMC, Conservation Commission, or other Town authority having jurisdiction.

By Yuval Gur

Environmental degradation and climate-changing behaviors have been part of our lives for many years. Yet, we are still in crisis, whether from microplastics in our oceans, rising sea levels, air pollution, or diminishing living habitats. What if nature could signal us with flashing lights and sounds that are not threatening but compelling?

As a composer and artist, I am pleased to introduce you to the Chickadee Tree, a musical-visual installation on Lone Tree Hill meant to trigger complex conversations about our environment and our perception of art.

As an environmentalist and artist, I wanted to create something that a local community not only could embrace and hold close to their hearts but also critique.

My idea was simple: a daily show of lights and sounds installed in a tree at the top of Lone Tree Hill that would evoke a feeling of calm. I utilized the same technology that bird call whistles use to evoke compelling sounds. And on a good day, you'll see chickadees roam around the branches of the trees, as the tree itself has called them.

I used 106 recycled acrylic cooling tubes and manufactured all the rest of the materials myself using polylactic acid as its base (a biodegradable polymer that decomposes in eight years). During the first week of the installation, I included a wind turbine-powered lighting system to show that we don't need batteries to have a beautiful experience. We just need the wind.

On a sunny day, you get to see the tree from afar. The sun that reflects on the tubes gives us a true Christmas show of lights during the day. At night, the moon is reflected by the same tubes.

I did not ask anyone if I could make this installation in the tree. I believe that public art for the people, by the people, should be accessible to create and be consumed by all who want to see it. This is not a rebellious move. On the contrary, it's a present for the local community of Belmont. I wish I could talk with each and every person who has happened upon the tree at Lone Tree Hill about the whistling effect it provides and to point out all of the organic material and materials recycled from trash that I've used. I have given this tree a voice.

I hope I haven't offended anyone as my intentions were to give nature a voice with recycled and biodegradable materials. I hope that my gift to you has made you smile at least once and that you get to enjoy the lights and sounds it evokes with the wind.

Unfortunately, the turbine broke. I hope the installation will be available to the public until January 20.

I made this tree art for you, dear reader. I hope you have the opportunity to enjoy it.

To read about the materials and learn more about the process, go to www.yuvalgur.com/chickadeetree.

Yuval Gur is a composer, producer, and multimedia artist.

YUVAL GUR

The Chickadee Tree, Lone Tree Hill

Could Town Buildings Generate Solar Power?

By Aditya Jain and Vincent Stanton, Jr.

Imagine a project that would produce a new recurring revenue stream for Belmont without any upfront cost, utilizing only town-owned land and buildings, while lowering electricity costs and helping the town achieve its green energy goals. That could be the payoff for installing photovoltaic (PV) panels on town properties.

Suitable town-owned sites include non-historic buildings with large flat rooftops, parking lots, and open ground including the former incinerator site along Concord Avenue. Adding PV arrays on privately owned rooftops and parking lots could significantly expand the network of arrays and improve the economics. The MBTA is another possible partner, as discussed in "Could the Community Path Host a Solar Array?" in the July 2022 BCF *Newsletter.*

To understand how Belmont-generated green power might help control the cost of electricity, consider that Belmont Light will be implementing a 13% rate increase in January 2023. As Belmont Light Board chair Steve Klionsky explained to the Select Board on December 5, 2022, the increase is largely driven by surging fuel prices. The price of natural gas more than quintupled from a trough around $1.63 per million BTU in June 2020 to a peak around $8.81 in August 2022.

While Belmont Light will have a 100% renewable energy portfolio in 2022—making it a leader among Massachusetts municipal utilities—the contracted green power does not cover peak loads on hot, humid summer days. As Klionsky explained, "Belmont Light seeks to sign contracts for power for 80% of its needs over the course of a year. And then the rest it buys on the spot market."

That is, during a heat wave, Belmont Light, like all utilities, has to supplement its contracted power purchases, typically made years in advance of consumption, with spot market purchases at much higher prices. It also has to pay the regional electric grid operator, ISO-New England, a capacity charge to build and maintain the gas-fired plants that come on line only at peak demand times. The more energy Belmont Light needs from the grid at peak demand times, the higher the capacity charge.

Local solar power plus battery storage would allow Belmont Light to reduce, or possibly eliminate, the amount of power it must purchase on the spot market during summer heat waves. The fact that peak solar power output coincides with peak Belmont Light demand on long, hot, sunny summer days is fortuitous, but the timing is not perfect. Peak solar electricity generation occurs around noon and declines in the late afternoon, while peak electricity consumption in Belmont occurs around 5 to 7 PM when residents get home and crank up the air conditioning.

Battery storage can bridge that gap. Storing energy for even a few hours and discharging it at peak demand time could make a big difference in the overall cost of electricity for Belmont Light and its customers.

Incentives, incentives, incentives

State and federal incentives help make solar PV project economics work for everybody: developers, electric utilities, municipalities, and their residents. Incentive structures provide both subsidies and the level of certainty required by lenders to finance projects that will generate 25 years of modest cash flows with no obvious way to cash out of the investment. As Everett Tatelbaum, vice president at solar developer Kearsarge Energy and a Belmont resident,explained, the current set of solar incentives in Massachusetts favors the investor-owned utilities (IOUs) National Grid, Eversource and Unitil, over the 40 Massachusetts municipal utilities.

"In a town with a municipal light department, there's still a sort of fundamental mismatch on the value of a given kilowatt hour of energy . . . versus the value of a kilowatt hour of energy in IOU territory where the state has said: Next door in Watertown, a kilowatt hour of solar might be worth $0.20 if a solar project generates it and sells it back to the grid. But in Belmont, it's worth probably half that."

However, Tatelbaum also noted that it is likely that the solar incentives in the 2022 federal

Inflation Reduction Act will help the economics of a Belmont PV array.

Several solar developers interviewed for this article, including Tatelbaum, agreed that two keys to an economically attractive project are being large scale and having at least one project element with generating capacity of 1 megawatt (MW) or greater to anchor the economics of smaller project elements.

Under ideal circumstances, ground-mounted solar arrays are the least expensive type of array to build, with costs as low as $1 to $2.00 per watt of generating capacity. Rooftop PV arrays have an average build-out cost of $1.80 to $2.80/watt, while parking lot canopies (carports) cost about $2.80 to $4.00/watt. The building cost affects the financial viability of a project.

Belmont's potential 1 MW+ arrays

Incinerator site

The biggest town-owned parcel for solar development has already been designated for that purpose by the Select Board. It's the former incinerator site on Concord Avenue, which occupies 25 acres along Beaver Brook and is suitable for a ground-mounted PV array.

VINCENT STANTON, JR.

The former incinerator site areas.

According to a March 2017 report by consultant CDM Smith, which studied possible uses of the site for the town, " . . . historically landfilled portions comprise three areas (A, B, and C) totaling approximately 17 acres . . . The remaining 8 acres of the site are predominantly wetlands . . . " The CDM report indicates that Area C could be developed now, with no limitations, while Area A could be developed for solar PV subject to MassDEP approval of the existing clay cap. Those two areas comprise 7 developable acres.

Belmont Director of Community Development Glenn Clancy confirmed in December 2022 that the the focus of current efforts is the capping of Area B. Thus planning for an array on Areas A and C (pending Mass Department of Environmental Protection approval) could begin now.

According to a 2013 National Renewable Energy Laboratory (NREL) study, a standard ground-mounted 1 MW array requires 5.5 acres. However, that study mostly included arrays with panel efficiencies of 10% to 16%, and the fraction of land occupied by PV panels in the studied properties ranged from 13% to 92%. With panel efficiencies exceeding 22% in 2022, more recent sources suggest that 4 to 4.5 acres is adequate. A recent 100 MW PV development in Texas that is placing panels on the ground flush against each other, stabilized by cables attached to the panels, expects to produce 1 MW on less than 2.5 acres. Utilizing the developable plateaus of incinerator site Areas A and C (7 acres) should allow construction of a 1.6 MW or larger array. Possible future expansion to Area B (10 acres), after capping, could potentially add another 2+ MW.

Cambridge Reservoir

A second opportunity for ground-mounted solar is the former Cambridge Reservoir, located between Cushing, Oakley, and Payson Roads. The 11.75 acre site is owned by Cambridge, which over 20 years ago replaced the reservoir with two large below-ground water storage tanks covered by a flat, grassy field surrounded by the rim of the former reservoir. In 2011, the

Cambridge Water Board hired consultant CDM to perform a feasibility study of a PV array at the reservoir, but project evaluation seems to have stalled there. The feasibility study may have discovered significant obstacles.

The flat area above the water tanks comprises 250,000 sq. ft. (5.74 acres), about half the total site area. A low-angled PV array limited to the flat area would accommodate an arracy of approximately ~1.35 MW array.

An alternate design would be to exploit the angle of the sun by adding panels on the northern and eastern ends of the sloping bowl to better capture sun rays from the south and west. This arrangement would not be visible from abutting properties. It would cover about 305,000 feet and might produce 1.65 MW. Since late afternoon is closest to peak demand time on hot summer days, the panels angled toward the setting sun would facilitate electricity generation when it is most valuable. This project would require the cooperation of Cambridge, but that seems plausible; Cambridge is served by Eversource, but Belmont Light is better situated to buy electricity from an array in town. Cambridge pays Belmont an annual payment in lieu of taxes (PILOT) for the property.

The area, in sq. ft., of 22 flat roofs (white type) and 4 parking lots (yellow type) flanking Brighton Street is displayed. In aggregate the building roofs cover 270,416 sq. ft. and the parking lots 126,830 sq. ft.

A third property that could be explored—also not under Belmont's control—is a large, under-utilized parking lot on the McLean property adjacent to Belmont conservation land.

The new Belmont Middle and High School, when complete, will have the largest roof of any town-owned building. A 1.3 MW rooftop PV array is planned. However, that project has been designed to address the electricity requirements of the building, not as a facility that could improve Belmont Light's economics by shaving peak energy costs as described above. That decision could be revisited, particularly since the school array will produce maximum energy during summer vacation.

Potential sub-1 MW municipal arrays: rooftops

The Chenery School also has a flat rooftop. A 78-panel, 29.6 KW array was installed on a small sloping part of the roof in late 2021, funded by Belmont Light and by an incentive payment to Belmont by Direct Energy Solar of $28,000. The flat part of the Chenery roof, about 65,000 sq. ft. clear of utility vents, is open for a potential solar array.

The Chenery School was not designed for a PV array, so an engineering study would be required to determine what the roof could support. Newer technologies like flexible, lightweight, adhesive-backed thin film solar may be an alternative to conventional panels. They adhere to membrane roofs and can weigh as little as 7 oz per sq. ft. The main disadvantage is lower efficiency, generally in the 8% to 11% range. However, at least one thin film technology, copper gallium indium diselenide (CIGS), offers efficiencies comparable to silicon panels (about 20%), albeit at a higher cost.

The Wellington School's roof is about 40,000 sq. ft.. In 2013, the Belmont School Department contracted for a 500+ panel, 111.65 KW solar PV array on the Wellington School roof, following review and approval by the Planning Board. Neighbor concerns about noise were addressed by arranging to locate six inverters in the basement. However, when the chosen solar contractor, Broadway Electric, went out of business in spring 2014, then-superintendent Kingston decided to pull the plug on what was—as a one-off project—an economically borderline proposition.

The 2014 contract was for an array serving the school's electric needs, but that could be reconsidered since a collection of projects with Belmont Light as electricity buyer may be more economically attractive.

The flat Winn Brook School roof is nearly the same size as the Wellington roof. As with the Chenery School, an engineering study of roof capacity would have to be performed to understand what is possible, and thin film technology may be the best alternative for solar power production. The flat part of the Butler School roof falls in the same category.

Adding up town-owned ground, roof, and parking lot arrays yields an estimated 6.47 MW of electric generating capacity.

Moving beyond school department buildings, the next largest assemblage of town-owned flat roofs is in the Department of Public Works yard, where 10 flat and angled building roofs provide about 90,000 sq. ft. of potentially usable surface. Again, thin film solar may well be the best option for buildings not designed to support solar panels.

The new library will have a solar roof. However, as with the Middle and High School, it will power the library, not the grid.

Potential sub-1 MW arrays: parking lots

Although parking lot PV arrays are more expensive to build than other arrays because the taller support beams carry heavier loads, many nearby municipalities have installed them. Watertown, Cambridge, Lexington, Waltham, and many other local communities have large carport PV arrays, including some on public lots. Unique advantages of carports include shading

cars during hot summer days, preventing snow and ice accumulation and saving plowing costs during winter, and potentially recharging electric cars while owners work or shop during peak electricity generating periods (an additional source of revenue).

The long, hard part of establishing a Belmont PV array is not buying and installing panels or batteries, but getting the rules, permitting, community acceptance, and economics right.

The largest Belmont-owned parking lot will be the new middle-high school lot, which is actually a collection of parking areas spread across campus that take up about 98,000 sq. ft. One parking zone is pushed back against the Fitchburg Line, where a fence-mounted PV array along the train line could complement a carport over the adjacent parking lot. Collectively, they encompass about 300,000 sq. ft. Assuming 10 watts per square foot that area could support about 3 MW of PV arrays.

Adding up town-owned ground, roof, and parking lot arrays yields an estimated 6.47 MW of electric generating capacity. (See BelmontCitizensForum.org for a table of values.) That likely constitutes an economically viable scale, and does not include Area B of the incinerator site, potentially worth another 2.35 MW, or the expanded Cambridge Reservoir array on part of the inner sloped areas, worth another 0.3 MW. Those two elements would push the total over 9 MW. This total also doesn't include the planned behind-the-meter projects that are not intended to feed into the electric grid on the middle-high school roof, the library roof, and the small array installed on the Chenery School roof last year.

Private solar arrays

There are far more commercial than municipal flat roofs and parking lots in Belmont. Nonprofits, particularly churches, also own large parking lots. In most cases the economics of a one-off project on a modest-sized commercial building or parking lot are not compelling.

When asked whether the town could help by providing a template for interested private and nonprofit property owners to participate in a town-driven solar PV project, Tatelbaum said developers would be interested ". . . if somebody did the legwork to put together a proposal that said there are these 20 sites and they will use a single negotiated lease so that the sponsor, or the developer, isn't necessarily trying to negotiate 20 different leases with 20 different building owners." Tatelbaum also said that Belmont Light would be the obvious electricity buyer and should be involved in any discussion about the best arrangement.

The town's payoff might include a PILOT from the developer reflecting the larger scale and enhanced economics of the project. Private and nonprofit property owners would receive annual lease payments for use of their property and could also receive discounted electricity prices.

As an example of what might be possible with commercial and nonprofit partners, a part of Pleasant Street has 22 flat roofs and four parking lots. In aggregate, the building roofs cover 270,416 sq. ft. and the parking lots 126,830 sq. ft.. The nearly 400,000 sq. ft. surface area could contain about 4 MW electric generating capacity.

Several other areas in Belmont with large commercial parking lots and flat-roofed buildings, such as Pleasant Street from Snake Hill Road to Trapelo Road. The potential electric generating capacity in Belmont likely exceeds what Belmont Light could absorb. Belmont Light's 2020-2025 Strategic Plan notes that peak demand in 2019 was 32.2 MW on July 21.

Technological advances

For the last 70 years, silicon has been the mainstay technology for solar panels. That has already changed in the last two decades. A wide variety of non-silicon materials are now used in thin film solar arrays, albeit most of them less efficient than silicon.

A new technology based on a family of compounds called perovskites is now on the threshold of wide commercial application, and several companies are already making commercial panels. Initial implementations of the technology place a perovskite layer over a silicon layer. The perovskites can be tuned to absorb light at wavelengths not efficiently converted to electricity by silicon panels, making the composite panels up to 28% efficient.

Solar PV technology, after several decades of continuous but slow improvement, appears poised for a leap in the next decade. Higher efficiency panels will dramatically improve project economics. Similar improvements are being made in battery technology.

However, the long, hard part of establishing a Belmont PV array is not buying and installing panels or batteries, but getting the rules, permitting, community acceptance, and economics right. Since that process could take years, now is the right time to evaluate and plan a Belmont solar project.

By the time the town figures out what it wants to do, the technology is likely to be notably better than today, and project economics will improve. As David Beavers, Belmont Light vice chair, remarked, "You're not, in a year or two, going to put solar on all those buildings. That's just not feasible . . . I think this is a long-term strategy and I think you're asking the right questions and getting the ball rolling."

Economic models

The details of state and federal incentives for solar electricity and battery storage are important determinants of project viability. They are fiendishly complex, and subject to continuous change, which makes a comprehensive evaluation of project economics well beyond the scope of this article. Economic models that have been implemented in surrounding communities include, at the most simple level:

- The utility (Belmont Light, in our case) owns the PV arrays and buys the electricity, paying the town for use of its property via a lease, and possibly also providing a discounted electricity price. Belmont Light Board vice-chair Beavers noted that, speaking for himself, this arrangement would come with some risk for Belmont Light, as it would have to significantly expand its scope of activity, and likely its headcount.
- A developer owns the PV arrays and sells the electricity to Belmont Light. The developer signs a lease agreement with the town for use of its property, generating one income stream, and may makes a contractual PILOT to the town, or sells the town discounted electricity.
- The town owns the arrays, uses them to power its buildings, and sells excess electricity to Belmont Light.

Getting the ball rolling

Municipal solar would be a town-driven project. While Belmont Light is a key player, the town needs to figure out what works best for Belmont before it is ready for a substantive conversation with Belmont Light.

The Select Board could ask the Energy Committee, or a new committee with membership drawn from the Energy Committee, the Vision 21 Committee, and possibly the Belmont Light Board, to explore the feasibility of a collection of PV arrays on town property.

Consulting with solar developers, particularly those with extensive experience working with municipal partners, would be an essential part of understanding what makes sense in the present environment. Kearsarge Energy, for example, has completed over 30 solar PV projects with public entities in Massachusetts, including cities, towns, school departments, housing authorities, water authorities, and three Massachusetts municipal electric companies.

There is extensive expertise in and near Belmont that should enable the town to perform a thorough evaluation of its solar power options.

Aditya Jain is a first-year student at Columbia University and a Belmont High School alumnus. Vincent Stanton, Jr. is a Belmont Citizens Forum board member, though the views expressed here are his own.

BHS Students Create Environmental Club

CLAIRE HLOTYAK

Project Environment founders Christina Xi (left) and Jessica Rui.

By Claire Hlotyak

If you were to ask current high school students what issues they care about, chances are they would say climate change. From science labs to social studies discussions, I have seen that Belmont High School (BHS) students show a real passion and drive to end climate destruction.

This keen interest doesn't just end in the classroom, though. Belmont High has student-run clubs focused on learning, raising awareness, and educating our community and surrounding areas about the impact of climate change. One new BHS club is Project: Environment, run by Jessica Rui and Christina Xi. Rui and Xi are juniors at BHS. I was interested in their club because of their plan to create an informational website about the environment for BHS students and their emphasis on volunteer work.

Rui and Xi are passionate about the environment and their club. They were inspired to start Project: Environment by summer trips to the beaches of Cape Cod and the forests of Acadia National Park, part of a climate research week aimed at encouraging girls to explore STEM fields. After building hydrophones, researching dolphin whistles, and studying and "becoming one with coastal seaweed," as they described it, Rui and Xi wanted to continue their learning. They decided to create a website that will act as the go-to place for students to learn about the environment and find volunteer opportunities.

While they work on their site, which will include a crowd-sourcing platform for others to share their research, they have set their sights on exploring local issues like carbon emissions, loss of species habitat, and the impact of waste pollution. One of their first goals for the club is to learn how to live a more sustainable lifestyle. Rui and Xi also hope to have their club attend climate conferences and seminars and set up a booth at Town Day to spread the word about their project. While their original goal was to create a platform for students to research environmental issues and find volunteer opportunities, Rui and Xi hope to get the Belmont community involved in advocacy for the environment with a goal to one day reach people worldwide.

I am pleased to see high school students interested in the environment and impressed to see many taking action. Thanks to the endeavors of Project: Environment and others like them, a greener future may be closer than we think.

Claire Hlotyak is a senior at Belmont High School

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