10 January 2018

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures

Millis Permanent Building Committee
Attn. Wayne Klocko
Chairman
Town of Millis
900 Main Street
Millis, MA 02054

Project 170970 – Millis Department of Public Works Garage Architectural Study

Dear Mr. Klocko:

The letter transmits an architectural study of the Town of Millis Department of Public Works (DPW) Garage by Taylor & Burns Architects.

The attached study presents a summary of the existing structures and an evaluation of the programming needs of the Millis DPW. Taylor & Burns to develop options for rehabilitating the existing garage building and constructing possible new structures on the site to meet the DPW's needs. We worked with Taylor & Burns to prepare these options by assembling information from prior condition assessments of the existing building and meeting with Jim McKay and Jon Wine to determine the current deficiencies and future programming needs.

As indicated in the report, the recommended approach for renovating the facility is a combination of Options 1 and 3 that are described in the report; this approach involves limited renovations to the existing garage structure and construction of a new staff wing, maintenance bay, and wash bay attached to or near to the existing structure.

The estimated costs included within the study are intended only to assist the committee in evaluating which option to develop further; these preliminary cost estimates are not suitable for budgeting or planning. During the design development phase the costs would be revised and updated as the scope of work is narrowed and the design is further refined. For example, our preliminary code review identified some probable building code implications for the existing structure. Also, the cost of some of the mechanical work and utility work has not been fully developed so those costs will change.

We look forward to meeting with you and the committee to review the options presented and finalize the approach. We will contact you to schedule this meeting at your earliest convenience.

Sincerely yours,

Gregory R. Doelp
Senior Principal

Edward S. Farrington
Staff III – Building Technology

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Encl.

TAYLOR & BURNS

architects

3 January 2018

James F. McKay
Deputy Director / Chief of Operations
Department of Public Works
900 Main Street
Millis MA 02054

RE: Millis DPW Facilities, 7 Water Street, Millis MA

Dear Mr. McKay,

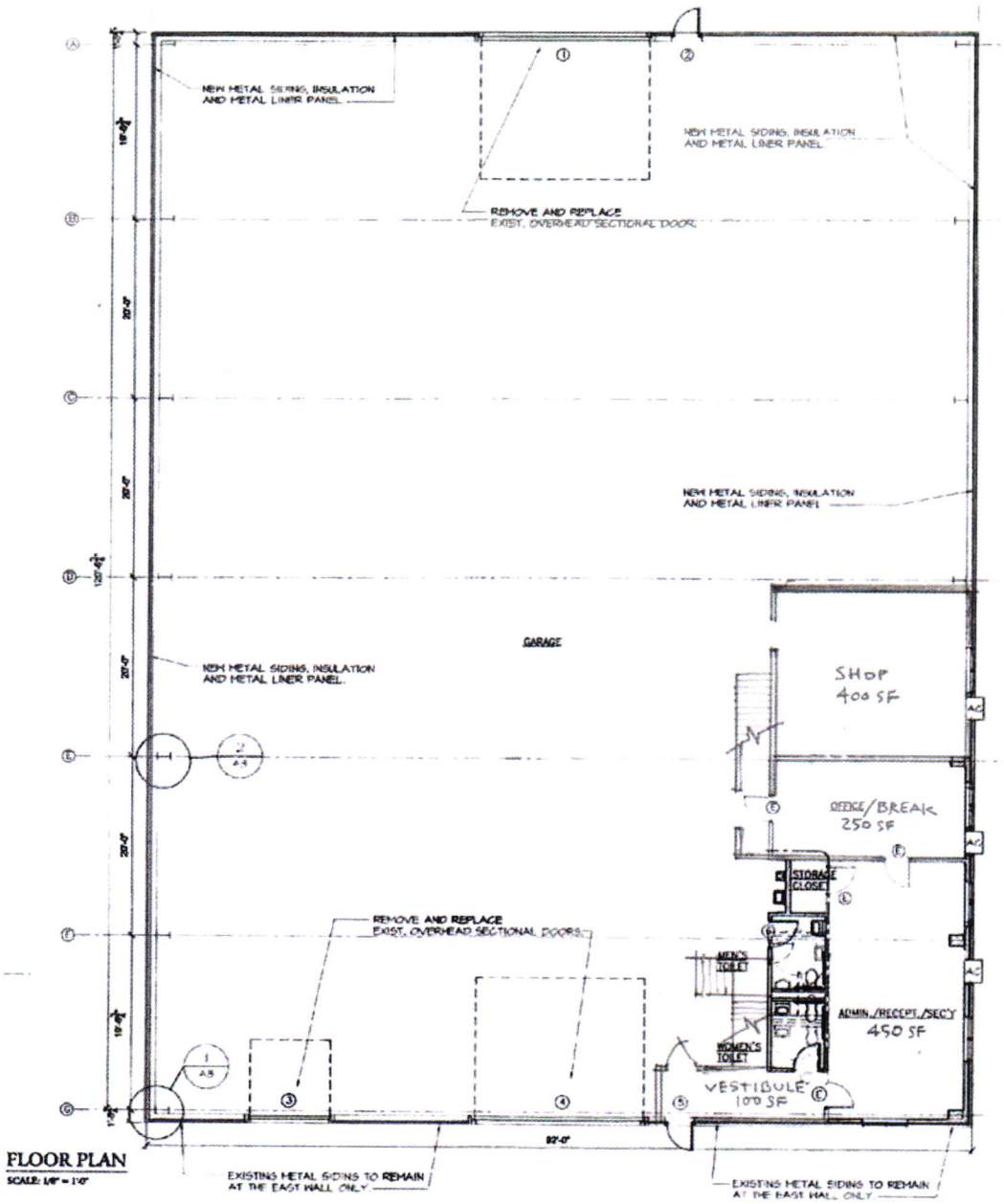
Following our meeting and tour of the DPW facilities on Water Street on August 22 and September 28, 2017, I have briefly studied the existing conditions at the DPW facilities, and offer preliminary findings and recommendations.

Statement of Existing Facilities

The DPW site on Water Street is comprised of 6 structures in a work yard, as follows:

Facility	Dimensions (ft)	Area (sf)	Function and Description
DPW Garage	92x120 overall	12,240	DPW equipment staging & operations garage – steel-framed clear-span barn on slab, with metal-clad walls and roofing
Includes:	20x20	400	Shop – wood-frame on slab
	10x25	250	Lockers/Break Room – wood-frame on slab
	15x30	450	Administrative Office – wood-frame on slab
	6x4	24	Storage Closet – wood frame room on slab
	15x6	90	M&W Restrooms – wood-frame on slab
	17x6	102	Vestibule – wood-frame room on slab
	60x20 approx.	1,200	Storage/MEP Mezzanine – open sided wood-frame deck over enclosed spaces below
Salt Barn	90x40	3,600	Road salt storage – wood fame, wood clad, on grade
Spreader Shed	10x40	400	Storage racks for truck bed salt spreaders – open sided steel frame on grade with metal roof
Pole Shed	10x40	400	Covered parking for DPW equipment – open-sided wood frame on grade with asphalt shingle roof
Brick Garage	40x50 approx.	2,000	Cold storage, mostly empty – brick walls, wood framed, asphalt shingle roof
Water Building	40x25	1,000	Water treatment facility – (did not inspect)
Work Yard	300x200 approx.	60,000	Parking lot & lay-down area – bituminous pavement

Overview of DPW Site, Water Street, Millis MA



Floor Plan of Existing Conditions at the DPW Metal Garage

Assessment of Existing Conditions at the DPW Metal Garage

On August 22, 2017 I toured the DPW site on Water Street with Jim McKay for a quick visual assessment of the facilities. The DPW's main garage is framed with 7 bays of clear-span steel beams, each bay 20 feet wide spanning 92 feet. The garage is clad with sheet metal on light gage steel framing over concrete knee walls. The building is heated and insulated. It is not sprinklered. Utilities including overhead electric and underground sewer connect on the southeast corner.

The metal garage encloses multiple functions within a simple structure and building envelope. Open space functions include truck storage and wash-down, vehicle repair lift and tool area, welding, mechanics' shop, material and tool storage. A wood-framed enclosure houses office space, staff locker and break room, restrooms, and check-in space for school bus and plow drivers. The restroom facilities in particular are inadequate for the population served, especially in winter when plows and sanders operate from the garage. A mezzanine loft above these rooms provides space for storage, and mechanical/electrical equipment.

This diverse array of functions under one roof introduces conflicting requirements of heating, cooling, thermal insulation and vapor control, overwhelming the building envelope's ability to provide adequate enclosure for all these functions simultaneously. Numerous failures of the building envelope are detailed in reports by Simpson Gumpertz & Heger.

In addition to those envelope failures, I observed interior environmental problems including:

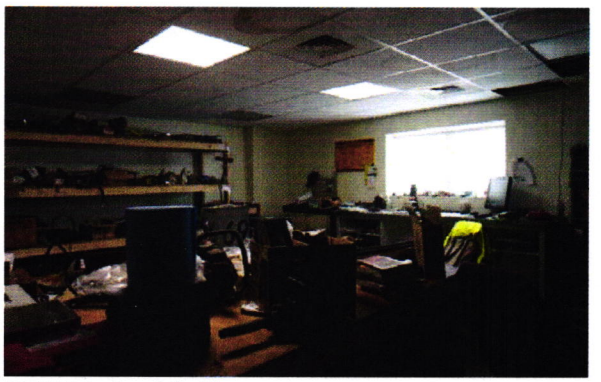
- Water damaged insulation and vapor barrier from roof leaks and condensation on the roof underside
- Water damaged interior ceilings of the Administrative Office and Break Room
- Black mold on the interior of the Administrative Office and Break Room (and maybe elsewhere)
- Poor air quality in the offices and break rooms, apparently due to vehicle exhaust and DPW operations in the garage. All horizontal surfaces were observed to be covered with a coating of dust. Jim McKay reported that HVAC system filters routinely become clogged with fine dirt.
- Poor temperature control throughout, due to lack of separation and "open door" practices of staff
- Pools of fluid on the garage floor, reportedly from hosing down of Town vehicles or melting of snow on vehicles parked indoors

Assessment of Existing Conditions at the DPW Metal Garage

Metal Garage Exterior

DPW Metal Garage Interior

Mohawk 25,000 lb. Truck Lift



DPW Mechanic's Shop

DPW Staff Office – note mold above windows

DPW Staff Restroom Area

DPW Mezzanine Loft – note vapor barrier failures

Assessment of Existing Conditions at the Brick Garage

On September 28, 2017 I visited the brick garage north of the DPW's metal garage for a quick visual assessment of its current condition. I was joined by Jon Wine. The building is a T-shaped, with a two-bay front garage and rear ell. It is uncertain which part is older. Brick load-bearing walls support wood-framed roofs spanning from wall to wall. The two bays of the front wing are divided by a center brick wall. The brick openings arch, and two have been joined into a single overhead door with a horizontal lintel. A significant crack on the southeast corner nearest the driveway extends from the window arch to the eave, and that corner has dropped approximate one inch, suggesting foundation failure at that corner, which should be investigated further. The exterior brick is in poor condition. At the northwest corner adjacent to the chimney a large hole in the wall and loose bricks indicate full failure of the mortar bond in that location. Repointing, masonry repair and cleaning is required throughout. The east and west walls include wood clapboard gable ends, painted, above brick walls. Except for the overhead doors, all openings are boarded-up.

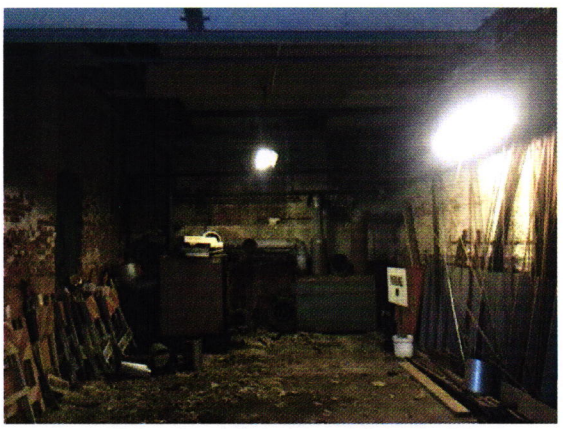
The asphalt shingled roofs intersect at a shallow valley with poor drainage, and masonry walls at this point are water damaged. Ceilings also show signs of water damage and deterioration. Roofing has exceeded expected service life; to stop further damage it should be replaced with new shingles and underlayment. Roof sheathing replacement might also be necessary, though this must be verified. A roof gutter on the south face is clogged with debris and has no apparent leaders or outlets. On the sides and rear of the building it appears that gutters and rain leaders were never installed, and the roof drains free from the eave which overhangs about one foot beyond the wall. Fascia boards, eaves, and eave soffits are deteriorated in places.

Assessment of Existing Conditions at the Brick Garage

Rear ell, from Northeast

View from Northwest

Masonry damage on Northwest wall



Interior

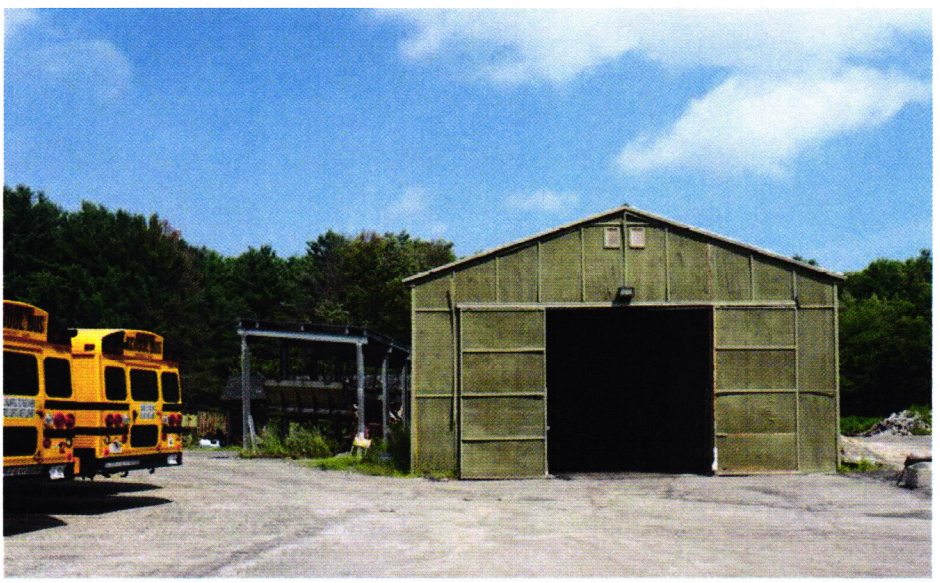
Interior finishes include concrete slab-on-grade floors, painted brick walls, and a failed plaster ceiling on the underside of roof truss cross-ties. All these surfaces were obscured by debris and stored DPW materials. Their condition and need for restoration and repair should be verified.

The building's electric service is active, indicated by operable interior lights, and appears to be 60 amps. An obsolete boiler was present with no sign of recent use, and disconnected from the chimney. A gas meter suggests gas fuel is available. The building is not insulated, is presently unheated, and is not sprinklered.

The brick garage can continue to be used as cold-storage with re-roofing and masonry repairs. For any higher use with human occupancy such as office, restroom or break space, the building should be gutted and rehabilitated and brought into compliance with the building code.

Assessment of Other Structures

The other structures on the DPW site are single-function within simple enclosures, and in contrast to the Garage, exhibit no urgent need for repair other than normal long-term building maintenance.



Spreader Shed and Salt Barn

Pole Shed

Preliminary Range of Solutions

In assessing the programmatic conflicts in the DPW metal garage building and consequent problems with building envelope and interior environment, at this preliminary point of study, at least four distinct general solutions are worth consideration:

Opt 1. Move "tempered space" functions to new Staff Wing Addition outside of the Garage.

The space to be relocated includes current 916 sf Administrative Office, and larger Break, Lockers, and Restroom facilities, for an addition of approximately 1,500 sf area (assuming the 400 sf Shop would remain in the Garage). New restrooms will include multiple stalls and showers. More detailed study would confirm program and footprint. The new space could be a new freestanding building.

Pros:

- Improves interior conditions through true physical separation of conflicting functions
- Increases DPW's total enclosed floor area
- Improves energy efficiency of new spaces and existing spaces
- Minimizes disruption of ongoing DPW operations within "sidebar" construction logistics

Cons:

- Cost of addition or new building Rough estimates range from $100,000 to $250,000, depending on type of structure (eg. trailer, modular or integrated addition) and utility connections, independent of costs to renovate the main Garage structure as identified in SGH reports
- Cost to re-purpose left-behind areas in garage. Rough estimates range from $10,000 to $50,000 depending on extent renovation.
- Loss of work yard area due to footprint of new addition/building

Option One – Site Plan of 1500 sf Staff Wing addition

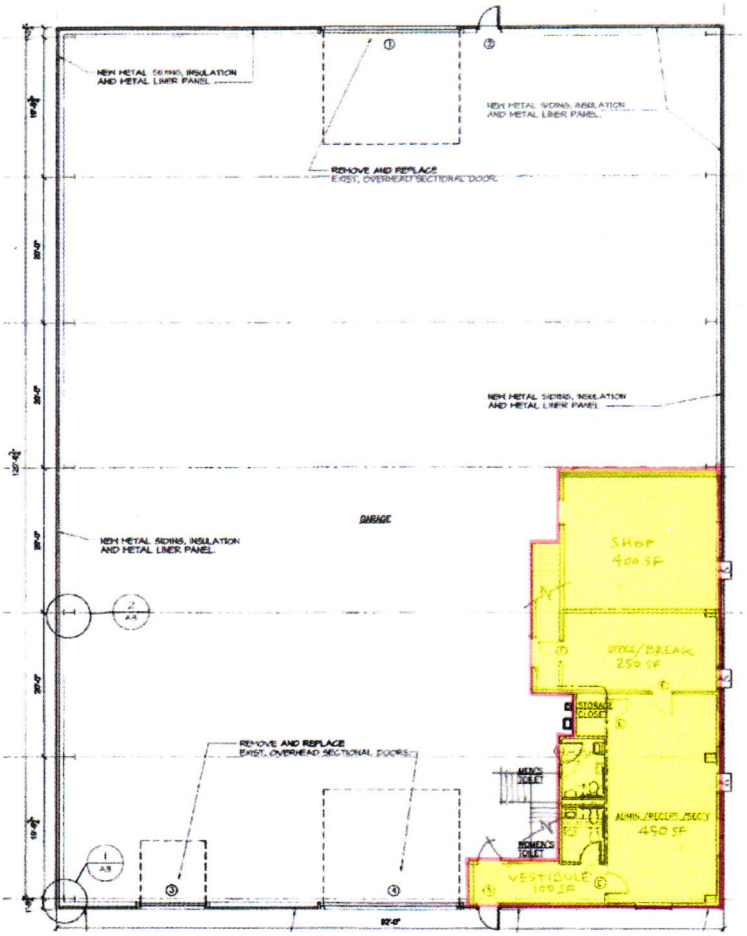
Opt 2. Retrofit the envelope and HVAC systems to make a "tempered bubble" within the existing metal garage footprint for DPW functions requiring a controlled interior environment. This retrofit would entail new layers of insulation and air/vapor barrier to better isolate the interior environment of those spaces, plus new or renovated HVAC systems to temper the spaces, including improved filtration and pressurization. Other important improvements might include air-lock entrance vestibules, door seals, walk-off matting, etc.

Pros:

- Improve interior environmental conditions through improved envelope separation of conflicting functions
- Improved energy efficiency of new spaces as well as old spaces
- Re-use of some existing MEP services for renovated spaces
- Familiar and compact arrangement of functions under one roof
- No loss of work yard to make way for new addition

Cons:

- Larger restrooms required won't fit in same footprint
- Cost to renovate "tempered" 1,300 sf area in garage, assuming shop is renovated. Rough estimate of $50,000 to $100,000 depends on finishes and extent of HVAC renovations, independent of costs to renovate the Garage building as identified in SGH reports
- Maximizes disruption of ongoing DPW operations with "underfoot & overhead" construction project within the garage
- Current constraints on space and organization would be locked-in
- "Déjà vu" sense that renovation has been tried before without success.



Option 2 – Floor Plan of Garage with 1,300 sf "tempered bubble"

Opt 3. Add a new Truck Wash and Mechanic's Bay

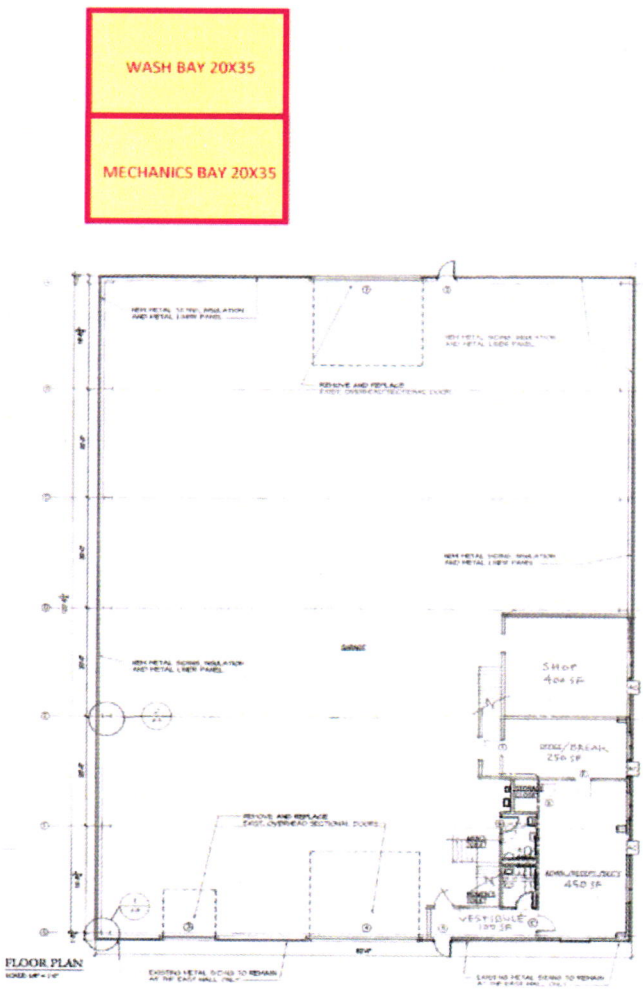
These two functions use a lot of space and cause problems in the current arrangement of the garage. The mechanic's truck lift requires high headroom in the center of the garage, disrupting the efficient flow of functions around it. The lift could be enclosed in its own dedicated bay. Moisture from washing vehicles causes many of the interior condensation and mold problems most difficult to solve in the current building. Relocating this function to a new dedicated wash bay would solve those issues. A diagram of and photo a typical truck wash-bay facility follows on the next page.

Pros:

- Improve space flow and functional efficiency in the garage by removing Mohawk truck lift from high headroom center position
- Repair bay would have dedicated exhaust ventilation and CO detection, improving safety of the work environment
- Relocating wash bay removes primary moisture source within the garage
- Recycling wash effluent would conform to water resource regulations.
- Heating the new added bays will reduce need to heat the metal barn.

Cons:

- Cost to add two new bays, each 20x35. Rough estimate for 1400 sf addition would range between $250,000 to 350,000 depending on many unknowns
- Regulatory hassles of permitting and maintain a truck wash bay, akin to a car wash facility, next to a wetland and public water supply pump house
- The addition should be separated by 10 feet from the metal barn to minimize code-required upgrades.



Option 3 – Plan for Truck wash and Mechanic's Bays

SELF-CONTAINED WASHBAY SYSTEM

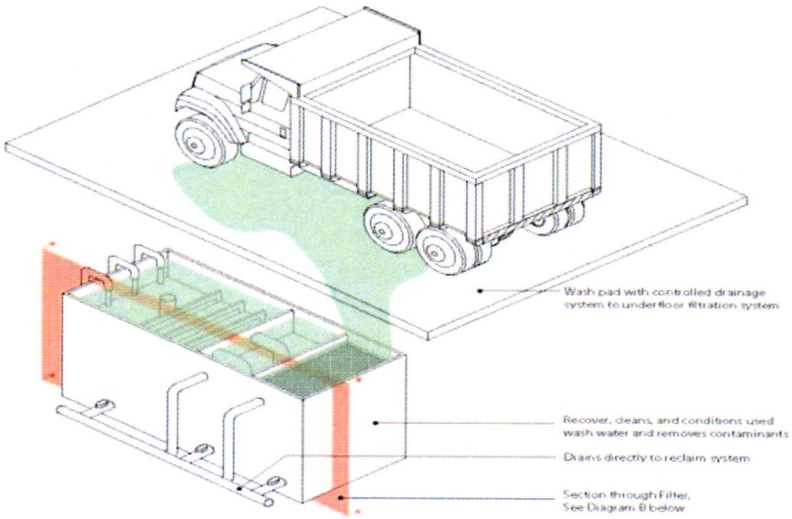


DIAGRAM A: Wash Bay With Underfloor Tight Tank Clarifier System and Filtration System

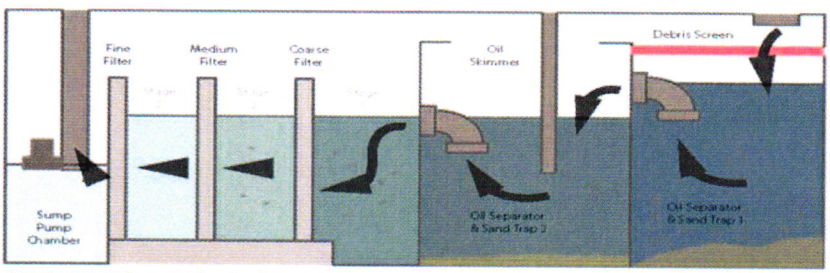


DIAGRAM B: Tight Tank Filtration System Processes

Typical truck wash bay

Opt 4. **Renovate the brick garage** north of the metal garage, approximately 2,000 sf in area, to enclose DPW personnel functions such as staff office, breakroom, restrooms and showers that can be separated from the vehicle and storage operations in the metal garage.

Pros:

- Improve interior environmental conditions with dedicated renovation
- Improved energy efficiency of new spaces as well as old spaces
- Minimizes disruption of ongoing DPW operations with "backyard" construction
- Higher and better use of an existing asset of the Town of Millis
- No loss of work yard to make way for new addition
- Utilities appear to be in place to serve this building

Cons:

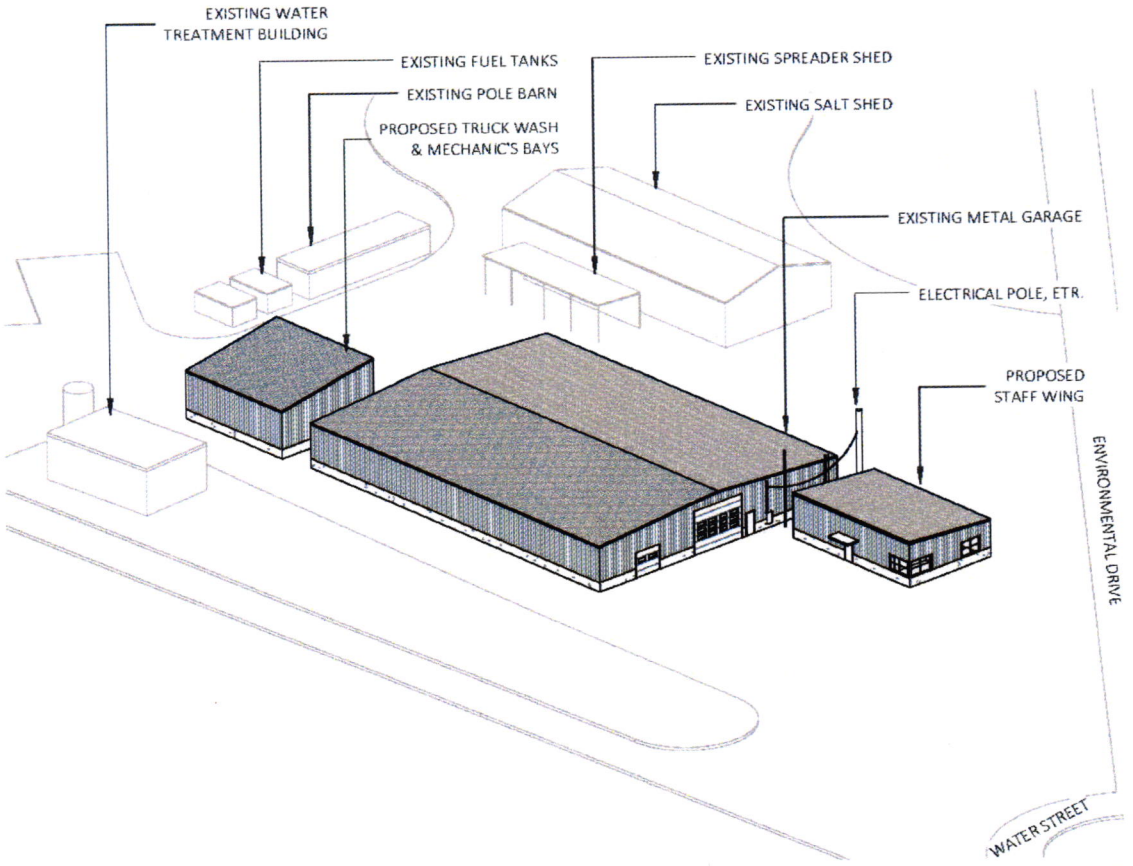
- Cost to gut demo & fully rehabilitate 2,000 sf est. area of abandoned building. Rough estimate of $300,000 to $500,000 depending on condition of building and numerous other factors unknown at this time, independent of costs to renovate the main Garage as identified in SGH reports
- 400 foot distance separating DPW garage from the brick building
- Brick garage might be oversized for space requirements, based on current usage. Program and plan need to be further evaluated.

Option Four – Site Plan of brick garage renovation

Recommendation: Combine Option 1 and 3

Each of the four options has pros and cons, and each could be implemented in various ways, depending on the details. They can also be combined.

Combining Options 1 (Addition of Staff Wing) and Option 3 (Addition of Truck Wash and Mechanic's Bays) will reorganize the functions in the garage to solve most of the recurring problems of condensation and air quality inside the metal barn. We recommended that the new additions be built as separated structures. This has several constructability advantages, but most importantly a building code advantage: the existing metal and wood structure, without the office functions, is a low-hazard storage structure (Use Group S-2) that will not require sprinklering at its present size of less than 13,500 sf. Minimal change would be required to the barn, other than roof and vapor barrier repairs.



OVERVIEW OF MILLIS DPW CAMPUS WITH PROPOSED OPTS 1 &3

OPT 1 STAFF WING ADDITION
OPT 3 TRUCK WASH & MECHANIC'S BAYS

Estimate of Probable Costs

Rough estimation of the probable costs for combining Options 1 and 3 can be summarized as follows:

• Staff Wing Addition	$100,000	to	250,000
• Mechanics and Wash Bay Addition	250,000	to	350,000
• Repurpose/refurbish existing DPW Barn interior	10,000	to	50,000
• Repair roof of existing DPW Barn	170,000		
• MEP systems in existing DPW Barn	132,000		
• Subtotal	652,000	to	952,000
GC Overhead & Profit 20%	130,000	to	190,000
Design, Estimation & Const Contingencies 25%	196,000	to	229,000
TOTAL	$978,000	to	$1,371,00

Caveats

- Estimates above do not include unknown factors such as geotechnical, underground utilities, stormwater management or other site and civil engineering that might be required.
- This cost estimate has not been reviewed by an independent cost estimator or general contractor

Further Questions

- Should the metal garage be sprinklered regardless of code compliance? Life safety and truck fleet protection suggest that answer is yes. However, the Massachusetts State Building Code will not require sprinklering if the staff space is removed from the building, and proposed additions are separated by at least 10 feet. The Millis Fire Department might opine, but sprinklers can be a costly consideration.
- Is the red brick garage building worth restoring or renovating? It is slowly falling apart by neglect.
- Is the capacity of the existing salt barn adequate for the needs of Millis?
- Should school bussing be staged from the DPW site?
- Should a reorganization of the entire site be considered?

Next Steps

Each option can be also further explored to examine assumptions in this preliminary report. For example:

- Utility and other subgrade conditions are not fully understood, and would inform work proposed.
- Modular and prefabrication strategies for construction should be studied for the proposed additions.
- Mechanical, electrical and plumbing needs should be evaluated, especially for the proposed additions.

Please feel free contact me with comments or questions.

Thank you,

Robert J. Taylor, AIA, LEED-AP

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