# **GARCIA • GALUSKA • DESOUSA**

Inc

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### SITE UTILITY SYSTEMS

### NARRATIVE REPORT

The following is the Site systems narrative, which defines the scope of work and capacities of the Site systems as well as the Basis of Design.

### 1. CODES

- A. All work installed under this DIVISION shall comply with all local, state, and federal codes, laws, statutes, and authorities having jurisdiction.
- B. The work shall be performed in accordance with local Department of Public Works Specifications, MA Highway Department Standard Specifications for Highways and Bridges and conform to all Town of Harwich Bylaws.

### 2. DESIGN INTENT

A. The work of Division 31, 32 and 33 is as described in this narrative. All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the site utility work and all items incidental thereto, including testing.

### 3. SITE EROSION CONTROL MEASURES

- A. The Contractor shall prepare and submit the EPA Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the EPA National Pollution Discharge Elimination System (NPDES) General Permit. The contractor shall implement a Storm Water Pollution Prevention Plan (SWPPP) per the requirements of the EPA General Permit. At project completion submit a Notice of Termination (NOT) to the EPA.
- B. The Contractor shall place silt barrier and straw bales around the perimeter of the limit of work to prevent the migration of silt-laden runoff from discharging from the construction site.
- C. The Contractor shall install sediment control bags in all existing and new stormwater inlets within the limit of work, and in areas prone to receive runoff from the construction site.
- D. The Contractor shall prepare weekly logs of erosion control inspections and maintenance. Inspection logs shall also be prepared after all rain events resulting in more than 0.25 inches/24-hour.

### 4. UTILITY DEMOLITION & RELOCATION

- A. Prior to the commencement of any excavation, the Contractor shall field locate all existing utilities within the limit of work based on available surface evidence and record documents.
- B. Furnish and install all required precast structures, piping and the like to maintain operations of existing building during the construction of the new building.

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### 5. STORM DRAINAGE SYSTEM

- A. The storm water drainage system shall be designed in accordance with Town standards and the current edition of the Massachusetts DEP Storm Water Management Policy to mitigate storm water runoff to abutting properties.
- B. Storm drain piping 12" and larger shall be smooth interior corrugated HDPE pipe with rubber gasket joints. Storm drain piping 10" and under will be ASTM-D3034 SDR35 PVC with push-on rubber ring joints.
- C. Catch basins and manholes shall be at least 6 feet deep and 4 feet in diameter. Castings shall be from the approved Mass Highway Department (MHD) list. All catch basins will have 4 foot sumps and be equipped with environmental hoods.
- D. Water quality structures shall be provided within the storm water drainage system to assist with TSS removal and water quality.
- E. Storm water runoff rate and flood control is proposed to be provided via use of storage facilities. Runoff storage for the parking area, building, walkways and contributing grass areas is to be provided by water-tight subsurface detention ponds consisting of water-tight HDPE pipe with outlet control structures.

### 6. SANITARY SYSTEM

- A. The sanitary system shall be designed in accordance with local Board of Health and DPW requirements.
- B. Manholes shall be at least 4 feet in diameter with brick invert channels. Castings shall be from the approved MHD list.
- C. Gravity sewer piping shall be Schedule 40 PVC pipe with solvent welded joints.
- D. The sanitary waste system shall discharge to on-site septic system. System design will include provisions for future connection to Municipal sewer system.

## 7. WATER SYSTEM

- A. The water distribution system will be designed in accordance with Local Water Department standards.
- B. Fire Protection service water piping shall be Class 52 cement-lined ductile iron pipe and fittings.
- C. Domestic water service piping shall be Type-K copper tubing.
- D. All water service piping shall be installed with a minimum cover of 5 feet.
- E. Fire hydrants shall be installed as required by the Local Fire Department.

# Toce Structural Engineering LLC

Date: October 24, 2017

Kaestle Boos Associates, Inc. 325 Foxborough Blvd. Suite 100 Foxborough, MA 02035

Re: Harwich Fire Station No.2 Renovation & New Construction 149 Route 137 Harwich, MA 02645 Structural Schematic Narrative

The purpose of this letter is to discuss the structural components of the proposed new building at the above-mentioned project location. This structural narrative is based upon the following documents.

Reference Drawings:

1. Proposed Schematic Building Plans A1.01 & A13.01.

The purpose for the new building is to serve as the replacement for the existing Harwich Fire Station No.2. The new facility will include living quarters with attached apparatus bay and accompanying storage / utility rooms. The proposed new building is approximately 9,500 sf. The new construction materials and methods of construction for the new building are as follows:

# Foundations:

The new building will be comprised of perimeter concrete frost walls with interior spread footings. At this time there is no basement space thus the perimeter foundation walls will only need to go down to the minimum frost depth of 4' or deeper if required per the recommendations of the geotechnical engineer. The interior floor will consist of a 4" concrete slab on grade in the main office and bunk building area and an 8" thick slab on grade in the apparatus bay area. The slab on grade in the apparatus bay will be pitched to interior trench drains. There will be 12" deep x 24" wide haunched slab/footings under the interior masonry walls.

The concrete for the walls, footings and slab on grade will be 3500 psi compressive strength concrete. The slab on grade will have a 15 mil poly vapor retarder and the concrete mix will contain the Barrier One moisture transmission retarding admixture. The concrete steel (rebar) reinforcing will be typical A615 or A706 grade 60 ksi material. The 4" concrete slab on grade shall contain 6x6 W2.1/W2.1 welded wire fabric reinforcing. The 8" concrete slab on grade in the apparatus bay will be reinforced with #4 at 12" o.c. each way and 6x6 x W2.1/W2.1 welded wire fabric reinforcing over the radiant

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heat piping. The #4 slab reinforcing will be set on continuous chairs with the radiant heat piping set on top of the #4's and the welded wire fabric set over the radiant heat piping.

# Existing Sub-Grade Preparation:

At this time a geotechnical report has not yet been generated. However, based upon the foundation system used for the existing fire station that is on the same property, standard conventional frost wall walls and spread footings were used thus it could be assumed that the soil subgrade is suitable for this foundation system at the proposed new building. The existing drawings indicated the test borings for 1975 building indicated the soil subgrade to be medium sand with some gravel to a depth of 15'.

The exterior building perimeter frost wall footings could be at least 2' wide and 1' thick with building spread footings at least 3'x3'x1' in size. The spread footings for the apparatus bay columns will be approximately 6'x6'x1'-4" in size. Based upon the soil boring on existing 1975 drawings the soil bearing capacity would most likely be between 3000-4000 psf. This value along with other specific soil property values will be fully quantified in a geotechnical report.

Once a full geotechnical report has been provided to the design team the foundation systems might have to be revisited to reflect the recommendations that are to be set forth by the geotechnical engineer.

# Roof Structure:

The main office area roof will be a pitched style roof arrangement that will be created by using wood pitched top chord roof trusses that are supported on wide flange steel beams or concrete masonry bearing walls. In some of the taller truss space areas there could be the need for attic style roof trusses to create an attic service walkway to allow for the servicing of any mechanical units or filters that will be installed above the ceiling in the open truss space. The steel beams will be supported on steel columns down to the concrete foundations at grade. The roof diaphragm will be comprised of plywood roof sheathing that will be attached to the wood roof trusses. The insulation and roofing finish system will be called out by the architect and will cover the roof decking to create a weather tight assembly.

The apparatus bay is required to be a large open structure to allow for the tall fire truck clearance. In this area of the building the roof will constructed from HSS (hollow structural sections, i.e. steel tubes) trusses that will clear span the front to back direction of the apparatus bay. Spanning between the trusses will be either steel beam or steel open web joist infill beams. 1 <sup>1</sup>/<sub>2</sub>" deep-20 gage galvanized wide rib steel decking will span between each roof beam or joist thus creating the roof diaphragm. The insulation and roofing finish system will be called out by the architect and will be placed over the steel roof decking to create a weather tight assembly.

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At the end of the apparatus bay are utility rooms that will be for parts storage and HVAC equipment rooms. These room walls will be constructed from 8" reinforced masonry. If desired a floor can be placed on top of these walls to create a mezzanine in areas where the headroom between the roof truss chords allow. This floor can be constructed with 1 ½" deep 20 gage composite galvanized steel decking supported on a combination of masonry bearing walls and steel infill beams that are bearing on the masonry partition walls.

Steel Framing / Wind and Seismic Lateral System:

The structural steel will be comprised of HSS tube steel columns with wide flange steel girder and infill beams. The lateral system will most likely consist of moment frames to create rigidity in the building framework.

The steel materials used shall be as follows:

HSS Tube Sections ASTM A500 Grade B Fy=46 ksi Plates, Angles, Channels, Solid and Flat Bars ASTM A36 Fy=36 ksi, Wide Flange Beams ASTM A992 Gr 50 ksi Anchor Rods ASTM F1554 Gr 55 ksi

All structural steel to be shop primed painted. Any exterior exposed angle, beam or plate lintels to be hot dip galvanized. The exterior exposed carport beams and columns will be prime painted, and finish painted per the architect specifications.

Should the proposed scope of the project change the above structural narrative should be adjusted to reflect these modifications. If you have any further questions regarding this please give me a call.

Sincerely,

Daw the

David J. Toce PE, SECB

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### PLUMBING SYSTEMS

### NARRATIVE REPORT

The following is the Plumbing system narrative, which defines the scope of work and capacities of the Plumbing system, as well as, the Basis of Design.

- 1. CODES
  - Α. All work installed under Section 220000 shall comply with the MA Building Code, MA Plumbing Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.
- 2. DESIGN INTENT
  - Α. All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the Plumbing work and all items incidental thereto, including commissioning and testing.
- **GENERAL** 3.
  - A. The Plumbing Systems that will serve the project are cold water, hot water, sanitary waste and vent system, garage waste and vent system, and natural gas.
  - Β. The Building will be serviced by Municipal water and on-site septic system.
  - C. All Plumbing in the building will conform to Accessibility Codes and to Water Conserving sections of the Plumbing Code.

#### 4. DRAINAGE SYSTEM

- A. Soil, Waste, and Vent piping system is provided to connect to all fixtures and equipment. System runs from 10 feet outside building and terminates with stack vents through the roof.
- Β. A separate Garage Waste System starting with connection to an exterior double wall fiberglass tight tank running thru the Apparatus Bay trench drains and terminating with a vent terminal through the roof. The exterior fiberglass tight tank is provided under this section 22.
- Drainage system piping will be service weight cast iron piping; hub and spigot with C. gaskets for below grade; no hub with gaskets, bands and clamps for above grade 2 in. and larger. Waste and vent piping 1-1/2 in. and smaller will be type 'L' copper.
- D. A separate Special Waste System shall be provided from the Mechanical rooms to collect boiler and water heater condensate and discharge to a dedicated leaching pit. Special Waste and Vent piping will be Schedule 40 electric heat fused polypropylene piping, fittings and traps, flame retardant above grade and non-flame retardant below ground.

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### 5. WATER SYSTEM

- A. New 2-inch domestic water service from the municipal water system will be provided. A meter and backflow preventer will be provided.
- B. Cold water distribution main is provided. Non-freeze wall hydrants with integral back flow preventers are provided along the exterior of the building.
- C. Domestic hot water heating will be provided with a combination of gas fired, high efficiency, condensing water heater with storage tank. System is to be equipped with thermostatically controlled mixing devices to control water temperature to the fixtures.
- D. A pump will re-circulate hot water from the piping system. Water temperature will be 120 deg. to serve general use fixtures.
- E. Water piping will be type 'L' copper with wrot copper sweat fittings, silver solder, or pressfit system. All piping will be insulated with 1 in. thick high density fiberglass.
- F. A dedicated non-potable cold water system, protected with a 2" RPBP, will be provided for truck fill.

### 6. GAS SYSTEM

- A. Natural gas service will be provided for the building and will serve the boilers, domestic water heaters, and roof top equipment.
- B. Gas piping will be Schedule 40 black steel pipe with threaded gas pattern malleable fittings for 2 in. and under and butt welded fittings for 2-1/2 in. and larger.

### 7. FIXTURES

- A. Furnish and install all fixtures, including supports, connections, fittings, and any incidentals to make a complete installation.
- B. Fixtures shall be the manufacturer's guaranteed label trademark indicating first quality. All acid resisting enameled ware shall bear the manufacturer's symbol signifying acid resisting material.
- C. Vitreous china and acid resisting enameled fixtures, including stops, supplies and traps shall be of one manufacturer by Kohler, American Standard, Eljer, or equal. Supports shall be Zurn, Smith, Josam, or equal. All fixtures shall be white. Faucets shall be Speakman, Chicago, or equal.
- D. Fixtures shall be as scheduled on drawings.
  - 1. <u>Water Closet</u>: High efficiency toilet, 1.28 gallon per flush, wall hung, vitreous china, siphon jet. Manually operated 1.28 gallon per flush-flush valve.
  - 2. <u>Urinal</u>: High efficiency 0.13 gallon per flush urinal, wall hung, vitreous china. Manually operated 0.13 gallon per flush-flush valve.

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- 3. Lavatory: Wall hung/countertop ADA lavatory with metering mixing faucet.
- 4. <u>Shower</u>: Aquatic Bath Model 48-ACS acrylic shower stall or Aquatic Bath 6036-BSFCMA barrier free acrylic shower stall with integral soap shelf and seat. Center drain location and slip resistant, textured bottom. Symmons Safetymix shower trim, concealed pressure balanced shower valve with lever handle, integral checkstops, factory pre-set temperature limit stops, 2.5 gpm flow restrictor.
- 5. <u>Sink</u>: ADA stainless steel countertop sink with gooseneck faucet and 0.5 GPM aerator.
- 6. <u>Drinking Fountain</u>: Hi-low wall mounted electric water cooler, stainless steel basin with bottle filling stations.
- 7. Janitor Sink: 24 x 24 x 10 Terrazo mop receptor Stern-Williams or equal.

### 8. DRAINS

A. Drains are cast iron, caulked outlets, nickaloy strainers, and in waterproofed areas and roofs shall have galvanized iron clamping rings with 6 lb. lead flashings to bond 9 in. in all directions. Drains shall be Smith, Zurn, Josam, or equal.

### 9. VALVES

A. Locate all valves so as to isolate all parts of the system. Shutoff valves 3 in. and smaller shall be ball valves, solder end, or screwed, Apollo, or equal.

### 10. INSULATION

A. All water piping shall be insulated with snap-on fiberglass insulation Type ASJ-SSL, equal to Johns Manville Micro-Lok HP.

### 11. CLEANOUTS

- A. Cleanouts shall be full size up to 4 in. threaded bronze plugs located as indicated on the drawings and/or where required in soil and waste pipes.
- B. Cleanouts for Special Waste System shall be Zurn #Z9A-C04 polypropylene cleanout plug with Zurn #ZANB-1463-VP nickel bronze scoriated floor access cover.

### 12. ACCESS DOORS

A. Furnish access doors for access to all concealed parts of the plumbing system that require accessibility. Coordinate types and locations with the Architect.

### 13. WATER HEATER

A. Gas fired, high efficiency, condensing water heater (200,000 BTUH input), with storage tank (200 gallon).

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### FIRE PROTECTION SYSTEMS

### NARRATIVE REPORT

The following is the Fire Protection system narrative, which defines the scope of work and capacities of the Fire Protection system ,as well as, the Basis of Design.

### 1. CODES

A. All work installed under Section 210000 shall comply with the MA Building Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.

### 2. DESIGN INTENT

A. All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the Fire Protection work and all items incidental thereto, including commissioning and testing.

### 3. GENERAL

A. In accordance with the provisions of the Massachusetts Building Code, a Fire Station building of this size and use group must be protected with an automatic sprinkler system.

### 4. DESCRIPTION

- A. The building will be served by a new 6-inch fire service, double check valve assembly, wet alarm valve complete with electric bell, and fire department connection meeting local thread standards.
- B. System will be an automatic sprinkler system. System will be a single wet zone.
- C. Wet system control valve assemblies shall consist of a supervised shutoff valve, check valve, flow switch, and test connection with drain.
- D. All areas of the building, including all finished and unfinished spaces, combustible concealed spaces, all electrical rooms, and closets will be sprinklered.
- E. All sprinkler heads will be quick response, pendent in hung ceiling areas and upright in unfinished areas.

### 5. BASIS OF DESIGN

- A. The Mechanical Rooms and Storage Rooms are considered Ordinary Hazard Group 1. The Apparatus Bay is considered Ordinary Hazard Group 2. All other areas are considered light hazard.
- B. Required Design Densities:

Light Hazard Areas =	0.10 GPM over 1,500 s.f.
Ordinary Hazard Group 1 =	0.15 GPM over 1,500 s.f.
Ordinary Hazard Group 2 =	0.20 GPM over 1,500 s.f.

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> C. Sprinkler spacing (max.):

Light Hazard Areas =	225 s.f.
Ordinary Hazard Areas =	130 s.f.

D. A hydrant flow test must be performed to confirm the Municipal water supply.

#### PIPING 6.

Α. Sprinkler piping 1-1/2 in. and smaller shall be ASTM A-53, Schedule 40 black steel pipe. Sprinkler piping 2 in. and larger shall be ASTM A-135, Schedule 10 black steel pipe.

#### 7. FITTINGS

Fittings on fire service piping, 2 in. and larger, shall be Victaulic Fire Lock Ductile Iron Α. Fittings conforming to ASTM A-536 with integral grooved shoulder and back stop lugs and grooved ends for use with Style 009-EZ or Style 005 couplings. Branch line fittings shall be welded or shall be Victaulic 920/920N Mechanical Tees. Schedule 10 pipe shall be roll grooved. Schedule 40 pipe, where used with mechanical couplings, shall be roll grooved and shall be threaded where used with screwed fittings. Fittings for threaded piping shall be malleable iron screwed sprinkler fittings.

#### 8. JOINTS

Α. Threaded pipe joints shall have an approved thread compound applied on male threads only. Teflon tape shall be used for threads on sprinkler heads. Joints on piping, 2 in. and larger, shall be made up with Victaulic, or equal, Fire Lock Style 005, rigid coupling of ductile iron and pressure responsive gasket system for wet sprinkler system as recommended by manufacturer.

#### 9. DOUBLE CHECK VALVE ASSEMBLY

- A. Double check valve assembly shall be MA State approved, U.L./F.M. approved, with iron body bronze mounted construction complete with supervised OS & Y gate valves and test cocks. Furnish two spare sets of gaskets and repair kits.
- Β. Double check valve detector assembly shall be of one of the following:
  - 1. Watts Series 757-OSY
  - 2. Wilkins 350A-OSY
  - 3. Conbraco Series 4S-100
  - 4. Or equal

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### HVAC SYSTEMS

### NARRATIVE REPORT

The following is the HVAC system narrative, which defines the scope of work as well as the Basis of Design:

### 1. HEATING PLANT

A. The primary equipment located in the heating plant will include three high-efficiency 300 MBH gas-fired condensing boilers located in a Mechanical room. The hot water system will be provided with a mixture of propylene glycol and water to prevent freezing at a concentration of approximately 35% by weight. The boilers will each be vented by a category four CPVC breeching system which will terminate through the Mechanical room exterior wall. Combustion air for the boiler room will be ducted directly from the outside through a CPVC inlet duct provided with motor operated dampers. Heating hot water will be distributed throughout the building through a fiberglass insulated copper distribution system which will include a primary and standby in-line circulator each at approximately 80 GPM. Each pump will be provided with a variable frequency drive or ECM motor which will vary flow in the distribution system as control valves modulate open and close resulting in energy savings.

### 2. OFFICE AND LIVING AREAS

- A. The office and living areas, which include the offices, training room, conference room, dormitory spaces, day room, fitness area, and toilet/shower rooms will be heated, ventilated and air conditioned.
- B. Air conditioning will be provided to all regularly occupied spaces by a combination of wall mounted and/or ceiling recessed cassette type ductless DX variable refrigerant floor (VRF) type heat pump air conditioning units. Multiple interior evaporator units shall be connected via a refrigerant piping distribution system to outdoor condensing units. It is estimated that (2) 6 ton outdoor condensing units will be required, with a pair of condensing units located on a concrete pad on grade outside the building. Each space will have individual heating and cooling control through a wired thermostat that will be connected to the room's indoor VRF heat pump unit. The individual thermostats shall be networked to a central manufactured furnished VRF system controller. The VRF controller shall have a BAS (building automation system) interface that will be networked to the main building energy management system. The VRF system shall be equipped with low ambient temperature controls and accessories.

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- C. The central ventilation system located in the attic above the living area will include a 2500 CFM indoor air handling unit which will be of the 100% outside air design. The air handling unit will be provided with Merv 13 filters, direct expansion cooling coil discharging (55°F to 60°F adj.) air at approximately 50 grains of moisture per pound of air connected to a split-system air-cooled condenser located outside on grade, supply fan with variable frequency drive, hot water coil with modulating control valve, energy recovery wheel, and hot-gas reheat coil for reheat purposes. The unit will provide ventilation air to each space through a fiberglass insulated galvanized sheet-metal distribution system. 100% of the supply air to each space will be returned through a separate galvanized sheet-metal return air system back to the air handling unit where it will pass through an energy recovery coil which will transfer heat from the exhaust air stream to the outside air intake stream for preheating. The unit will operate at 100% of its design flow during daytime operation and will reduce to approximately 50% of design flow during nighttime operation to conserve energy.
- D. Heating for all regularly occupied spaces will primarily be provided by Hot Water ceiling mounted radiant panels and/ or baseboard fin-tube type radiators. A high efficiency VRF (variable refrigerant flow) heat pump air conditioning system will provide supplemental heating to each occupied area. The terminal devices will be controlled by a wall mounted temperature sensors
- E. Toilet and shower rooms will be served by the same central air-handling unit w/ energy recovery.

### 3. BUNKER GEAR

A. The bunker gear area will be heated with perimeter hot water wall-mounted radiator units similar to "Runtal". A dedicated exhaust system will be provided for this area to run 100% of the time for removal of odors.

### 4. APPARATUS BAY

- A. The area will be provided with hot water unit heaters with axial fans suspended from the ceiling with its air flow directed at the exterior overhead doors. It is estimated that six (6) unit heaters will be required.
- B. The area will also be provided with a central exhaust system proposed to be controlled by a combination carbon monoxide, carbon dioxide, and nitrogen oxides sensing control system. There will be approximately four (4) wall mounted sensing controllers with override switch located within the apparatus bay. The exhaust ductwork will be of the uninsulated galvanized sheet-metal. There will be multiple exhaust drops to 12" above the finished floor. An in-line exhaust fan will be located in the apparatus area and will discharge through a louver located in the exterior wall.
- C. The apparatus bay will also have a dedicated vehicle exhaust system which will connect to the exhaust of the apparatus equipment.

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# 5. STORAGE AND UTILITY ROOM AREAS

- A. This area will be provided with hot water unit heaters with axial fans suspended from the ceiling/ structure. These utility areas include the Mechanical space, Mechanics' Workroom, and Wash Room. The Electrical room will be provided with a propeller-type horizontal electric unit.
- B. The above-noted spaces will be provided with a dedicated exhaust system due to odors, moisture, and heat generated within these spaces. Ventilation/ Make-up air will be provided through transfer grilles that communicate with the apparatus bay. Space temperature will be controlled by a wall mounted thermostat. The support area exhaust fans will run 100% of the time to maintain adequate ventilation control within each space.

### 6. AUTOMATIC TEMPERATURE CONTROLS (DDC)

A. Automatic temperature controls will be of the low-voltage direct digital control design for the operation of all valves and actuators. A central communication network will be provided for the monitoring of all space temperatures, system set points, and overall control for the entire HVAC system. A central front-end workstation PC will be provided as a user interface for access to the entire automatic temperature control system. A front-end Tridium Niagara JACE Controller shall be provided to integrate the buildings ATC/DDC system with Town's central control system via web-accessible connection that shall be coordinated with the Owner.

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# ELECTRICAL SYSTEMS

### NARRATIVE REPORT

The following is the Electrical system narrative, which defines the scope of work and capacities of the Power and Lighting system as well as the Basis of Design.

#### 1. CODES

All work installed under Section 260000 shall comply with the Massachusetts State Building Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.

#### 2. DESIGN INTENT

All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the Electrical work and all items incidental thereto, including commissioning and testing.

Energy Efficiency: Lighting system shall be designed and installed in accordance with IECC 2009 requirements.

#### 3. POWER DISTRIBUTION

Electrical power will be brought into the site via underground medium voltage cables from the utility company network. A pad mounted step-down transformer will be located at grade adjacent to the building. Service entrance and distribution switchgear will be located in the electrical room along with lighting and power distribution panels. The service capacity will be sized for 600 amperes at 120/208V, 3Ø, 4 wire.

A 125kw, 120/208V, 3Ø, 4W natural gas powered emergency generator will be provided. The unit will be housed in a sound attenuated weather proof enclosure with critical grade exhaust silencer, and automatic starting and safety controls. The generator will include two (2) service breakers: one (1) for life safety equipment, one (1) for optional standby equipment.

The generator will be sized for 100% of all lighting and power loads, including air conditioning and elevator.

- All air conditioning will be connected to the generator.
- All air-handling units will be provided with emergency power to maintain ventilation and heat for the duration of a commercial power outage.
- The emergency generator will serve all heating system equipment. •
- The emergency power distribution system will consist of an automatic transfer switch for non-• life safety systems. A separate system of distribution panels and conduit systems will be provided for emergency power as required by code.

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### 4. INTERIOR LIGHTING SYSTEM:

General office lighting fixtures will consist of recessed mounted direct with LED lamps and electronic drivers. The fixtures will be pre-wired for dimming control where natural daylight is available and also for multi-level switching.

Corridors and other functional lighting fixtures will consist of acrylic recessed direct fixtures with LED lamps and electronic drivers.

Storage, mechanical, apparatus, etc. will be LED industrial fixtures with acrylic lens.

Dorm Rooms will be provided with dual level white/red lighting with low level lighting to be automatically activated by lighting control system

Selected area lighting, including Corridors, Apparatus and populated areas will also be automatically activated by lighting control system.

Exit signs will be of the energy efficient, long life LED type.

Lamps will generally be LED with electronic drivers.

Each area will be locally switched and designed for multi-level controls. Each office space and toilet rooms will have an occupancy sensor to turn lights off when unoccupied. Daylight sensors will be installed in each space with daylight for automatic dimming of light fixtures.

The entire facility will be controlled with an automatic lighting control system for programming lights on & off.

### 5. SITE LIGHTING SYSTEM

Fixtures for area lighting will be pole mounted LED luminaries in the parking area. The exterior lighting will be connected to the automatic lighting control system for photocell on and timed off operation.

Building perimeter fixtures will be wall mounted over LED sconces exterior doors.

All fixtures will be of the cut-off type.

### 6. WIRING DEVICES:

Offices will generally have one (1) duplex outlet per wall. At each workstation a double duplex receptacle will be provided.

Corridors will have a cleaning receptacle at approximately 30-40 foot intervals.

Exterior weatherproof receptacles will be installed at exterior doors.

A system of computer grade panelboards will double neutrals and surge protective devices will be provided for receptacle circuits.

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Receptacles in Apparatus space will be GFI type with weatherproof covers mounted at 48 inches above floor.

### 7. FIRE ALARM SYSTEM:

A fire alarm and detection system will be provided with 60 hour battery back-up. The system will be of the addressable type, where each device will be identified at the control panel and remote annunciator by device type and location to facilitate search for origin of alarms.

Smoke detectors will be provided in open areas, corridors, stairwells and other egress ways. Elevator recall will be provided.

Local smokes with low frequency sounder bases will be provided in the dorms.

The sprinkler system will be supervised for water flow and tampering with valves.

Horn/strobes will be provided in egress ways, assembly spaces, open areas and other large spaces. Strobe only units will be provided in single toilets and conference rooms.

Manual pull stations will be provided at exit discharge personnel doors.

The system will be connected to automatically report alarms to the fire department.

### 8. LIGHTNING PROTECTION SYSTEM:

A system of lightning protection devices will be provided.

The lightning protection equipment will include air terminals, conductors, conduits, fasteners, connectors, ground rods, etc.

The lightning protection system will be provided with a UL master label certificate.

### 9. SECURITY SYSTEM:

An addressable Security system will be provided. The system will be integrated with the Card Access and Closed Circuit TV (CCTV) System.

Position switches will be provided at all exterior doors.

A UL Listed closed circuit TV system will be provided. The system consists of computer servers with image software, computer monitors, and IP based closed circuit TV cameras. The head end server shall be located in the server room and will be rack mounted. The system can be accessed from any PC within the facility or externally via an IP address. Each camera can be viewed independently. The Stored Appliance Network (SAN) will store this information for 45 days at 30 images per second.

The location of the cameras is generally in corridors, secure areas, and exterior building perimeter. The exterior cameras are pan-tilt-zoom type. The site shall be 100% covered.

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The system shall fully integrate with the access control system to allow viewing of events from a single alarm viewer. Camera images and recorded video shall be linked to the access system to allow retrieval of video that is associated with the event.

The system includes a card access controller, door controllers, and proximity readers/keypads. The electrical hardware for each door is provided by the Hardware Contractor. Proximity readers will be located at various locations as shown on the security drawings. The purpose is to only allow access to authorized personnel at all times. Each proximity reader will have a distinctive code to identify the user and a log will be kept in memory. The log within the panel can be accessed through a computer.

The alarm condition shall also initiate real time recording on the integral CCTV system that is included as part of this submission. The system is programmed with graphic maps allowing the end-user to quickly identify alarm conditions and lock/unlock doors.

The system shall be tested and complete documentation shall be provided to the Owner on the operational and programming functions available. The system may be easily expanded to accommodate any additional devices that may be added in the future.

The System will be included with a site license to accommodate future expansion to include the entire district. This will allow the Harwich Fire Station #2 to have a centralized solution that may be managed at a central location.

### 10. TESTING REQUIREMENTS

The Electrical Contractor shall provide testing of the following systems with the Owner and Owner's Representative present:

- a. Lighting and power panels for correct phase balance.
- b. Emergency Generator.
- c. Lighting Control System (interior and exterior).
- d. Fire Alarm System.
- e. Security System
- f. Lightning Protection System

Testing reports shall be submitted to the Engineer for review and approval before providing to the Owner.

### 11. OPERATION MANUALS AND MAINTENANCE MANUALS:

When the project is complete, the Electrical Contractor shall provide operation and maintenance manuals to the Owner. Final affidavits will not be issued until Operation and Maintenance Manuals are issued.

### 12. RECORD DRAWINGS AND CONTROL DOCUMENTS:

When the project is complete, an as-built set of drawings, showing all lighting and power requirements from contract and addendum items will be provided by the Contractor to the Owner.

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# **TECHNOLOGY SYSTEMS**

### NARRATIVE REPORT

The following is the Technology system narrative which defines scope of work as well as basis of design.

The Technology system design at the Harwich Fire Station No. 2 is designed with category 6 cable and intended for 100/1000mbps to the work station. The voice wiring will be capable of VOIP.

**TECHNOLOGY COMPONENTS:** 

Installation and integration of multiple technology components are as follows:

- A. Cabling for Voice, Data, and Video Technologies
- B. Data Electronics for LAN/WAN Data Infrastructure (not included as part of scope)
- C. Data Electronics for Internet Access (not included as part of scope)
- D. Data Network Computer Hardware (not included as part of scope)
- E. Data Network Software (not included as part of scope)
- F. Computer Peripherals (not included as part of scope)

### DATA SYSTEM:

The data system is designed for a Gigabit Ethernet (Category 6 cable) with 100/1000 Base-T connection to the work station. The high speed data transmission will allow users to retrieve data from the internet and local area network almost instantly. The data system has been designed for users to accomplish:

- A. Internet access through a wireless Ian and hard wired data drops.
- B. Applications for word processing, spreadsheet, and alike through a central applications server.
- C. Printing of documents from any user computer connected to network printers.
- D. Wireless access for employees at the facility.

### **TELEPHONE SYSTEM:**

The telephone system will utilize Category 6 cable similar to the data system. The infrastructure will be designed to accommodate Voice-Over-IP.

### CABLE-TV SYSTEM:

The Cable-TV system will comprise of a coaxial cable drops at each location. The system will be bidirectional type, which allows for both receiving and transmitting broadband signals.

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SOUND SYSTEM:

The facility will have a paging/sound system. The system will have inputs from Zetron and Centrex paging module.

The Paging system will be provided with (8) zones.