

**Town Of Darien Department of Public Works Garage Complex:
Feasibility Study & Preliminary Concept Design
126 Ledge Road
Darien, CT. 06820**



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I. PROGRAM INFORMATION

The Town of Darien has planned to renovate and expand their existing public works garage complex. The current complex provides facility operations for the Town's Department of Public Works, Board of Education, and Parks / Recreation. Two building additions are proposed with associated interior renovations to the main office area, and elevated slab replacement to the existing original garage bays. The southern building addition will provide (2) garage bays for vehicle washing / repairs, bunk rooms, storage areas, a meeting room and administrative offices. The northern addition will provide (2) garage service bays. Interior corridor circulation will also be improved between existing / new areas with new interior corridor ramps addressing pre-existing building elevations. New architectural finishes will be introduced and MEP systems modified as required to meet these changes and/or code requirements. An attached room/program matrix is provided.

II. SYSTEM NARRATIVES

A. SITE

Parking, Site Circulation and ADA Accessibility

The existing facility contains a total of approximately 46 parking spaces, with most spaces (28+/-) located in the lower parking lot at the rear of the facility. A total of 19 marked stalls are located at the front of the building (upper parking lot) and there are 3 or 4 additional

“unofficial” spaces (unmarked) located in front of the gate to the north wing which is typically kept in a closed position. None of the existing parking spaces are ADA compliant, and there is no clear accessible path into the building. Fourteen of the existing spaces along Ledge Avenue are angled in such a way as to indicate a one-way traffic pattern in a westerly direction, although the width of the driveway is suitable for two-way traffic.

A few of the parking spaces in the lower parking lot along the west curb line are currently occupied by storage materials and a small storage trailer. The line striping in this area is faded or otherwise covered by material. There are eight parking stalls which are newly striped located southeast of the salt shed which appear to be used often. The remaining spaces along the westerly curb line (leading up the driveway towards Ledge Road) also appear to be used often and the line striping is fairly visible. The driveway from the upper lot to the lower lot on the west side of the building is deficient for two-way traffic (too narrow), and sight-lines around the western side of the building appear to be lacking. The facility contains 3 curb cuts, the easternmost of which is a shared driveway with the adjacent transfer station facility. This curb cut is wide (+/-55') and can be confusing to the general public given the multiple entry and exit points to the DPW garage and transfer station. This is especially true if they are visiting the site for the first time.

In general, the existing bituminous pavement around the vicinity appears to be in mostly fair condition with some cracking occurring in heavily used areas.

Recommendations:

Eliminate the middle curb cut and install a one-way traffic operation (via signage) in an easterly direction in front of the DPW garage. This will eliminate the current traffic conflict which occurs when DPW employees cross the “exit” lane of the transfer station as they pull into the DPW garage from the eastern curb cut. The eastern curb cut can be relocated further east as shown on the Conceptual Site Plan in order to provide additional space for the new wash-bay addition (this will require relocating an existing fire hydrant). Restriping of the multiple lanes into and out of the transfer facility, and a simple reconfiguration of the traffic islands will help to clarify lane choices for users of the transfer station.

The proposed parking layout as shown on the Conceptual Site Plan contains a total of 48 parking spaces, which requires 2 ADA compliant parking stalls. Since there is no elevator in the building, and thus no way for a disabled employee or visitor to get from the upper to the lower level, we recommend that one ADA space be placed at each of the upper and lower parking lots. The ADA space at the lower parking lot is located at the corner of the west wing of the building such that a crosswalk will be placed in this location. The cross walk will signal to drivers to be cautious as they round the corner of the west wing of the building into the lower lot.

The west driveway should be widened to 24' minimum for two-way traffic. This will require a low retaining wall to be constructed along the eastern curb line parallel to the existing building. A new generator is proposed to be placed in this area and the retaining wall will need to be able to support the weight of the generator.

Fuel Tanks and Pumps:

Currently the facility contains two fuel pumps located in front of the main entrance to the building. The pumps are fed by two underground fuel storage tanks (2,000 gallons each) buried in the driveway in front of the pumps.

The current location of the tanks is problematic in that filling of the tanks obstructs traffic in front of the facility. The Town of Darien desires that the tanks be located above ground and increased to 4,000 gallons each.

Recommendations:

Two above-ground tanks (4,000 gal.) are proposed to be placed on a separate driveway located east of the transfer station. The driveway will remain a gravel surface to discourage the general public from confusing it with the transfer station entrance. Placing the tanks separate from the main facility will reduce conflicts when the tanks are being filled. Placing them above ground will reduce future maintenance costs and reduces the risk of environmental damage if the tanks leak. Above ground tanks also remove much of the environmental permitting and UST (Underground Storage Tank) permit requirements.

Sanitary Sewage:

Sanitary waste leaves the building in a northwesterly direction in the lower parking lot. There are two existing oil-water separator (OWS) structures located in the lower lot, one for each wing of the building. Based on plans prepared c. 1994 when the north wing was added, it appears that the floor drains in the garage bays are discharging into the OWS's as required by plumbing code.

Sanitary (building) waste from the main facility does not pass thru the OWS structures but instead enters an existing manhole located in the center of the parking lot, where it is combined with flow from the two OWS discharge lines. There is a sanitary line from the existing scale house building which appears to be tied into the interior plumbing system within the main facility.

Recommendations:

The proposed garage addition on the north side of the facility should utilize the existing floor drainage system to take advantage of the OWS already installed. The new wash bay located on the upper level of the garage will require a new OWS prior to combining with the scale house waste line. This sanitary line will then need to be tied into the internal plumbing waste system in the north wing since there is no sanitary line in Ledge Road.

Storm Drainage:

The upper and lower parking lots have separate drainage systems due to their difference in elevation. The upper parking lot is picked up by catch basins located in front of the facility along Ledge Road. The system conveys flows westerly along Ledge Road via an existing 15" RCP.

The lower parking lot is constructed over a large (72" RCP) culvert, and several catch basins located in the parking lot are connected directly to this culvert. There is one OWS located in the northeast corner of the lot near the north addition, which picks up flow from a catch basin located in the upper parking lot. Other than that, there doesn't appear to be any treatment of storm water runoff.

The existing 72" culvert carries flow from the Cummings Brook located on the northeastern side of the property in a southwesterly direction across the site. The culvert terminates in a concrete headwall just on the westerly side of the existing lower parking lot.

The culvert is indicated as a "watercourse" on the Town of Darien "Regulated Wetlands and Watercourses Map." The western half of the culvert was installed c. 1977 and subsequently extended c. 1993 when the north wing was added.

The culvert has limited cover below the lower parking lot and the condition of the existing pipe is not known.

Recommendations

Given the limited cover over the pipe, and the heavy truck traffic (especially during winter salting operations) it is recommended that the pipe be inspected for structural integrity. The existing OWS in the northeast corner of the lower lot should be maintained and incorporated into the new design where possible.

Storm water Runoff (Quality) and Wetlands Issues:

The proximity of the existing Cummings Brook places the site within the review of the Town of Darien Environmental Protection Commission (EPC), which regulates all activities within 50' of a mapped inland-wetlands or watercourse. At least a portion of the project is likely to fall within this regulatory area.

The project is also subject to the Town's Zoning Regulations regarding storm water management and flooding. Specifically, the following sections apply from the Town Planning Regulations, Article VIII:

- Section 820 "Flood Damage Prevention"
- Section 850 "Land Filling, Excavation and Earth Removal"
- Section 870 "Soil Erosion and Sediment Control"
- Section 880 "Storm water Management"

Storm water runoff is regulated by the Town of Darien Planning & Zoning Commission. Table 3.1 of the Town Drainage Manual identifies "public works storage areas" as a "storm water Hotspot" which may require the use of specific structural BMP's and pollution prevention practices.

Recommendations

In the lower parking lot, the existing OWS can be reused. This basin will pick up the roof flow from the north garage bay addition. For the upper lot, the new impervious area can utilize the existing drainage system.

Flooding and Floodplain Management:

The site lies approximately 500 feet east of Stony Brook, to which Cummings Brook is tributary. The FEMA FIRM map dated July 8, 2013 indicates that the site is not located in a high hazard flood area. However, as part of a detailed study of Stony Brook a LOMR (Letter of Map Revision) was issued by FEMA on September 9, 2014 which now shows the site within the Zone "AE" floodplain limits. The base flood elevation (BFE) in the area of the existing facility appears to be approximately elevation 40+/- (NAVD88). In order to determine the exact BFE at the site a more thorough hydraulic study of Cummings Brook must be performed.

The existing lower level “finished floor” elevation of the facility is approximately elev. 29.2 which is well below the BFE. The upper finished floor elevation of 41.0 is approximately 12” above the BFE. Any new additions or modifications to the building must be located at or above the BFE or otherwise be in conformance with FEMA regulations for non-residential structures.

FEMA regulations are included as Section 820 of the Town Zoning Regulations as noted above. However, if the proposed modifications do not meet FEMA regulations, then a variance is needed from the Zoning Board of Appeals. Also, if the total dollar amount of the building improvements exceeds 50% of the existing market value of the building (as determined by Accessor’s office, currently approximately \$2.1MIL), then the existing portions of the building will also need to be made FEMA compliant or receive a variance from ZBA.

Recommendations

Constructing a new floodwall or earthen berm along the edge of the western parking lot may protect the site from backwater flooding from Stony Brook. A detailed hydraulic analysis and study of Cummings Brook must be performed in accordance with FEMA requirements in order to determine if such a system is feasible.

If it is determined that a floodwall structure can adequately protect the site from flooding, then the Town may request that FEMA provide another letter of map revision (LOMR) to revise the FIRM map and thus remove the property from the flood zone. The FEMA review process for issuing a new LOMR is approximately 120 days. For now, any proposed new utilities (i.e. generator) should be located above the current B.F.E. of 40.0 until further review is completed.

Zoning:

A review of the zoning history for the property reveals several permits have been issued beginning in 1971 with the construction of the original public works garage. Permits were granted in 1976 (#89-C) for an addition to the north side of the original building and again in 1993 (#89-F) for the administrative office addition and the north wing garage bays.

Other permits were granted for the construction of the fire drilling station, the transfer station, the 72” culvert, the “swap shop,” radio antennae, cell tower, replacement of the scale house and for leasing a portion of the property to a BMW dealership for storage of vehicles.

For the proposed modifications to the DPW facility, a Special Permit will be required from the Planning & Zoning Commission. Most of the property and the DPW building are located in the R1/3 zone, although a portion of the property on the east side is zoned as “SB” (Service Business).

A review of the zoning table for the R1/3 zone indicates that a variance will be needed for the proposed front yard setback of +/-21.4-feet which is less than the required front yard setback of 30-feet. It is noted that the existing building currently is only +/-16.2-feet from the front property line, and so the proposed setback is not any greater than the existing condition. From old record mapping of the property, it appears that the property line in front of the facility was moved northerly (towards the building) approximately 50-feet. This may have been done by CDOT in an effort to secure more R.O.W. in anticipation of future work to the nearby I-95 SB on-ramp. Detailed deed research is needed to determine why and when the property line was moved, however, it can be assumed at this point that by altering the property line a “hardship” was created which would allow the front yard variance to be granted.

A list of anticipated regulatory Town approvals is as follows:

1. Environmental Protection Commission for any work within the 50’ upland review area;
2. Zoning Board of Appeals for the front yard variance and (possibly) for non-FEMA compliant elements (section 820 of the Zoning Regulations);
3. Architectural Review Board for the building façade and any new signage proposed;
4. Planning and Zoning: Special Permit, Site Plan, Filling and Regrading, Flood Zone Management;

B. ARCHITECTURAL

The existing building is a 28,800 sf, two story, IIB type construction with sprinkler protection. Given the existing site’s topography, the existing building efficiently utilizes the sloping site and upper / lower level functions remain accessible to grade level. The existing building is comprised of the original 1940 structure and the 1993 additions. Garage bay walls are constructed of brick and block masonry walls with steel roof framing. Floors of both garage bay buildings are either reinforced concrete slab or structural metal deck with a concrete slab. The administrative building is a slab on grade with a steel supporting column grid, and a brick cavity wall construction. The building’s structure was noted to be in good condition overall with the exception of the known slab corrosion within the original bay. This slab has been previously studied in a separate project and again referenced in this project’s structural section. The newer upper garage bay slab was noted to be in fair to good condition with some metal deck corrosion noted. Wall construction was noted to be in good condition at both garage buildings with brick masonry replacement, repointing, and cleaning required at the original building. Exterior painted block masonry of the original building was noted to be in poor condition along the expansion joint of the 1993 addition and requires repair. Water infiltration is likely at the existing cast stone coping joints which require repair. The exterior painted finish along the rear of the original building was also in fair condition and requires refinishing. Exterior split face concrete block at the garage bay addition was noted to be in good condition with no known issues.

All existing roofing is rolled type roofing with ballast at the additions, and is fair to poor condition. No water infiltration was noted at the original building roof, but roof drains were noted not to coincide with the valley's low point. The additions' roof and associated counterflashing were in poor condition with noted water infiltration at the interior ceiling.

Exterior man doors throughout the complex were in fair to poor condition with some doors, frames, and hardware requiring replacement. Exterior garage bay doors were noted to be in good condition with some door operators and weather stripping requiring replacement. Exterior windows were steel framed sliding type windows and noted to be in good condition with no known issues.

Interior finishes within the bay areas were in fair condition with sealed concrete floors and painted concrete block walls. The newer garage bays at the upper floor provided an epoxy Finish system which was in very good condition. The administrative office area provided metal stud interior partition walls with painted sheetrock, vinyl flooring, and tiled flooring in the meeting and bathrooms. Interior finish ceilings are acoustic ceiling tiles and are in fair condition with the exception of noted water staining along the original building. The building is served by separate men's and women's toilet rooms on the upper level which are noted to be in fair to poor condition requiring updating.

The proposed building additions will be constructed of similar type IIB type construction as the original buildings. The overall additions' massing will be similar in height and scale to the original buildings with slightly taller walls to accommodate new truck lifts. New garage bays will be clad in a matching brick masonry veneer while the administrative office facade will be exterior metal panels. The cast stone banding on the original building will be repointed and the addition will recreate this feature as a metal panel soffit around the building and highlighted at the new main entrance. New roofs will be membrane type, low slope roofing with tapered insulation. All existing roofs are suggested to be re-roofed in-kind with the exception of the original building which does not require tapered insulation since the structure is pitched. Two clerestory light monitors are proposed for the south garage bay roof which maximize natural daylight within the area. The fuel canopy roof will provide a low slope roof that protects drivers from inclement weather.

The current and proposed building use groups, Storage (S1 & S2), and Business (B) require firewall separation between each. The existing building does provide fire rated separations with rated wall and door/frame construction. The proposed garage additions will be provided with a (2) hour fire rated separation from the adjacent office (Business/ B) use group. Interior corridor walls will be provided with a smoke separation as they are along a means of egress. All interior stud walls will be painted sheetrock with sound attenuated batts for acoustic separation. All interior flooring shall be resilient flooring tile and acoustical ceiling tile will be provided. New garage bay flooring will be an epoxy system extended up the wall to an effective height. New interior ramps formed concrete and provide the metal handrails for safety.

The overall floor planning strategy for the proposed additions includes several criteria. Internal circulation from garage bay to administrative areas and common areas is direct and efficiently sized. Offices are grouped together and maintain visual control to the outdoors and along key interior corridors. Noise disruptions from service bays back to the bunk areas are minimized through appropriate wall construction and reasonable distance separation. The proposed addition provides a clear primary public entrance with a secure, lockable vestibule.

The existing entrance by the men's toilet room will be used as an authorized staff entrance. Both of these exit doors serve as the (2) required means of egress from the upper level. The (2) existing stairs are not a required means of egress since the current exiting requirements are achieved at each level. Proximity readers with electric strikes are recommended for (3) exterior doors as noted below. (16) exterior security cameras will be provided by the Town of Darien with wiring and installation by the contractor.

1. Lower level Parks and Recreation entry door
2. Upper level Board of Education entry door
3. Upper level main entrance

Construction Phasing:

Construction phasing of the additions and renovations should be planned to limit disruption of daily activities with continued building use. The north addition construction is independent of its adjacencies and can be constructed with very little impact. The south addition would involve much greater coordination with ongoing building functions, site constraints, and user safety. The south garage bays and adjacent roadway realignments would need to be closely paired in their own phase. The south office and common area addition would greatly impact present building egress and would need to be coordinated with the fire marshal. All interior space tie-ins, and administrative / common area renovations would likely be the last phase of construction and temporary facilities would need to be considered.

Phase 1: North Addition, west, and north driveway improvements

Phase 2: South garage bays, roadway realignment at scale house, fuel tank, fuel lines/pumps, concrete tank pads, and fuel canopy. Re-routing of existing below grade utilities.

Phase 3: South office and common area addition

Phase 4: Existing interior space renovations, tie-ins to addition.

C. STRUCTURAL SYSTEMS

STRUCTURAL:

All proposed structural renovations performed as part of this project shall be designed in accordance with 2003 International Building Code/2013 Connecticut Supplement. The minimum design criteria as provided by the code, includes dead, live, and gravity loads, and wind and seismic loads. Dead loads consist of the weight of architectural, structural, mechanical and electrical systems. Live, wind and seismic loads are outlined in the "Design Criteria" following this narrative. The proposed structure shall be designed in accordance with the International Building Code (IBC) and Connecticut State Building Codes to withstand winds to 105 mph.

Existing Construction:

Maintenance Garage (South Wing):

Based on our visual observations during our site visit on October 14, 2015 the existing supported floor construction is understood to consist of a 6" reinforced cast in place concrete slab supported on cast in place concrete beams and cast in place concrete columns. The concrete has been repaired in various areas due to spalling resulting from the leaching of chemicals thru the slab surface. Please refer to Photograph Exhibits "A" thru "C".

The spalling of the concrete at the base of the columns has exposed the reinforcing. Please refer to Photograph Exhibit "D". These columns will require structural repairs.

All loose concrete must be removed from all surfaces (vertical and horizontal) and inspected to determine the extent of the damage before final recommendations can be provided. It is our understanding that concrete cores were previously taken in multiple areas for chemical analysis. We have requested copies of the reports as well as the samples if available to assist in our investigation.

We have performed a preliminary review of the slab replacement documents prepared by TranSystems dated 10/3/13 and take no exception to the design concept. A final review will be performed and any comments or questions will be documented and issued in a written report.

Transystems Review

We have reviewed the structural drawings prepared by TranSystems dated October 3, 2013 and have the following comments:

1. Drawing S4:
 - 1.1 Section 1 and 2: Is a 6" embedment sufficient for the epoxy coated #6 reinforcing?
 - 1.2 Section A: If the reinforcing is removed is the #6 adequate for the shear transfer?
Is a 6" embedment sufficient for the epoxy coated #6 reinforcing?
 - 1.3 Section B: If the beam stirrup is removed or damaged and the #4 at 12" on center is provided, is the #4 adequate for the shear reinforcing, and if it is epoxy coated, is there sufficient development length?
 - 1.4 Section C: Refer to Section B comments.
 - 1.5 Section G: Refer to Section A comments.

2. Drawing S5:
 - 2.1 Section F: Refer to Section A/S4 comments in Item 1.2.
 - 2.2 Table of Splice Lengths: Are these splice lengths adequate with epoxy coated reinforcing?
 - 2.3 If beams are spalled that are to receive FRP, are they repaired prior to placing FRP?

3. Drawing S6:
 - 3.1 Table of Splice Lengths: Are these splice lengths adequate with epoxy coated reinforcing?

Maintenance Garage (North Wing):

This area was not inspected by our staff. Photographs were provided to our office of this area which displayed a cast in place slab over a metal deck. Areas of the deck are observed to be corroded and will require repairs.



New Construction:

New foundations are assumed to be cast in place concrete frost walls on spread footings. An investigation of the soils will be required prior to the final design of the proposed foundations.

Typical Floor - Slabs on Grade: 5" thick concrete slab reinforced with 6x6-W2.9xW2x.9 welded wire fabric supported on continuous steel wire chairs, placed over a 15 mil vapor retarder on a minimum of 4" of 3/8" crushed stone fill over controlled fill or compacted subgrade. All concrete for the slabs on grade shall have a moisture vapor reducing admixture, i.e. ΔBarrier 1".

Vehicle Wash Bay Building - Slab on Grade: 6" thick concrete slab reinforced with #6 at 14" o.c. each way, located 1 ½" below top of slab supported on continuous steel wire chairs, placed over a 15 mil vapor retarder on a minimum of 4" of 3/8" crushed stone controlled fill or compacted subgrade. All concrete for the slabs on grade shall have a moisture vapor reducing admixture, i.e. ΔBarrier 1". The completed slab shall finished with an approved epoxy coating.

Superstructure of New Additions – Metal roof deck over steel joists and structural steel beams support on structural steel columns and exterior walls load bearing masonry walls.



Photograph Exhibit "A"



Photograph Exhibit "B"



Photograph Exhibit "C"



Photograph Exhibit "D"

DESIGN CRITERIA

1. 2003 International Building Code/2013 Connecticut Supplement

2. Design Live Loads:
Minimum Live Loads:

Offices	50 psf
Classrooms	40 psf
Stairs	100 psf

Corridors:	80 psf
Partitions	20 psf
Vehicle Loading	TBD

3. Wind Load Criteria: Refer to ASCE 7-02, "Minimum Design Loads for Buildings and Other Structures"

$$P = q G C_p - q_i (G C_{pi})$$

Basic Wind Speed, V:	105 mph
Exposure Category:	B
Importance Factor, I: (Category III)	1.15

4. Earthquake Load Criteria: Refer to Chapter 9 of ASCE 7-02, "Minimum Design Loads for Buildings and Other Structures"

Lateral force resisting system – To be determined during the subsequent phases of design

S_s = 0.313
 S₁ = 0.067
 S_{ds} = 0.294
 S_{d1} = 0.108

Seismic Use Group II (Typical)
 Seismic Design Category B (Typical)
 Importance Factor, I_s (Category II) = 1.15
 Soil Site Class D
 Response Modification Factor, R = 3.0
 Deflection coefficient, C_d: 3.0
 Mean Roof Height, h TBD

C. MECHANICAL SYSTEMS

Existing Conditions:

The facility is served by a Central Hot Water Plant consisting of four Slant Fin model L 70 C Modular Boilers firing No. 2 Fuel Oil with a gross heating output of approximately 1,340,000 BTU/Hr. Two base mounted Hot Water Pumps circulate hot water to Terminal Heating Equipment throughout the facility. Heating Terminal Equipment consists of Hot Water Unit Heaters serving the repair and storage bays, with Convectors and Finned Tube Radiation serving offices and common areas. The Boilers were installed in 1994 and are approaching their end of useful life. The Boiler Room is located on the lower level which is potentially subject to flooding.

Exhaust systems serving the Repair Bays are not code compliant and are at the end of their useful life. Most systems appear to be inoperable and there are damaged and missing sections

of exhaust duct. Exhaust quantities indicated in the 1993 Construction Documents are generally less than 1.0 CFM/SF. Current Code requires the ventilation system be capable of 1.5 CFM/SF for Repair and Storage Garages that exceed 850 SF in floor area.

Miscellaneous Public Works spaces are served by Window Air Conditioners which are inefficient and provide poor ventilation. The Board of Ed. Offices are served by existing Split System Air Conditioning which appears to be in good condition.

Recommendations:

The HVAC systems will be designed in accordance with the State Building Code – 2005 Connecticut Supplement with the 2009 and 2011 Amendments which includes the 2003 International Building Code, 2003 International Mechanical Code, 2009 International Energy Conservation Code and the 2005 National Electric Code. The systems will also be designed in accordance with the applicable provisions of the Connecticut Fire Safety Code and other applicable standards, ordinances and regulations.

It is expected the Gas Utility Company will provide a new gas service to the facility and it is therefore recommended that the oil fired boilers be removed and replaced with new gas fired heating equipment. Due to the potential for flooding on the lower level it is recommended that the existing Central Boiler Plant be dismantled and the space used for another purpose. In order to conserve valuable upper level floor space and reduce installation costs, it is recommended that new gas fired Terminal Heating Equipment be used, eliminating the need for a Boiler Plant.

Existing Boilers, Pumps and associated piping and Terminal Heating Equipment will be removed. The Storage and Repair Bays will be served by natural gas fired Unit Heaters. High Efficiency Condensing Unit Heaters, with combustion efficiencies exceeding 95%, may be used in spaces that will be maintained above 40°F. By comparison, standard efficiency Unit Heaters are typically 80% efficient. Improved operating efficiency will also be achieved with gas fired Unit Heaters by eliminating the pump energy required to circulate hot water continuously during the heating season. Condensing appliances will require a condensate drainage system, equipped with acid neutralization device consisting of a PVC tube containing a limestone medium.

Existing Window Air Conditioners will be removed. Offices and miscellaneous spaces where air conditioning is desired will be served by high efficiency gas fired Packaged Rooftop Air Conditioning Units with estimated cooling capacities in the range of 3 to 5 Tons. Air Conditioning Equipment provided in this capacity range will have SEER ratings of approximately 17.0, as compared to minimum 13.0 SEER required by the Energy Code. Packaged Rooftop Units will provide minimum ventilation rates as required by the Building Code and will be equipped with economizer controls for free cooling with 100 percent outside air at times when outdoor air temperature and humidity are suitable for economizer cooling.

The required ventilation rates for the Repair and Storage Bays is 0.05 CFM/SF (minimum) increasing to 1.5 CFM/SF upon detection of hazardous gasses. Due to the deficiencies of the existing systems, it is recommended that they be upgraded to provide the required ventilation rates for compliance with the Building Code. A Gas Detection System (CO, NO₂ and flammable vapors) will be required for control of Exhaust Systems, so ventilation rates may be reduced to minimum CFM during normal operation, when hazardous gasses and vapors are not present. Exhaust inlets in the repair bays will be located near the floor to prevent accumulation of flammable vapors. Make-up air will be provided through the overhead doors or through wall louvers with motorized dampers. Overhead doors and/or motorized dampers will have a control interlock with the Gas Detection System and will be zoned such that only the doors or dampers in the affected area will be opened. The exhaust system will also be equipped with manual switching to allow maximum ventilation when desired.

A Tailpipe Exhaust Systems will be provide for the two repair bays. A Tailpipe Exhaust System is required in repair bays where vehicles are operated longer than the time required only to move vehicles in and out of the bay. The system will consist of an exhaust blower and hose reel suspended from the roof structure, and will be capable of attachment to high vehicle exhaust stacks as well as low tailpipes.

Automatic Temperature Controls for the facility will consist of programmable thermostats and controllers capable of being programmed for scheduled occupied and unoccupied operating modes. Each system will have a timed manual override function for temporary occupied periods. The system will not be capable of being monitored or adjusted though the internet. Zone control for separate areas served by a single Packaged Rooftop Unit will be provided by a bypass type Variable Air Volume (VAV) System.



Boiler Room



Typical Hot Water Unit Heaters



Exhaust Duct

PLUMBING

Domestic Water Service Existing Conditions:

The facility is provided with a 1" domestic water service supplied from the Aquarion Water Co. The static water pressure ranges from 75 PSI to 90 PSI (pressure indicated on the fire protection riser inspection tag) which is adequate to serve the facility's water demand. The domestic service consists of a water meter and copper piping with soldered joints and fittings. The service enters the building on the lower level parallel to the fire protection water service. An angle valve is provided as means of system shut down within the building and is located on the outlet of the water meter. The water service main is not provided with adequate supports and was observed swaying and moving due to pressure fluctuations from domestic usage which could result in eventual piping damage. The 1" cold water service is then distributed throughout the facility to all plumbing fixtures and to the water heater. The service appears to be in good condition, though working condition of the main shut off valve is unknown. A cross connection device to protect the municipal water system was not observed on building's water service. A double check backflow preventer was installed on the domestic water feed to the boiler system. A variety of domestic water piping materials have been installed which consist of wrought copper piping with soldered and fittings, mechanical press type copper joints and fittings, and reinforced PEX tubing with metal shield and crimped fittings. Some piping was provided with mineral fiber insulation with PVC elbows, others partially with flexible elastomeric insulation.

Vehicle wash down takes place on site with water supplied not from the building, but from a local fire hydrant. The current domestic water provisions are not adequate in terms of flow for the facilities wash down operations.



Domestic Water Recommendations:

The anticipated demand of the facility will be increasing due to DPW programming which includes a new wash bay and increased plumbing fixture count with commercial grade fixtures. It is recommended to increase the water service size to meet the building's new water demands because the current 1" service can only flow approximately 15 gpm while still remaining at or below the recommended velocity of 5 feet per second (per the CDA's Copper Tube Hand book).

It has been confirmed with Aquarion Water that it is acceptable to tap the new 3" domestic water service off the existing 6" fire protection water service (in lieu of tapping the 12" municipal water main located on Ledge Road). The new domestic water tap and associated 3" curb shut off valve will be located near the Fire Service's existing curb shut off valve on the customer side of the property line. Additionally a new 6" curb valve on the Fire Service would

be required downstream of new domestic tap. The reasoning is that Aquarion Water needs to be able to isolate either the Domestic or Fire Protection water service outside of the facility in the event of an emergency. Further development and coordination of the scope is required to determine if a water meter pit would be required or if the meter would be located within the facility.

It is required to protect the municipal water supply against cross contamination with an approved reduced pressure backflow preventer assembly as per Aquarion Water. Install in accordance with the water authority's rules and regulations in a heated mechanical space.

Provide all new domestic water distribution piping to bathroom groups, kitchenettes, etc. per new architectural layout as the original system is not sized nor routed properly for the anticipated system upgrades. Ancillary and existing to remain remote fixture needs will be reviewed individually for reconnection. Provide proper hangers, supports, and water hammer arrestors accordingly to protect all domestic water piping from movement. Insulate all piping in accordance with the International Energy Code and ASHRAE 90.1. According to the Connecticut Cross Control Manual boiler feeds are required to have a reduced pressure device (RPD) type backflow preventer, not a double check valve assembly (DCVA) type which is currently installed. Although the DCVA was likely compliant during the original boiler installation, all new make-up feeds to be provided with a RPD backflow preventer in accordance with code.



Some of the domestic water piping dates to the original building construction. The lead (Pb) content of the existing domestic water pipe, fittings and solder is unknown, but lead-containing materials may have been used for domestic water systems during the time of construction. All new potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G lead free requirements.

Domestic Water Heating System Existing Conditions:

The facility generates domestic hot water via 80 gallon electric storage type water heater. The hot water distribution system is not equipped with a hot water recirculation piping loop, circulator pump, nor thermostatic mixing valve. The equipment appears to be in fair operating condition but is nearing its life expectancy and out of warranty.



Domestic Water Heating System Code / System Deficiencies & recommendations:

The average life expectancy for an electric water varies but is around 15 years. Given the age of the facility it is recommended to provide a new water heating system to deliver 120°F hot water to all plumbing fixtures.

Traditionally hot water is stored at 140°F to reduce the growth of legionella, then the temperature is lowered via a thermostatic mixing valve (to prevent scalding hazards) and is distributed around 120°F to all plumbing fixtures. Energy efficiency codes also requires means of temperature maintenance when the distance between the water heating equipment and remote fixtures are greater than 100'. Typically a hot water recirculation pump with recirculation piping loop and aqua stat is provided to achieve compliance.

With new on demand point of use heaters water is only heated when there is a call for hot water. Equipment accommodations and infrastructure requirements are simplified while energy efficiency is increased when compared to the traditional tank type storage heater with thermostatic mixing valve and hot water maintenance recirculation system.

Due to the building's anticipated hot water demand it is recommended to replace the existing storage type hot water heating system and provide a high efficient, gas fired, condensing instantaneous water heater serving areas of elevated demands (showers). Provide multiple point of use electric instantaneous water heaters for remote low flow fixtures (handwashing lavatories) in lieu of providing a recirculation system.

All systems to be provided and installed to prevent water from entering within their components. Systems shall be capable of withstanding hydrostatic and hydrodynamic loads and stresses. Any equipment or system not capable of meeting such requirements shall not be located where subject to water damage.

Provide all required, piping, fittings, hangers etc. to accommodate the proposed architectural program. Provide di-electric fittings on all piping components of dissimilar material to avoid galvanic corrosion. Properly ground all electrical equipment accordingly where it interfaces with the plumbing system (i.e. pumps, controls, water heater, etc.). Insulate all piping in accordance with the International Energy Code and ASHRAE 90.1

Sanitary, Oil Waste & Venting Systems Existing Conditions:

The facility is provided with multiple sanitary, oil waste, and venting systems piped throughout the building which serve the plumbing fixtures. Sanitary, oil waste and vent piping material consists of cast iron hub and spigot joints and fittings, cast iron no-hub joints and fittings with banded couplings, and schedule 40 PVC piping with solvent welded (glued) joints and fittings.

These systems can be broken down into two areas, the original building and the 1994 addition. The original building is provided with one dedicated oil waste line serving garage floor drains which are piped to the exterior below grade oil water interceptor located in the paved driveway. A 4" sanitary service which accommodates the non-oily waste from plumbing fixtures (sinks, toilets, etc.) connects downstream of the oil water interceptor. Both of these systems leave the site via gravity to the municipal sewer system.

The addition is provided with two oil waste drainage systems which connect to a second oil water separator. A portion of the upper level addition which was intended to be a double high lift bay now has been converted to an office space with a kitchenette and a bathroom group. Sanitary piping serving these upper level fixtures are piped to an above ground sewage ejector pump located on the level below. The pump's discharge is piped to an exterior wall and is thought to be connected to the scale house's exterior sanitary lateral, it is believed the pipe then reconnects back into the original sanitary system within building. The pump's corresponding vent is connected to the building's sanitary venting system incorrectly. The remaining sanitary and oil waste venting systems are connected to each other and terminate thru the roof at several locations. Additionally in lieu of hard piping several fixtures to the main venting system, multiple air admittance valves were provided on individual fixtures.

Visible floor drains serving the original building's upper garage bays were not provide with P-traps or vents. This is likely to eliminate the water trap seal from freezing in the winter months when garage bays are open. It is likely that the oil water separator is acting as a single main trap to prevent the entry of sewer gases from the municipal sewer system though means of venting the system were not observed. Garage floor drains in the Addition are provided with P-traps and are vented accordingly.

Several garage floor drains were observed to be clogged with sand and debris, while other floor drains were missing their grates. The condition of floor drain piping varied but some locations show sign of corrosion and leakage.



Sanitary Oil Waste & Vent Code / System Deficiencies:

The existing oil water separators are both over 20 years old, therefore it is recommended to test and inspect the internal epoxy sealant lining to ensure the system maintains resistance to gasoline, oil, solvents. Additionally it is under best management practices that semi-annual inspections of all oil water separators shall be performed per the CT General Permit for the Discharge of Vehicle Maintenance Wastewater.

It is recommended to snake all floor drains clean so they are free of sand and debris to allow proper drainage and ensure they are performing under current guidelines and Environmental regulations. Replace missing floor drain grates accordingly.

Maintain water trap seals on floor drains where applicable to prevent sewer gas from escaping (that do not normally see use, i.e. mechanical room, ancillary drains, etc.) by establishing a daily maintenance program to re-fill traps or install automatic trap seal maintenance devices. Verify the routing of the exterior oil water separator vent lines to determine if un-trapped floor drains are provided with a means of preventing sewer gas from entering the building. Providing means of venting as needed to achieve code compliance.

Plumbing vent termination through the roof is damaged and should be repaired accordingly to eliminate water infiltration.



Determine the exact location, routing and invert elevations of the existing oil waste and sanitary laterals leaving the garage bays. Verify the scale house and pump discharge under slab pipe routing by mapping and documenting via camera scope locations of the drainage system on a drawing, including cleanouts, drains, pits, etc. and provide inverts elevations of existing piping where it enters the building and where it is the farthest from the point of entry.

Connect the new scale house lateral back into the building's sanitary system (refer to civils' conceptual site plan).

Route new piping exposed in the bays, or route below slab as needed. Additionally the pump discharge piping serving the upper bay's office area will be rerouted so that pumping is no longer required. Design considerations and in-field conditions such as DPW programming, concerns of pipe freezing, inverts, coordination with other utilities, structure, etc. will help in determining where the point of connection will be between the existing and new piping to achieve gravity drainage.

All proposed modifications to the new and existing sanitary system are dependent upon verification of the existing sanitary, storm, and oil waste piping invert elevations in addition to actual pipe routing (provided by camera scoping).

Storm System Existing Conditions:

The building is provided with flat roofs and parapets throughout. Primary roof drains are provided throughout and are piped internal to the building and discharge to the site storm system via gravity. Only one roof has provisions for secondary or overflow accommodations in the event of the primary drains becoming obstructed. This is achieved via low roof edge spill over to a gutter which serves the original building only. The remaining roofs all have high parapets with no secondary drainage accommodations.

Minor ponding was observed in multiple locations throughout the roof and gutters were observed to be obstructed with vegetation growth.



Recommendations:

Provide emergency or secondary roof drainage accommodations per the 2003 International Plumbing Code such as scuppers or piped overflow drains which discharge to grade accordingly to an approved location. Clean and snake roof drains, piping, gutters and leaders so they are clean and free of debris to allow proper drainage. Secure debris grates to roof drains to ensure proper operation.

Plumbing Fixtures Existing Conditions:

The facility is provided with a mixture of commercial and residential type fixtures. Bathrooms groups consist of tank type toilets, with lavatories, showers and floor drains. The drain piping arrangement for lavatories do not compliant with ADA standards as they interfere with clear knee space and some areas are not provided with insulation. Two kitchenettes with sinks are provided, and various water coolers are provided.



Floor drains, hose bibs and service sinks are provided throughout all the garage bays, and some service sinks are provided with small reservoir pumps. Freeze proof hose bibs are provided throughout the facility and are located on facility’s exterior walls. Emergency fixtures are provided and consist of point of use non plumbed eye wash stations located throughout the facility in the garage bays and bathrooms. In the lower level garage a commercial ice maker has been installed, a cross connection device was not observed on the cold water supply.

Plumbing Fixtures Recommendations:

Provide a proper cross connection device on the ice maker’s cold water supply line. Refer to the Proposed Wash Bay and Addition section for additional recommendations.

Compressed Air Systems Existing Conditions:

Multiple air compressors are located throughout the facility serving various garage bays and work shop areas.

The lower level is provided with a pad mounted 120 gallon, 2 stage, 10 hp reciprocating air compressor which is in good operating condition. Distribution piping consists of threaded galvanized steel and sweated copper and is routed throughout the upper and lower garage bays of the original building. Outlets are provided with filters, pressure regulator, pressure gauges, hose reels and quick disconnect fittings.

A second 6 hp stationary air compressor is mounted on the addition’s upper level and feeds both upper and lower levels of the addition. This compressor is older but in operating

condition. Air pressure is set to 120 PSI with copper distribution piping and sweated joints and fittings with quick disconnect outlets.

A portable air compressor is located on the lower level in the Parks and Rec area and serves the area via hose with quick disconnect outlet.



Compressed Air Systems Recommendations:

Perform preventative maintenance on all air compressors per the manufactures recommendations. Refer to the Proposed Wash Bay and Addition section for additional requirements.

New Natural Gas Service:

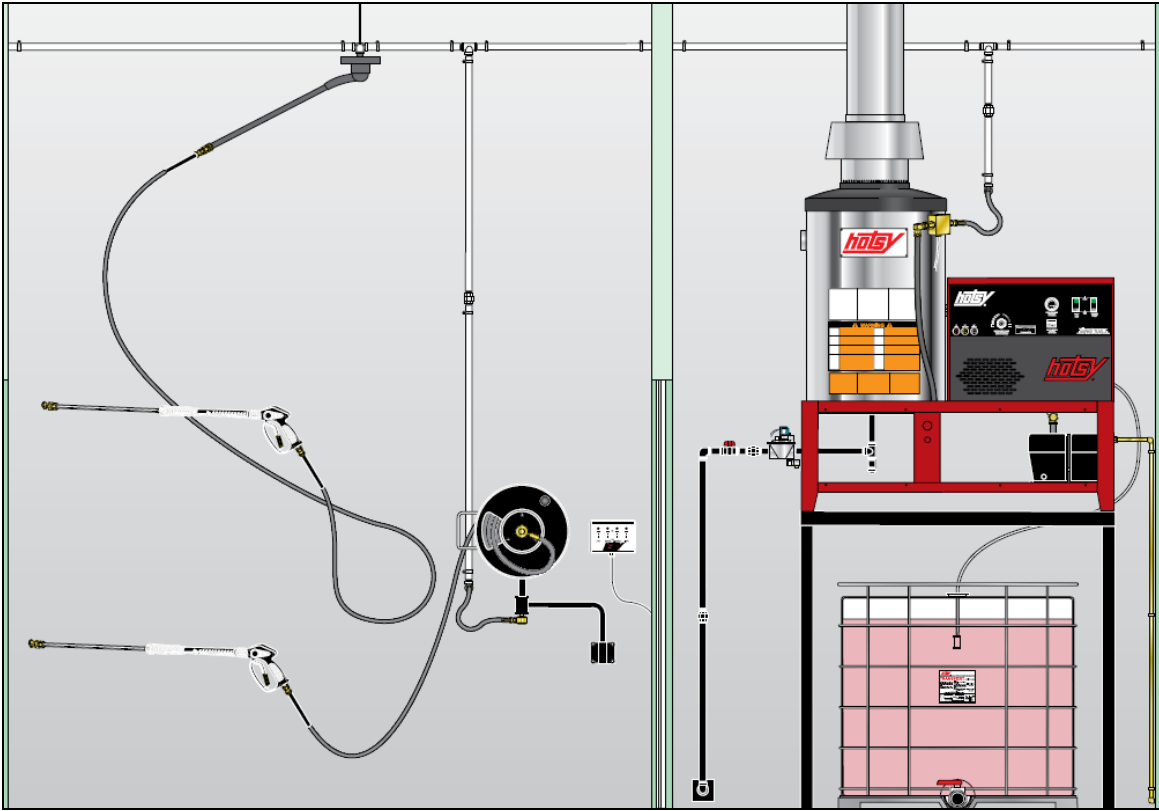
Currently natural gas is not provided to the site. Preliminary conversations with the gas company indicate that a 2 psi service is available and can be extended to the site. Further development and coordination of programming with Eversource Gas is required to determine all requirements. Routing and installation of new gas service piping up the new meter assembly shall be performed by the Gas Company. Coordinate pipe routing, meter location and regulator assembly requirements with new and existing site utilities and services. The proposed location of the gas meter will be adjacent to the generator while still maintaining required clearances to ignition sources.

The contractor shall provide and install a new natural gas system piped within the building connected to a new gas meter assembly which will serve the new natural gas stand by generator, domestic water heating, and HVAC equipment. Install piping and equipment in accordance with Eversource Gas utility requirements, State of Connecticut Fuel Gas Code and NFPA 54. Refer to the Proposed Wash Bay and Addition section for additional requirements.

All systems to be provided and installed to prevent water from entering within their components. Systems shall be capable of withstanding hydrostatic and hydrodynamic loads and stresses. Any equipment or system not capable of meeting such requirements shall not be located where subject to water damage.

Proposed New Wash Bay & New Addition :

Provide a complete wash bay system, basis of design by "Hotsy". The system shall include a stationary heavy duty, gas fired Hot Water pressure washer "1400 Series" Model 1452N rated at 4 GPM @ 3000 PSI (208 volt, three phase, 24 Amps). Accessories including hose reels, spray nozzles, high reach wash poles, automatic detergent fill, and remote activation control panel.



Comply with the State of Connecticut Department of Environmental Protection's General Permit for the Discharge of Vehicle Maintenance Wastewater, 2003 International Plumbing Code, and local Authority Having Jurisdiction (AHJ).

Provide a separately piped oil waste and vent system connected to a new oil water separator prior to being connected to the sanitary system in support of the new wash bay. The interceptor shall be sized to handle the anticipated wash down flow rates and not to exceed effluent discharge level of 1 ppm.

Provide a trench drain system with sand interceptor catch basin in support of the new wash bay and include new floor drains in the mechanics bay. All associated drainage piping shall be connected to the new oil waste and vent system. All drain and piping material shall be chemical resistant and H2O rated, capable of withstanding heavy traffic loads.

All below grade oil waste piping shall be Sch. 40 PVC with glued joints and fittings, above grade vent piping shall be no-hub cast iron piping with banded clamped joints and fittings where subject to physical damage, above grade concealed piping shall be PVC. Drain sizes shall be coordinated and installed as required by the DPW to facilitate their wash down and mechanics accessibility needs. Provide transition coupling between dissimilar materials.

Provide new plumbing fixtures installed at standard and accessible ADA heights per new architectural layout. Provide low flow fixtures for commercial facilities in accordance with code. Provide hot and cold water and extend sanitary and vent services to new fixtures as

required. Saw cut and trench the existing slab to accommodate piping for new fixture layout accordingly. Provide a proper cross connection device on all required equipment's make up water supply line.

Provide domestic hot and cold water to the new wash bay and distribute to the associated equipment. Equipment to include hose bibs, retractable hose reel system connected to the power washer, and a 2" high flow hose outlet. Provide a backflow preventer with appropriate hazard rating to protect the potable water system from cross contamination, include all piping, fittings, valves, etc. All domestic water piping shall be lead-free copper with soldered joints and fittings with mineral fiber insulation with protectant jacket. Provide all piping, fittings, valves, etc.

Provide a new dedicated general purpose shop air compressor sized for the anticipated SCFM and pressure requirements to support pneumatic equipment in the new wash and mechanic bays. Provide all required filters, gauges, piping, fittings, hangers, outlets and quick disconnect fittings accordingly. Piping to be copper with sweated joints and fittings.

Route new natural gas to the wash bay in support of the wash bay's hot water generating system and HVAC equipment. Piping shall be Sch. 40 threaded black steel with malleable joints and fittings. Provide all piping, fittings, valves, etc.

Provide new roof drainage in support of new architectural program. Roof drains serving flat roof areas to be piped internal to the building then routed underground. Where possible connect new underground storm to the existing site storm system. Where not possible provide a new storm main, piped to the existing or extended site storm system, refer to civil engineer scope of work for continuation. Secondary or emergency roof drainage serving the flat roof areas shall be piped independent of the primary system and shall discharge above grade to an approved location. New sloped roof areas will be drained utilizing architectural gutters and exterior leaders. All downspouts and rain leaders will drain to the site storm sewer system via gravity. All above grade storm and overflow storm piping shall be no-hub cast iron piping with banded clamped joints and fittings. All below grade piping shall be Sch. 40 PVC with glued joints and fittings. Provide transition coupling between dissimilar materials.

Fuel Dispensing System:

Provide two new "Atlas" mechanical gasoline and diesel fuel dispensers, manufactured by Gasboy, with traditional rotary display and integrated suction pumps. Units will have a standard flow rate of 15 gpm and each dispenser will be provided with one hose.

It has been confirmed with the manufacturer that reusing the existing TLS-300C Veeder-Root fuel management system is appropriate for the application and is capable of monitoring the proposed above grade storage tanks. Additionally the existing probes, sensors, etc. currently installed on the below grade tanks can be reused as long as the new tanks have the same diameter.

Provide two new 4,000 gallon aboveground, horizontal, double-wall Type I, steel storage tanks

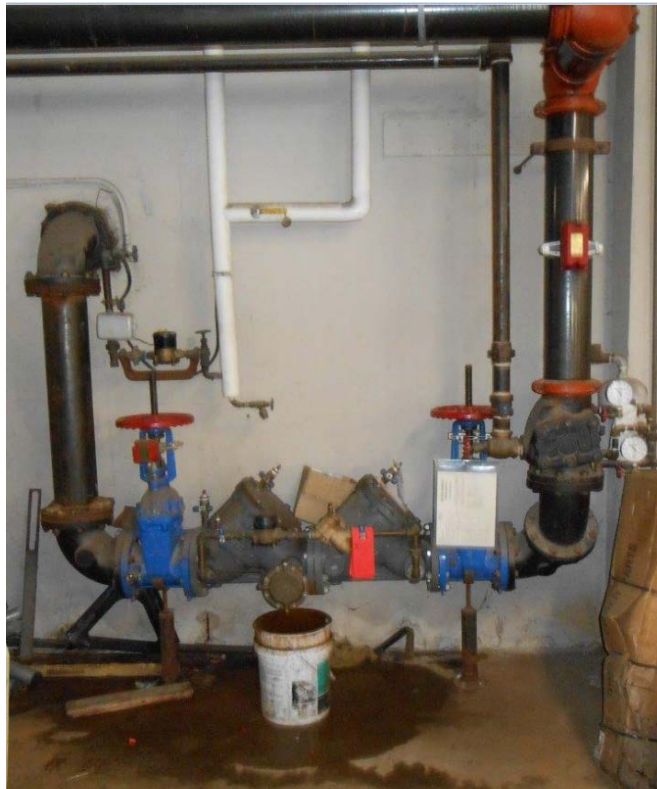
(size dependent upon verification of the existing fuel tank dimensions and compatibility of existing management system). Tank shall be fabricated from mild carbon steel with flat-flanged heads. Minimum inner tank thickness ¼" head and shell. Minimum outer tank thickness 10 gauge head and shell. All items included with the tank shall be coated with red primer paint. The tank shall be manufactured in conformance with Underwriters Laboratories' UL-142 specifications and so labeled. Manufacture Highland Tank, Model HT-1069.

FIRE PROTECTION

Water Service Existing Conditions:

The facility is provided with a fully automatic fire sprinkler system with sprinkler coverage throughout the building. A 6" reduced pressure detector assembly backflow preventer, Febco model 825Y with by-pass meter, is provided to protect the municipal water supply from cross contamination. A large bucket is located below the backflow preventer to collect water due to constant dripping from the relief valve. The backflow preventer assembly has recently been inspected by Aquarion Water dated 4/15/15.

Based on conversation with the facility staff, the supply main became obstructed with rock and debris, it has subsequently been cleaned out, but the current internal condition of the piping and backflow preventer is unknown.



Recommendations:

The backflow preventer constant dripping relief valve may be due to the normal operation of the valve due to DPW's standard operations (resulting in fluctuating water pressure) or debris

with in the check valve not allowing proper valve seating. Maintain current inspection and testing of the Back Flow Preventer (BFP) by Aquarion Water and verify that the fire service main is clean and free of debris to allow for proper flow. To eliminate spillage and need for a bucket under the BFP, provide an air gap fitting on the BFP's relief valve and pipe to the closest floor drain.

All systems to be provided and installed to prevent water from entering within their components. Systems shall be capable of withstanding hydrostatic and hydrodynamic loads and stresses. Any equipment or system not capable of meeting such requirements shall not be located where subject to water damage. Fire Marshal / AHJ shall review and approve all final equipment locations.

Control Valves and Supervisory Equipment Existing Conditions:

The fire protection system is provided with a wet pipe alarm check valve manufactured by Reliable, Model E which serves the building's automatic sprinkler system. The alarm valve has been recently inspected, dated 7/9/15 by a local mechanical contractor and indicates a static water pressure of 90 psi with residual pressure at 60 psi. The main system drain is routed to the boiler room then is piped directly to the sanitary system, a swing check valve has been provided at the point of connection.

Due to the concern of pipes freezing when the garage bays are open in the winter, the system now has been converted to a dry system. Providing a dry system eliminates the freezing concerns as the piping system is filled with compressed air instead of water. When a sprinkler head is activated the compressed air is evacuated and water is then allowed to flow thru the piping system to extinguish the fire, thus eliminating any freezing concerns.

Means of pressurizing the system is through an air compressor, although the compressor was not physically piped to the dry system. Periodic system recharging may take place throughout the year during the alarm valves scheduled testing thru the local mechanical contractor.

The existing factory tamper and flow switches have been disconnected from the backflow preventer and alarm valve assembly, the power and control wiring has been removed as well. The only notification appears to be an exterior water motor alarm (water powered mechanical alarm bell) with electric alarm pressure switch. This system would only be activated upon the fire department connecting to the double inlet (2-½" x 2-½" x 4") free standing Fire Department Connection (FDC) and charging the system with water via a pumper truck.

The water motor alarm and FDC are also located directly behind the existing gasoline and diesel pumping stations. The location of the Fire Department Connection (FDC) is a potential concern being in close proximity to the gas pumps (which can be considered a source of ignition). This scenario is a potential hazard to the first responder's safety and their ability to connect to the FDC with hoses, pumper truck, etc. to back feed the system as is their standard procedure.



Recommendations:

It has been confirmed with the alarm check valve manufacturer (Reliable) that the use of the wet valve as a dry valve is not compliant with NFPA 13, the UL Listings and are not in accordance with the equipment installation requirements.

It is recommended to provide a new fully UL listed and NFPA 13 compliant automatic sprinkler system. In areas subject to freezing, provide an Automatic Dry Pipe system with dry valve, dedicated and piped air compressor, tamper and flow switches etc. serving all unheated spaces subject to freezing including the entire garage bays, and service rooms adjacent to the apparatus bays.

In areas that are not subject to freezing temperatures provide a fully Automatic Wet System including all riser check valve, tamper and flow switches, piping, fittings, etc.

All systems to be provided and installed to prevent water from entering within their components. Systems shall be capable of withstanding hydrostatic and hydrodynamic loads and stresses. Any equipment or system not capable of meeting such requirements shall not be located where subject to water damage. The Fire Marshal / AHJ shall review and approve all final valve and equipment locations.

Relocate the Fire Department Connection (FDC) in accordance with the Fire Marshal and Fire Department.

Sprinkler Heads & Piping Existing Conditions:

Exposed upright and pendent sprinkler heads are provided in areas without ceilings such as the garage bays and workshop areas. Semi-recessed sprinkler heads are provided in areas with ceilings such as offices, bathroom, kitchen, etc. The currently installed sprinkler heads are UL Listed for wet sprinkler systems not dry sprinkler systems.



Currently black steel piping with a combination of grooved mechanical or threaded joints and fittings are installed throughout the facility. This pipe material is appropriate for the original wet system, but is not appropriate for the converted dry system.

Due to the characteristic of a dry pipe sprinkler system's internal environment it is likely that the piping distribution system has areas of internal corrosion from water and moisture begin introduced during air pressurization and annual testing. The result is that water flow to the sprinkler heads can become obstructed in the smaller piping as oxidized material is removed or scoured off from the internal pipe surface during flow. This could compromise the life safety systems performance and ability to protect the occupants and property.

The systems drain line is currently routed high over electrical panels in numerous locations in the lower level. Further investigation is required to determine if additional locations are present.



Recommendations:

In areas where freezing is not a concern, an automatic wet sprinkler system will be provided, all existing piping can remain Sch. 10 & 40 black steel contingent upon testing. Sample the existing to remain portions of the system in accordance with NFPA 25 (by a recognized testing laboratory acceptable to the authority having jurisdiction for field service testing) to determine the extent of any corrosion if any, and replace piping as necessary.

Replace all remaining black steel piping serving the dry system with corrosion resistant Sch. 40 & Sch. 10 galvanized steel piping and fittings. Replace all sprinkler heads with new to comply with the appropriate system type i.e. wet or dry. Note that existing sprinkler heads cannot be re-used or relocated. Provide sprinkler coverage under the roll up garage doors in accordance with NFPA 13, and with guards in areas prone to damage.

Electrical panels require 6' of dedicated clear space directly above their horizontally projected depth so any piping which is located in that area is in violation of the National Electric Code. Relocate and modify piping as required to achieve compliance.

Fuel Dispensing Station Fire Suppression System:

Provide a Pre-Engineered Dry Chemical Extinguishing Fire-suppression system serving the existing fueling station's new canopy. The suppression system shall be provided in accordance with the qualified vendor / manufactures regulations, NFPA-17, UL-1254 listed, and per local AHJ requirements. System shall include pneumatic and electrical connections, automatic dispensing pump deactivation, control panels, remote pull station, fire-protection cylinders, piping, actuation devices, and manual control devices. The Local AHJ and Fire Marshal to review and approve final system configuration prior to installation.

D. ELECTRICAL

Interior Lighting:

The existing luminaires throughout the interior scope areas consist of a combination of various sized fluorescent & LED lights. In the garage bay areas the lights are an industrial type fluorescent light. Inside the building in the offices there are recessed fluorescent lights in the lay-in ceiling. The garage facility was re-lamped with LED's as a part of a program through Eversource/CL&P. All interior lighting was working. There are occupancy sensors in the office areas but not in the garage bays. If the lights need to be replaced then LED lighting should be used, especially for the new additions.

With the new office area expansion/demolition of walls in that area it will affect the lighting circuits for that area & placement of lights might need to be rearranged. In that case it'd be advisable to replace the existing lights in those areas with LED lights. For the offices & new rooms in the additions that will have a lay-in ceiling there will be recessed LED lighting added there, whereas in the new bays there will be new vapor tight ceiling mounted LED lights added. In all new rooms in the additions there will be occupancy sensors added as required by energy code. Occupancy sensors will not be added to the new bays, instead a manual switch will be utilized so that if someone is working under the vehicles the lights won't turn off if the occupancy sensor can't see them.

Exterior Lighting:

The existing luminaires throughout the exterior scope consist of downlights and flood lights. The lights appear to be in good shape but were not turned on since it was during the day, so can't be sure at the time being that they work or not. Exterior lighting will need to be added to the new additions. New lights will be added to the exterior of the building of the new additions & will be chosen to match the existing exterior lights, or get as close as possible to matching the existing lights. A new light for the flagpole will also be added. Site lighting will come from the exterior lights mounted to the building and photometric designs will be provided for lighting prior to the final design.

Emergency Lighting:

There are existing emergency lights throughout the office area and some in the garage bays. There are 2 types of emergency lighting throughout the facility, the main one is a compact twin head emergency light whereas the other kind is a dual head industrial type emergency light. There doesn't appear to be enough emergency lighting in the garage bay areas to comply with code, so adding emergency lights would be advised.

New compact twin head emergency lights will be added to the new additions as required by code, and will be chosen to match existing emergency lights throughout the facility.

Generator:

The facility currently contains a 3 phase 50KW diesel Kohler Fast Response II generator. This generator is of medium age and is rusting a little. The generator will be evaluated based on the new load that is being added to the building whether or not an increase in size is necessary.



With the addition of natural gas to the facility a new natural gas generator will be utilized. Since there will be a new gas service to the building the best spot to relocate the generator would be at a higher elevation as close as possible to the new gas line. This would mean removing the existing diesel generator, the existing transfer switch and extending any conduit and cable to the new location for the generator. A new Automatic Transfer Switch will be used to replace the existing Manual Transfer Switch. This switch will be placed in the same spot if it can fit, if it can't fit it will need to be placed as close as possible to the MDS & MDP to limit the length of cable needed. With the generator being moved outside a new location will need to be chosen so that any cable being run to the generator isn't too long so as to prevent a voltage drop. The areas to be electrified during use would remain as whatever areas are currently being electrified along with the new additions specifically the office area. All of the new offices, meeting/break room, bunk room, mechanics bay & wash bay would need to be added to the generators circuits to be electrified during use.

There is piping above the generator transfer switch & also above the panels in the generator room which are in violation of NEC code 110.26(E)(1)(a). This code states that all panelboards & switchboards need dedicated equipment space which is located 6' above the electrical equipment. Since the piping is already there it could either be rerouted somewhere so that it isn't in the dedicated space anymore, or a drip tray can be installed so that no condensation or liquid drips onto the electrical equipment.



Power:

All of the panels not including the 2 panels that are rusted and not being used are in good shape and have plenty of spares. The 2 rusted panels that aren't being used anymore will be removed completely. It should be confirmed prior to removal if the circuits for these panels being removed are still in place and abandoned, or if they have been removed already. Any new circuits added to the facility will have plenty of power from any of the panels. Power will need to be provided for any new infrastructure that will be added.



There are existing 110/220V receptacles throughout the entire facility which for the most part appear to be in good shape. Some receptacles are missing cover plates for them specifically the receptacles that are just outside of the garage bays on the lower levels. There are multiple junction boxes throughout the garage bays which are missing cover plates.



New receptacles will need to be added to the new rooms as a part of the addition. The office areas will have 110V receptacles in them according to code and the mechanics bay will need to have a 220V receptacle to account for the possibilities of adding a welder there. The bays will also contain 110V receptacles for any miscellaneous equipment that needs to be plugged in or charged. Any receptacle that is missing a cover plate will need to have one added. Receptacles will need to be added to the bays & to the exterior of the bays for the diesel truck heaters. The garage door openers appear to be of medium age and are also rusting a little. Didn't get to see them working but they appear to be in working condition. All garage door controls will need to be inspected & evaluated to be replaced.



There are minimal means of security for the facility with the entrance having a keypad on it. There are several cameras in the facility for the Board of Education but not for the Department of Public Works. The garage bay doors appear to be open during the warm weather so it would be easy for any random person to just walk into the facility without needing any kind of clearance to get in.



There will be a new keypad/card reader added to the facility so that only employees can enter & any visitors will have to go to the lobby to deliver packages or to be let into the facility. There will also be cameras added around the exterior of the building & inside the building to. Specific locations of the cameras will be discussed during the design phase of the project. There might be a need to upgrade the current system to hold more cameras depending on the amount of cameras that will be added to the system. There will also be intrusion detection set up as a part of the new security system.

At the end of the truck wash bay there will be an air drying system to dry the trucks off after the wash. This system will consist of at least 3 10-15 H.P. motors (1 on top and 1 on each side) and will need to have a structure for it that will give clearance for the largest vehicles to pass under unobstructed. This could potentially require a significant amount of power depending on how many motors are needed & a new panel may need to be built in the area to power this truck dryer system.

Voice / Data:

The telephone line comes into the building from the telephone pole outside of the building & goes into a panel next to the main power panel in the generator area. There are mainly telephone & data jacks in the office areas. There are other telephone jacks throughout the garage bays. There are some computers also in the garage bays so I'd assume that there were several data jacks also in the garage bays. The employees in the facility were using the computers & phones in the office area so those are operational, and I would assume based on the condition of the jacks not in use that they are operational also. Telephone/data jacks will be added to all of the offices in the new additions. They will also be added to any room in the additions where there would be a need for a computer or telephone.

Fire Alarm:

There were no manual pull stations that were observed throughout the entire facility. I didn't observe any strobes/alarms either. Controls to activate the air compressor for the fire suppression system were not observed, same with any controls to activate a fire alarm system. Fire alarm strobes & horns will be added to the facility wherever the code demands there be a strobe or horn. There will also be manual pull stations added by the egress doors as required by code. Since there is no fire alarm annunciation panel one will need to be added. The location of the panel will need to be confirmed by the Fire Marshal, but an ideal spot for it would be in the new vestibule at the entrance to the building so that any firemen arriving at the building will have easy access to the panel.

III. CODE STANDARDS

Current Building Codes
State of Connecticut
Effective December 31, 2005

2005 State of Connecticut Building Code/2009 Connecticut Supplement
2005 State of Connecticut Fire Safety Code/2005 Connecticut Supplement
2003 International Building Code (Including CT Amendments)
2003 International Existing Building Code (Including CT Amendments)
2003 International Mechanical Code (Including CT Amendments)
2003 International Plumbing Code (Including CT Amendments)
2009 International Energy Conservation Code (Including CT Amendments)

2003 International Fire Code
2011 National Electrical Code (Including CT Amendments)
2003 NFPA 101 Life Safety Code (Including CT Amendments)
2002 NFPA 13 – Standard for the Installation of Sprinkler Systems
1996 NFPA 54 – National Fuel Gas Code
2003 ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
1973 Uniform Federal Accessibility Standards (UFAS)
 Section 504, Rehabilitation Act of 1973
2002 Connecticut Public Health Code
1999 Connecticut O.S.H.A. Regulations - Title 29 Dept of Labor
1991 Americans with Disabilities Act
 - Title I Employment
 - Title III Public Accommodations
SMACNA – IAQ Guidelines for Occupied Buildings Under Construction
PA 07-242 & PA 07-249 (Portions of these Public Acts that deal with sustainable design)
Title 29, Chapter 538 – Elevators, Escalators and Lifts
Title 29, Chapter 540 - Boilers and Water Heaters
Title 29, Chapter 541 – Building, Fire and Demolition Codes. Fire Marshals and Fire Hazards.
 Safety of Public and Other Structures.

TOWN OF DARIEN
DEPARTMENT OF PUBLIC WORKS GARAGE: RENOVATIONS & ADDITIONS
CONCEPT DESIGN SPACE PROGRAM

SPACE COMPONENT	Total SF	
Office Space		
Office	220	
Office	220	
Office	220	
Office	220	
BOE Office	200	
Total Office Space	1,080	
Common Space		
Existing Meeting Room	100	
New Meeting Room	275	
Bunk Room	385	
Existing BOE Lunchroom	480	
Total Common Space	1,240	
Service Bays		
New Mechanic's Bay (Upper Level)	1,160	
New Wash Bay (Upper Level)	1,135	
New North Bays (Upper Level)	1,270	
New North Bays (Lower Level)	1,270	
Existing South Bays (Upper Level)	6,560	
Existing North Bays (Upper Level)	2,930	
Existing South Bays (Lower Level)	6,360	
Existing North Bays (Lower Level)	2,930	
Total Service Bays	23,615	
Support Space		
New Bathroom	115	
New Storage	140	
New Tool Storage	250	
BOE Support Rooms	420	
Existing Men's Toilet Room	140	
Existing Women's Toilet Room	140	
Existing Bay Storage(New Utility Room)	165	
Existing Bay Locker Room	200	
New Lower Level Toilet Room	60	
New Lower Level Locker Room	100	
Miscellaneous Lower Level Storage	390	
Existing Mechanical Room	135	
Existing Electrical Room	145	
New Fueling Canopy	1,050	
Total Support Space	3,450	
Total Net square footage		
	29,385	
circulation (corridors, walls, structure), misc. stor.	8,595	
Total Gross square footage		
	37,980	

Town Of Darien Department of Public Works Garage Complex: Feasibility Study & Preliminary Concept Design Darien, Connecticut

Opinion of Probable Construction Cost

Total New Construction (SF)	8130
Total New Fueling Station Canopy (SF)	1050
Total Existing Construction (SF)	28800
Total Existing Mod. Renovated (SF)	1860
Total Proposed Building (SF)	37980

	AREA	Detail	COST/SF	SUBTOTAL
New Construction	8,130	New Construction (Architectural & Baseline MEP)	\$ 210.00	\$1,707,300.00
New Fueling Station Canopy	1,050	New Construction	\$ 25.00	\$26,250.00
Moderate Renovations	1,860	Extg. Administrative Area, Grnd Flr. Tlt. (Arch. & Baseline MEP)	\$ 110.00	\$204,600.00
Demolition		Architectural, MEP Demolition	LS	\$62,000.00
Elevated Slab Replacement	3,000	Demolition and Installation of New Reinforced Elevated Slab	\$ 220.00	\$660,000.00
Roof Structural Fortification		Existing Roof Structure Fortification for New RTU's	LS	\$20,000.00
New Gas Fired Unit Heaters		Unit Heaters, Gas Supply, Vent		\$130,000.00
Garage Bay Ventilation		Exhaust Fans, Ductwork, Gas Detection	LS	\$150,000.00
Garage Bay Miscellaneous		Tailpipe Exhaust, Demo Existing	LS	\$50,000.00
Office & Misc HVAC		Packaged Rooftop Units & Controls	LS	\$80,000.00
Fire Protection	37,980	Wet & Dry Systems, Existing Demo, New FD Connection	\$ 6.00	\$227,880.00
New Water Service		2" or 3" Domestic Water Service	LS	\$15,000.00
Fire Alarm		Fire Alarm panel, annunciators, horns, strobes, pull stations	LS	\$23,000.00
Generator		80KW Natural Gas Generator w/ 400a Automatic Transfer Switch	LS	\$40,000.00
Security System		Card Readers, Intruder Detection	LS	\$8,000.00
Truck Wash Dryer		Air dryer system for truck wash w/at least 3 10-15 H.P. motors	LS	\$35,000.00
Site Demolition, Earthwork		Trenching, Foundations, Fill	LS	\$106,000.00
Site Paving, Curbs, Walkways		Bituminous Paving, Concrete Sidewalks & Aprons	LS	\$214,000.00
Retaining Walls		Block Land Retaining Wall	LS	\$25,000.00
Storm Drainage and Utilities		Oil Separator, Gas Service, Fuel Tanks/Lines/Pumps, Sanitary	LS	\$195,000.00
Landscaping		Fencing, Flagpole, Signage, Plantings	LS	\$62,000.00

CONSTRUCTION TOTAL	\$4,041,030.00
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15% DESIGN CONTINGENCY	\$606,154.50
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A/E CONSTRUCTION DESIGN, BID & CA	\$250,000.00
ENVIRONMENTAL (tbd..PLACEHOLDER)	\$50,000.00
FURNITURE FIXTURES EQUIPMENT (tbd..PLACEHOLDER)	\$40,000.00
BID PRINTING & LEGAL NOTICES	\$2,000.00
SPECIAL INSPECTIONS AND MATERIAL TESTING	\$8,000.00
BONDING AND FINANCING COSTS (tbd..PLACEHOLDER)	\$0.00
LEGAL FEES (tbd..PLACEHOLDER)	\$0.00

SOFT COST TOTAL	\$350,000.00
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10% SOFT COST CONTINGENCY	\$35,000.00
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TOTAL PROJECT COST	\$5,032,184.50
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ANTICIPATES 2016 CONSTRUCTION

ADDITIONS AND RENOVATIONS

**PUBLIC WORKS GARAGE COMPLEX
126 LEDGE ROAD
DARIEN, CT 06820**

S/P+A PROJECT NO. 15.091

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	Geotechnical Report
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Section 311000	Site Clearing
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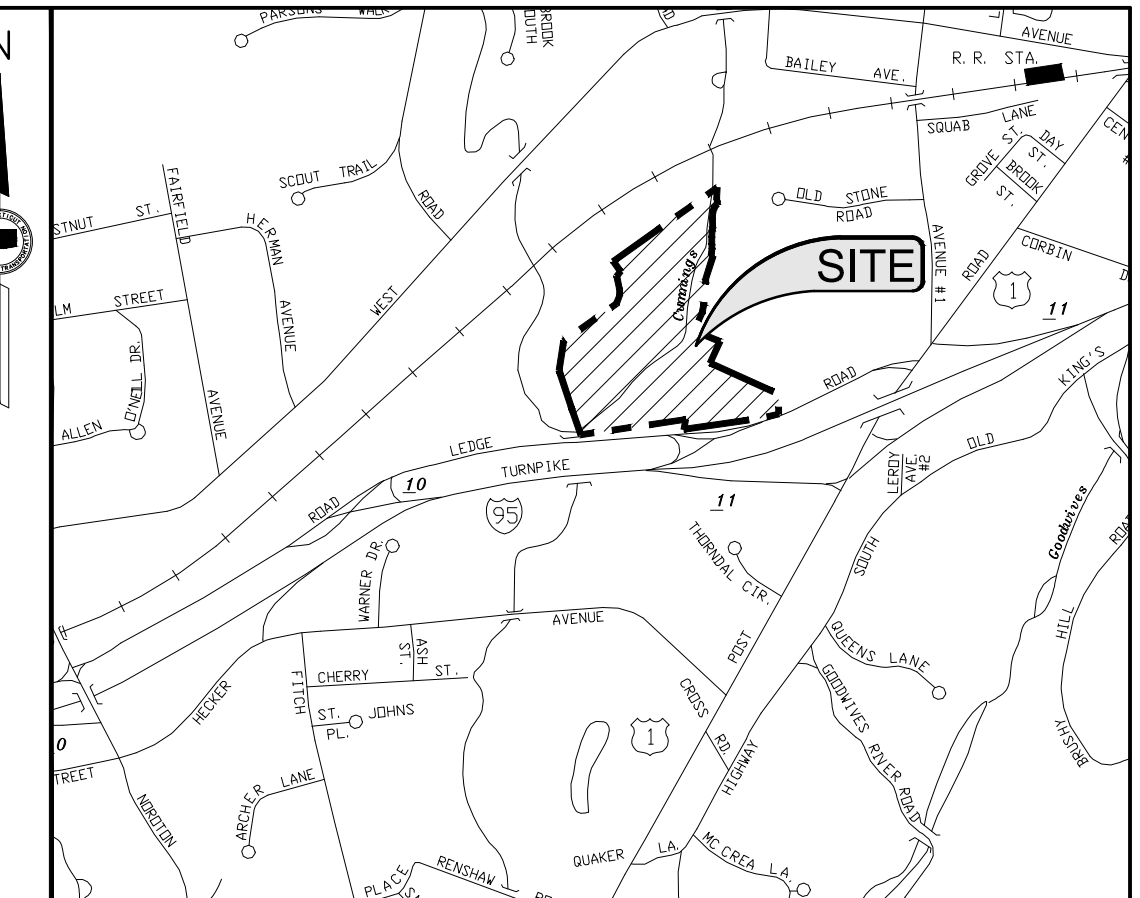
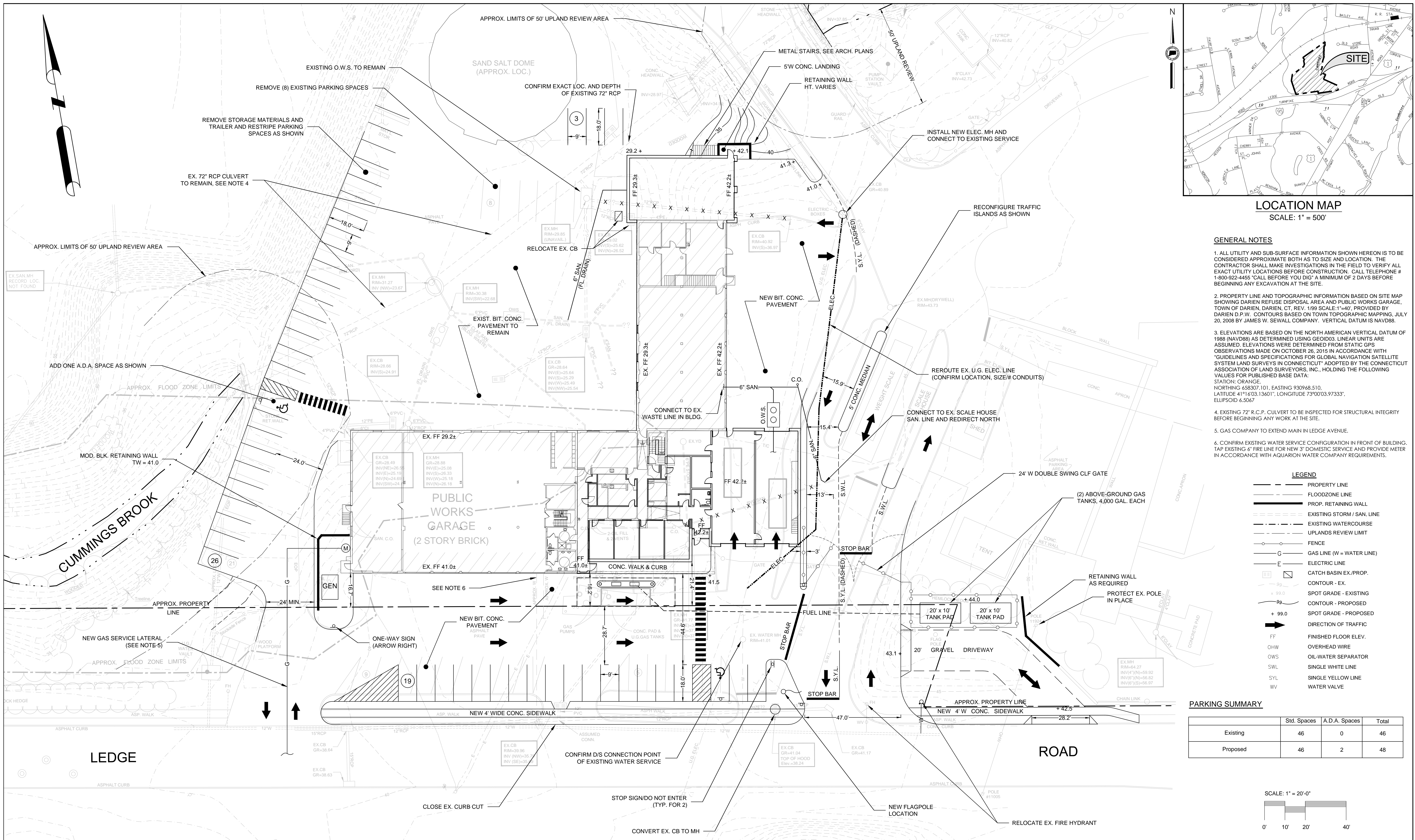
DIVISION 32 – EXTERIOR IMPROVEMENTS

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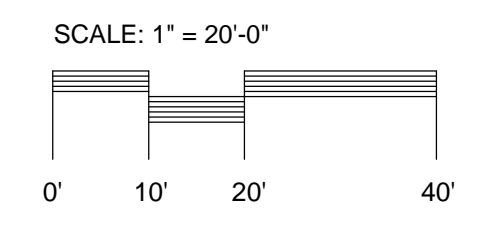
LOCATION MAP
SCALE: 1" = 500'

- GENERAL NOTES**
1. ALL UTILITY AND SUB-SURFACE INFORMATION SHOWN HEREON IS TO BE CONSIDERED APPROXIMATE BOTH AS TO SIZE AND LOCATION. THE CONTRACTOR SHALL MAKE INVESTIGATIONS IN THE FIELD TO VERIFY ALL EXACT UTILITY LOCATIONS BEFORE CONSTRUCTION. CALL TELEPHONE # 1-800-922-4455 "CALL BEFORE YOU DIG" A MINIMUM OF 2 DAYS BEFORE BEGINNING ANY EXCAVATION AT THE SITE.
 2. PROPERTY LINE AND TOPOGRAPHIC INFORMATION BASED ON SITE MAP SHOWING DARIEN REFUSE DISPOSAL AREA AND PUBLIC WORKS GARAGE, TOWN OF DARIEN, DARIEN, CT, REV. 1/99 SCALE: 1"=40'. PROVIDED BY DARIEN D.P.W. CONTOURS BASED ON TOWN TOPOGRAPHIC MAPPING, JULY 20, 2008 BY JAMES W. SEWALL COMPANY. VERTICAL DATUM IS NAVD88.
 3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AS DETERMINED USING GEOID03. LINEAR UNITS ARE ASSUMED. ELEVATIONS WERE DETERMINED FROM STATIC GPS OBSERVATIONS MADE ON OCTOBER 26, 2015 IN ACCORDANCE WITH "GUIDELINES AND SPECIFICATIONS FOR GLOBAL NAVIGATION SATELLITE SYSTEM LAND SURVEYS IN CONNECTICUT" ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC., HOLDING THE FOLLOWING VALUES FOR PUBLISHED BASE DATA:
STATION: ORANGE,
NORTHING: 658307.101, EASTING: 930968.510,
LATITUDE: 41°16'03.1360"1", LONGITUDE: 73°00'03.97333",
ELLIPSOID: 6.5067
 4. EXISTING 72" R.C.P. CULVERT TO BE INSPECTED FOR STRUCTURAL INTEGRITY BEFORE BEGINNING ANY WORK AT THE SITE.
 5. GAS COMPANY TO EXTEND MAIN IN LEDGE AVENUE.
 6. CONFIRM EXISTING WATER SERVICE CONFIGURATION IN FRONT OF BUILDING. TAP EXISTING 6" FIRE LINE FOR NEW 3" DOMESTIC SERVICE AND PROVIDE METER IN ACCORDANCE WITH AQUARIUM WATER COMPANY REQUIREMENTS.

- LEGEND**
- PROPERTY LINE
 - FLOODZONE LINE
 - PROP. RETAINING WALL
 - EXISTING STORM / SAN. LINE
 - EXISTING WATERCOURSE
 - UPLANDS REVIEW LIMIT
 - FENCE
 - G --- GAS LINE (W = WATER LINE)
 - E --- ELECTRIC LINE
 - CB --- CATCH BASIN EX./PROP.
 - CONTOUR - EX.
 - 99 --- SPOT GRADE - EXISTING
 - + 99.0 --- SPOT GRADE - PROPOSED
 - --- DIRECTION OF TRAFFIC
 - FF --- FINISHED FLOOR ELEV.
 - OWH --- OVERHEAD WIRE
 - OWS --- OIL-WATER SEPARATOR
 - SWL --- SINGLE WHITE LINE
 - SYL --- SINGLE YELLOW LINE
 - WV --- WATER VALVE

PARKING SUMMARY

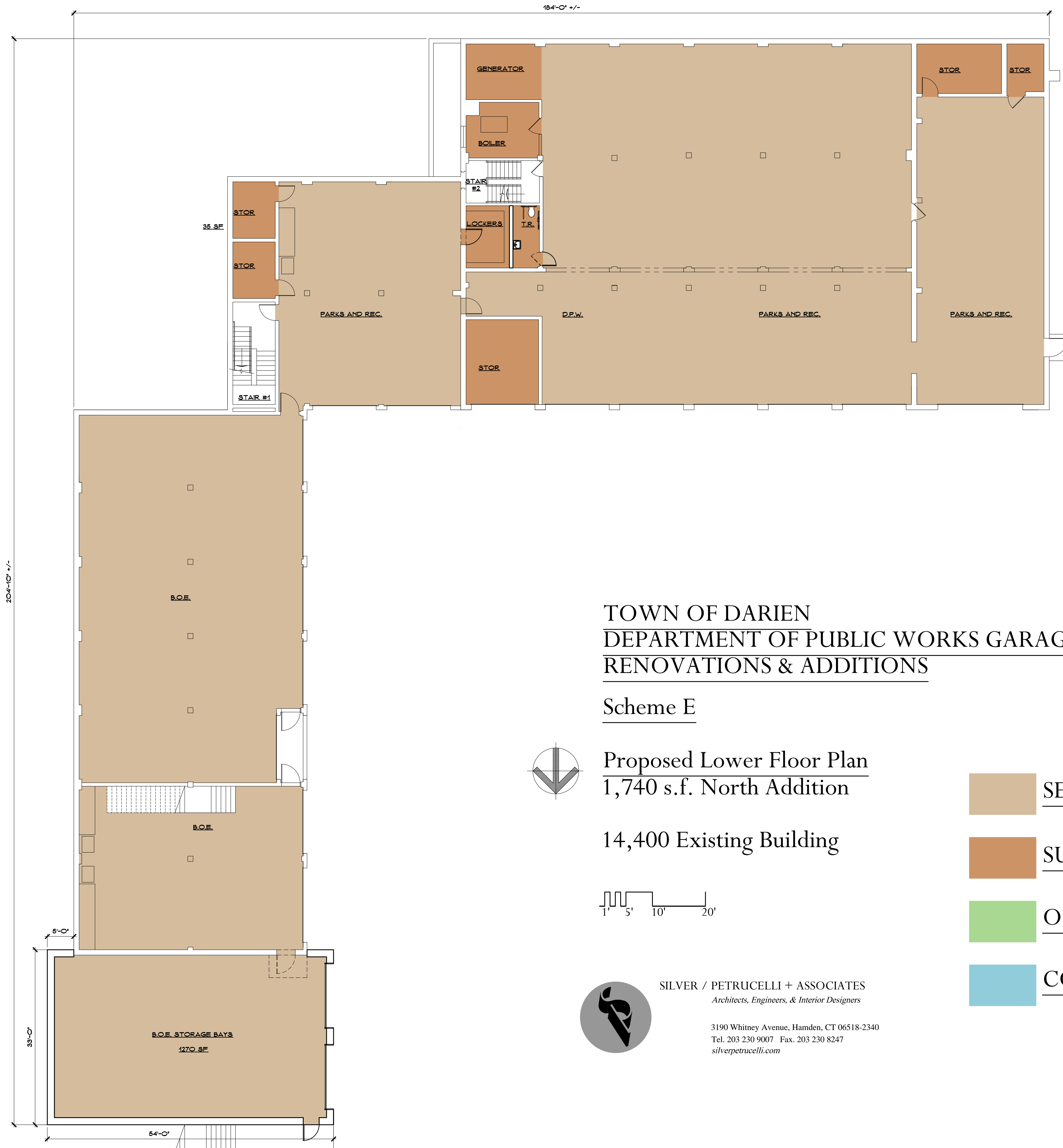
	Std. Spaces	A.D.A. Spaces	Total
Existing	46	0	46
Proposed	46	2	48



Department of Public Works
Additions & Renovations to Garage Facility
 126 Ledge Street
 Darien, Connecticut 06820

January 13, 2016

Conceptual Site Plan

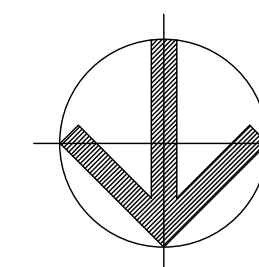
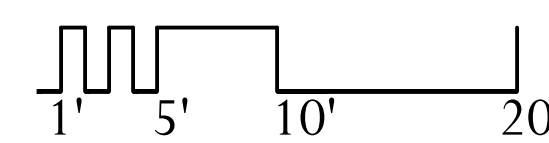


TOWN OF DARIEN
 DEPARTMENT OF PUBLIC WORKS GARAGE COMPLEX:
 RENOVATIONS & ADDITIONS

Scheme E

Proposed Lower Floor Plan
 1,740 s.f. North Addition

14,400 Existing Building



- SERVICE BAYS
- SUPPORT SPACE
- OFFICE SPACE
- COMMON SPACE



SILVER / PETRUCELLI + ASSOCIATES
 Architects, Engineers, & Interior Designers

3190 Whitney Avenue, Hamden, CT 06518-2340
 Tel. 203 230 9007 Fax. 203 230 8247
 silverpetrucelli.com

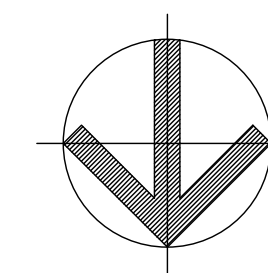
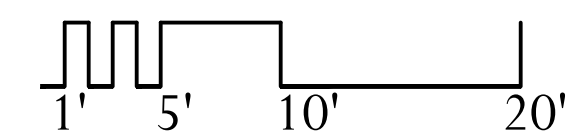


TOWN OF DARIEN
 DEPARTMENT OF PUBLIC WORKS GARAGE COMPLEX:
 RENOVATIONS & ADDITIONS

Scheme E

Proposed Upper Floor Plan
 4,650 s.f. South Addition
 1,740 s.f. North Addition

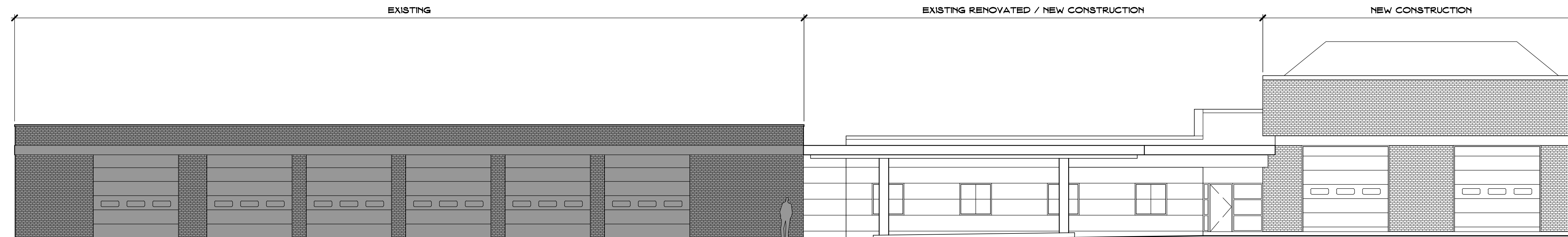
14,400 Existing Building



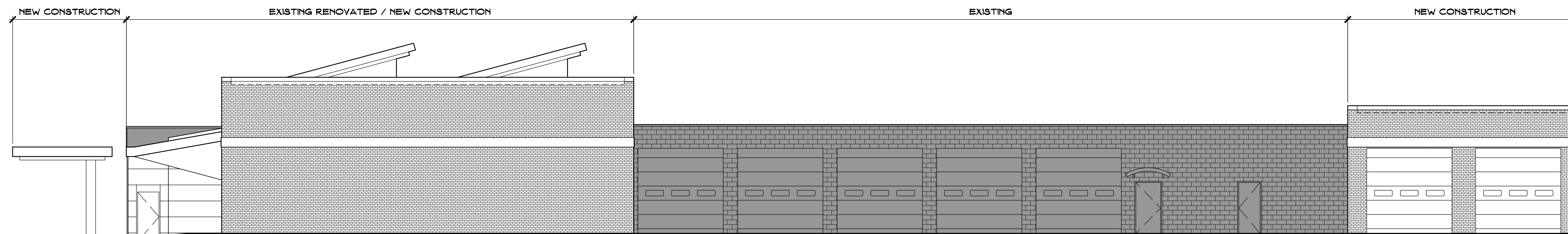
- SERVICE BAYS
- SUPPORT SPACE
- OFFICE SPACE
- COMMON SPACE



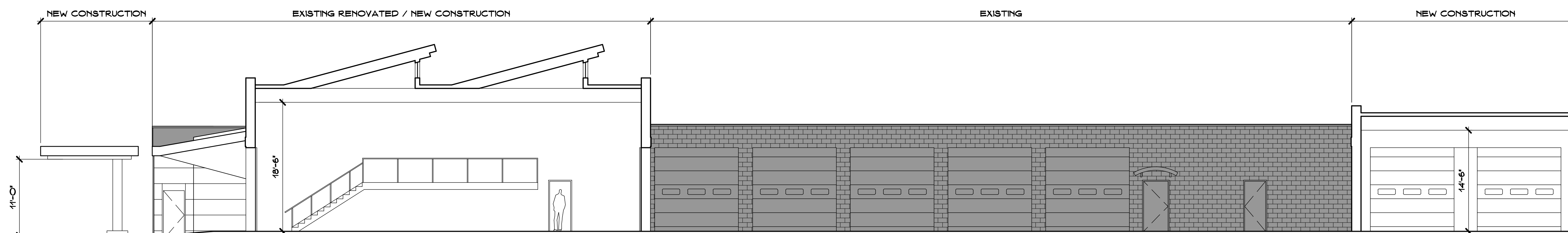
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NORTH ELEVATION



SOUTH ELEVATION



LONGITUDINAL SECTION

TOWN OF DARIEN
DEPARTMENT OF PUBLIC WORKS GARAGE COMPLEX:
RENOVATIONS & ADDITIONS

Scheme E



SILVER / PETRUCELLI + ASSOCIATES
Architects, Engineers, & Interior Designers

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